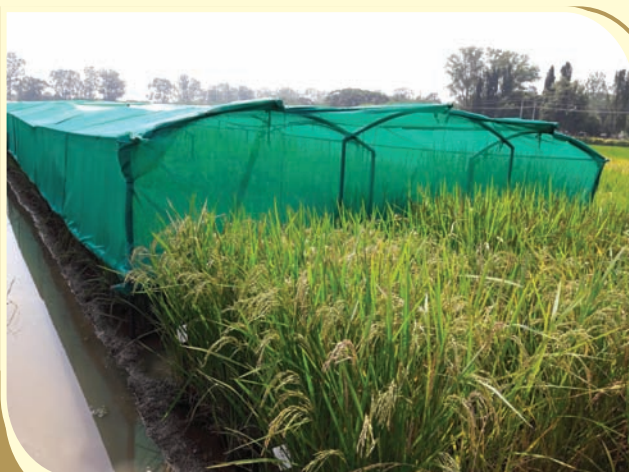


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अखिल भारतीय समन्वित अनुसंधान परियोजना: चावल
All India Coordinated Research Project on Rice (AICRPR)



2024

Diamond Jubilee Year



भारतअनुसंधान-भारतीय चावल अनुसंधान संस्थान
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PROGRESS REPORT 2024

CROP PRODUCTION

AGRONOMY

**ALL INDIA CO-ORDINATED
RESEARCH PROJECT ON RICE
(AICRPR)**



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PREFACE

AICRPR experiments conducted by Agronomists at different locations during *rabi* 2023-24 and *Kharif* 2024 for understanding the response of rice crop to management practices, resource conservation and climatic variations for developing efficient crop and resource management technologies that maximize the productivity and ensure high profitability to double the farmer's income on a sustainable basis are compiled in this report. Agronomists conducted 300 experiments at 50 locations (Funded and Voluntary) consisting of an evaluation of promising cultivars (128 cultures) belonging to 15 groups viz., Medium Hill (MH), early (TP and DS), IME, IM, AL& ISTVT, Aerobic, MS, LPT, LNT, Boro, BT, RSL, SDW, NIL, NIL HT (HT- herbicide - resistant mutant, Nitrogen and Phosphorous use efficiency) trials in transplanted situation, for their response to integrated nutrient management at 50 and 100 % Recommended dose of fertilizer(RDF). Also, six trials on resource conservation technologies, five trials on rice-based crop diversification system, six inter disciplinary collaborative trials (Soil science, Entomology, Pathology and Economics) includes Drone based application technologies were conducted to develop cost-effective technologies in rice and rice-based cropping systems for sustainable rice production across India.

The coordinated program in soil science addressed the issues related to sustaining productivity of soil and crop systems on a long-term basis, management of sodic and acid soils and their management using different formulations, residue management in rice-based cropping systems, assessment of Carbon dynamics in rice ecologies and recarbonising rice soils for sustainable production, assessment of bio fortified genotypes to Zn applications and collaborative trials such as nano-fertilisers for increasing use efficiency, yield maximization in different zones and organic rice cultivation with Agronomy & Entomology. A total of nine trials were conducted during *kharif* 2024 and *rabi* 2023-24 in 20 locations (11 funded as well as 9 voluntary centers) representing typical soil and crop systems and important rice-growing regions.

Physiological studies under All India Co-Ordinated Rice Improvement Program were conducted at nine funded centers, (Coimbatore, Maruteru, Pantnagar, Pattambi, Rewa, Raipur, Karjat, Titabar and Kaul), two ICAR institutions (IIRR Hyderabad and NRII Cuttack) and four voluntary centers (RARS Chinsurah, NDUAT Faizabad, PJNAR Karaikal, and BAU Ranchi).

I congratulate and compliment the Cooperating Scientists, technical staff and Principal Investigators of the program in Agronomy, Soil Science and Physiology Sections for their excellent effort in conducting the trials, monitoring, data collection and compilation, analysis and preparation of this voluminous report, which will benefit to develop suitable technologies.



**(R.M. SUNDARAM),
DIRECTOR**

AGRONOMY

4. AGRONOMY

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SUMMARY

Crop production experiments under All India Coordinated Research Project on Rice (AICRPR) were conducted by Agronomists, Soil scientists and Physiologists at different locations during *rabi* 2023-24 and *kharif* 2024 for understanding the response of rice crop to management practices, resource conservation and climatic variations for developing efficient crop and resource management technologies that maximize the productivity and ensure high profitability to double the farmers income on a sustainable basis are compiled in this report.

A total of 283 experiments were conducted at 50 (39 funded and 11 voluntary centres) locations consisting of evaluation of promising cultivars (117 cultures) belonging to 17 groups viz., Medium Hill (MH), early (TP and DS), IME, IM, Late, CSTVT, AL& ISTVT, Aerobic, MS, LPT, LNT, Basmati, RSL, SDW, NIL (HT- herbicide - resistant mutant, Nitrogen and Phosphorous use efficiency) in the transplanted situation, for their response to integrated nutrient management at 50 and 100% Recommended Dose of Fertilizer (RDF). In addition, six trials each on Resource Conservation, rice-based cropping systems and four collaborative trials with Soil science (2), Entomology (1), and Pathology (1). All nutrient management trials were in collaboration with Plant Breeding to develop superior and cost effective, resource efficient cultivars and technologies in rice and rice-based cropping systems.

4.1. AGRONOMIC EVALUATION TRIALS (AETs)

The development of high- yielding and improved varieties and hybrids is one of the major components of rice production technology. In rice growing regions, nutrient management is also the most important yield limiting factor for production. Adaptation of cultivars with high Nutrient use efficiency is a potential strategy for optimizing nutrient requirements, lowering cost of cultivation and reducing the environmental pollution. Optimization of nutrient use not only enhances grain yield through better nutrient use efficiency but also reduces the cost of cultivation. In order to find out the production potential of promising cultivars and their response to varying levels of nutrients and to identify the optimum dose, the effect on late planted rice situations and efficient N and P cultivars, Nutrient management trials (NMTs) were constituted and conducted during *kharif* 2024. A total of 117 AVT-2 entries belonging to 17 categories were evaluated at different locations under two levels of nutrient application, i.e., 50 and 100 % of the recommended dose of nutrients along with standard and local cultivars to identify stable, high yielding and efficient genotypes.

4.1(a) AVT 2 - MH (Irrigated)

Cultivars IET 29654 and IET 30513 were evaluated in comparison with local checks at three locations (**Khudwani, Malan and Uppershillong**). Nutrient response (kg grain / kg N) and grain yield were higher at 100% RDF. Among the cultures, **IET 30513** found to be promising in terms of higher grain yield efficiency index.

4.1(b) AVT 2 - Early (Transplanted)

Eleven AVT-2 entries (IET 29947, IET 29940, IET 29939, IET 29694, IET 29689, IET 29692, IET 28123, IET 29691, IET 29690, IET 29696, IET 29700, IET 29975, IET 28965, IET 28956 and IET 29142(R)) were evaluated for their response to 50% and 100% dose of RDF at fourteen viz., **Coimbatore (150:50:50), Dhangain (80:40:20), Faizabad (80:40:40), Ghaghraghat (120:60:40), Jagdalpur (120:60:40), Karjat (100:50:50), Mandya (100:50:50), Maruteru (90:60:60), Nagaina (120:60:40), Nawagam (100:25:0), Puducherry (120:40:40), Ranchi (80:40:30), Sabour (100:40:20) and Varanasi (100:50:50)**. In this trial, recommended input of nutrients (100% RDF) was found to be promising with 19% higher grain yield and also exhibited higher nutrient efficiency. **IET 29696, IET 29947 and IET 29694** recorded higher grain yield among the cultures (4.95 to 5.04 t/ha respectively) were found to be promising entries as compared to standard and local checks.

4.1(c) AVT 2 - Irrigated Medium Early

AVT-2 IME cultures (IET 29738, IET 29734, IET 29726, IET 29708, IET 29717, IET 29720, IET 29820, IET 29808, IET 29822, IET 29188, IET 29304, IET 30282, IET 29203 and IET 30697) were evaluated at 17 locations viz., **Aduthurai (150:60:60), Chinsurah (70:35:35), Dhangain (120:60:40), Faizabad (120:60:40), Gangavathi (150:75:75), Ghaghraghat (120:60:60), Kanpur (120:60:60), Karjat (100:50:50), Kota (120:60:40), Mandya (100:50:50), Maruteru (90:60:60), Nagaina (120:60:40), Navsari (100:30:0), Nawagam (100:25:0), Puducherry (120:40:40), Varanasi (120:60:40) and Warangal (120:60:40)**. Nutrient management with 100% RDF application recorded better yield over 50% RDF at all the locations with 21% higher grain yield. Among the cultures, **IET 30578** (5.54 t/ha), **IET 30574** (5.41 t/ha), **IET 30589** (5.20 t/ha), and **IET 30579** (5.14 t/ha) performed better and recorded higher mean grain yield across the locations as compared to other test entries and checks.

4.1(d) AVT 2 - Irrigated Medium

Seven AVT-2 entries IET 30608, IET 30603, IET 30604, IET 30605, IET 30819, IET 30613, and IET 32047 (NIL) at nineteen different locations Viz; **Aduthurai (150:50:50) Chinsurah (80:40:40), Coimbatore (150:50:50), Dhangain (120:60:40), Faizabad (120:60:60), Jagdalpur (120:60:30), Karjat (100:50:50), Kaul (150:60:60), Maruteru (90:60:60), Nagaina (120:60:40), Navsari (100:30:0), Nawagam (100:25:0), Pantnagar (120:60:40), Puducherry (120:40:40), Pusa (120:60:40), ARI-Rajendranagar (120:60:40), Titabar (60:20:20), Varanasi (120:60:40) and Warangal (120:60:40)** indicated that cultures, **IET 30603** (5.23 t/ha) followed by **IET 30605** (5.17 t/ha), and **IET 30604** (5.16 t/ha) were found promising on the basis of overall mean grain yield across the locations. Application of 100% RDF of the location (28% higher) found significantly superior to 50% RDF application at all the locations.

4.1(e) AVT 2 - AL & ISTVT

Saline tolerant cultures (Twelve) Viz., IET 31055, IET 31053, IET 31050, IET 31048, IET 31080, IET 31051, IET 31045, IET 31044, IET 32053, IET 32052, IET 32055 and IET

32056 were evaluated at **Kanpur (150:60:60)** and **Navasari (120:30:0)**, indicated 100% RDF was found to be promising and also exhibited higher nutrient response (2.51). IET 31051 and IET 31045 at **Kanpur** while, IET 31045 and IET 31044 were promising at **Navasari**.

4.1(f) AVT 2 - Aerobic

One AVT-2 entry IET 30919 was evaluated for its response to two fertilizer levels on grain yield at seven locations viz., **Jagdalpur (120:60:40)**, **Kaul (150:60:60)**, **Kota (120:60:40)**, **Ludhiana (150:30:30)**, **Nawagam (80:25:0)**, **Pantnagar (120:60:40)** and **Raipur (100:60:40)** showed the application of 100% RDF was found to be promising (12% higher grain yield) and also exhibited higher nutrient response. **IET 30919** was found to be promising with higher grain yield (5.85 t/ha) across the locations.

4.1(g) AVT 2 - Medium Slender

Five entries (IET 30959, IET 30961, IET 31001, IET 29019 and IET 32072(R)) of medium slender group were evaluated for their response to two levels of nutrients (50% and 100% RDF) on grain yield at nine different locations i.e., **Dhangain (120:60:40)**, **Faizabad (120:60:40)**, **Karjat (100:50:50)**, **Kaul (150:60:60)**, **Mandya (100:50:50)**, **Maruteru (90:60:60)**, **Nagina (120:60:40)**, **Nawagam (100:25:0)** and **Raipur (120:60:40)** showed the application of 100% RDF was found to be promising (12% higher yield) and also exhibited higher nutrient response. Entries viz., **IET 30961** and **IET 29019** (6.26 and 6.20 t/ha) respectively and **IET 30957** (6.01 t/ha) were found to be promising with better yields over other test entries and checks at 100% of RDF application at respective locations.

4.1(h) AVT 2 - Phosphorous efficient cultivars (LPT)

The trial was conducted at seven locations viz., **Gangavathi, Karjat, Mandya, Maruteru, Raipur, Ranchi and Varanasi** with 12 IET entries IET 31097, IET 31102, IET 31105, IET 28070, IET 31103, IET 31098, IET 31108, IET 29560, IET 31115 and IET 31096 at graded levels of the Phosphorus application. Mean over the locations, the cultures **IET 31098** (5.06 t/ha) **IET 31103** (4.79 t/ha) and **IET 28070** (4.71 t/ha) found promising and gave better yields over other cultures and checks at most of the locations.

4.1(i) AVT 2 - Nitrogen efficient cultivars (LNT)

A total of 13 IET cultures viz., IET 31134, IET 29579, IET 31135, IET 31120, IET 31119, IET 31118, IET 31131, IET 30269, IET 31128, IET 31124, IET 31117, IET 29581 and IET 31004 were evaluated at seven locations (**Gangavathi, Karjat, Kaul, Mandya, Maruteru, Raipur, Ranchi and Varanasi**) at graded levels of the Nitrogen application. Mean over the locations and 'N' doses, the IET cultures viz., IET 31004, IET 31135, IET 31124, IET 31134 (4.27 to 4.61 t/ha) were found promising and gave better yield over the checks.

4.1(j) AVT 2 – NIL (Second Set)

Fifteen AVT-2 NIL entries (IET 32055, IET 32059, IET 32060, IET 32063, IET 32056, IET 32062, IET 32054, IET 32061, IET 32058, IET 32051, IET 32074, IET 32064, IET 32065, IET 32052 and IET 32053) were evaluated at ten locations i.e. **Coimbatore (150:50:50)**, **Dhangain (120:60:40)**, **Karjat (100:50:50)**, **Ludhiana (105:30:30)**, **Mandya (100:50:50)**,

Maruteru (90:60:60) Nawagam (100:25:0) and Pantnagar (120:60:40), Raipur (100:60:40) and Rewa (80:40:30) under two levels of RDF (50% and 100% RDF). 100% RDF was found to be promising with 20 % increased grain yield and also exhibited higher nutrient recovery efficiency. IET cultures **IET 32074, IET 32051** and **IET 32054** were found promising and recorded better mean yields.

4.1 (l) AVT 1- BAS HT NIL

A total of two NIL entries namely, IET 32296 and IET 32297 carrying the bacterial blight resistance genes *xa13+Xa21*; blast resistance genes *Pi2+Pi54*; and herbicide tolerance *AHAS^{rb}* were evaluated for yield and grain quality in the AVT1-NIL trial along with its recurrent parent Pusa Basmati 1509. On overall mean basis, the entry IET 32297 was significantly superior to the recurrent parent Pusa Basmati 1509 and on par with check PB1985. It yielded significantly superior at IARI and PAU, while performed on par with the check PB1985 at **Kaul and Nagina**.

4.1(m) AVT 2 - BT

Fourteen BT cultures (IET 32296, IET 32297, IET 32298, PB 1, IET 30533, IET 30535, IET 31306, IET 31307, PB 1509, PB 1121, PB 1, Pusa RH 10, Taraori Basmati, PB 1509) and one Local Check were evaluated for their response on grain yield at four locations viz., **Kaul (90:30:0), Ludhiana (40:30:30), Nagina (120:60:40) and Pantnagar (120:60:40)** indicated 100% RDF was found to be promising (13%) and also exhibited higher nutrient recovery efficiency. Among the entries tested, IET cultures (IET 31307 and 32298) were superior (4.32 t/ha) to Local checks..

4.1(n) AVT 2 - Early (Direct Seeded)

Five AVT-2 entries (IET 30330, IET 31193, IET 31185, IET 31170 and IET 31163) were evaluated for their response to low and optimum level of nutrients application (50 and 100% RDF) on grain yield at five locations viz., **Coimbatore (100:50:50), Jagdalpur (100:60:30), Raipur (120:60:60), Ranchi (60:40:30) and Rewa (50:30:20)** indicated application of 100% of RDF was found promising across the locations with 22% higher grain yield and **IET 31163** (4.34t/ha) followed by **IET 30330** (4.28 t/ha) t/ha). were found promising with higher grain yield of (4.06 to 4.22 t/ha) across the locations among the tested cultures.

4.1(o) AVT 2 - Rainfed Shallow Lowland

Eight AVT-2cultures (IET 32130, IET 32123 and IET 32124 IET 31237, IET 32121, IET 32122, IET 31204, IET 32131) of rainfed shallow land were evaluated at **Chinsurah (80:40:40), Dhangain (120:60:40), Ghaghraghat (120:60:60), and Titabar (60:20:40)** recorded the application of 100% RDF was found to be promising and also exhibited higher nutrient recovery efficiency. Among the IET cultures, **IET 32123** (4.11t/ha) followed by **IET 32121** (4.06 t/ha) were found promising in terms of higher mean grain yield and nutrient response also on par with Swarna Sub 1 (4.09 t/ha).

4.1(p) AVT 2 - Semi-Deep Water

The grain yield performance of SDW cultures and response to nutrient levels of three selected IET cultures (IET 29031, IET 29026 and IET 31258) were evaluated at **Chinsurah, Ghaghraghat** and **Pusa** against two standard checks indicated that **IET 29031** (4.41 t/ha) followed by **IET 29026** (4.31 t/ha) found promising at 100% of RDF.

4.1 (q) AVT 2 – BORO

One IET 29624 and its response to nutrient levels was evaluated against one standard check (Swarna) along with one local check (Naveen) under two graded levels of nutrient (50 and 100% of recommended dose of nutrient) at **NRRI Cuttack**. The maximum grain yield was recorded by standard check Swarna (5.87 t/ha) and found promising over IET 29624 at 100% of RDF application.

4.2 RESOURCE CONSERVATION TECHNOLOGIES TRIALS (RCTs)

4.2.1 Water management for enhancing water use efficiency and productivity of mechanical transplanted rice

In order to evaluate the promising irrigation management practices in different crop establishment methods a trial was formulated and conducted at 6 locations (**Aduthurai, Chiplima, Gangavathi, Khudwani, Ludhiana and Mandya**). Overall, across the 6 locations, among crop establishment methods, the highest mean grain yield was recorded under wet direct seeding (6.13 t/ha). Similarly, among irrigation management practices, alternate wetting and drying method recorded the highest mean grain yield of 5.99 t/ha across all locations.

4.2.2a. Identification of suitable sowing method of dry DSR for higher productivity in different zones

The trial was conducted at 13 locations (**Chatha, Gangavathi, Jagdalpur, Khudwani, Ludhiana, Mandya, Nagina, Nawagam, Pantnagar, Pusa, Raipur, Rewa and Vadgaon**). The trial was laid out in RBD with 7 treatments and replicated thrice. Across the 13 locations location specific high yielding dry DSR system was found to be the best among all dry DSR establishment methods with mean grain yield of 4.91 t/ha.

4.2.2b. Identification of suitable varieties for dry DSR system

The trial was conducted at 8 locations (**Dhangain, Gangavathi, Kota, Mandya, Nawagam, Pusa, Rajendranagar and Ranchi**). The trial was laid out in RBD with 13 treatments and replicated thrice.

Location	Grain yield (t/ha) of varieties		
	1 st rank	2 nd rank	3 rd rank
Dhangain	LC 1 (5.30)	LC 2 (4.75)	LC 3 (3.49)
Gangavathi	DRR Dhan 44 (4.63)	LC 3 (4.13)	LC 2 (4.07)
Kota	DRR Dhan 44 (4.81)	DRR Dhan 42 (4.71)	IRRI 1 (4.63)
Mandya	LC 2 (5.60)	LC 3 (5.57)	Sahbhagidhan (5.11)

Nawagam	LC 3 (4.88)	DRR Dhan 44 (4.78)	LC 1 (4.63)
Pusa	LC 1 (4.40)	Sahbhagidhan (4.27)	LC 3 (4.22)
Rajendranagar	DRR Dhan 44 (4.29)	Sahbhagidhan (4.07)	LC 3 (4.01)
Ranchi	DRR Dhan 44 (4.84)	DRR Dhan 42 (4.58)	LC 3 (4.34)

4.2.2c Seed priming in Dry DSR for proper establishment and productivity

In dry Direct seeding, good crop establishment is constrained by subsurface soil drying associated with high temperature. Besides, poor germination under aerobic soil condition results in sparse and patchy stands, which encourages weed growth and reduces the competitive ability of rice against weeds. Since seedling vigour is an agronomical trait that predicts the possibility of seed germination, seedling growth, and climate tolerance, there are a few agronomic interventions that can promote seedling vigour as well, which include seed invigoration/priming, a simple, yet effective technique. With the objectives of evaluating different seed invigorators in crop establishment, growth and yield of dry DSR and to identify the suitable, cost effective and promising seed invigoration in dry DSR; the trial was conducted in kharif season 2024 at six locations viz., Chatha, Coimbatore, Jagdalpur, ICAR-IIRR, Ludhaina and Mandya with six priming treatments and control viz., hydro-priming, hardening, priming with NaCl1%, seed treatment with CPB-1 (Chitinolytic bacterium), seed treatment with Trichoderma asperellum, seed treatment with Bacillus and control in replicated Randomized Block Design. Seedling Vigor Index was significantly superior with seed hardening and seed treatment with Chitinolytic Bacterium at 14 and 21 DAS. Based on the results of two seasons field experiment, it was concluded that, seed priming of any type instead of unprimed seed, helps in improving germination, seedling vigor, crop growth, yield attributes and grain yield in Dry DSR.

4.2.3a. Identification of suitable sowing method of wet DSR for higher productivity in different zones

The trial was conducted at 16 locations (**Chatha, Chiplima, Coimbatore, Karjat, Mandya, Moncompu, Navasari, Nawagam, Pattambi, Puducherry, Pusa, Rewa, Vadagaon, Varanasi, Aduthurai and Maruteru**). The trial was conducted in RBD and replicated thrice. The treatments were S₁: Broadcasting of seeds and S₂: Manual line sowing, S₃: Mechanized line sowing of seeds (Dribbler, Happy seeder or any Drum seeder, spacing as per the equipment specifications) S₄: Raised bed sowing, S₅: Any improved system in that particular location and S₆: Location specific high yielding wet DSR method, and S₇: Farmers' practice of the wet DSR method of the region. Across 14 locations mechanized line sowing resulted in the highest grain yield (4.24 t/ha). The same trial was conducted in different lay out and treatments at **Aduthurai and Maruteru**. Details is given in the table.

4.2.3b. Identification of suitable varieties for wet DSR system

The trial was conducted at 8 locations (**Bankura, Dhangain, Gangavathi, IIRR, Kota, Mandya, Nawagam, Pusa, Raipur and Warangal**).

Location	Grain yield (t/ha) of varieties		
	1 st rank	2 nd rank	3 rd rank
Bankura	LC 1 (6.84)	LC 2 (6.36)	LC 3 (5.28)
Dhangain	DRR Dhan 42 (6.37)	LC 1 (5.79)	DRR Dhan 44 (5.66)
Gangavathi	LC 2 (4.07)	DRR Dhan 44 (4.81)	LC 3 (3.83)
IIRR	Sahbhagidhan (6.31)	DRR Dhan 44 (6.23)	DRR Dhan 42 (6.06)
Kota	Varalu (5.40)	DRR Dhan 44 (5.32)	IRRI 1 (5.17)
Mandya	LC 3 (7.03)	LC 2 (6.99)	DRR Dhan 60 (6.94)
Nawagam	LC 3 (4.73)	DRR Dhan 42 (4.69)	DRR Dhan 44 (4.50)
Pusa	LC 1 (4.58)	Sahbhagidhan (4.44)	LC 3 (4.37)
Raipur	DRR Dhan 44 (4.03)	LC 1 (3.86)	LC 2 (3.84)
Warangal	Sahbhagidhan (7.42)	Varalu (7.32)	DRR Dhan 60 (7.16)

4.3. RICE BASED CROP DIVERSIFICATION SYSTEM TRAILS (RBCDTs)

4.3.1. Conversation Agriculture/ System based management practices in rice and rice-based cropping systems (crop diversification) for higher profitability

The trial was initiated to evaluate systems of rice crop establishment under different residue management during 2017 and continued in *Kharif* 2024, to realize the production potential of alternate systems of crop establishment under different residue retention during *Kharif* 2024 at four locations continued at **Ghaghrahat, Karjat, Vadagaon** and **Titabar** to assess the effect of different crop establishment methods under various residue/straw management practices. The system productivity analysis (*Kharif* and *rabi*- 2023-24) indicated the superiority of transplanting at **Karjat** (7.30 t/ha) and **Vadagaon** (7.77 t/ha). The tillage system S-1 conventional tillage found promising at **Karjat** with higher yield (7.56 t/ha).

The REY of the system productivity indicated superiority of the conventional tillage system with transplanting at both **Karjat** and **Vadagaon** with higher rice equivalent system (7.30 and 7.77 t/ha) which needs to be promoted in large scale.

4.3.2 Assessing the performance and yielding ability of Sorghum hybrids in Rice fallows

In rice-fallows, sorghum cultivation was found to be high yield potential with labour and inputs intensive cropping system. It is found that use of high inputs Viz., pesticides, weedicides, fertilizers, labourers, and skillful management of all the innovative practices including irrigations, were resulted into the high yield. In *Kharif* season 2023, among the crop establishment methods at **Karaikal** and **Jagdalpur**, transplanting system was superior over others and at Mandya, wet DSR system was superior. In *Rabi* season 2023-24, at **Karaikal** and **Jagdalpur**, the previous season dry DSR system was superior over wet DSR and transplanted system in recording higher Sorghum grain yields. Among the Sorghum hybrids evaluated in Rice-Sorghum system, CSH 30 at **Jagdalpur**, CSH 48 at **Karaikal** were promising with significantly higher yield, whereas at **Mandya**, no significant difference among test hybrids

was reported. The rice equivalent yield (REY) was higher with Dry DSR followed by wet DSR and lowest with transplanted system. The Dry DSR system was found promising for rice-sorghum system and sorghum hybrids CSH 30, CSH 41 and CSH 48 shown comparable performance.

4.3.3. Long term trial on Weed Dynamics in rice under different establishment methods

Weeds are endemic in crops and a constant problem in crop production because of their dynamic nature. Despite modern control practices aimed at weed elimination, weeds continue to be a ubiquitous and recurrent threat for crop production due to its ability to shift in response to management practices and environmental conditions. Further, continuous use of selective herbicides in rice over the long term period may cause a shift in weed flora, from annuals to perennials, which are difficult to control. The Long term trial was initiated with the objective of assessing the weed dynamics in different establishment methods, and was conducted in kharif season 2024 at 16 locations viz., Aduthurai, Chatha, Chinsurah, Chiplima, Gangavathi, Ghaghraghat, Jagdalpur, Malan, Moncompu, Nagina, Nawagam, Pantnagar, Pattambi, ARI-Rajendranagar, Titabar and Varanasi; in rabi season 2023-24 at two locations (Karaikal and Pattambi), in replicated split plot design. The treatments consisted of 3 main plots M1 – Mechanised planting or hand transplanting, M2 – Puddled direct seeding, M3 – Unpuddled dry direct seeding and three sub plots S1 – Weedy check, S2 – Mechanical weeding using weeder and S3 – Chemical weed control *(pre and post-emergence Herbicide application as per the recommendation of respective University). The individual Genus and Species wise, group wise, total weed population, weed dry biomass at two critical crop growth stages of active tillering and panicle initiation showed that, the un puddled direct sown rice system recorded higher weed population and weed biomass compared to puddled DSR system and , mechanical or manual transplanting. The weed dry biomass was significantly low with chemical weed control treatments followed by mechanical weeding using weeder.

From the results of 5th year study it is evident that the shift in species within the weed groups was recorded. In all the establishment methods, among the grasses group of 15 individual species, *Echinochloa colona*, *E. crusgalli* and *Cynodon dactylon* were reported dominant rather than regular *Echinochloa crusgalli*. Though *Leptochloa chinensis* was limited in occurrence, it is reported as difficult to control weed; among sedges group of 6 individual species, *Cyperus rotundus* has increased than regular *Cyperus difformis*. among BLW group of 19 individual genus and species, *Monochoria vaginalis*, *Eclipta* spp., *Ludwigia parviflora*, *Marsilea quadrifolia*, *Alternanthera* spp. have been major. The mean grain yield ranged from 2.32 t/ha at Moncompu to 5.43 t/ha at Aduthurai. The puddled and un puddled DSR systems were comparable to mechanical transplanting/ transplanting under chemical weed control at seven locations viz., Chiplima, Jagdalpur, Malan, Nawagam, Pattambi, Titabar and Varanasi. The results of the crop dry matter production, yield attributes, grain and straw yield showed that Puddled DSR and un-puddled DSR were comparable. Economics worked out revealed that, low cost of cultivation in un-puddled direct sown rice under weedy check and high cost of cultivation in mechanical/ manual transplanting with chemical weed control. The Benefit-Cost ratio in Puddled DSR system was superior to un-puddled DSR system and lowest in

transplanted system. Based on the long term trial of five years, the conclusion is, puddled or unpuddled DSR system are comparable to transplanting system in terms of crop growth, grain yield and superior in terms of Benefit-Cost ratio, though individual weed shift in number, species, biomass are higher in DSR systems which are manageable with mechanical and or chemical control methods.

4.3.4 Weed Survey in different zones

The results of Rice Weed survey, conducted in six zones, seven States and One Union Territory, 28 Districts, showed that, in Zone II, *Echinochloa crusgalli*, *Cyperus iria*, *Leptochloa chinensis*; in Zone III, *Echinochloa colona*, *Echinochloa crusgalli*, *Cyperus difformis*, *Ludwigia parviflora*, *Marselia quadrifolia*; in Zone IV, *Echinochloa crusgalli*, *Amaranthus*, *Cyperus*; in Zone V, *Echinochloa colona*, *Cyperus iria*, *Cyperus difformis*; in Zone VI *Echinochloa colona*, *Echinochloa crusgalli*, *Cyperus iria*; in Zone VII, *Echinochloa colona*, *Echinochloa crusgalli*, *Leptochloa chinensis*, *Cyperus rotundus*, *Fimbristylis miliacea*, Weedy rice, *Monochoria vaginalis* were major and dominant. The chemical weed control of both pre and post-emergence herbicides was in practice at all the zones except zone VI (Western), where two times manual weeding is common practice. The average cost of weed control ranged from Rs. 3,848/ha in Karaikkal District of Puducherry (UT Zone VII Southern) and Rs. 13,555/ha in Hoogly District of West Bengal (Zone III Eastern) indicating the weed pressure and expenses in controlling weeds in irrigated transplanted rice.

4.3.5 Analysis of long-term meteorology data (temperatures and rainfall) for identifying the reasons for yield reduction

The Dataset consists of rice yield data and meteorological data of 10 locations viz; **Navasari, Rajendranagar, Mandya, Coimbatore, Gangavathi, Kaul, Khudwani, Ludhiana, Pattambi, Chinsurah and Karaikal** for the years 2005 to 2024. This data includes yield of rice crop (t/ha), rainfall of the crop season(mm) and mean weekly minimum temperature and maximum temperature of the crop season ($^{\circ}\text{C}$).

4.4 INTER DISCIPLINARY TRIALS

4.4.1 Yield maximization of rice in different zones

The trial consisted of 8 treatments and laid out in RBD design with 3 replications. Treatments are T₁: RDF as per site-specific nutrient management; T₂: T₁ + FYM @ 5 t/ha; T₃: T₁ + sampoorana (KAU) @ 10g/L (250 L/ha/application); T₄: 125% RDF of T₁; T₅: 125% RDF of T₁ + FYM @ 5 t/ha; T₆: T₁ + application of micronutrient; T₇: Optional (location specific). The trial was conducted at 24 locations (**Bankura, Chinsurah, Chinsurah (boro), Faizabad, Gangavathi, Ghaghraghat, Karaikal, Kota, Malan, Mandya, Maruteru, Pantnagar, Pattambi, Pattambi (rabi), Raipur, Ranchi, Titabar, Warangal, Khudwani, Chiplima, Kanpur, Karaikal, Ludhiana, Moncompu, Pusa and Titabar**). Details are given in table.

4.4.2 Agronomic evaluation of the package of practices of the best farmers of the state/region and yield gap analysis of the region

A yield gap analysis conducted across major rice-producing states in India demonstrated significant disparities between potential and actual rice yields, with gaps ranging from 8.67% to 18.18%, and an average gap of 13.34%. These yield gaps indicated the substantial untapped potential for improving rice productivity in the country.

4.4.3 Evaluation of Organic fertilizers and Natural farming practices for enhancing the productivity and soil health

Please refer Soil Science report

4.4.4 Nano-fertilizers for increasing nutrient use efficiency, yield and economic returns in transplanted rice

Please refer Soil Science report

4.4.5. Integrated Pest Management– on farm management of Insects, Diseases and Weeds in DSR (*Entomology, Pathology and Agronomy- Special interdisciplinary trial, Kharif 2024*)

In recent years, intensive cultivation of rice (Conventional transplanted) and changing establishment methods like DSR has resulted in the frequent occurrence of biotic stresses that formed major constraint in rice production. The Integrated Pest Management special (IPMs) trial was conducted at 13 locations viz; Malan, Kaul, Ludhiana, Chinsurah, Faizabad, Titabar, Navasari, Vadagaon, Aduthurai, Coimbatore, Gangavathi, Mandya and Puducherry in Kharif 2024 with an objective of managing all pests i.e., weeds, insects, diseases in a holistic way in farmer's fields involving them in a participatory mode. Across the locations, weeds, insect pests and disease incidence were significantly low in IPM plots. The data on weed population and weed dry biomass in critical period of crop weed competition (Active Tillering and Panicle Initiation stages) showed that, the mean weed population reduction in IPM adopted fields ranged from 4.23 % in Zone-VII to 76.92% in Zone-VI at Active Tillering stage, and from 10.00 % to 82.39% in Zone-VII at Panicle Initiation stage respectively. The dry weed biomass showed that, both Active Tillering and Panicle Initiation stages were significantly reduced by 28.68% to 80.07% in Zone-III; 9.38% to 82.87% in Zone-VII respectively. IPM implemented plots resulted in mean grain yield advantage of 10.63%, 1.08%, 23.32%, 23.05%, 21.29% and 17.18% over the farmer practices in respectively in Zone-I, II, III, IV, VI and VII respectively.

4.4.6. Evaluation of drone for its suitability to various agronomy interventions

To evaluate the suitability of drones to various Agronomic practices (sowing, herbicide spray and top dressing of fertilisers) drone technology, a new trial was formulated with the following objectives 1. To Evaluate the suitability of drones to various Agronomic practices (sowing, herbicide spray and top dressing of fertilizers) 2. To evaluate cost reduction and

economics of the drone technology. The trial consisted of 6 treatments and laid out in RBD design with 3 replications. Treatments are T1: Broadcasting in Wet DSR; T2: Drone broad casting in Wet DSR; T3: Pre-emergence herbicide manually; T4- Pre-emergence herbicide with drone; T5- Nano or micro nutrients as top dressing at 30- 45 DAS manually and T6- Nano or micro nutrients as top dressing at 30- 45 DAS by drone. However, only the data received only for 3 treatments (S1: Drone; S2: Battery operated knapsack sprayer and S3: Untreated control) from 5 locations (**Chinsurah, Gangavathi, Ludhiana, Moncompu and ARI-Rajendranagar**).

The overall mean grain yield of 5 locations revealed that pre-emergence and post-emergence application of herbicides through drone resulted in the highest grain yield (6.68 t/ha) followed by knapsack sprayed plots (6.31 t/ha).

AGRONOMIC EVALUATION TRIALS



AGRONOMY- 4

4.1 AGRONOMIC EVALUATION TRIALS (AETs)

The development of high- yielding pest disease resistant; nutrient efficient and improved varieties, and hybrids is one of the major components of AICRIP programme of Agronomy. In rice growing regions, nutrient management is also the most important yield limiting factor for production. Adaptation of cultivars with high Nutrient use efficiency in two different planting situations is a potential strategy for optimizing nutrient requirements, lowering cost of cultivation and reducing the environmental pollution. Optimization of nutrient use not only enhances grain yield through better nutrient use efficiency but also reduces the cost of cultivation. In order to find out the production potential of promising cultivars and their response to varying levels of nutrients and to identify the optimum dose, the effect on late planted rice situations and efficient N and P cultivars, Nutrient management trials (NMTs) were constituted and conducted during *kharif* 2024. A total of 117 AVT-2 entries belonging to 17 categories were evaluated at different locations under two levels of nutrient application, i.e., 50 and 100 % of the recommended dose of nutrients along with standard and local cultivars to identify stable and efficient genotypes. NTLs and DSR cultivars were also evaluated to develop nutrient efficient and DSR suitable cultivars for sustainable rice production

4.1(a) AVT 2 - Medium Hill MH (Irrigated)

Cultivars IET 29654, and IET 30513 were evaluated in comparison with local checks at three locations (**Khudwani**, **Malan** and **Uppershillong**) under two fertilizer doses (50% RFD & 100% RFD) under hill conditions. The data received from four locations was summarized and presented in **Table 4.1(a)**.

The application of 100% RFD gave significantly higher grain yield at **Khudwani** (2.69 t/ha) and **Malan** (5.06 t/ha) and **Uppershillong** (2.18 t/ha) over 50% RDF. Interaction effect of varieties and fertilizer levels are non-significant at all the centers. Nutrient response (kg grain/kg fertilizer) was higher at 100% RDF as compared to 50% RDF at all locations (2.21 to 7.19 kg grain/kg nutrient).

The mean grain yield of the locations ranged from 1.89 to 4.76 t/ha at **Uppershillong** and **Malan** respectively. Among the cultivars tested, IET 30513 at **Uppershillong** (2.12 t/ha) was found promising. Mean over the locations, RC Maniphace 1, Drr Dhan 65 were found to be promising.

In this trial, application with 100% RFD was found to be promising (11% higher) and also exhibited higher nutrient recovery. Among the cultures, IET 30513 was found to be promising in terms of higher grain yield. There is a need for improved cultures for testing at hill ecology.

Table 4.1(a): Summary of data on grain yield and ancillary character of selected AET- mid hill (irrigated) cultures grown under transplanted conditions at low and optimum graded levels of recommended nutrient(NPK) doses, kharif 2024.

Fertilizer-levels	Varieties	KHUDWANI						
		Grain Yield (t/ha)	Rank	Panicle/m² (No.)	Panicle Weight (g)	Test Wt(g)	Days for 50% flowering	Nutrient res. (kg grain/kg Nutrient) (Base level 50% RDF)
F1 - 50% RFD	V1	1.24	7	300	0.55	23.88	122	
	V2	3.58	4	285	1.71	26.57	104	
	V3	-		-	-	-	-	
	V4	1.20	8	293	0.58	25.09	115	
	V5	-		-	-	-	-	
	V6	3.79	3	298	1.77	27.43	101	
F2 - 100% RFD	V1	1.33	5	313	0.64	24.05	123	0.86
	V2	3.88	2	316	1.87	26.50	105	2.86
	V3	-		-	-	-	-	-
	V4	1.30	6	298	0.63	24.76	117	0.95
	V5	-		-	-	-	-	-
	V6	4.23	1	320	2.04	27.56	102	4.19
Interaction								
F at same V		NS		NS	NS	NS	NS	
V at same F		NS		NS	NS	NS	NS	
Means of F levels:								
F1		2.45	2	294	1.15	25.74	110	
F2		2.69	1	312	1.30	25.72	112	2.21
C.D.(0.05)		NS		9.15	0.09	NS	1.29	
C.V.(%)		5.89		1.72	4.01	1.8	0.66	
Mean of varieties:								
V1		1.29	3	306	0.60	23.97	122	0.86
V2		3.73	2	300	1.79	26.54	105	2.86
V3		-		-	-	-	-	
V4		1.25	4	296	0.61	24.93	116	0.95
V5		-		-	-	-	-	
V6		4.01	1	309	1.91	27.50	102	4.19
C.D.(0.05)		0.3		NS	0.14	1.25	1.03	
C.V.(%)		9.24		6.97	9.16	3.87	0.74	
Expt. Mean		2.57		303	1.22	25.73	111	
Soil type		Silty clay loam						
pH		6.60						
Fertilizer levels (kg/ha)								
F1		60:30:15						
F2		120:60:30						
Varieties								
V1		IET 29654						
V2		IET 30513						
V3		-						
V4		Vivek Dhan 62						
V5		-						
V6		Local check - Shalimar Rice -4 duration 135-138 days						
Available NPK in Soil		221:15.7:246						

Table 4.1(a): Contd.

Fertilizer-levels	Varieties	MALAN						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test Wt(g)	Days for 50% flowering	Nutrient res. (kg grain/kg Nutrient) (Base level 50% RDF)
F1 - 50% RFD	V1	4.46	8	261	2.88	34.58	91	
	V2	3.73	10	228	2.83	31.09	75	
	V3	4.79	7	232	2.70	24.61	94	
	V4	5.53	3	251	2.94	25.57	88	
	V5	5.04	6	269	2.77	24.80	93	
	V6	3.20	12	225	2.89	34.14	84	
F2 - 100% RFD	V1	5.32	5	254	3.14	34.69	92	10.12
	V2	4.06	9	241	2.89	32.09	77	3.88
	V3	5.77	2	231	2.85	24.78	95	11.53
	V4	6.09	1	273	3.02	28.97	89	6.59
	V5	5.42	4	227	3.03	25.03	94	4.47
	V6	3.69	11	222	3.02	34.40	84	5.76
Interaction								
F at same V		NS		27.02	0.1	0.65	NS	
V at same F		NS		38.39	0.12	0.81	NS	
Means of F levels:								
F1		4.46	2	244	2.84	29.13	88	
F2		5.06	1	241	2.99	29.99	88	7.06
C.D.(0.05)		0.51		NS	0.1	0.71	NS	
C.V.(%)		7.52		10.85	2.39	1.67	0.99	
Mean of varieties:								
V1		4.89	4	258	3.01	34.64	91	10.12
V2		3.90	5	235	2.86	31.59	76	3.88
V3		5.28	2	231	2.78	24.70	95	11.53
V4		5.81	1	262	2.98	27.27	88	6.59
V5		5.23	3	248	2.90	24.92	93	4.47
V6		3.45	6	224	2.96	34.27	84	5.76
C.D.(0.05)		0.35		19.1	0.07	0.46	1.26	
C.V.(%)		6.13		6.53	2.05	1.28	1.19	
Expt. Mean		4.76		243	2.91	29.56	88	
Soil type		Silty Clay Loam						
pH		5.20						
Fertilizer levels (kg/ha)								
F1		45:20:20						
F2		90:40:40						
Varieties								
V1		IET 29654						
V2		IET 30513						
V3		Maniphace 1(NE)						
V4		Vivek Dhan 62						
V5		VL Dhan 65						
V6		Local check -HPR 2143 (Duration 125-135 days)						
Available NPK in Soil		-						

Table 4.1(a): Contd.

Fertilizer-levels	Varieties	UPPER SHILLONG							Over All Mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test Wt(g)	Days for 50% flowering	Nutrient res. (kg grain/kg Nutrient) (Base level 50% RDF)		
F1 - 50% RFD	V1	1.89	4	240	2.13	22.97	87.33		2.53	12
	V2	1.75	6	235	1.83	21.37	83.67		3.02	8
	V3	-		-	-	-	-		4.79	4
	V4	1.42	7	204	1.81	18.3	82.67		2.72	11
	V5	-		-	-	-	-		5.04	3
	V6	1.35	8	260.67	2.15	22.17	74.33		2.78	10
F2 - 100% RFD	V1	2.35	2	270.33	2.46	24.5	87.67	5.75	3.00	9
	V2	2.4	1	251.67	2.56	21.8	85.33	8.13	3.45	5
	V3	-		-	-	-	-		5.77	1
	V4	2.08	3	215	2.37	20.1	84.67	8.25	3.16	7
	V5	-		-	-	-	-		5.42	2
	V6	1.88	5	265	2.62	23.5	77	6.63	3.27	6
Interaction										
F at same V		NS								
V at same F		NS								
Means of F levels:										
F1		1.60	2	235	1.98	21.20	82		2.84	2
F2		2.18	1	251	2.50	22.48	84	7.19	3.31	1
C.D.(0.05)		0.05		NS	0.28	0.78	0.36			
C.V.(%)		1.41		6.06	7.1	2.03	0.25			
Mean of varieties:										
V1		2.12	1	255	2.30	23.74	88	5.75	2.77	6
V2		2.08	2	243	2.20	21.59	85	8.13	3.23	3
V3		-		-	-	-	-		5.28	1
V4		1.75	3	210	2.09	19.20	84	8.25	2.94	5
V5		-		-	-	-	-		5.23	2
V6		1.62	4	263	2.39	22.84	76	6.63	3.02	4
C.D.(0.05)		0.41		31.27	NS	1.12	0.93			
C.V.(%)		17.05		10.24	8.02	4.09	0.89			
Expt. Mean		1.89		243	2.24	21.84	83		3.07	
Soil type		Silty Clay Loam								
pH		5.11								
Fertilizer levels (kg/ha)										
F1		30:30:20								
F2		60:60:40								
Varieties										
V1		IET 29654								
V2		IET 30513								
V3		-								
V4		Vivek Dhan 62								
V5		-								
V6		Local check - Meg 1								
Available NPK in Soil		351.23-35.84-95.2								

4.1(b) NMT – AVT 2 Early (Transplanted)

Eleven AVT-2 entries (IET 30641, IET 30651, IET 30630, IET 30565, IET 30555, IET 30561, IET 30657, IET 30642, IET 30656, IET 30669 and IET 30690) were evaluated for their response to 50% and 100% level of nutrients on grain yield in comparison to standard varieties i.e. Narendra 97(E), CO-51(NC) PR 124(N) LVIT(NE) MTV 1153 (S) as well as local checks at twelve locations viz. **Coimbatore (150;50:50), Dhangain (80:40:20), Faizabad (80:40:40), Ghaghraghat (120:60:40), Jagdalpur (120:60:40), Karjat (100:50:50), Mandya (100:50:50), Maruteru (90:60:60), Nagaina (120:60:40), Nawagam (80:25:0), Puducherry (120:40:40), Ranchi (80:40:30) Rewa (80:40:30) Sabour (100:40:20) and Varanasi (120:50:40).** The experiments were conducted in a split plot design at all the locations. The treatments were two levels of fertilizer input (50% and 100% RDF) as main plot and varieties assigned to sub plots. The data received from these locations are summarized and presented in **Table 4.1(b).**

Different doses of RDF (50% and 100%) exhibited significant differences on grain yield at most of the locations except **Nawagam** and **Varanasi**. Grain yield increased was significant with increasing level of input from 50 to 100% RFD at all the locations. Application of 100% NPK recorded significantly higher yield at **Coimbatore (5.85 t/ha), Dhangain (5.19 t/ha), Faizabad (4.28 t/ha), Ghaghraghat (3.43 t/h), Jagdalpur (5.75 t/ha), Karjat (3.64 t/ha), Mandya (6.59 t/ha), Maruteru (5.32 t/ha), Nagaina (4.42 t/ha), Ranchi (3.97 t/ha), Puducherry (6.95 t/ha), Rewa (3.97 t/ha) and Sabour (4.90 t/ha),** Nutrient response (kg grain / kg nutrient) was higher at application of 100 % RDF at **Coimbatore (9.85), Dhangain (7.23), Faizabad (8.46), Ghaghraghat (9.08), Jagdalpur (6.71), Mandya (8.21) Nagaina (16.77), Puducherry (8.38 t/ha) Rewa (7.71) and Sabour (6.45)** compared to 50% NPK.

Grain yield differences among the tested genotypes were significant at all the locations except **Ghaghraghat** and **Ranchi**. All the test entries found significantly superior over checks in all the centres, except **Nawagam, Rewa** and **Maruteru**. Significant higher mean maximum yield was recorded by IET 30690 (5.98 t/ha) followed by IET 30565 (5.91 t/ha) at **Coimbatore**; and at **Faizabad (5.06 t/ha) Puducherry (7.22 t/ha)** and at **Sabour (5.62 t/ha) IET 30561 at Dhangain (6.08 t/ha); IET 30565 at Ghaghraghat (3.20 t/ha) and Jagdalpur (6.74 t/ha); and at Mandya (7.19 t/ha), IET 30555 at Nagaina (4.00 t/ha), IET 30636 (4.03 t/ha) at Ranchi IET 30641 (5.07 t/ha) followed by IET 30636 (5.05 t/ha) at Varanasi** found promising. Mean over the locations, the performance of IET 30690 (4.96 t/ha) followed by IET 30565 (4.84 t/ha) were promising over CO-51 (4.08 t/ha). Interaction effects of nutrient levels x cultivars on grain yield was non-significant at most of the locations.

In this trial, recommended input of nutrients (100% RDF) was found promising with 17% higher grain yield and also exhibited higher nutrient efficiency. IET 30690 and IET 30565 recorded higher grain yield of 4.90 and 4.84 t/ha, respectively were found to be promising entries as compared to standard and local checks.

Table 4.1(b): Summary of data on grain yield and ancillary characters of selected NMT Early (TP) cultures grown under transplanted conditions at low and optimum recommended fertilizer doses, kharif 2024.

F-levels	Varieties	COIMBATORE					
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Test weight (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: Low input (50% NPK)	V1	4.25	30	215	25.17	80	
	V2	4.15	32	208	27.23	80	
	V3	4.74	26	251	20.97	82	
	V4	5.09	18	279	22.33	81	
	V5	4.87	24	267	23.47	80	
	V6	4.15	32	220	27.57	84	
	V7	3.88	34	190	21.63	82	
	V8	5.03	19	286	20.27	81	
	V9	4.17	31	216	22.13	83	
	V10	5.03	19	267	22.23	83	
	V11	5.17	16	296	26.17	84	
	V12	4.95	21	265	20.13	83	
	V13	4.53	27	237	27.63	84	
	V14	4.43	28	221	21.57	83	
	V15	4.35	29	219	24.17	84	
	V16	4.90	23	273	23.57	83	
	V17	4.84	25	265	15.27	80	
F2: Optimum input (100% NPK)	V1	5.23	14	281	25.30	80	7.84
	V2	5.16	17	276	27.33	80	8.08
	V3	5.84	9	326	21.00	83	8.80
	V4	6.73	2	356	22.43	81	13.12
	V5	5.95	8	331	23.57	80	8.64
	V6	5.22	15	285	27.73	85	8.56
	V7	4.95	21	254	21.73	83	8.56
	V8	6.73	2	356	20.37	82	13.60
	V9	5.25	13	291	22.17	84	8.64
	V10	6.24	5	338	22.37	84	9.68
	V11	6.79	1	363	26.23	85	12.96
	V12	6.15	7	335	20.13	84	9.60
	V13	5.66	10	305	27.73	85	9.04
	V14	5.54	11	296	21.67	85	8.88
	V15	5.50	12	289	24.23	85	9.20
	V16	6.34	4	345	23.63	84	11.52
	V17	6.18	6	338	15.33	81	10.72
Interaction							
F at same V		0.12		NS	NS	NS	
V at same F		0.13		NS	NS	NS	
F1		4.62	2	246	23.03	82	
F2		5.85	1	316	23.11	83	9.85
C.D.(0.05)		0.08		6.65	0.07	0.61	
C.V.(%)		1.79		2.78	0.34	0.87	

Table 4.1(b): Contd.

N-levels	Varieties	COIMBATORE					
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Test weight (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties:							
	V1	4.74	13	248	25.2	80	7.84
	V2	4.66	16	242	27.3	80	8.08
	V3	5.29	9	289	21.0	82	8.80
	V4	5.91	2	317	22.4	81	13.12
	V5	5.41	8	299	23.5	80	8.64
	V6	4.69	15	252	27.7	84	8.56
	V7	4.42	17	222	21.7	83	8.56
	V8	5.88	3	321	20.3	81	13.60
	V9	4.71	14	254	22.2	83	8.64
	V10	5.64	4	303	22.3	83	9.68
	V11	5.98	1	329	26.2	85	12.96
	V12	5.55	6	300	20.1	83	9.60
	V13	5.10	10	271	27.7	84	9.04
	V14	4.99	11	259	21.6	84	8.88
	V15	4.93	12	254	24.2	84	9.20
	V16	5.62	5	309	23.6	83	11.52
	V17	5.51	7	302	15.3	81	10.72
	C.D.(0.05)	0.08		7.86	0.11	0.63	
	C.V. (%)	1.42		2.45	0.42	0.67	
	Expt. Mean	5.24		281	23.07	82	
	Soil type	Clay loam					
	pH	8.10					
	N - levels (kg/ha)						
	F1	75:25:25					
	F2	150:50:50					
	Recommended N:P:K (kg/ha)	150:50:50					
	Varieties						
	V1	IET 30641					
	V2	IET 30651					
	V3	IET 30636					
	V4	IET 30565					
	V5	IET 30555					
	V6	IET 30561					
	V7	IET 30657					
	V8	IET 30642					
	V9	IET 30656					
	V10	IET 30669					
	V11	IET 30690					
	V12	CO-51 (NC)					
	V13	PR 124 (N)					
	V14	Narendra 97(E)					
	V15	Luit (NE)					
	V16	MTU 1153 (S)					
	V17	Local Check - CO 51 (115 days)					
	Available N:P:K of soil (kg/ha)	347:48:262					

Table 4.1(b): Contd.

F-levels	Varieties	DHANGAIN						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test weight (g)	Days 50% flowering	Nutri. res. (kg grain/ kg Nutri.) (Base level 50% RDF)
F1: Low input (50% NPK)	V1	5.08	17	253	3.96	25.2	85	
	V2	4.52	24	238	3.18	26.0	85	
	V3	5.74	6	273	4.72	24.4	93	
	V4	5.70	7	272	4.05	22.2	84	
	V5	4.94	20	237	3.77	22.3	85	
	V6	5.89	3	281	4.25	27.0	85	
	V7	5.62	8	274	3.66	20.5	84	
	V8	4.40	27	238	3.43	24.9	83	
	V9	5.09	16	265	3.74	21.3	86	
	V10	4.73	22	246	4.32	23.7	83	
	V11	4.73	22	245	4.04	25.7	85	
	V12	3.78	30	234	2.56	19.4	77	
	V13	4.52	24	238	3.93	25.3	89	
	V14	3.05	33	227	2.36	22.5	77	
	V15	3.03	34	216	3.27	24.7	73	
	V16	4.52	24	240	4.12	22.5	83	
	V17	4.35	28	237	3.90	17.9	86	
F2: Optimum input (100% NPK)	V1	5.56	11	258	4.61	25.5	86	6.86
	V2	4.90	21	245	3.81	25.7	86	5.43
	V3	5.82	5	278	5.12	23.7	95	1.14
	V4	6.33	1	289	4.52	23.9	85	9.00
	V5	5.58	10	262	4.10	23.7	86	9.14
	V6	6.26	2	285	5.19	27.9	86	5.29
	V7	5.86	4	275	4.90	21.8	85	3.43
	V8	5.03	18	243	4.87	25.7	85	9.00
	V9	5.62	8	269	4.43	22.3	88	7.57
	V10	5.20	14	250	4.88	24.9	84	6.71
	V11	5.13	15	246	4.40	25.2	86	5.71
	V12	3.97	29	237	2.82	17.5	77	2.71
	V13	5.51	12	251	4.04	27.1	89	14.14
	V14	3.50	31	232	3.19	22.3	78	6.43
	V15	3.50	31	241	3.38	26.0	73	6.71
	V16	5.02	19	240	4.73	23.6	84	7.14
	V17	5.50	13	249	3.74	16.9	87	16.43
Interaction								
<i>F at same V</i>		NS		NS	NS	NS	0.59	
<i>V at same F</i>		NS		NS	NS	NS	0.68	
F1		4.69	2	248	3.72	23.27	84	
F2		5.19	1	256	4.28	23.75	85	7.23
C.D.(0.05)		0.39		7.73	0.47	NS	0.47	
C.V.(%)		9.23		3.6	13.72	3.47	0.66	

Table 4.1(b): Contd.

N-levels	Varieties	DHANGAIN						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test weight (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties:								
	V1	5.32	6	256	4.29	25.4	86	6.86
	V2	4.71	14	242	3.50	25.9	85	5.43
	V3	5.78	3	276	4.92	24.1	94	1.14
	V4	6.02	2	281	4.29	23.0	85	9.00
	V5	5.26	7	249	3.94	23.0	85	9.14
	V6	6.08	1	283	4.72	27.5	86	5.29
	V7	5.74	4	275	4.28	21.2	84	3.43
	V8	4.72	13	241	4.15	25.3	84	9.00
	V9	5.36	5	267	4.09	21.8	87	7.57
	V10	4.97	9	248	4.60	24.3	83	6.71
	V11	4.93	10	246	4.22	25.5	85	5.71
	V12	3.88	15	235	2.69	18.4	77	2.71
	V13	5.02	8	245	3.99	26.2	89	14.14
	V14	3.28	16	230	2.78	22.4	77	6.43
	V15	3.27	17	229	3.33	25.4	73	6.71
	V16	4.77	12	240	4.43	23.1	83	7.14
	V17	4.93	11	243	3.82	17.4	86	16.43
	C.D.(0.05)	0.52		23.01	0.77	1.37	0.42	
	C.V. (%)	9.16		7.99	16.86	5.1	0.43	
	Expt. Mean	4.94		252	4.00	23.51	84	6.65
	Soil type	Clay loam						
	pH	6.56						
	N - levels (kg/ha)							
	F1	40:20:10						
	F2	80:40:20						
	Recommended N:P:K (kg/ha)	80:40:20						
	Varieties							
	V1	IET 30641						
	V2	IET 30651						
	V3	IET 30636						
	V4	IET 30565						
	V5	IET 30555						
	V6	IET 30561						
	V7	IET 30657						
	V8	IET 30642						
	V9	IET 30656						
	V10	IET 30669						
	V11	IET 30690						
	V12	CO-51 (NC)						
	V13	PR 124 (N)						
	V14	Narendra 97(E)						
	V15	Luit (NE)						
	V16	MTU 1153 (S)						
	V17	Local Check - Sabour Kunwar(115-120Days)						
	Available N:P:K of soil (kg/ha)	282:42.4:162.2						

Table 4.1(b): Contd.

F-levels	Varieties	FAIZABAD						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test weight (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: Low input (50% NPK)	V1	2.71	32	165	2.61	20.1	74	
	V2	2.86	31	141	2.14	19.6	78	
	V3	3.85	19	196	3.27	23.7	81	
	V4	3.21	24	201	2.14	20.9	77	
	V5	3.45	23	214	2.89	28.2	77	
	V6	3.18	27	189	2.18	22.0	72	
	V7	4.07	15	238	2.57	28.0	72	
	V8	3.21	24	203	3.11	22.7	74	
	V9	3.90	17	211	3.00	27.1	72	
	V10	2.45	33	204	2.85	21.4	73	
	V11	4.72	3	248	4.22	23.6	67	
	V12	3.85	19	245	5.50	25.9	70	
	V13	3.07	28	162	3.83	22.7	68	
	V14	4.28	10	196	3.44	25.4	71	
	V15	2.94	30	213	3.61	21.0	66	
	V16	3.01	29	176	4.58	25.7	74	
	V17	2.15	34	118	2.90	17.4	66	
F2: Optimum input (100% NPK)	V1	3.52	22	198	3.47	21.5	71	7.36
	V2	3.74	21	199	4.24	23.6	72	8.00
	V3	4.89	2	245	5.97	27.8	74	9.45
	V4	4.58	7	237	3.82	20.6	73	12.45
	V5	4.60	6	199	4.38	27.1	74	10.45
	V6	4.37	9	248	4.61	25.7	73	10.82
	V7	4.68	5	332	4.98	18.6	76	5.55
	V8	4.16	13	240	4.17	24.7	73	8.64
	V9	4.71	4	241	4.31	27.3	79	7.36
	V10	4.09	14	223	2.93	24.7	82	14.91
	V11	5.40	1	309	4.89	35.9	85	6.18
	V12	3.96	16	317	3.13	34.6	79	1.00
	V13	4.22	11	212	2.83	22.3	79	10.45
	V14	4.55	8	247	3.00	26.4	77	2.45
	V15	3.87	18	235	3.54	25.6	83	8.45
	V16	4.20	12	251	3.08	26.1	74	10.82
	V17	3.19	26	163	3.40	18.0	78	9.45
Interaction								
F at same V		0.23		36.55	0.29	0.91	1.73	
V at same F		0.28		37.24	0.33	1.26	2.29	
F1		3.35	2	195	3.23	23.26	72	
F2		4.28	1	241	3.93	25.32	77	8.46
C.D.(0.05)		0.22		14.64	0.23	1.15	1.99	
C.V.(%)		6.65		7.88	7.6	5.54	3.14	

Table 4.1(b): Contd.

N-levels	Varieties	FAIZABAD						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test weight (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties:								
	V1	3.12	16	181	3.04	20.8	73	7.36
	V2	3.30	14	170	3.19	21.6	75	8.00
	V3	4.37	4	221	4.62	25.7	77	9.45
	V4	3.90	8	219	2.98	20.8	75	12.45
	V5	4.03	6	206	3.64	27.6	75	10.45
	V6	3.78	9	219	3.40	23.8	73	10.82
	V7	4.38	3	285	3.78	23.3	74	5.55
	V8	3.69	10	221	3.64	23.7	74	8.64
	V9	4.31	5	226	3.66	27.2	75	7.36
	V10	3.27	15	213	2.89	23.1	77	14.91
	V11	5.06	1	279	4.56	29.8	76	6.18
	V12	3.91	7	281	4.32	30.3	75	1.00
	V13	3.65	11	187	3.33	22.5	73	10.45
	V14	4.42	2	222	3.22	25.9	74	2.45
	V15	3.41	13	224	3.58	23.3	75	8.45
	V16	3.61	12	213	3.83	25.9	74	10.82
	V17	2.67	17	140	3.15	17.7	72	9.45
	C.D.(0.05)	0.16		25.84	0.2	0.64	1.22	
	C.V. (%)	3.76		10.37	4.99	2.32	1.44	
	Expt. Mean	3.81		218	3.58	24.29	75	
	Soil type	Sandy loam						
	pH	7.40						
	N - levels (kg/ha)							
	F1	60:30:20						
	F2	120:60:40						
	Recommended N:P:K (kg/ha)	120:60:40						
	Varieties							
	V1	IET 30641						
	V2	IET 30651						
	V3	IET 30636						
	V4	IET 30565						
	V5	IET 30555						
	V6	IET 30561						
	V7	IET 30657						
	V8	IET 30642						
	V9	IET 30656						
	V10	IET 30669						
	V11	IET 30690						
	V12	CO-51						
	V13	(NC)						
	V14	PR 124 (N)						
	V15	Narendra 97(E)						
	V16	Luit (NE)						
	V17	MTU 1153						
	Available N:P:K of soil (kg/ha)	(S)						
		Local Check - Sahbhagidhan						
		75:13:22						

Table 4.1(b): Contd.

F-levels	Varieties	GHAGHRAGHAT						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test weight (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: Low input (50% NPK)	V1	2.20	24	110	3.90	23.5	83	
	V2	2.40	20	93	3.77	21.9	82	
	V3	2.40	20	125	3.40	20.5	83	
	V4	2.97	14	140	3.93	22.6	83	
	V5	2.57	17	102	3.10	22.8	82	
	V6	2.63	16	123	3.27	21.9	80	
	V7	2.77	15	130	3.63	21.6	82	
	V8	2.30	22	126	3.63	22.7	83	
	V9	2.43	19	131	3.40	19.8	82	
	V10	2.17	25	137	3.57	23.8	82	
	V11	2.13	26	109	3.60	24.6	83	
	V12	2.23	23	120	3.30	21.7	78	
	V13	-	-	-	-	-	-	
	V14	2.47	18	82	3.67	23.2	82	
	V15	-	-	-	-	-	-	
	V16	-	-	-	-	-	-	
	V17	-	-	-	-	-	-	
F2: Optimum input (100% NPK)	V1	3.47	4	128	3.80	23.6	82	11.55
	V2	3.50	2	144	3.77	23.1	82	10.00
	V3	3.50	2	119	3.97	26.4	82	10.00
	V4	3.43	6	142	3.57	21.8	82	4.18
	V5	3.37	11	126	3.73	24.8	83	7.27
	V6	3.53	1	160	3.70	23.3	82	8.18
	V7	3.43	6	140	3.67	21.5	82	6.00
	V8	3.33	12	144	3.60	23.9	78	9.36
	V9	3.43	6	145	3.60	21.2	84	9.09
	V10	3.43	6	127	3.67	21.7	82	11.45
	V11	3.43	6	122	3.60	23.1	82	11.82
	V12	3.33	12	118	3.53	21.7	77	10.00
	V13	-	-	-	-	-	-	-
	V14	3.47	4	94	3.50	19.2	82	9.09
	V15	-	-	-	-	-	-	-
	V16	-	-	-	-	-	-	-
	V17	-	-	-	-	-	-	-
Interaction								
F at same V		NS		19.03	NS	2.09	NS	
V at same F		NS		20.12	NS	2.31	NS	
F1		2.44	2	118	3.55	22.35	82	
F2		3.43	1	132	3.67	22.72	81	9.08
C.D.(0.05)		0.36		10.79	NS	NS	NS	
C.V.(%)		12.69		8.89	6.44	6.58	3.14	

Table 4.1(b): Contd.

N-levels	Varieties	GHAGHRAGHAT						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test weight (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties:								
	V1	2.84	9	119	3.85	23.5	82	11.55
	V2	2.95	6	119	3.77	22.5	82	10.00
	V3	2.95	6	122	3.69	23.5	82	10.00
	V4	3.20	1	141	3.75	22.2	83	4.18
	V5	2.97	5	114	3.42	23.8	82	7.27
	V6	3.08	3	142	3.49	22.6	81	8.18
	V7	3.10	2	135	3.65	21.6	82	6.00
	V8	2.82	10	135	3.62	23.3	80	9.36
	V9	2.93	8	138	3.50	20.5	83	9.09
	V10	2.80	11	132	3.62	22.8	82	11.45
	V11	2.78	12	116	3.60	23.8	82	11.82
	V12	2.78	12	119	3.42	21.7	78	10.00
	V13	-	-	-	-	-	-	-
	V14	2.97	4	88	3.59	21.2	82	9.09
	V15	-	-	-	-	-	-	-
	V16	-	-	-	-	-	-	-
	V17	-	-	-	-	-	-	-
	C.D.(0.05)	NS		13.45	NS	1.48	2.17	
	C.V. (%)	8.13		9.35	8.71	5.69	2.3	
	Expt. Mean	2.94		125	3.61	22.53	82	
	Soil type	Sandy loam						
	pH	7.40						
	N - levels (kg/ha)							
	F1	60:30:20						
	F2	120:60:40						
	Recommended N:P:K (kg/ha)	120:60:40						
	Varieties							
	V1	IET 30641						
	V2	IET 30651						
	V3	IET 30636						
	V4	IET 30565						
	V5	IET 30555						
	V6	IET 30561						
	V7	IET 30657						
	V8	IET 30642						
	V9	IET 30656						
	V10	IET 30669						
	V11	IET 30690						
	V12	CO-51 (NC)						
	V13	PR 124 (N)						
	V14	Narendra 97(E)						
	V15	Luit (NE)						
	V16	MTU 1153 (S)						
	V17	-						
	Available N:P:K of soil (kg/ha)	200:24:234						

Table 4.1(b): Contd.

F-levels	Varieties	JAGDALPUR					
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test weight (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: Low input (50% NPK)	V1	6.44	7	257	4.27	28.0	
	V2	4.01	29	351	4.67	28.0	
	V3	3.26	33	330	4.67	24.0	
	V4	6.59	5	348	5.67	26.3	
	V5	4.98	26	358	5.67	27.0	
	V6	6.09	10	439	6.07	31.7	
	V7	5.36	20	360	5.47	25.3	
	V8	5.83	13	251	4.87	28.3	
	V9	4.78	28	252	4.00	27.3	
	V10	5.26	21	380	5.20	25.7	
	V11	5.56	17	343	5.20	29.0	
	V12	5.51	18	442	3.40	22.0	
	V13	4.99	25	250	4.67	29.7	
	V14	2.89	34	457	2.67	26.0	
	V15	3.35	32	340	4.93	29.0	
	V16	5.16	23	335	5.67	26.0	
	V17	5.67	16	407	4.93	20.3	
F2: Optimum input (100% NPK)	V1	6.66	3	327	4.50	28.0	2.10
	V2	5.13	24	365	5.27	28.0	10.67
	V3	4.83	27	321	6.53	24.3	14.95
	V4	6.88	2	359	7.53	27.3	2.76
	V5	6.41	8	359	5.73	31.3	13.62
	V6	6.60	4	230	5.93	24.3	4.86
	V7	5.75	15	381	5.33	28.3	3.71
	V8	6.99	1	358	5.20	27.7	11.05
	V9	5.39	19	347	4.20	26.0	5.81
	V10	5.77	14	282	5.40	29.0	4.86
	V11	6.19	9	330	5.67	22.7	6.00
	V12	5.86	12	331	4.20	29.0	3.33
	V13	5.23	22	460	4.53	27.0	2.29
	V14	3.77	31	400	3.33	28.0	8.38
	V15	3.87	30	327	4.27	27.0	4.95
	V16	5.89	11	360	6.33	27.0	6.95
	V17	6.49	6	558	4.67	20.3	7.81
Interaction							
F at same V		NS		46.12	0.73	1.56	
V at same F		NS		49.78	0.73	1.56	
F1		5.04	2	347	4.83	26.69	
F2		5.75	1	359	5.21	26.78	6.71
C.D.(0.05)		0.42		NS	0.2	NS	
C.V.(%)		9.08		9.34	4.74	1.96	

Table 4.1(b): Contd.

N-levels	Varieties	JAGDALPUR					
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test weight (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties:							
	V1	6.55	2	292	4.39	28.0	2.10
	V2	4.57	14	358	4.97	28.0	10.67
	V3	4.05	15	326	5.60	24.2	14.95
	V4	6.74	1	354	6.60	26.8	2.76
	V5	5.70	7	359	5.70	29.2	13.62
	V6	6.35	4	335	6.00	28.0	4.86
	V7	5.56	9	371	5.40	26.8	3.71
	V8	6.41	3	305	5.04	28.0	11.05
	V9	5.09	13	299	4.10	26.7	5.81
	V10	5.52	11	331	5.30	27.3	4.86
	V11	5.88	6	336	5.44	25.8	6.00
	V12	5.69	8	386	3.80	25.5	3.33
	V13	5.11	12	355	4.60	28.3	2.29
	V14	3.33	17	428	3.00	27.0	8.38
	V15	3.61	16	333	4.60	28.0	4.95
	V16	5.53	10	348	6.00	26.5	6.95
	V17	6.08	5	483	4.80	20.3	7.81
	C.D.(0.05)	0.59		32.61	0.52	1.11	
	C.V. (%)	9.62		8.09	9.04	3.62	
	Expt. Mean	5.40		353	5.02	26.73	
	Soil type	Clay loam					
	pH	5.85					
	N - levels (kg/ha)						
	F1	60:30:15					
	F2	120:60:30					
	Recommended N:P:K (kg/ha)	120:60:30					
	Varieties						
	V1	IET 30641					
	V2	IET 30651					
	V3	IET 30636					
	V4	IET 30565					
	V5	IET 30555					
	V6	IET 30561					
	V7	IET 30657					
	V8	IET 30642					
	V9	IET 30656					
	V10	IET 30669					
	V11	IET 30690					
	V12	CO-51 (NC)					
	V13	PR 124 (N)					
	V14	Narendra 97(E)					
	V15	Luit (NE)					
	V16	MTU 1153 (S)					
	V17	Local Check					
	Available N:P:K of soil (kg/ha)	-					

Table 4.1(b): Contd.

F-levels	Varieties	KARJAT						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test weight (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: Low input (50% NPK)	V1	3.98	6	365	3.82	28.0	87	
	V2	2.65	31	314	2.45	21.1	85	
	V3	3.26	21	351	3.25	22.2	92	
	V4	3.89	8	356	3.56	22.3	85	
	V5	3.74	11	354	3.51	26.7	85	
	V6	3.31	19	352	3.28	28.0	87	
	V7	3.47	14	353	3.30	23.7	86	
	V8	3.71	12	354	3.37	27.4	84	
	V9	2.68	29	325	2.66	27.2	87	
	V10	4.24	4	365	3.84	24.2	85	
	V11	3.92	7	365	3.68	22.9	85	
	V12	2.64	32	310	2.18	21.5	80	
	V13	2.66	30	317	2.62	28.1	87	
	V14	2.46	34	286	2.11	23.2	77	
	V15	2.56	33	290	2.15	26.5	78	
	V16	2.73	27	348	3.20	25.6	84	
	V17	2.71	28	346	2.97	22.3	91	
F2: Optimum input (100% NPK)	V1	5.19	2	398	4.03	33.2	88	12.10
	V2	3.01	23	339	2.69	25.8	87	3.60
	V3	3.45	16	358	3.47	23.6	87	1.90
	V4	4.23	5	383	3.73	25.3	81	3.40
	V5	3.88	9	382	3.70	27.6	81	1.40
	V6	3.46	15	358	3.49	28.9	85	1.50
	V7	3.50	13	362	3.52	24.6	86	0.30
	V8	3.87	10	363	3.65	29.8	87	1.60
	V9	3.31	19	354	3.03	28.1	85	6.30
	V10	5.23	1	426	4.09	27.2	84	9.90
	V11	4.32	3	396	3.85	23.3	84	4.00
	V12	2.90	24	325	2.59	22.0	80	2.60
	V13	3.15	22	349	2.81	28.8	87	4.90
	V14	2.76	26	288	2.47	26.2	79	3.00
	V15	2.77	25	321	2.49	27.1	78	2.10
	V16	3.44	17	356	3.39	26.5	86	7.10
	V17	3.38	18	356	3.07	27.1	90	6.70
Interaction								
<i>F at same V</i>		NS		NS	NS	0.97	1.42	
<i>V at same F</i>		NS		NS	NS	1.31	1.84	
F1		3.21	2	338	3.06	24.75	85	
F2		3.64	1	360	3.30	26.76	84	4.26
<i>C.D.(0.05)</i>		0.4		2.76	0.21	1.18	NS	
<i>C.V.(%)</i>		13.6		0.93	7.91	5.39	2.19	

Table 4.1(b): Contd.

N-levels	Varieties	KARJAT						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test weight (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties:								
	V1	4.59	2	381	3.93	30.61	88	12.10
	V2	2.83	14	327	2.57	23.45	86	3.60
	V3	3.36	9	354	3.36	22.85	90	1.90
	V4	4.06	4	369	3.65	23.78	83	3.40
	V5	3.81	5	368	3.61	27.10	83	1.40
	V6	3.39	8	355	3.39	28.46	86	1.50
	V7	3.49	7	358	3.41	24.17	86	0.30
	V8	3.79	6	358	3.51	28.56	86	1.60
	V9	3.00	12	340	2.85	27.64	86	6.30
	V10	4.74	1	396	3.97	25.71	85	9.90
	V11	4.12	3	380	3.77	23.10	85	4.00
	V12	2.77	15	318	2.39	21.75	80	2.60
	V13	2.91	13	333	2.72	28.42	87	4.90
	V14	2.61	17	287	2.29	24.69	78	3.00
	V15	2.67	16	306	2.32	26.77	78	2.10
	V16	3.09	10	352	3.30	26.09	85	7.10
	V17	3.05	11	351	3.02	24.69	91	6.70
	C.D.(0.05)	0.41		38.78	0.42	0.68	1	
	C.V. (%)	10.46		9.72	11.57	2.32	1.03	
	Expt. Mean	3.43		349	3.18	25.75	85	
	Soil type	-						
	pH	-						
	N - levels (kg/ha)							
	F1	50:25:25						
	F2	100:50:50						
	Recommended N:P:K (kg/ha)	100:50:50						
	Varieties							
	V1	IET 30641						
	V2	IET 30651						
	V3	IET 30636						
	V4	IET 30565						
	V5	IET 30555						
	V6	IET 30561						
	V7	IET 30657						
	V8	IET 30642						
	V9	IET 30656						
	V10	IET 30669						
	V11	IET 30690						
	V12	CO-51 (NC)						
	V13	PR 124 (N)						
	V14	Narendra 97(E)						
	V15	Luit (NE)						
	V16	MTU 1153 (S)						
	V17	Local Check - KJT -3 (115 Days)						
	Available N:P:K of soil (kg/ha)	-						

Table 4.1(b): Contd.

F-levels	Varieties	MANDYA					
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: Low input (50% NPK)	V1	6.24	17	311	4.11	79	
	V2	5.03	29	321	3.55	76	
	V3	6.37	15	297	4.70	89	
	V4	6.76	10	293	4.68	87	
	V5	6.06	18	295	4.51	87	
	V6	6.35	16	309	4.76	89	
	V7	6.44	13	291	4.16	80	
	V8	6.01	20	270	4.43	83	
	V9	5.36	25	272	3.31	82	
	V10	6.49	12	305	4.17	79	
	V11	6.57	11	269	4.25	80	
	V12	5.51	24	311	2.94	79	
	V13	5.29	26	310	4.01	85	
	V14	3.33	32	313	1.91	77	
	V15	4.91	30	290	2.73	78	
	V16	5.57	22	281	4.05	82	
	V17	-	-	-	-	-	
F2: Optimum input (100% NPK)	V1	7.52	6	319	4.19	78	12.80
	V2	5.21	27	321	4.03	76	1.80
	V3	7.14	8	300	4.72	89	7.70
	V4	7.61	3	299	4.91	87	8.50
	V5	7.84	1	325	4.84	87	17.80
	V6	7.56	4	319	5.22	89	12.10
	V7	7.74	2	338	4.55	79	13.00
	V8	7.14	8	318	4.74	82	11.30
	V9	6.40	14	316	3.62	81	10.40
	V10	7.46	7	314	4.37	79	9.70
	V11	7.55	5	334	4.48	79	9.80
	V12	5.58	21	318	3.46	79	0.70
	V13	5.52	23	323	4.18	85	2.30
	V14	3.99	31	372	2.27	76	6.60
	V15	5.13	28	328	3.46	77	2.20
	V16	6.04	19	302	4.94	83	4.70
	V17	-	-	-	-	-	-
Interaction							
F at same V		NS		NS	NS	0.62	
V at same F		NS		NS	NS	0.78	
F1		5.77	2	296	3.89	82	
F2		6.59	1	322	4.25	82	8.21
C.D.(0.05)		0.6		NS	NS	NS	
C.V.(%)		11.02		9.76	19.75	0.9	

Table 4.1(b): Contd.

N-levels	Varieties	MANDYA					
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties:							
	V1	6.88	7	315	4.15	79	12.80
	V2	5.12	14	321	3.79	76	1.80
	V3	6.76	8	299	4.71	89	7.70
	V4	7.19	1	296	4.80	87	8.50
	V5	6.95	6	310	4.68	87	17.80
	V6	6.96	5	314	4.99	89	12.10
	V7	7.09	2	314	4.36	79	13.00
	V8	6.58	9	294	4.59	82	11.30
	V9	5.88	10	294	3.47	82	10.40
	V10	6.98	4	310	4.27	79	9.70
	V11	7.06	3	302	4.37	80	9.80
	V12	5.55	12	314	3.20	79	0.70
	V13	5.41	13	316	4.10	85	2.30
	V14	3.66	16	342	2.09	77	6.60
	V15	5.02	15	309	3.10	77	2.20
	V16	5.81	11	291	4.50	82	4.70
	V17	-	-	-	-	-	-
	C.D.(0.05)	0.52		25.22	0.43	0.44	
	C.V. (%)	7.27		7.07	9.17	0.46	
	Expt. Mean	6.18		309	4.07	82	
	Soil type	Red Sandy loam					
	pH	7.85					
	N - levels (kg/ha)						
	F1	50:25:25					
	F2	100:50:50					
	Recommended N:P:K (kg/ha)	100:50:50					
	Varieties						
	V1	IET 30641					
	V2	IET 30651					
	V3	IET 30636					
	V4	IET 30565					
	V5	IET 30555					
	V6	IET 30561					
	V7	IET 30657					
	V8	IET 30642					
	V9	IET 30656					
	V10	IET 30669					
	V11	IET 30690					
	V12	CO-51 (NC)					
	V13	PR 124 (N)					
	V14	Narendra 97(E)					
	V15	Luit (NE)					
	V16	MTU 1153 (S)					
	V17	Local Check					
	Available N:P:K of soil (kg/ha)	296:85:248					

Table 4.1(b): Contd.

F-levels	Varieties	MARUTERU						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test weight (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: Low input (50% NPK)	V1	4.74	21	312	4.34	19.87	83	
	V2	5.15	12	214	3.97	22.67	81	
	V3	4.53	25	305	3.62	19.90	88	
	V4	5.06	14	320	2.82	20.00	85	
	V5	4.79	19	308	3.61	22.83	82	
	V6	4.25	31	313	2.86	21.91	77	
	V7	5.96	5	319	5.46	19.80	91	
	V8	4.44	27	313	3.83	22.17	83	
	V9	5.62	7	249	4.23	19.30	90	
	V10	4.88	16	308	4.63	20.00	84	
	V11	4.89	15	310	4.23	23.07	90	
	V12	4.82	17	300	2.40	23.27	79	
	V13	5.78	6	304	4.43	22.53	81	
	V14	4.33	29	222	1.88	19.73	74	
	V15	4.23	32	229	2.65	21.03	74	
	V16	4.62	23	294	4.35	24.33	77	
	V17	-	-	-	-	-	-	
F2: Optimum input (100% NPK)	V1	4.76	20	319	4.18	20.23	87	0.19
	V2	5.35	9	243	4.01	22.80	83	1.90
	V3	4.80	18	304	3.75	20.10	96	2.57
	V4	5.23	10	334	3.89	20.03	89	1.62
	V5	5.12	13	318	3.65	22.60	83	3.14
	V6	4.57	24	317	2.96	21.94	79	3.05
	V7	6.05	4	324	5.28	21.20	98	0.86
	V8	4.68	22	341	3.92	21.93	88	2.29
	V9	6.53	3	332	4.24	21.30	98	8.67
	V10	5.45	8	311	4.72	21.07	87	5.43
	V11	6.68	2	313	4.56	22.80	98	17.05
	V12	5.21	11	277	2.63	24.33	86	3.71
	V13	7.50	1	275	4.44	24.00	83	16.38
	V14	4.47	26	223	2.71	19.70	76	1.33
	V15	4.32	30	295	2.69	21.00	76	0.86
	V16	4.40	28	305	5.24	24.37	79	-2.10
	V17	-	-	-	-	-	-	-
Interaction								
F at same V		0.36		26.73	0.66	0.76	0.93	
V at same F		0.37		26.82	0.77	1.16	1.09	
F1		4.88	2	289	3.71	21.40	83	
F2		5.32	1	302	3.93	21.84	87	4.18
C.D.(0.05)		0.19		9.05	0.54	NS	0.78	
C.V.(%)		4.14		3.49	1.62	6.06	1.05	

Table 4.1(b): Contd.

N-levels	Varieties	MARUTERU						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test weight (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties:								
	V1	4.75	10	315	4.26	20.05	85	0.19
	V2	5.25	5	229	3.99	22.74	82	1.90
	V3	4.67	11	305	3.69	20.00	92	2.57
	V4	5.15	7	327	3.36	20.02	87	1.62
	V5	4.96	9	313	3.63	22.72	82	3.14
	V6	4.41	14	315	2.91	21.93	78	3.05
	V7	6.01	3	321	5.37	20.50	95	0.86
	V8	4.56	12	327	3.88	22.05	86	2.29
	V9	6.08	2	291	4.24	20.30	94	8.67
	V10	5.17	6	310	4.68	20.54	85	5.43
	V11	5.79	4	312	4.40	22.94	94	17.05
	V12	5.02	8	289	2.51	23.80	82	3.71
	V13	6.64	1	290	4.44	23.27	82	16.38
	V14	4.40	15	222	2.29	19.72	75	1.33
	V15	4.28	16	262	2.67	21.02	75	0.86
	V16	4.51	13	300	4.80	24.35	78	-2.10
	V17	-	-	-	-	-	-	-
	C.D.(0.05)	0.25		18.9	0.47	0.54	0.66	
	C.V. (%)	4.27		5.54	1.06	2.15	0.67	
	Expt. Mean	5.10		295	3.82	21.62	85	
	Soil type	-						
	pH	5.80						
	N - levels (kg/ha)							
	F1	45:30:30						
	F2	90:60:60						
	Recommended N:P:K (kg/ha)	90:60:60						
	Varieties							
	V1	IET 30641						
	V2	IET 30651						
	V3	IET 30636						
	V4	IET 30565						
	V5	IET 30555						
	V6	IET 30561						
	V7	IET 30657						
	V8	IET 30642						
	V9	IET 30656						
	V10	IET 30669						
	V11	IET 30690						
	V12	CO-51 (NC)						
	V13	PR 124 (N)						
	V14	Narendra 97(E)						
	V15	Luit (NE)						
	V16	MTU 1153 (S)						
	V17	Local Check						
	Available N:P:K of soil (kg/ha)	119:14:273						

Table 4.1(b): Contd.

F-levels	Varieties	NAGINA						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test weight (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: Low input (50% NPK)	V1	2.75	19	258	3.41	26.32	98	
	V2	2.66	21	228	3.15	26.30	97	
	V3	2.52	27	237	3.31	26.28	109	
	V4	2.73	20	239	3.37	26.31	97	
	V5	3.00	16	233	3.36	26.36	99	
	V6	2.52	27	226	2.92	26.26	101	
	V7	2.59	24	218	3.36	26.32	99	
	V8	2.59	24	233	3.47	26.31	98	
	V9	2.80	18	244	3.18	26.34	101	
	V10	2.61	22	239	3.32	26.28	101	
	V11	2.61	22	228	3.52	26.24	99	
	V12	2.25	32	239	3.41	25.11	82	
	V13	2.30	30	222	3.27	26.17	103	
	V14	2.57	26	228	3.37	26.30	84	
	V15	2.36	29	216	3.35	26.12	80	
	V16	2.27	31	214	3.40	25.13	100	
	V17	-	-	-	-	-	-	
F2: Optimum input (100% NPK)	V1	4.87	2	297	3.40	26.45	98	19.27
	V2	4.67	4	312	3.36	26.43	98	18.27
	V3	4.44	10	325	3.20	26.36	109	17.45
	V4	4.66	5	321	3.27	26.44	98	17.55
	V5	5.00	1	333	3.60	26.55	99	18.18
	V6	4.38	11	316	3.36	26.33	101	16.91
	V7	4.55	7	313	3.41	26.40	99	17.82
	V8	4.53	8	306	3.48	26.38	99	17.64
	V9	4.83	3	299	3.41	26.47	102	18.45
	V10	4.57	6	317	3.48	26.40	102	17.82
	V11	4.29	12	320	3.12	26.32	100	15.27
	V12	2.87	17	257	3.44	26.21	83	5.64
	V13	4.24	13	265	3.17	26.26	103	17.64
	V14	4.52	9	317	3.35	26.37	85	17.73
	V15	4.19	14	297	3.41	891.83	80	16.64
	V16	4.03	15	214	3.40	26.24	101	16.00
	V17	-	-	-	-	-	-	-
Interaction								
F at same V		0.24		24.53	0.06	NS	NS	
V at same F		0.24		25.62	0.06	NS	NS	
F1		2.57	2	231	3.32	26.13	97	
F2		4.42	1	301	3.37	80.47	97	16.77
C.D.(0.05)		0.08		12.35	0.04	NS	0.09	
C.V.(%)		2.68		5.29	1.3	497.26	0.11	

Table 4.1(b): Contd.

N-levels	Varieties	NAGINA						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test weight (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties:								
	V1	3.81	3	278	3.41	26.39	98	19.27
	V2	3.67	5	270	3.26	26.37	98	18.27
	V3	3.48	10	281	3.26	26.32	109	17.45
	V4	3.70	4	280	3.32	26.38	98	17.55
	V5	4.00	1	283	3.48	26.46	99	18.18
	V6	3.45	11	271	3.14	26.30	101	16.91
	V7	3.57	7	265	3.39	26.36	99	17.82
	V8	3.56	8	270	3.48	26.35	99	17.64
	V9	3.82	2	271	3.30	26.41	101	18.45
	V10	3.59	6	278	3.40	26.34	102	17.82
	V11	3.45	11	274	3.32	26.28	100	15.27
	V12	2.56	16	248	3.43	25.66	83	5.64
	V13	3.27	14	244	3.22	26.22	103	17.64
	V14	3.55	9	273	3.36	26.34	84	17.73
	V15	3.28	13	257	3.38	458.98	80	16.64
	V16	3.15	15	214	3.40	25.69	101	16.00
	V17	-	-	-	-	-	-	-
	C.D.(0.05)	0.17		17.34	0.04	NS	1.24	
	C.V. (%)	4.17		5.65	1.05	497.24	1.1	
	Expt. Mean	3.49		266	3.34	53.30	97	
	Soil type	-						
	pH	7.70						
	N - levels (kg/ha)							
	F1	60:30:20						
	F2	120:60:40						
	Recommended N:P:K (kg/ha)	120:60:40						
	Varieties							
	V1	IET 30641						
	V2	IET 30651						
	V3	IET 30636						
	V4	IET 30565						
	V5	IET 30555						
	V6	IET 30561						
	V7	IET 30657						
	V8	IET 30642						
	V9	IET 30656						
	V10	IET 30669						
	V11	IET 30690						
	V12	CO-51 (NC)						
	V13	PR 124 (N)						
	V14	Narendra 97(E)						
	V15	Luit (NE)						
	V16	MTU 1153 (S)						
	V17	Local Check						
	Available N:P:K of soil (kg/ha)	21:18:209						

Table 4.1(b): Contd.

F-levels	Varieties	NAWAGAM						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test weight (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: Low input (50% NPK)	V1	4.82	20	255	3.37	22.8	101	
	V2	4.15	29	304	3.73	23.5	100	
	V3	4.86	18	296	4.02	21.1	105	
	V4	4.96	17	294	3.62	23.0	97	
	V5	4.65	24	342	3.52	23.6	101	
	V6	5.14	11	280	3.66	28.0	95	
	V7	5.33	5	302	3.64	18.1	105	
	V8	5.45	3	286	3.46	22.8	101	
	V9	5.00	15	315	3.12	22.0	106	
	V10	5.31	7	331	3.10	19.3	99	
	V11	5.08	12	298	3.95	24.9	101	
	V12	4.07	30	319	2.21	17.4	97	
	V13	4.37	25	273	3.08	22.3	94	
	V14	2.03	34	290	1.54	21.0	92	
	V15	4.16	28	298	2.51	24.2	94	
	V16	5.26	8	267	3.88	23.7	101	
	V17	5.07	13	230	3.44	17.9	91	
F2: Optimum input (100% NPK)	V1	5.45	3	292	4.23	22.6	102	10.08
	V2	4.20	27	261	4.16	28.4	102	0.80
	V3	4.81	21	327	4.22	20.3	106	-0.80
	V4	4.97	16	300	4.17	23.7	99	0.16
	V5	4.74	22	265	3.72	22.9	101	1.44
	V6	5.17	10	336	4.12	30.7	94	0.48
	V7	4.70	23	309	3.96	16.3	104	-10.08
	V8	5.52	2	288	3.57	23.4	103	1.12
	V9	4.85	19	336	3.26	23.8	106	-2.40
	V10	5.02	14	327	3.19	24.1	101	-4.64
	V11	5.23	9	286	4.01	24.7	102	2.40
	V12	4.22	26	348	2.23	17.8	97	2.40
	V13	4.04	31	292	3.21	25.7	94	-5.28
	V14	2.22	33	321	1.60	21.5	92	3.04
	V15	3.32	32	334	3.02	20.2	95	-13.44
	V16	5.73	1	315	3.93	21.2	101	7.52
	V17	5.33	5	296	3.77	16.4	91	4.16
Interaction								
F at same V		0.5		NS	NS	1.09	NS	
V at same F		0.49		NS	NS	1.11	NS	
F1		4.69	1	293	3.29	22.09	99	
F2		4.68	2	308	3.55	22.58	99	-0.18
C.D.(0.05)		NS		NS	NS	0.43	0.22	
C.V.(%)		2.27		16.59	12.88	2.27	0.26	

Table 4.1(b): Contd.

N-levels	Varieties	NAWAGAM						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test weight (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties:								
	V1	5.14	7	274	3.80	22.70	102	10.08
	V2	4.18	14	282	3.95	25.97	101	0.80
	V3	4.84	11	311	4.12	20.70	105	-0.80
	V4	4.97	9	297	3.90	23.34	98	0.16
	V5	4.70	12	304	3.62	23.27	101	1.44
	V6	5.16	6	308	3.89	29.35	95	0.48
	V7	5.02	8	305	3.80	17.20	105	-10.08
	V8	5.49	2	287	3.52	23.09	102	1.12
	V9	4.93	10	326	3.19	22.92	106	-2.40
	V10	5.17	4	329	3.15	21.72	100	-4.64
	V11	5.16	5	292	3.98	24.82	102	2.40
	V12	4.15	15	334	2.22	17.59	97	2.40
	V13	4.21	13	282	3.15	24.00	94	-5.28
	V14	2.13	17	305	1.57	21.27	92	3.04
	V15	3.74	16	316	2.77	22.17	94	-13.44
	V16	5.50	1	291	3.91	22.47	101	7.52
	V17	5.20	3	263	3.61	17.15	91	4.16
	C.D.(0.05)	0.35		37.36	0.4	0.77	1.24	
	C.V. (%)	6.55		10.88	10.24	3.03	1.1	
	Expt. Mean	4.68		300	3.42	22.33	99	
	Soil type	Clay loam						
	pH	8.08						
	N - levels (kg/ha)							
	F1	40:12.5:0						
	F2	80:25:0						
	Recommended N:P:K (kg/ha)	80:25:0						
	Varieties							
	V1	IET 30641						
	V2	IET 30651						
	V3	IET 30636						
	V4	IET 30565						
	V5	IET 30555						
	V6	IET 30561						
	V7	IET 30657						
	V8	IET 30642						
	V9	IET 30656						
	V10	IET 30669						
	V11	IET 30690						
	V12	CO-51 (NC)						
	V13	PR 124 (N)						
	V14	Narendra 97(E)						
	V15	Luit (NE)						
	V16	MTU 1153 (S)						
	V17	Local Check - Mahisagar(115 days)						
	Available N:P:K of soil (kg/ha)	188:13:281						

Table 4.1(b): Contd.

F-levels	Varieties	PUDUCHERRY					
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test weight (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: Low input (50% NPK)	V1	6.01	27	232	3.89	24.1	
	V2	-	-	-	-	-	
	V3	5.85	29	190	3.22	24.9	
	V4	5.90	28	227	3.86	24.7	
	V5	6.27	23	250	5.33	29.5	
	V6	6.66	16	238	4.78	24.0	
	V7	5.48	32	192	3.53	25.7	
	V8	6.34	20	223	3.98	23.8	
	V9	6.28	22	243	4.76	27.1	
	V10	6.51	18	211	3.21	20.7	
	V11	6.48	19	217	3.66	29.3	
	V12	5.56	31	208	2.94	19.9	
	V13	6.04	26	200	2.72	21.3	
	V14	6.31	21	171	2.50	22.1	
	V15	6.22	24	178	2.40	26.0	
	V16	6.13	25	185	2.69	21.6	
	V17	5.78	30	161	2.40	21.3	
F2: Optimum input (100% NPK)	V1	6.82	9	291	4.98	2.5	8.10
	V2	-	-	-	-	-	-
	V3	6.70	12	234	4.11	2.6	8.50
	V4	6.69	13	283	5.01	2.5	7.90
	V5	6.92	6	319	6.10	3.0	6.50
	V6	7.77	1	305	5.45	2.4	11.10
	V7	6.69	13	239	4.34	2.7	12.10
	V8	7.19	4	275	4.91	2.5	8.50
	V9	6.91	7	312	5.76	2.8	6.30
	V10	7.39	2	258	4.60	2.2	8.80
	V11	7.35	3	264	4.86	3.0	8.70
	V12	6.57	17	250	3.97	2.2	10.10
	V13	6.77	10	245	3.58	2.3	7.30
	V14	7.16	5	222	3.36	2.3	8.50
	V15	6.85	8	226	3.22	2.7	6.30
	V16	6.76	11	230	3.45	2.2	6.30
	V17	6.69	13	227	3.02	2.2	9.10
Interaction							
F at same V		0.13		1.8	NS	0.51	
V at same F		0.14		4.05	NS	0.98	
F1		6.11	2	208	3.49	24.13	
F2		6.95	1	261	4.42	2.50	8.38
C.D.(0.05)		0.07		4.82	0.09	1.1	
C.V.(%)		1.15		2.34	2.52	9.41	

Table 4.1(b): Contd.

N-levels	Varieties	PUDUCHERRY					
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test weight (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties:							
	V1	6.42	10	262	4.44	13.32	8.10
	V2						
	V3	6.28	13	212	3.67	13.72	8.50
	V4	6.30	12	255	4.44	13.60	7.90
	V5	6.60	7	285	5.72	16.25	6.50
	V6	7.22	1	272	5.12	13.21	11.10
	V7	6.09	15	216	3.94	14.21	12.10
	V8	6.77	4	249	4.45	13.12	8.50
	V9	6.60	6	278	5.26	14.98	6.30
	V10	6.95	2	235	3.91	11.47	8.80
	V11	6.92	3	241	4.26	16.15	8.70
	V12	6.07	16	229	3.46	11.02	10.10
	V13	6.41	11	223	3.15	11.77	7.30
	V14	6.74	5	197	2.93	12.22	8.50
	V15	6.54	8	202	2.81	14.35	6.30
	V16	6.45	9	208	3.07	11.92	6.30
	V17	6.24	14	194	2.71	11.78	9.10
	C.D.(0.05)	0.09		1.28	0.24	0.36	
	C.V. (%)	1.24		0.47	5.18	2.34	
	Expt. Mean	6.53		235	3.96	13.32	
	Soil type	Clay loam					
	pH	7.50					
	N - levels (kg/ha)						
	F1	60:20:20					
	F2	120:40:40					
	Recommended N:P:K (kg/ha)	120:40:40					
	Varieties						
	V1	IET 30641					
	V2	IET 30651					
	V3	IET 30636					
	V4	IET 30565					
	V5	IET 30555					
	V6	IET 30561					
	V7	IET 30657					
	V8	IET 30642					
	V9	IET 30656					
	V10	IET 30669					
	V11	IET 30690					
	V12	CO-51 (NC)					
	V13	PR 124 (N)					
	V14	Narendra 97(E)					
	V15	Luit (NE)					
		MTU 1153					
	V16	(S)					
	V17	Local Check - ADT 45(105 days)					
	Available N:P:K of soil (kg/ha)	134:37:180					

Table 4.1(b): Contd.

F-levels	Varieties	RANCHI						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Test weight (g)	Days 50% flowering	Filled grains/panicle (No.)	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: Low input (50% NPK)	V1	3.59	28	227	25.9	84	81	
	V2	3.67	24	235	26.0	86	83	
	V3	3.80	16	252	25.7	88	86	
	V4	3.72	20	239	25.6	90	84	
	V5	3.70	21	236	26.3	88	84	
	V6	3.58	29	229	25.5	87	79	
	V7	3.88	11	256	25.5	89	102	
	V8	3.51	31	225	24.3	85	79	
	V9	3.73	19	239	26.8	87	98	
	V10	3.67	24	235	24.4	86	83	
	V11	3.65	26	233	25.2	83	83	
	V12	3.47	33	222	24.3	85	78	
	V13	3.33	34	213	25.6	86	76	
	V14	3.69	23	238	24.3	88	83	
	V15	3.70	21	237	25.3	68	84	
	V16	3.53	30	226	25.7	86	80	
	V17	3.48	32	223	24.2	73	77	
F2: Optimum input (100% NPK)	V1	3.93	10	254	26.2	88	89	4.53
	V2	4.12	4	264	26.6	91	93	6.00
	V3	4.25	1	274	25.8	92	96	6.00
	V4	4.07	6	261	25.8	95	92	4.67
	V5	4.05	8	257	26.4	92	92	4.67
	V6	3.83	13	245	27.1	90	87	3.33
	V7	3.88	11	268	25.8	93	94	0.00
	V8	3.78	17	265	24.3	88	85	3.60
	V9	4.17	3	264	26.9	90	94	5.87
	V10	4.07	6	262	24.5	90	92	5.33
	V11	4.00	9	256	25.4	86	90	4.67
	V12	3.83	13	245	24.4	88	87	4.80
	V13	3.65	26	235	25.7	90	83	4.27
	V14	4.11	5	264	24.7	92	93	5.60
	V15	4.23	2	272	25.7	72	96	7.07
	V16	3.82	15	245	25.9	91	86	3.87
	V17	3.75	18	241	24.3	76	85	3.60
Interaction								
F at same V		NS		NS	NS	0.61	NS	
V at same F		NS		NS	NS	0.6	NS	
F1		3.63	2	233	25.33	85	84	
F2		3.97	1	257	25.62	88	90	4.58
C.D.(0.05)		0.24		15.42	NS	0.17	3.58	
C.V.(%)		7.36		7.38	1.82	0.23	4.83	

Table 4.1(b): Contd.

N-levels	Varieties	RANCHI						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Test weight (g)	Days 50% flowering	Filled grains/panicle (No.)	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties:								
	V1	3.76	11	241	26.03	86	85	4.53
	V2	3.90	6	250	26.31	89	88	6.00
	V3	4.03	1	263	25.76	90	91	6.00
	V4	3.90	5	250	25.69	93	88	4.67
	V5	3.88	8	247	26.30	90	88	4.67
	V6	3.71	12	237	26.31	88	83	3.33
	V7	3.88	7	262	25.67	91	98	0.00
	V8	3.65	15	245	24.30	87	82	3.60
	V9	3.95	3	252	26.87	89	96	5.87
	V10	3.87	9	248	24.43	88	88	5.33
	V11	3.83	10	245	25.32	85	87	4.67
	V12	3.65	14	234	24.35	87	83	4.80
	V13	3.49	17	224	25.67	88	79	4.27
	V14	3.90	4	251	24.51	90	88	5.60
	V15	3.97	2	254	25.50	70	90	7.07
	V16	3.68	13	236	25.81	88	83	3.87
	V17	3.62	16	232	24.24	75	81	3.60
	C.D.(0.05)	NS		NS	0.48	0.43	7.25	
	C.V. (%)	10.16		9.02	1.64	0.43	7.3	
	Expt. Mean	3.80		245	25.55	87.31	87	
	Soil type	-						
	pH	5.90						
	N - levels (kg/ha)							
	F1	40:20:15						
	F2	80:40:30						
	Recommended N:P:K (kg/ha)	80:40:30						
	Varieties							
	V1	IET 30641						
	V2	IET 30651						
	V3	IET 30636						
	V4	IET 30565						
	V5	IET 30555						
	V6	IET 30561						
	V7	IET 30657						
	V8	IET 30642						
	V9	IET 30656						
	V10	IET 30669						
	V11	IET 30690						
	V12	CO-51 (NC)						
	V13	PR 124 (N)						
	V14	Narendra 97(E)						
	V15	Luit (NE)						
	V16	MTU 1153 (S)						
	V17	Local Check - BVD111(100 days)						
	Available N:P:K of soil (kg/ha)	-						

Table 4.1(b): Contd.

F-levels	Varieties	REWA						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test weight (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: Low input (50% NPK)	V1	4.31	11	320	2.57	22.2	95	
	V2	2.88	26	299	3.15	22.3	92	
	V3	4.25	12	288	3.17	23.0	102	
	V4	2.59	27	299	2.50	23.8	93	
	V5	3.25	24	256	3.43	24.0	87	
	V6	4.17	15	288	2.63	25.1	96	
	V7	4.35	9	256	2.43	23.1	95	
	V8	4.23	14	288	2.37	21.8	97	
	V9	3.47	23	299	2.50	21.6	99	
	V10	2.28	30	288	2.57	25.3	97	
	V11	4.15	16	288	3.40	25.1	96	
	V12	2.40	29	277	2.83	25.1	88	
	V13	3.54	22	288	3.63	22.9	91	
	V14	1.11	33	309	2.80	25.2	82	
	V15	0.87	34	320	2.37	25.2	89	
	V16	4.90	5	277	3.77	24.6	99	
	V17	4.85	6	309	4.43	23.7	95	
F2: Optimum input (100% NPK)	V1	5.64	1	288	2.63	24.7	95	17.73
	V2	3.92	19	277	3.47	25.3	91	13.87
	V3	5.07	4	256	3.80	25.7	99	10.93
	V4	2.92	25	277	2.90	25.8	91	4.40
	V5	3.77	20	277	3.83	25.7	87	6.93
	V6	4.77	7	299	3.03	26.4	95	8.00
	V7	4.32	10	256	2.83	24.1	92	-0.40
	V8	4.37	8	320	2.87	22.7	97	1.87
	V9	3.72	21	320	2.73	22.5	97	3.33
	V10	4.25	12	320	2.77	27.3	97	26.27
	V11	3.98	18	288	3.63	27.1	95	-2.27
	V12	2.53	28	341	3.00	26.4	86	1.73
	V13	4.14	17	256	3.90	24.6	89	8.00
	V14	1.51	31	299	3.20	26.0	80	5.33
	V15	1.51	31	256	2.80	26.4	85	8.53
	V16	5.47	3	256	4.30	25.6	96	7.60
	V17	5.61	2	299	4.77	24.7	96	10.13
Interaction								
<i>F at same V</i>		NS		NS	NS	NS	1.51	
<i>V at same F</i>		NS		NS	NS	NS	1.59	
F1		3.39	2	291	2.97	23.77	94	
F2		3.97	1	287	3.32	25.36	92	7.76
<i>C.D.(0.05)</i>		0.5		NS	0.06	0.2	0.81	
<i>C.V.(%)</i>		16.09		13.14	2.25	0.96	1.03	

Table 4.1(b): Contd.

N-levels	Varieties	REWA						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test weight (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties:								
	V1	4.98	3	304	2.60	23.47	95	17.73
	V2	3.40	12	288		23.80	92	13.87
	V3	4.66	4	272	3.49	24.34	101	10.93
	V4	2.76	14	288	2.70	24.83	92	4.40
	V5	3.51	11	267	3.63	24.84	87	6.93
	V6	4.47	5	293	2.83	25.77	95	8.00
	V7	4.34	6	256	2.63	23.63	94	-0.40
	V8	4.30	7	304	2.62	22.25	97	1.87
	V9	3.60	10	309	2.62	22.05	98	3.33
	V10	3.27	13	304	2.67	26.27	97	26.27
	V11	4.07	8	288	3.52	26.13	96	-2.27
	V12	2.47	15	309	2.92	25.74	87	1.73
	V13	3.84	9	272	3.77	23.77	90	8.00
	V14	1.31	16	304	3.00	25.59	81	5.33
	V15	1.19	17	288	2.59	25.82	87	8.53
	V16	5.19	2	267	4.04	25.10	98	7.60
	V17	5.23	1	304	4.60	24.23	96	10.13
	C.D.(0.05)	0.67		33.33	0.21	0.96	1.07	
	C.V. (%)	15.83		10.08	5.72	3.42	1	
	Expt. Mean	3.68		289	3.14	24.59	92.93	
	Soil type	-						
	pH	5.90						
	N - levels (kg/ha)							
	F1	40:20:15						
	F2	80:40:30						
	Recommended N:P:K (kg/ha)	80:40:30						
	Varieties							
	V1	IET 30641						
	V2	IET 30651						
	V3	IET 30636						
	V4	IET 30565						
	V5	IET 30555						
	V6	IET 30561						
	V7	IET 30657						
	V8	IET 30642						
	V9	IET 30656						
	V10	IET 30669						
	V11	IET 30690						
	V12	CO-51 (NC)						
	V13	PR 124 (N)						
	V14	Narendra 97(E)						
	V15	Luit (NE)						
	V16	MTU 1153 (S)						
	V17	Local						
	Check	Check						
	Available N:P:K of soil (kg/ha)	-						

Table 4.1(b): Contd.

F-levels	Varieties	SABOUR					
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Test weight (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: Low input (50% NPK)	V1	4.28	25	205	21.5	81	
	V2	4.45	20	200	24.2	84	
	V3	4.39	21	217	32.2	83	
	V4	5.25	8	267	46.7	85	
	V5	4.69	18	274	28.8	86	
	V6	5.18	9	203	26.8	84	
	V7	4.82	16	212	24.7	83	
	V8	5.32	7	254	20.5	84	
	V9	4.72	17	256	27.5	82	
	V10	4.95	14	280	29.2	85	
	V11	5.12	10	156	22.0	83	
	V12	4.05	27	202	21.2	83	
	V13	3.16	32	218	23.7	85	
	V14	3.12	33	196	23.2	85	
	V15	3.06	34	174	22.5	83	
	V16	3.92	28	202	22.0	83	
	V17	4.06	26	187	23.3	83	
F2: Optimum input (100% NPK)	V1	4.39	21	227	24.3	81	1.37
	V2	5.07	13	225	25.2	84	7.75
	V3	4.95	14	283	33.5	83	7.00
	V4	5.99	1	298	49.8	85	9.25
	V5	5.12	10	305	30.0	86	5.38
	V6	5.78	2	255	28.2	85	7.50
	V7	5.12	10	239	25.5	82	3.75
	V8	5.72	4	284	21.3	85	5.00
	V9	5.42	6	290	29.3	82	8.75
	V10	5.76	3	281	30.5	85	10.13
	V11	5.72	4	236	23.2	82	7.50
	V12	4.32	23	278	24.3	83	3.38
	V13	3.68	30	271	26.2	84	6.50
	V14	3.88	29	263	24.2	85	9.50
	V15	3.52	31	238	24.0	83	5.75
	V16	4.32	23	238	23.2	83	5.00
	V17	4.55	19	200	24.8	84	6.13
Interaction							
<i>F at same V</i>		NS		23.89	NS	NS	
<i>V at same F</i>		NS		26.34	NS	NS	
F1		4.38	2	218	25.87	84	
F2		4.90	1	259	27.50	84	6.45
<i>C.D.(0.05)</i>		0.39		24.47	1.4	NS	
<i>C.V.(%)</i>		9.95		12.03	6.18	0.54	

Table 4.1(b): Contd.

N-levels	Varieties	SABOUR					
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Test weight (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties:							
	V1	4.34	11	216	22.92	81	1.37
	V2	4.76	9	213	24.67	84	7.75
	V3	4.67	10	250	32.84	83	7.00
	V4	5.62	1	283	48.25	85	9.25
	V5	4.91	8	290	29.42	86	5.38
	V6	5.48	3	229	27.50	85	7.50
	V7	4.97	7	226	25.09	83	3.75
	V8	5.52	2	269	20.92	84	5.00
	V9	5.07	6	273	28.42	82	8.75
	V10	5.36	5	281	29.84	85	10.13
	V11	5.42	4	196	22.59	83	7.50
	V12	4.19	13	240	22.75	83	3.38
	V13	3.42	16	245	24.92	85	6.50
	V14	3.50	15	229	23.67	85	9.50
	V15	3.29	17	206	23.25	83	5.75
	V16	4.12	14	220	22.59	83	5.00
	V17	4.31	12	193	24.08	84	6.13
	C.D.(0.05)	0.68		38.21	2.57	0.64	
	C.V. (%)	12.73		14	8.44	0.67	
	Expt. Mean	4.64		239	26.69	84	
	Soil type	-					
	pH	7.60					
	N - levels (kg/ha)						
	F1	50:20:10					
	F2	100:40:20					
	Recommended N:P:K (kg/ha)	100:40:20					
	Varieties						
	V1	IET 30641					
	V2	IET 30651					
	V3	IET 30636					
	V4	IET 30565					
	V5	IET 30555					
	V6	IET 30561					
	V7	IET 30657					
	V8	IET 30642					
	V9	IET 30656					
	V10	IET 30669					
	V11	IET 30690					
	V12	CO-51 (NC)					
	V13	PR 124 (N)					
	V14	Narendra 97(E)					
	V15	Luit (NE)					
	V16	MTU 1153 (S)					
	V17	Local Check - Harshit					
	Available N:P:K of soil (kg/ha)	161:27:197					

Table 4.1(b): Contd.

F-levels	Varieties	VARANASI							Over all mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test weight (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)		
F1: Low input (50% NPK)	V1	4.67	5	183	3.50	32.5	99		4.40	20
	V2	4.23	10	190	3.25	32.3	96		3.77	32
	V3	4.66	6	163	3.80	29.2	97		4.30	26
	V4	3.11	28	166	3.80	29.3	102		4.50	15
	V5	4.02	14	191	3.23	31.2	102		4.33	21
	V6	3.52	22	173	3.77	35.7	103		4.44	18
	V7	3.24	27	158	3.37	26.2	101		4.48	16
	V8	3.71	19	145	3.27	30.7	96		4.41	19
	V9	4.54	7	174	3.27	31.6	96		4.30	25
	V10	4.18	11	176	3.47	28.4	99		4.32	23
	V11	3.52	22	195	3.43	30.5	98		4.55	14
	V12	2.38	31	190	1.83	23.3	88		3.83	31
	V13	3.25	26	131	3.10	31.3	96		4.06	28
	V14	2.29	32	291	1.17	28.8	81		3.22	34
	V15	2.06	34	144	2.20	30.1	79		3.41	33
	V16	3.75	18	138	3.23	28.7	101		4.31	24
	V17	3.71	19	180	3.35	29.5	101		4.24	27
F2: Optimum input (100% NPK)	V1	5.47	1	141	3.10	30.9	99	7.62	5.23	2
	V2	4.69	4	152	3.10	30.6	96	4.38	4.48	17
	V3	5.43	2	153	3.93	29.0	98	7.33	5.06	9
	V4	3.26	25	181	3.77	29.6	103	1.43	5.17	4
	V5	3.83	17	120	3.63	30.5	103	-1.81	5.08	7
	V6	2.88	29	133	3.33	38.6	103	-6.10	5.08	8
	V7	3.96	16	140	3.00	27.4	103	6.86	5.01	10
	V8	3.97	15	151	2.77	30.7	96	2.48	5.13	5
	V9	4.08	12	145	3.53	30.0	98	-4.38	4.97	12
	V10	4.07	13	152	3.80	28.9	99	-1.05	5.20	3
	V11	4.38	9	154	2.70	35.3	58	8.19	5.36	1
	V12	3.54	21	193	1.83	24.5	89	11.05	4.32	22
	V13	3.30	24	134	3.27	34.0	96	0.48	4.76	13
	V14	2.72	30	196	1.30	29.2	81	4.10	3.88	30
	V15	2.22	-	145	1.67	29.5	78	1.52	3.91	29
	V16	4.54	7	175	2.70	28.4	104	7.52	5.00	11
	V17	5.43	2	182	2.93	28.0	105	16.38	5.10	6
Interaction										
F at same V		0.86		32.54	0.45	1.81	9.86			
V at same F		1.06		51.77	0.45	1.89	10.17			
F1		3.58	2	176	3.12	29.95	96		4.16	2
F2		3.99	1	156	2.96	30.29	95	3.88	4.86	1
C.D.(0.05)		NS		NS	1.39	NS	NS			
C.V.(%)		25.81		37.57	5.37	3.51	5.5			

Table 4.1(b): Contd.

N-levels	Varieties	VARANASI							Over all mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/ m ² (No.)	Panicle Weight (g)	Test weight (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)		
Mean of varieties:										
V1		5.07	1	162	3.30	31.68	99	7.62	4.82	3
V2		4.46	4	171	3.18	31.43	96	4.38	4.12	14
V3		5.05	2	158	3.87	29.08	98	7.33	4.68	9
V4		3.19	14	173	3.78	29.43	103	1.43	4.84	2
V5		3.93	9	155	3.43	30.86	103	-1.81	4.71	8
V6		3.20	13	153	3.55	37.16	103	-6.10	4.76	5
V7		3.60	11	149	3.18	26.79	102	6.86	4.75	7
V8		3.84	10	148	3.02	30.69	96	2.48	4.77	4
V9		4.31	5	160	3.40	30.79	97	-4.38	4.64	12
V10		4.13	7	164	3.63	28.66	99	-1.05	4.76	6
V11		3.95	8	174	3.07	32.87	78	8.19	4.96	1
V12		2.96	15	192	1.83	23.91	89	11.05	4.08	15
V13		3.28	12	132	3.18	32.61	96	0.48	4.41	13
V14		2.51	16	243	1.23	29.03	81	4.10	3.55	17
V15		2.14	17	144	1.93	29.77	79	1.52	3.66	16
V16		4.15	6	157	2.97	28.58	103	7.52	4.65	11
V17		4.57	3	181	3.14	28.76	103	16.38	4.67	10
C.D.(0.05)		0.61		23.01	3.19	1.28	6.97			
C.V. (%)		14.09		12.15	9.18	3.72	6.39			
Expt. Mean		3.78		166	3.04	30.12	95		4.51	
Soil type		-								
pH		7.20								
N - levels (kg/ha)										
F1		60:25:20								
F2		120:50:40								
Recommended N:P:K (kg/ha)		120:50:40								
Varieties										
V1		IET 30641								
V2		IET 30651								
V3		IET 30636								
V4		IET 30565								
V5		IET 30555								
V6		IET 30561								
V7		IET 30657								
V8		IET 30642								
V9		IET 30656								
V10		IET 30669								
V11		IET 30690								
V12		CO-51 (NC)								
V13		PR 124 (N)								
V14		Narendra 97(E)								
V15		Luit (NE)								
V16		MTU 1153 (S)								
V17		Local Check - HUR 1304								
Available N:P:K of soil (kg/ha)		-								

4.1(c) AVT 2 - Irrigated Medium Early

AVT-2 IME cultures (IET 30704, IET 30574, IET 30575, IET 30577, IET 30587, IET 30593, IET 30573, IET 30756, IET 30578, IET 30589, IET 30579, IET 30576, IET 32043 and (GEL) IET 30245 (NIL) a total of fourteen cultures were evaluated at 17 locations viz., **Aduthurai (150:60:60), Chinsurah (70:35:35), Dhangain (120:60:40), Faizabad (120:60:40), Gangavathi (150:75:75), Ghaghrahat (120:60:60), Kanpur (120:60:60), Karjat (100:50:50), Kota (120:60:40), Mandya (100:50:50), Maruteru (90:60:60), Moncompu (120:60:40), Navsari (100:30:0), Nawagam (100:25:0), Puducherry (120:40:40), Rajendranagar (120:60:40), Varanasi (120:60:40) and Warangal (120:60:40)** in comparison to high yielding standard checks (US-312, Krishnahamsa and Local checks respective local checks) under two recommended dose of fertilizers (50% and 100% RDF). The details and data received from these locations are summarized and presented in **Table 4.1(c)**.

Application of different nutrient levels significantly influenced the grain yield at all the locations except at **Ghaghrahat, Navasari and Varanasi** only. Application of 100% RDF recorded significantly higher grain yield at **Aduthurai (6.67t/ha), Chinsurah (5.37 t/ha), Dhangain (5.74 t/ha), Faizabad (4.58 t/ha), Gangavathi (3.63 t/ha), Karjat (4.04 t/ha), Kota (7.01 t/ha), Mandya (6.08 t/ha), Maruteru (4.96 t/ha), Moncompu (4.61 t/ha), Navsari (4.49 t/ha), Nawagam (4.74 t/ha), Puducherry (5.52 t/ha), Rajendranagar (5.99 t/ha) and Warangal (8.60t/ha)** with mean grain yield increase of 21% over 50% of RDF application. Nutrient response (kg grain/kg nutrient) was found to be higher (>5 kg grain / kg Nutrient) with the application of 100% RDF (11 out of 17 locations at **Aduthurai (17.09), Chinsurah (19.05), Dhangain (10.7), Faizabad (10.76), Kota (9.61), Mandya (9.34), Moncompu (18.55), Nawagam (5.07), Puducherry (9.80), Rajendranagar (18.89), and Warangal (9.01)** as compared to other locations.

Grain yield differences among the tested varieties were found to be significant at all the locations except Ghaghrahat having average yield of 3.43 t/ha. Highest grain yield was recorded with IET 30578, at **Aduthurai (7.00 t/ha)**; and at **Chinsurah (5.77 t/ha)**; at **Faizabad (6.07 t/ha)**; at **Kota (8.14)**; at **Maruteru (7.54 t/ha)**; followed by IET 30579 at **Dhangain (6.23 t/ha)**; and at **Mandya (6.72 t/ha)**; were found promising cultures interms of grain yield and yield attributing characters. Interaction effect among RDF x varieties was found to be significant at all the locations except at **Dhangain, Gangavathi, Ghaghrahat, Karjat, Kota, Moncompu, Navasari and Nawagam** where in 50% RDF gave on par yields of cultures as compared to 100% RDF.

In this trial, mean over the locations, nutrient management with 100% RDF application recorded better yield over 50% RDF at all the locations with 21% higher grain yield. Among the cultures, IET 30578 (5.54 t/ha), IET 30574 (5.41 t/ha), IET 30589 (5.20 t/ha), and IET 30579 (5.14 t/ha) performed better and recorded higher mean grain yield across the locations as compared to other test entries and checks.

Table 4.1(c): Summary of data on grain yield and ancillary characters of selected AVT -2 IME cultures grown under transplanted conditions at low and optimum levels level of recommended fertilizer doses, kharif 2024.

F-levels	Varieties	ADUTHURAI						CHINSURAH					
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test wt(g)	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)	Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: low input (50% NPK)	V1	4.58	27	247.67	3.48	19.47		3.34	33	280.00	2.63	91.00	
	V2	5.19	21	264.67	4.52	18.53		5.23	10	296.00	3.15	88.33	
	V3	4.58	27	253.33	4.19	19.30		4.88	17	296.00	3.29	92.00	
	V4	4.75	24	264.33	2.55	16.53		3.85	31	278.00	2.74	91.33	
	V5	3.83	34	264.67	2.59	16.37		4.36	28	228.00	2.69	91.33	
	V6	4.08	32	262.00	3.18	18.60		4.62	23	302.00	3.11	94.00	
	V7	-		-	-	-		-		-	-	-	
	V8	4.03	33	258.67	3.55	19.40		2.96	36	230.33	2.46	94.00	
	V9	5.36	20	263.00	4.32	19.43		5.07	11	300.33	3.09	91.33	
	V10	4.83	22	246.33	5.58	20.67		4.92	16	285.00	3.55	88.33	
	V11	4.78	23	269.67	3.12	18.60		4.45	24	290.33	2.71	88.00	
	V12	3.83	34	247.67	3.11	17.63		4.14	29	275.33	2.65	87.67	
	V13	4.71	25	238.67	4.06	19.77		3.25	34	250.00	1.77	87.67	
	V14	4.54	29	255.67	2.08	16.30		3.59	32	264.00	2.74	94.00	
	V15	4.33	30	247.33	4.39	19.60		2.72	38	233.00	2.46	94.33	
	V16	3.63	36	241.33	4.08	19.53		2.77	37	250.00	2.47	104.00	
	V17	4.33	30	242.33	2.35	15.87		4.45	24	296.33	2.83	89.33	
	V18	-		-	-	-		-		-	-	-	
	V19	-		-	-	-		-		-	-	-	
	V20	-		-	-	-		4.82	19	305.00	2.94	94.00	
	V21	4.63	26	254.67	2.53	15.63		2.97	35	260.00	2.56	91.33	
	V22	5.67	19	265.00	5.21	21.47		3.94	30	282.00	2.50	94.33	
F2: Optimum input (100% NPK)	V1	6.58	8	271.67	3.72	20.47	16.00	5.82	6	293.33	3.04	91.00	35.43
	V2	6.33	13	288.00	5.00	19.10	9.12	5.72	8	350.00	3.64	89.33	7.00
	V3	5.79	17	273.33	4.52	20.50	9.68	6.34	3	350.33	3.63	94.00	20.86
	V4	7.04	4	288.67	2.63	17.63	18.32	5.86	5	311.33	3.03	94.33	28.71
	V5	6.83	6	281.33	2.80	17.50	24.00	4.85	18	348.33	2.90	94.33	7.00
	V6	6.54	10	282.67	3.59	19.43	19.68	5.92	4	315.33	3.19	94.00	18.57
	V7	-		-	-	-		-		-	-	-	
	V8	5.79	17	275.33	3.78	20.70	14.08	4.44	26	265.00	2.68	94.00	21.14
	V9	8.63	1	290.67	4.82	20.60	26.16	6.46	1	354.33	3.22	91.33	19.86
	V10	6.42	12	268.33	6.00	21.67	12.72	6.42	2	363.00	3.62	94.00	21.43
	V11	6.58	8	285.33	3.55	19.70	14.40	4.96	14	303.00	2.93	91.00	7.29
	V12	6.33	13	270.67	3.59	18.40	20.00	4.68	21	280.33	2.92	87.67	7.71
	V13	6.83	6	259.00	4.42	20.80	16.96	4.66	22	272.00	3.50	87.67	20.14
	V14	6.33	13	273.33	2.35	17.43	14.32	4.76	20	280.00	2.81	94.00	16.71
	V15	6.91	5	272.67	4.83	20.83	20.64	4.40	27	248.00	2.53	98.33	24.00
	V16	6.08	16	263.00	4.38	21.63	19.60	4.95	15	268.00	2.74	107.00	31.14
	V17	6.54	10	268.00	2.62	16.80	17.68	5.48	9	305.33	2.98	96.00	14.71
	V18	-		-	-	-		-		-	-	-	
	V19	-		-	-	-		-		-	-	-	
	V20	-		-	-	-		5.82	6	325.00	3.39	94.00	14.29
	V21	7.08	3	270.33	2.70	16.63	19.60	5.05	13	270.33	2.72	91.33	29.71
	V22	7.50	2	287.00	5.70	22.67	14.64	5.07	11	291.00	3.11	94.33	16.14
Interaction													
N at same V		0.7		NS	0.15	0.33		0.2		11.97	0.12	NS	
V at same N		0.64		NS	0.15	0.34		0.2		11.69	0.12	NS	
Means of F levels:													
F1		4.54	2	255	3.61	18.48		4.02	2	274	2.75	92	
F2		6.67	1	276	3.94	19.58	17.09	5.35	1	305	3.08	94	19.05
C.D.(0.05)		0.4		4.15	0.08	0.1		0.05		1.31	0.01	0.08	
C.V.(%)		8.72		1.89	2.41	0.61		1.2		0.56	0.57	0.1	

Table 4.1(c): Contd.

Table 4.1(c). Contd.													
F- levels	Varieties	ADUTHURAI						CHINSURAH					
		Grain Yield (t/ha)	Rank	Panicle/ m ² (No.)	Panicle Weight (g)	Test wt(g)	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)	Grain Yield (t/ha)	Rank	Panicle /m ² (No.)	Panicle Weight (g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties													
	V1	5.58	10	260	3.60	19.97	16.00	4.58	11	287	2.84	91	35.43
	V2	5.76	6	276	4.76	18.82	9.12	5.48	4	323	3.40	89	7.00
	V3	5.19	15	263	4.36	19.90	9.68	5.61	3	323	3.46	93	20.86
	V4	5.90	3	277	2.59	17.08	18.32	4.86	8	295	2.89	93	28.71
	V5	5.33	13	273	2.70	16.94	24.00	4.61	10	288	2.80	93	7.00
	V6	5.31	14	272	3.39	19.02	19.68	5.27	6	309	3.15	94	18.57
	V7	-	-	-	-	-	-	-	-	-	-	-	-
	V8	4.91	17	267	3.67	20.05	14.08	3.70	18	248	2.57	94	21.14
	V9	7.00	1	277	4.57	20.02	26.16	5.77	1	327	3.16	91	19.86
	V10	5.63	8	257	5.79	21.17	12.72	5.67	2	324	3.59	91	21.43
	V11	5.68	7	278	3.34	19.15	14.40	4.71	9	297	2.82	90	7.29
	V12	5.08	16	259	3.35	18.02	20.00	4.41	13	278	2.79	88	7.71
	V13	5.77	5	249	4.24	20.29	16.96	3.96	16	261	2.64	88	20.14
	V14	5.44	11	265	2.22	16.87	14.32	4.18	14	272	2.78	94	16.71
	V15	5.62	9	260	4.61	20.22	20.64	3.56	19	241	2.50	96	24.00
	V16	4.86	18	252	4.23	20.58	19.60	3.86	17	259	2.61	106	31.14
	V17	5.44	11	255	2.49	16.34	17.68	4.97	7	301	2.91	93	14.71
	V18	-	-	-	-	-	0.00	-	-	-	-	-	-
	V19	-	-	-	-	-	0.00	-	-	-	-	-	-
	V20	-	-	-	-	-	0.00	5.32	5	315	3.17	94	14.29
	V21	5.86	4	263	2.62	16.13	19.60	4.01	15	265	2.64	91	29.71
	V22	6.59	2	276	5.46	22.07	14.64	4.51	12	287	2.81	94	16.14
	C.D.(0.05)	0.45		7.55	0.1	0.24		0.14		8.46	0.09	2.73	
	C.V.(%)	7.04		2.47	2.39	1.08		2.6		2.54	2.54	2.56	
	Expt. Mean	5.61		265	3.77	19.03		4.68		289	2.92	93	
	Soil type	Clay soil						Clay loam					
	pH	7.22						7.20					
F - levels (kg/ha)													
	F1	75:25:25						35:17.5:17.5					
	F2	150:50:50						70:35:35					
	Recmnd N:P:K	150:50:50						70:35:35					
Varieties													
	V1	IET 30704						IET 30704					
	V2	IET 30574						IET 30574					
	V3	IET 30575						IET 30575					
	V4	IET 30577						IET 30577					
	V5	IET 30587						IET 30587					
	V6	IET 30593						IET 30593					
	V7	-						-					
	V8	IET 30756						IET 30756					
	V9	IET 30578						IET 30578					
	V10	IET 30589						IET 30589					
	V11	IET 30579						IET 30579					
	V12	IET 30576						IET 30576					
	V13	IET 32043 (GEL)						IET 32043 (GEL)					
	V14	IET 32045 (NIL)						IET 32045 (NIL)					
	V15	Gontra Bidhan-3 (NC);						Gontra Bidhan-3 (NC);					
	V16	PR 113 (N),						PR 113 (N),					
	V17	Lalat (E & NE),						Lalat (E & NE),					
	V18	-						-					
	V19	-						-					
	V20	-						US 312,					
	V21	Krishna Hamsa(RP)						Krishna Hamsa(RP)					
	V22	Local check - ADT 59 (115 days)						Local check - Mukdashree (125-130 days)					
Available N:P:K		282;46;532						-					

Table 4.1(c): Contd.

F-levels	Varieties	DHANGAIN							FAIZABAD						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test wt(g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)	Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test wt(g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: low input (50% NPK)	V1	4.67	24	257.33	4.96	25.07	87.33		3.32	26	210.67	4.27	20.70	89.00	
	V2	5.18	16	279.00	5.79	27.33	88.33		5.28	5	289.00	5.70	38.97	91.00	
	V3	4.87	22	259.67	5.12	25.60	91.33		3.17	30	208.33	3.13	20.50	92.00	
	V4	5.09	18	265.33	5.74	26.20	88.33		3.51	24	237.33	4.43	23.47	87.00	
	V5	4.26	30	252.00	4.22	25.47	87.33		3.72	20	236.00	4.13	25.47	88.67	
	V6	5.32	13	288.00	5.92	24.33	88.33		4.09	16	281.00	4.20	30.57	91.00	
	V7	-	-	-	-	-	-		3.63	22	246.00	4.03	26.73	87.00	
	V8	3.64	35	237.00	3.45	25.27	99.67		3.95	17	223.67	4.50	26.60	84.00	
	V9	3.99	34	244.00	3.82	26.93	93.33		5.04	8	308.33	6.37	35.20	89.00	
	V10	4.98	20	261.67	5.26	30.13	86.33		3.88	19	293.67	5.43	30.90	82.00	
	V11	5.44	11	290.33	6.27	27.80	91.00		3.35	25	218.33	4.27	25.17	88.00	
	V12	4.16	32	246.67	4.19	26.47	87.67		3.18	29	198.33	3.70	19.77	94.00	
	V13	3.41	36	235.67	2.99	25.53	83.67		2.73	35	184.67	2.37	19.17	82.00	
	V14	4.10	33	246.67	4.15	22.13	91.67		3.13	31	177.33	2.97	20.33	89.00	
	V15	4.53	27	254.67	4.84	21.07	84.33		3.32	26	221.00	3.53	25.37	87.00	
	V16	4.66	25	255.67	4.95	30.93	96.67		3.03	32	204.67	2.43	20.33	87.00	
	V17	4.51	28	253.67	4.66	24.40	96.33		2.24	36	160.67	1.77	16.07	86.00	
	V18	-	-	-	-	-	-		2.24	36	168.00	2.20	17.57	86.00	
	V19	-	-	-	-	-	-		-	-	-	-	-	-	
	V20	-	-	-	-	-	-		-	-	-	-	-	-	
	V21	4.32	29	253.33	4.56	22.00	87.67		-	-	-	-	-	-	
	V22	5.02	19	263.00	5.37	19.53	98.33		1.69	38	115.33	2.33	19.97	93.00	
F2: Optimum input (100% NPK)	V1	6.02	8	268.33	5.12	25.40	88.33	12.27	4.73	11	251.33	4.77	21.17	93.00	12.82
	V2	6.72	4	281.00	5.99	28.60	89.33	14.00	6.33	2	346.67	6.17	29.67	92.00	9.55
	V3	6.07	7	268.33	5.50	26.53	89.00	10.91	4.30	14	243.67	3.13	21.70	92.00	10.27
	V4	6.54	5	274.00	5.94	26.40	89.33	13.18	4.90	9	288.67	4.43	22.57	87.00	12.64
	V5	5.19	15	254.33	3.61	26.73	88.33	8.45	5.27	6	281.33	4.97	24.87	93.67	14.09
	V6	6.84	3	295.00	6.15	24.67	89.33	13.82	5.53	3	352.00	4.80	24.40	96.00	13.09
	V7	-	-	-	-	-	-		5.13	7	280.33	4.70	24.27	91.00	13.64
	V8	4.63	26	244.67	3.55	25.33	101.33	9.00	5.50	4	271.33	4.93	25.63	88.00	14.09
	V9	4.71	23	249.00	3.86	27.27	94.67	6.55	7.10	1	378.00	6.53	26.37	94.00	18.73
	V10	6.30	6	269.67	5.53	30.20	87.67	12.00	4.87	10	338.33	6.20	24.70	88.00	9.00
	V11	7.01	1	297.00	6.62	28.00	92.33	14.27	4.50	13	268.67	4.77	26.07	91.33	10.45
	V12	5.10	17	251.00	4.40	26.73	88.67	8.55	3.93	18	252.00	4.10	24.53	95.67	6.82
	V13	4.19	31	238.00	3.13	26.13	84.67	7.09	4.17	15	210.67	2.83	24.23	86.00	13.09
	V14	4.95	21	251.00	4.23	22.47	92.67	7.73	3.70	21	223.67	3.40	24.10	92.00	5.18
	V15	5.54	10	266.33	5.03	21.27	85.67	9.18	4.60	12	273.33	4.17	24.53	93.00	11.64
	V16	5.83	9	267.33	5.03	31.60	97.33	10.64	3.20	28	215.00	2.50	26.03	97.00	1.55
	V17	5.44	11	265.00	4.89	25.20	97.33	8.45	2.80	34	204.67	2.10	25.70	88.00	5.09
	V18	-	-	-	-	-	-		2.90	33	189.00	1.87	26.40	92.33	6.00
	V19	-	-	-	-	-	-		-	-	-	-	-	-	
	V20	-	-	-	-	-	-		-	-	-	-	-	-	
	V21	5.29	14	255.67	4.66	22.47	88.67	8.82							
	V22	6.98	2	270.67	5.76	20.40	99.33	17.82	3.53	23	125.33	2.5	26.83	97.00	16.73
Interaction															
N at same V		NS		NS	NS	NS	NS		0.25		14.13	0.34	0.73	1.91	
V at same N		NS		NS	NS	NS	NS		0.21		13.93	0.34	0.72	1.8	
Means of F levels:															
F1		4.56	2	258	4.79	25.34	90		3.39	2	220	3.78	24.36	88	
F2		5.74	1	265	4.94	25.86	91	10.71	4.58	1	263	4.15	24.94	92	10.76
C.D.(0.05)		0.05		NS	NS	0.41	NS		0.2		2.88	0.04	0.28	0.98	
C.V.(%)		1.25		6.05	8.86	1.95	1.53		6.07		1.48	1.23	1.4	1.35	

Table 4.1(c): Contd.

F-levels	Varieties	DHANGAIN							FAIZABAD						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test wt(g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)	Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test wt(g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties															
	V1	5.35	8	263	5.04	25.24	88	12.27	4.03	9	231	4.52	20.94	91	12.82
	V2	5.95	4	280	5.89	27.97	89	14.00	5.81	2	318	5.94	34.32	92	9.55
	V3	5.47	7	264	5.31	26.07	90	10.91	3.74	12	226	3.13	21.10	92	10.27
	V4	5.82	5	270	5.84	26.30	89	13.18	4.21	8	263	4.43	23.02	87	12.64
	V5	4.73	13	253	3.92	26.10	88	8.45	4.50	5	259	4.55	25.17	91	14.09
	V6	6.08	2	292	6.04	24.50	89	13.82	4.81	3	317	4.50	27.49	94	13.09
	V7	-		-	-	-	-	-	4.38	6	263	4.37	25.50	89	13.64
	V8	4.14	17	241	3.50	25.30	101	9.00	4.73	4	248	4.72	26.12	86	14.09
	V9	4.35	16	247	3.84	27.10	94	6.55	6.07	1	343	6.45	30.79	92	18.73
	V10	5.64	6	266	5.40	30.17	87	12.00	4.38	7	316	5.82	27.80	85	9.00
	V11	6.23	1	294	6.45	27.90	92	14.27	3.93	11	244	4.52	25.62	90	10.45
	V12	4.63	14	249	4.30	26.60	88	8.55	3.56	13	225	3.90	22.15	95	6.82
	V13	3.80	18	237	3.06	25.83	84	7.09	3.45	14	198	2.60	21.70	84	13.09
	V14	4.53	15	249	4.19	22.30	92	7.73	3.42	15	201	3.19	22.22	91	5.18
	V15	5.04	10	261	4.94	21.17	85	9.18	3.96	10	247	3.85	24.95	90	11.64
	V16	5.25	9	262	4.99	31.27	97	10.64	3.12	16	210	2.47	23.18	92	1.55
	V17	4.98	11	259	4.78	24.80	97	8.45	2.52	19	183	1.94	20.89	87	5.09
	V18	-		-	-	-	-	-	2.57	18	179	2.04	21.99	89	6.00
	V19	-		-	-	-	-	-	-		-	-	-	-	-
	V20	-		-	-	-	-	-	-		-	-	-	-	-
	V21	4.81	12	255	4.61	22.24	88	8.82	-		-	-	-	-	-
	V22	6.00	3	267	5.57	19.97	99	17.82	2.61	17	120	2.42	23.40	95	16.73
	C.D.(0.05)	0.49		21.69	0.71	0.55	1.16		0.15		9.99	0.24	0.51	1.27	
	C.V.(%)	8.19		7.2	12.74	1.88	1.11		3.21		3.59	5.32	1.79	1.23	
	Expt. Mean	5.15		261	4.87	25.60	91		3.99		241	3.96	24.65	90	
	Soil type	Clay loam							Sand 32.2, Silt 48.6 & Clay 16.2						
	pH	6.56							7.40						
F - levels (kg/ha)															
	F1	60:30:20							60:30:30						
	F2	120:60:40							120:60:60						
	Recmnd N:P:K	120:60:40							120:60:60						
	Varieties														
	V1	IET 30704							IET 30704						
	V2	IET 30574							IET 30574						
	V3	IET 30575							IET 30575						
	V4	IET 30577							IET 30577						
	V5	IET 30587							IET 30587						
	V6	IET 30593							IET 30593						
	V7	IET 30573							IET 30573						
	V8	IET 30756							IET 30756						
	V9	IET 30578							IET 30578						
	V10	IET 30589							IET 30589						
	V11	IET 30579							IET 30579						
	V12	IET 30576							IET 30576						
	V13	IET 32043 (GEL)							IET 32043 (GEL)						
	V14	IET 32045 (NIL)							IET 32045 (NIL)						
	V15	Gontra Bidhan-3 (NC);							Gontra Bidhan-3 (NC);						
	V16	PR 113 (N),							PR 113 (N),						
	V17	Lalat (E & NE),							Lalat (E & NE),						
	V18	-							Karjat-7 (W),						
	V19	-							-						
	V20	-							-						
	V21	Krishna Hamsa(RP)							-						
	V22	Local check - Sabor Vijay (125-130 days)							Local check - NDR 2065						
	Available N:P:K	347.5:48.3:262.2							75.4:13.5:22.5						

Table 4.1(c): Contd.

F-levels	Varieties	GANGAVATHI							GHAGHRAGHAT						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test wt(g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)	Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test wt(g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: low input (50% NPK)	V1	3.89	10	231.67	3.46	2.35	88.00		3.77	13	168.00	3.73	21.70	95.33	
	V2	3.62	17	210.33	3.39	2.48	88.00		3.67	19	159.33	3.63	21.80	99.67	
	V3	3.21	25	246.33	3.18	2.69	98.00		3.57	31	171.67	3.77	21.43	91.33	
	V4	4.10	8	292.33	2.91	2.52	94.00		3.50	33	162.67	3.47	21.17	91.67	
	V5	3.72	15	295.33	3.69	2.39	89.00		3.87	6	134.33	3.80	22.80	90.33	
	V6	3.54	18	266.67	2.96	2.52	96.00		3.67	19	148.33	3.47	21.83	92.67	
	V7	-	-	-	-	-	-		3.77	13	170.33	3.87	22.87	91.67	
	V8	2.65	33	222.33	2.59	2.63	96.00		3.77	13	143.00	3.33	21.40	100.00	
	V9	4.00	9	216.67	3.24	2.99	100.00		3.57	31	151.33	3.50	21.87	95.00	
	V10	3.86	11	219.33	3.55	2.69	88.00		3.63	26	133.67	3.73	22.23	99.00	
	V11	3.40	21	249.33	3.30	2.56	98.00		3.67	19	132.67	3.53	21.93	96.33	
	V12	3.49	19	234.33	3.40	2.47	91.00		3.87	6	135.67	3.90	22.33	92.67	
	V13	2.99	29	197.33	2.72	2.53	88.00		3.70	17	137.33	3.27	21.57	91.67	
	V14	2.48	36	251.67	3.25	2.50	93.67		3.80	11	150.67	3.80	22.40	89.67	
	V15	3.31	24	232.33	3.89	2.33	89.00		3.63	26	128.67	3.07	18.73	90.33	
	V16	3.19	26	247.33	2.93	2.80	98.00		-	-	-	-	-	-	
	V17	2.51	35	228.67	2.44	2.41	87.00		3.67	19	145.33	3.57	21.30	91.00	
	V18	2.05	38	195.33	2.61	2.21	89.00		-	-	-	-	-	-	
	V19	-	-	-	-	-	-		-	-	-	-	-	-	
	V20	-	-	-	-	-	-		-	-	-	-	-	-	
	V21	2.63	34	232.33	1.98	2.01	88.00		-	-	-	-	-	-	
	V22	2.93	30	282.33	2.21	1.27	88.00		3.63	26	151.67	3.73	20.47	94.33	
F2: Optimum input (100% NPK)	V1	4.11	7	325.00	3.78	2.36	88.00	1.47	3.67	19	157.33	3.40	23.97	98.00	-0.91
	V2	3.76	14	276.00	3.84	2.58	88.00	0.93	3.63	26	131.67	3.33	23.93	89.00	-0.36
	V3	3.69	16	277.67	3.80	2.62	98.00	3.20	3.67	19	124.33	3.53	22.27	90.67	0.91
	V4	4.24	2	324.00	3.06	2.46	94.00	0.93	3.97	5	151.67	3.60	22.13	83.67	4.27
	V5	4.13	5	315.67	4.20	2.39	89.00	2.73	4.07	1	138.00	3.93	22.63	93.33	1.82
	V6	4.13	5	317.67	3.21	2.44	96.00	3.93	3.87	6	147.33	3.33	22.20	94.33	1.82
	V7	-	-	-	-	-	-		4.03	2	155.33	3.83	23.80	92.33	2.36
	V8	2.89	31	283.33	2.85	2.77	96.00	1.60	3.43	34	150.67	3.40	21.97	97.00	-3.09
	V9	4.33	1	282.33	3.77	2.99	100.00	2.20	3.63	26	141.00	3.70	22.67	94.67	0.55
	V10	4.20	3	298.00	4.45	2.64	88.00	2.27	3.70	17	135.67	3.63	23.17	91.67	0.64
	V11	3.85	12	287.00	3.75	2.42	98.00	3.00	3.83	9	138.33	3.47	23.53	98.33	1.45
	V12	3.79	13	296.33	3.96	2.39	91.00	2.00	4.03	2	138.33	3.80	25.77	92.67	1.45
	V13	3.36	23	293.33	3.10	2.57	88.00	2.47	3.77	13	135.67	3.60	21.63	92.33	0.64
	V14	2.88	32	282.33	3.79	2.43	94.00	2.67	4.03	2	138.33	4.07	26.07	95.00	2.09
	V15	4.20	3	267.33	4.90	1.96	89.00	5.93	3.80	11	143.00	3.97	24.23	92.67	1.55
	V16	3.44	20	260.00	3.39	2.92	98.00	1.67							
	V17	3.17	27	264.67	2.82	2.46	87.00	4.40	3.67	19	164.67	4.03	25.33	92.67	0.00
	V18	2.29	37	221.33	2.84	2.24	89.00	1.60	-	-	-	-	-	-	
	V19	-	-	-	-	-	-		-	-	-	-	-	-	
	V20	-	-	-	-	-	-		-	-	-	-	-	-	
	V21	3.10	28	245.33	2.36	1.89	88.00	3.13	-	-	-	-	-	-	
	V22	3.37	22	289.67	2.82	1.26	88.00	2.93	3.83	9	149.67	3.77	22.40	94.67	1.82
Interaction															
N at same V		NS		NS	NS	NS	NS		NS		NS	0.44	2.16	NS	
V at same N		NS		NS	NS	NS	NS		NS		NS	0.45	1.83	NS	
Means of F levels:															
F1		3.24	2	240	3.04	2.44	92		3.69	2	149	3.60	21.64	94	
F2		3.63	1	285	3.51	2.41	92	2.58	3.80	1	144	3.67	23.39	93	1.00
C.D.(0.05)		0.16		NS	0.24	NS	NS		NS		NS	0.06	1.57	NS	
C.V.(%)		5.93		24.39	9.09	1.66	0.1		12.74		15.51	1.79	8.19	3.61	

Table 4.1(c): Contd.

F- levels	Varieties	GANGAVATHI							GHAGHRAGHAT						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test wt(g)	Days for 50% Floweri ng	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)	Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test wt(g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties															
	V1	4.00	4	278	3.62	2.36	88	1.47	3.72	10	163	3.57	22.84	97	-0.91
	V2	3.69	8	243	3.62	2.53	88	0.93	3.65	14	146	3.48	22.87	94	-0.36
	V3	3.45	11	262	3.49	2.66	98	3.20	3.62	15	148	3.65	21.85	91	0.91
	V4	4.17	1	308	2.99	2.49	94	0.93	3.74	7	157	3.54	21.65	88	4.27
	V5	3.93	5	306	3.95	2.39	89	2.73	3.97	1	136	3.87	22.72	92	1.82
	V6	3.84	6	292	3.09	2.48	96	3.93	3.77	5	148	3.40	22.02	94	1.82
	V7	-		-	-	-	-	-	3.90	4	163	3.85	23.34	92	2.36
	V8	2.77	17	253	2.72	2.70	96	1.60	3.60	16	147	3.37	21.69	99	-3.09
	V9	4.17	2	250	3.51	2.99	100	2.20	3.60	17	146	3.60	22.27	95	0.55
	V10	4.03	3	259	4.00	2.67	88	2.27	3.67	13	135	3.68	22.70	95	0.64
	V11	3.63	10	268	3.53	2.49	98	3.00	3.75	6	136	3.50	22.73	97	1.45
	V12	3.64	9	265	3.68	2.43	91	2.00	3.95	2	137	3.85	24.05	93	1.45
	V13	3.18	13	245	2.91	2.55	88	2.47	3.74	7	137	3.44	21.60	92	0.64
	V14	2.68	18	267	3.52	2.47	94	2.67	3.92	3	145	3.94	24.24	92	2.09
	V15	3.76	7	250	4.40	2.15	89	5.93	3.72	11	136	3.52	21.48	92	1.55
	V16	3.32	12	254	3.16	2.86	98	1.67	-	-	-	-	-	-	-
	V17	2.84	16	247	2.63	2.44	87	4.40	3.67	12	155	3.80	23.32	92	0.00
	V18	2.17	19	208	2.73	2.23	89	1.60	-	-	-	-	-	-	-
	V19	-		-	-	-	-	-	-	-	-	-	-	-	-
	V20	-		-	-	-	-	-	-	-	-	-	-	-	-
	V21	2.87	15	239	2.17	1.95	88	3.13	-	-	-	-	-	-	-
	V22	3.15	14	286	2.52	1.27	88	2.93	3.73	9	151	3.75	21.44	95	1.82
	C.D.(0.05)	0.49		46.68	0.47	0.19	0.11		NS		24.15	0.32	1.3	NS	
	C.V.(%)	12.39		15.48	12.57	6.95	0.1		6.1		14.34	7.63	4.99	5.65	
	Expt. Mean	3.43		262	3.27	2.42			3.75		146	3.63	22.52	93	
	Soil type	Black clay							Sandy Loam						
	pH	8.00							7.40						
F - levels (kg/ha)															
	F1	75:37.5:37.5							60:30:20						
	F2	150:75:75							120:60:40						
	Recmnd N:P:K	150:75:75							120:60:40						
	Varieties														
	V1	IET 30704							IET 30704						
	V2	IET 30574							IET 30574						
	V3	IET 30575							IET 30575						
	V4	IET 30577							IET 30577						
	V5	IET 30587							IET 30587						
	V6	IET 30593							IET 30593						
	V7	-							IET 30573						
	V8	IET 30756							IET 30756						
	V9	IET 30578							IET 30578						
	V10	IET 30589							IET 30589						
	V11	IET 30579							IET 30579						
	V12	IET 30576							IET 30576						
	V13	IET 32043 (GEL)							IET 32043 (GEL)						
	V14	IET 32045 (NIL)							IET 32045 (NIL)						
	V15	Gontra Bidhan-3 (NC);							Gontra Bidhan-3 (NC);						
	V16	PR 113 (N),							-						
	V17	Lalat (E & NE),							Lalat (E & NE),						
	V18	Karjat-7 (W),							-						
	V19	-							-						
	V20	-							-						
	V21	Krishna Hamsa(RP)							Krishna Hamsa(RP)						
	V22	Local check - RNR 15048 (125-130 days)							Local check - NDR 2065						
Available N:P:K		-							200:24:234						

Table 4.1(c): Contd.

F-levels	Varieties	KARJAT							KOTA						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test wt(g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)	Grain Yield (t/ha)	Rank	Panicle /m ² (No.)	Panicle Weight (g)	Test wt(g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: low input (50% NPK)	V1	3.85	18	312	3.98	28.57	89		4.97	31	191	5.89	21.60	82	
	V2	4.71	5	377	5.19	28.63	84		6.80	11	215	6.93	25.31	79	
	V3	3.53	25	306	3.34	32.15	84		5.93	24	217	5.97	25.45	92	
	V4	3.28	31	282	2.67	29.78	87		6.34	18	222	5.15	23.34	87	
	V5	4.33	8	349	4.84	28.93	85		6.08	21	194	5.73	22.31	84	
	V6	4.27	10	347	4.62	24.93	85		5.40	29	218	5.25	22.69	84	
	V7	-	-	-	-	-	-		-	-	-	-	-	-	
	V8	3.33	30	284	2.85	30.51	86		4.53	32	235	4.47	24.06	91	
	V9	3.62	23	308	3.83	30.59	84		7.38	6	256	6.04	27.69	86	
	V10	3.92	16	340	4.12	32.40	82		7.40	5	248	6.89	26.41	84	
	V11	3.55	24	307	3.76	28.74	87		6.95	8	199	6.24	24.36	81	
	V12	3.93	15	342	4.28	30.93	86		6.00	23	211	6.51	22.03	82	
	V13	3.11	33	274	2.57	32.84	86		5.10	30	210	4.47	23.82	79	
	V14	3.41	26	304	3.06	30.35	85		5.62	26	227	5.48	23.24	91	
	V15	4.36	6	373	4.99	26.56	85		5.77	25	245	5.19	19.91	83	
	V16	3.76	20	309	3.86	29.44	90		5.45	28	238	6.03	27.74	92	
	V17	3.18	32	280	2.66	30.84	85		-	-	-	-	-	-	
	V18	-	-	-	-	-	-		-	-	-	-	-	-	
	V19	-	-	-	-	-	-		-	-	-	-	-	-	
	V20	-	-	-	-	-	-		-	-	-	-	-	-	
	V21	2.68	36	273	1.99	27.04	85		5.57	27	258	4.07	20.33	82	
	V22	3.05	35	274	2.33	28.73	82		-	-	-	-	-	-	
F2: Optimum input (100% NPK)	V1	4.21	11	375	4.76	29.34	91	3.60	6.66	13	209	6.13	22.37	83	15.36
	V2	5.22	1	407	5.66	29.49	89	5.10	8.20	2	234	7.44	26.06	80	12.73
	V3	3.91	17	341	4.06	32.92	97	3.80	6.74	12	234	6.35	25.90	92	7.36
	V4	3.67	22	310	3.26	31.09	97	3.90	7.18	7	247	5.49	24.00	88	7.64
	V5	4.78	3	383	5.46	30.67	96	4.50	6.94	9	217	6.07	23.16	84	7.82
	V6	4.75	4	381	5.13	27.91	101	4.80	6.27	20	231	5.61	23.14	85	7.91
	V7	-	-	-	-	-	-		-	-	-	-	-	-	
	V8	3.69	21	310	3.47	31.86	99	3.60	6.06	22	257	5.07	24.69	92	13.91
	V9	3.97	13	345	4.53	32.23	98	3.50	8.90	1	283	6.57	28.28	87	13.82
	V10	4.30	9	377	4.76	32.92	101	3.80	8.18	3	268	7.94	26.83	84	7.09
	V11	3.94	14	342	4.47	30.16	102	3.90	7.97	4	229	6.65	24.82	82	9.27
	V12	4.35	7	378	5.02	32.85	94	4.20	6.88	10	243	6.99	23.42	83	8.00
	V13	3.40	27	305	3.05	33.82	94	2.90	6.45	16	228	4.83	24.21	80	12.27
	V14	3.80	19	341	4.05	31.15	100	3.90	6.36	17	244	5.73	24.11	93	6.73
	V15	4.83	2	402	5.48	28.42	95	4.70	6.60	14	260	5.83	20.81	84	7.55
	V16	4.01	12	345	4.56	30.89	96	2.50	6.31	19	256	6.41	28.12	92	7.82
	V17	3.40	27	308	3.11	32.46	94	2.20	-	-	-	-	-	-	
	V18	-	-	-	-	-	-		-	-	-	-	-	-	
	V19	-	-	-	-	-	-		-	-	-	-	-	-	
	V20	-	-	-	-	-	-		-	-	-	-	-	-	
	V21	3.06	34	281	2.55	29.26	98	3.80	6.51	15	275	4.24	20.88	82	8.55
	V22	3.37	29	284	3.02	29.92	97	3.20	-	-	-	-	-	-	
Interaction															
N at same V		NS		NS	NS	NS	4.13		NS		NS	NS	NS	NS	
V at same N		NS		NS	NS	NS	3.13		NS		NS	NS	NS	NS	
Means of F levels:															
F1		3.66	2	313	3.61	29.55	85		5.96	2	224	5.64	23.77	85	
F2		4.04	1	345	4.24	30.96	97	3.77	7.01	1	245	6.08	24.43	86	9.61
C.D.(0.05)		0.2		NS	0.25	0.91	3.58		0.96		8.18	0.38	NS	NS	
C.V.(%)		6.23		13.59	7.74	3.62	4.75		16.77		3.98	7.44	3.68	1.68	

Table 4.1(c): Contd.

F-levels	Varieties	KARJAT							KOTA						
		Grain Yield (t/ha)	Rank	Panicle /m ² (No.)	Panicle Weight (g)	Test wt(g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)	Grain Yield (t/ha)	Rank	Panic le/m ² (No.)	Panicle Weight (g)	Test wt(g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties		4.03	7	344	4.37	28.96	90	3.60	5.82	14	200	6.01	21.99	82	15.36
	V1	4.97	1	392	5.43	29.06	87	5.10	7.50	3	224	7.19	25.69	80	12.73
	V2	3.72	11	324	3.70	32.54	90	3.80	6.34	8	225	6.16	25.68	92	7.36
	V3	3.48	14	296	2.97	30.44	92	3.90	6.76	5	234	5.32	23.67	88	7.64
	V4	4.56	3	366	5.15	29.80	91	4.50	6.51	6	205	5.90	22.74	84	7.82
	V5	4.51	4	364	4.88	26.42	93	4.80	5.84	13	225	5.43	22.92	85	7.91
	V6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	V7	3.51	13	297	3.16	31.19	93	3.60	5.30	16	246	4.77	24.38	91	13.91
	V8	3.80	9	327	4.18	31.41	91	3.50	8.14	1	270	6.31	27.99	87	13.82
	V9	4.11	6	359	4.44	32.66	92	3.80	7.79	2	258	7.42	26.62	84	7.09
	V10	3.75	10	325	4.12	29.45	94	3.90	7.46	4	214	6.45	24.59	82	9.27
	V11	4.14	5	360	4.65	31.89	90	4.20	6.44	7	227	6.75	22.73	82	8.00
	V12	3.26	16	290	2.81	33.33	90	2.90	5.78	15	219	4.65	24.02	79	12.27
	V13	3.61	12	322	3.56	30.75	93	3.90	5.99	11	236	5.61	23.68	92	6.73
	V14	4.60	2	387	5.24	27.49	90	4.70	6.19	9	252	5.51	20.36	84	7.55
	V15	3.89	8	327	4.21	30.17	93	2.50	5.88	12	247	6.22	27.93	92	7.82
	V16	3.29	15	294	2.89	31.65	90	2.20	-	-	-	-	-	-	-
	V17	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	V18	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	V19	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	V20	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	V21	2.87	18	277	2.27	28.15	91	3.80	6.04	10	267	4.16	20.61	82	8.55
	V22	3.21	17	279	2.68	29.33	90	3.20	-	-	-	-	-	-	-
	C.D.(0.05)	0.54		39.95	0.24	0.84	2.22		0.46		12.49	0.43	0.79	0.69	
	C.V.(%)	12.27		10.53	5.37	2.42	2.11		6.1		4.62	6.36	2.83	0.7	
	Expt. Mean	3.85		329	3.93	30.26	91		6.48		234	5.86	24.10	85	
	Soil type	-							Clay						
	pH	-							7.55						
F - levels (kg/ha)															
	F1	50:25:25							60:30:20						
	F2	100:50:50							120:60:40						
	Recmnd N:P:K	100:50:50							120:60:40						
	Varieties														
	V1	IET 30704							IET 30704						
	V2	IET 30574							IET 30574						
	V3	IET 30575							IET 30575						
	V4	IET 30577							IET 30577						
	V5	IET 30587							IET 30587						
	V6	IET 30593							IET 30593						
	V7	-							-						
	V8	IET 30756							IET 30756						
	V9	IET 30578							IET 30578						
	V10	IET 30589							IET 30589						
	V11	IET 30579							IET 30579						
	V12	IET 30576							IET 30576						
	V13	IET 32043 (GEL)							IET 32043 (GEL)						
	V14	IET 32045 (NIL)							IET 32045 (NIL)						
	V15	Gontra Bidhan-3 (NC);							Gontra Bidhan-3 (NC);						
	V16	PR 113 (N),							PR 113 (N),						
	V17	Lalat (E & NE),							-						
	V18	-							-						
	V19	-							-						
	V20	-							-						
	V21	Krishna Hamsa(RP)							Krishna Hamsa(RP)						
	V22	Local check - KJT 3 (115-120 days)							Local check -						
Available N:P:K		-							210.34:25.6:350.2						

Table 4.1(c): Contd.

F-levels	Varieties	MANDYA							MARUTERU						
		Grain Yield (t/ha)	Rank	Panicle/ m ² (No.)	Panicle Weight (g)	Test wt(g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)	Grain Yield (t/ha)	Rank	Panicle/ m ² (No.)	Panicle Weight (g)	Test wt(g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: low input (50% NPK)	V1	5.03	27	312	4.91	25.16	84		4.60	14	227	23.27	22.83	98	
	V2	5.76	15	294	5.24	26.45	93		5.00	10	276	26.43	24.63	97	
	V3	5.98	13	316	4.45	27.77	99		4.63	13	269	20.70	23.07	98	
	V4	5.62	19	313	3.89	25.63	94		4.14	25	238	24.57	19.77	98	
	V5	6.31	9	318	4.53	25.01	89		4.75	12	275	22.63	15.17	87	
	V6	4.81	30	324	4.41	22.44	90		5.51	8	277	22.88	20.53	98	
	V7	-	-	-	-	-	-		-	-	-	-	-	-	
	V8	3.36	36	312	3.72	28.32	91		3.57	31	210	20.90	21.80	98	
	V9	5.64	18	307	4.63	30.72	100		7.52	2	311	38.90	21.93	88	
	V10	4.52	31	291	5.36	28.78	86		7.24	3	266	36.80	25.23	88	
	V11	6.27	10	306	5.68	25.96	96		3.05	34	217	32.43	22.87	88	
	V12	5.72	16	312	5.94	25.75	97		4.39	20	185	31.67	23.00	98	
	V13	5.36	23	331	4.03	27.14	84		3.55	32	366	27.23	22.77	98	
	V14	4.43	33	316	4.16	26.22	93		3.59	30	251	31.67	23.80	98	
	V15	5.96	14	283	5.47	22.26	94		4.88	11	270	28.37	19.30	98	
	V16	5.00	28	283	4.14	30.17	102		3.26	33	277	35.77	24.13	97	
	V17	4.06	34	299	3.55	26.51	89		4.37	21	319	24.47	24.03	98	
	V18	-	-	-	-	-	-		-	-	-	-	-	-	
	V19	-	-	-	-	-	-		-	-	-	-	-	-	
	V20	-	-	-	-	-	-		-	-	-	-	-	-	
	V21	3.76	35	318	2.56	23.25	87		3.62	29	188	19.33	20.33	98	
	V22	5.06	26	317	2.82	24.37	85		-	-	-	-	-	-	
F2: Optimum input (100% NPK)	V1	7.64	1	328	5.10	24.44	84	26.10	3.73	28	321	29.17	23.90	101	-8.29
	V2	6.43	8	317	5.68	28.34	93	6.70	6.21	5	276	22.70	24.80	100	11.52
	V3	6.16	11	332	4.51	26.88	99	1.80	5.64	7	259	26.33	22.73	99	9.62
	V4	5.67	17	337	3.96	25.88	94	0.50	5.71	6	235	26.80	22.53	99	14.95
	V5	7.04	3	321	4.60	25.63	89	7.30	4.30	24	263	19.03	14.90	99	-4.29
	V6	6.06	12	320	4.45	25.27	90	12.50	5.39	9	264	25.40	20.83	102	-1.14
	V7	-	-	-	-	-	-		-	-	-	-	-	-	
	V8	4.91	29	336	3.79	26.57	91	15.50	3.91	26	215	21.97	23.27	104	3.24
	V9	6.54	6	326	5.21	31.45	100	9.00	7.55	1	313	36.40	22.77	98	0.29
	V10	6.50	7	294	5.42	29.05	86	19.80	6.58	4	226	27.87	25.60	98	-6.29
	V11	7.17	2	321	6.00	26.41	96	9.00	3.87	27	94	31.40	22.83	98	7.81
	V12	7.02	4	323	6.20	25.27	97	13.00	4.49	19	165	22.77	22.83	99	0.95
	V13	5.40	22	351	4.62	27.04	84	0.40	4.55	16	355	31.87	23.37	107	9.52
	V14	5.32	24	321	4.28	27.77	93	8.90	4.37	21	226	32.93	23.60	103	7.43
	V15	6.96	5	326	5.96	22.30	94	10.00	4.55	16	233	30.90	18.97	105	-3.14
	V16	5.26	25	336	4.72	30.69	101	2.60	4.51	18	233	28.57	25.30	104	11.90
	V17	5.42	21	321	4.06	27.43	89	13.60	4.60	14	316	26.17	23.97	104	2.19
	V18	-	-	-	-	-	-		-	-	-	-	-	-	
	V19	-	-	-	-	-	-		-	-	-	-	-	-	
	V20	-	-	-	-	-	-		-	-	-	-	-	-	
	V21	4.50	32	319	3.57	23.21	87	7.40	4.34	23	212	21.20	20.77	103	6.86
	V22	5.47	20	336	2.93	25.70	85	4.10	-	-	-	-	-	-	
Interaction															
N at same V		0.96		NS	NS	NS	NS		0.45		22.5	2.07	1.16	1.78	
V at same N		0.86		NS	NS	NS	NS		0.47		22.34	1.85	1.07	1.79	
Means of F levels:															
F1		5.15	2	308	4.42	26.22	92		4.57	2	260	27.53	22.07	95	
F2		6.08	1	326	4.73	26.63	92	9.34	4.96	1	247	27.15	22.53	101	3.71
C.D.(0.05)		0.61		5.77	NS	NS	NS		0.06		6.14	NS	NS	0.51	
C.V.(%)		13.16		2.2	8.76	7.62	0.21		1.59		2.84	5.73	3.49	0.6	

Table 4.1(c): Contd.

F-levels	Varieties	MANDYA							MARUTERU						
		Grain Yield (t/ha)	Rank	Panicle/ m ² (No.)	Panicle Weight (g)	Test wt(g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)	Grain Yield (t/ha)	Rank	Panicle/ m ² (No.)	Panicle Weight (g)	Test wt(g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties															
	V1	6.34	5	320	5.01	24.80	84	26.10	4.17	11	274	26.22	23.37	99	-8.29
	V2	6.10	6	306	5.46	27.40	93	6.70	5.61	3	276	24.57	24.72	99	11.52
	V3	6.07	8	324	4.48	27.33	99	1.80	5.14	5	264	23.52	22.90	99	9.62
	V4	5.65	9	325	3.93	25.76	94	0.50	4.93	6	237	25.69	21.15	99	14.95
	V5	6.68	2	320	4.57	25.32	89	7.30	4.53	8	269	20.83	15.04	93	-4.29
	V6	5.44	11	322	4.43	23.86	90	12.50	5.45	4	271	24.14	20.68	100	-1.14
	V7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	V8	4.14	17	324	3.76	27.45	91	15.50	3.74	16	213	21.44	22.54	101	3.24
	V9	6.09	7	317	4.92	31.09	100	9.00	7.54	1	312	37.65	22.35	93	0.29
	V10	5.51	10	293	5.39	28.92	86	19.80	6.91	2	246	32.34	25.42	93	-6.29
	V11	6.72	1	314	5.84	26.19	96	9.00	3.46	17	156	31.92	22.85	93	7.81
	V12	6.37	4	318	6.07	25.51	97	13.00	4.44	10	175	27.22	22.92	99	0.95
	V13	5.38	12	341	4.33	27.09	84	0.40	4.05	12	360	29.55	23.07	102	9.52
	V14	4.88	15	319	4.22	27.00	93	8.90	3.98	13	238	32.30	23.70	101	7.43
	V15	6.46	3	305	5.72	22.28	94	10.00	4.72	7	252	29.64	19.14	101	-3.14
	V16	5.13	14	310	4.43	30.43	102	2.60	3.89	15	255	32.17	24.72	101	11.90
	V17	4.74	16	310	3.81	26.97	89	13.60	4.49	9	318	25.32	24.00	101	2.19
	V18	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	V19	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	V20	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	V21	4.13	18	318	3.07	23.23	87	7.40	3.98	13	200	20.27	20.55	100	6.86
	V22	5.27	13	327	2.88	25.04	85	4.10	-	-	-	-	-	-	-
	C.D.(0.05)	0.61		35.19	0.47	1.58	0.16		0.33		15.91	1.31	0.75	1.27	
	C.V.(%)	9.43		9.63	8.87	5.18	0.15		6		5.43	4.15	2.93	1.12	
	Expt. Mean	5.61		317	4.57	26.42	92		4.76		254	27.34	22.30	98	
	Soil type	Red Sandy loam													
	pH	7.68							5.80						
F - levels (kg/ha)															
	F1	50:25:25							45:30:30						
	F2	100:50:50							90:60:60						
	Recmnd N:P:K	100:50:50							90:60:60						
	Varieties														
	V1	IET 30704							IET 30704						
	V2	IET 30574							IET 30574						
	V3	IET 30575							IET 30575						
	V4	IET 30577							IET 30577						
	V5	IET 30587							IET 30587						
	V6	IET 30593							IET 30593						
	V7	-							-						
	V8	IET 30756							IET 30756						
	V9	IET 30578							IET 30578						
	V10	IET 30589							IET 30589						
	V11	IET 30579							IET 30579						
	V12	IET 30576							IET 30576						
	V13	IET 32043 (GEL)							IET 32043 (GEL)						
	V14	IET 32045 (NIL)							IET 32045 (NIL)						
	V15	Gontra Bidhan-3 (NC);							Gontra Bidhan-3 (NC);						
	V16	PR 113 (N),							PR 113 (N),						
	V17	Lalat (E & NE),							Lalat (E & NE),						
	V18	-							-						
	V19	-							-						
	V20	-							-						
	V21	Krishna Hamsa(RP)							Krishna Hamsa(RP)						
	V22	Local check - KMP 225 (120-125 days)							Local check -						
Available N:P:K		261.2:73.60:288.0							119:14.3:273						

Table 4.1(c): Contd.

F-levels	Varieties	MOCOMPU						Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test wt(g)	Days for 50% Flowering	
F1: low input (50% NPK)	V1	2.61	23	231	2.91	23.14	97	
	V2	2.88	18	245	3.11	23.17	97	
	V3	2.52	28	224	2.80	23.05	105	
	V4	2.58	24	231	2.88	23.12	99	
	V5	2.34	33	204	2.61	22.99	98	
	V6	2.83	19	244	3.01	23.17	101	
	V7	2.46	30	223	2.74	23.05	111	
	V8	2.70	21	233	2.96	23.16	105	
	V9	2.77	20	239	2.96	23.17	99	
	V10	2.57	26	231	2.85	23.05	101	
	V11	2.69	22	233	2.91	23.15	98	
	V12	2.22	34	198	2.59	22.94	95	
	V13	2.44	32	210	2.62	23.02	105	
	V14	2.47	29	224	2.83	23.04	94	
	V15	2.45	31	223	2.64	23.02	108	
	V16	2.56	27	223	2.80	23.05	109	
	V17	-		-	-	-	-	
	V18	-		-	-	-	-	
	V19	-		-	-	-	-	
	V20	-		-	-	-	-	
	V21	2.58	24	233	2.90	23.12	98	
	V22	-		-	-	-	-	
F2: Optimum input (100% NPK)	V1	4.75	6	315	3.49	24.68	97	19.45
	V2	4.93	1	334	3.66	25.02	97	18.64
	V3	4.54	11	303	3.24	24.63	105	18.36
	V4	4.62	8	312	3.48	24.67	100	18.55
	V5	4.21	17	285	3.02	24.19	98	17.00
	V6	4.92	2	328	3.60	24.94	101	19.00
	V7	4.36	14	292	3.25	24.56	111	17.27
	V8	4.84	4	324	3.52	24.72	105	19.45
	V9	4.87	3	326	3.52	24.85	100	19.09
	V10	4.62	8	311	3.36	24.67	101	18.64
	V11	4.81	5	318	3.49	24.70	98	19.27
	V12	4.29	16	282	2.95	24.06	95	18.82
	V13	4.30	15	290	3.13	24.56	105	16.91
	V14	4.51	12	302	3.20	24.61	94	18.55
	V15	4.48	13	297	3.18	24.59	108	18.45
	V16	4.60	10	306	3.36	24.66	109	18.55
	V17	-		-	-	-	-	
	V18	-		-	-	-	-	
	V19	-		-	-	-	-	
	V20	-		-	-	-	-	
	V21	4.71	7	314	3.48	24.68	98	19.36
	V22	-		-	-	-	-	
Interaction								
N at same V		NS		NS	0.07	0.05	NS	
V at same N		NS		NS	0.06	0.04	NS	
Means of F levels:								
F1		2.57	2	226	2.83	23.08	101	
F2		4.61	1	308	3.35	24.63	101	18.55
C.D.(0.05)		0.08		11.77	0.04	0.03	NS	
C.V.(%)		2.55		5.17	1.43	0.17	0.52	

Table 4.1(c): Contd.

F- levels		Varieties		MOCOMPU				
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test wt(g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties								
V1		3.68	6	273	3.20	23.91	97	19.45
V2		3.91	1	289	3.39	24.10	97	18.64
V3		3.53	11	264	3.02	23.84	105	18.36
V4		3.60	8	272	3.18	23.90	100	18.55
V5		3.28	16	244	2.82	23.59	98	17.00
V6		3.88	2	286	3.31	24.06	101	19.00
V7		3.41	14	258	3.00	23.81	111	17.27
V8		3.77	4	279	3.24	23.94	105	19.45
V9		3.82	3	282	3.24	24.01	100	19.09
V10		3.60	9	271	3.11	23.86	101	18.64
V11		3.75	5	276	3.20	23.93	98	19.27
V12		3.26	17	240	2.77	23.50	95	18.82
V13		3.37	15	250	2.88	23.79	105	16.91
V14		3.49	12	263	3.02	23.83	94	18.55
V15		3.47	13	260	2.91	23.81	108	18.45
V16		3.58	10	265	3.08	23.86	109	18.55
V17		-		-	-	-	-	
V18		-		-	-	-	-	
V19		-		-	-	-	-	
V20		-		-	-	-	-	
V21		3.65	7	273	3.19	23.90	98	19.36
V22		-		-	-	-	-	
C.D.(0.05)		0.17		11.33	0.05	0.03	1.18	
C.V.(%)		4.13		3.67	1.26	0.1	1.01	
Expt. Mean		3.59		267	3.09	23.86	101	
Soil type		-						
pH		7.70						
F - levels (kg/ha)								
F1		60:30:20						
F2		120:60:40						
Recmnd N:P:K (kg/ha)		120:60:40						
Varieties								
V1		IET 30704						
V2		IET 30574						
V3		IET 30575						
V4		IET 30577						
V5		IET 30587						
V6		IET 30593						
V7		IET 30573						
V8		IET 30756						
V9		IET 30578						
V10		IET 30589						
V11		IET 30579						
V12		IET 30576						
V13		IET 32043 (GEL)						
V14		IET 32045 (NIL)						
V15		Gontra Bidhan-3 (NC);						
V16		PR 113 (N),						
V17		-						
V18		-						
V19		-						
V20		-						
V21		Krishna Hamsa(RP)						
V22		Local check -						
Available N:P:K of soil (kg/ha)		21:18.33:209						

Table 4.1(c): Contd.

F-levels	Varieties	NAVSARI							Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test wt(g)	Days for 50% Flowering		
F1: low input (50% NPK)	V1	4.20	26	262	2.70	20.97	89		
	V2	5.03	5	253	5.33	26.80	90		
	V3	4.70	19	276	4.91	26.20	95		
	V4	4.88	15	245	3.17	24.90	94		
	V5	4.44	22	270	3.27	22.87	90		
	V6	5.03	5	238	3.66	22.97	90		
	V7	-		-	-	-	-		
	V8	4.43	24	252	3.86	28.50	95		
	V9	4.95	12	249	3.99	26.67	95		
	V10	4.98	8	264	5.19	24.97	92		
	V11	5.12	1	248	4.84	25.10	89		
	V12	5.07	3	237	4.93	22.83	91		
	V13	3.51	40	235	2.62	24.00	89		
	V14	3.92	32	243	3.06	22.53	92		
	V15	4.88	15	249	6.01	19.97	89		
	V16	4.20	26	239	4.26	28.07	91		
	V17	4.43	24	240	3.50	23.50	93		
	V18	3.91	33	266	2.30	21.33	94		
	V19	3.83	34	229	2.79	20.73	87		
	V20	-		-	-	-	-		
	V21	3.63	39	255	2.25	18.50	89		
	V22	4.96	11	249	3.42	32.33	89		
F2: Optimum input (100% NPK)	V1	4.17	29	272	2.76	22.07	90	-0.46	
	V2	4.86	17	256	5.45	27.90	90	-2.62	
	V3	4.94	13	278	5.00	27.00	96	3.69	
	V4	4.86	17	256	3.29	25.80	93	-0.31	
	V5	4.90	14	273	3.38	23.50	91	7.08	
	V6	5.11	2	253	3.84	23.43	89	1.23	
	V7	-		-	-	-	-		
	V8	4.07	30	258	4.02	29.80	96	-5.54	
	V9	4.59	21	255	4.17	27.23	95	-5.54	
	V10	4.69	20	273	5.36	25.60	90	-4.46	
	V11	4.99	7	256	5.03	25.27	91	-2.00	
	V12	4.97	10	246	5.08	23.10	91	-1.54	
	V13	3.72	37	248	2.67	24.97	92	3.23	
	V14	3.74	36	254	3.13	23.27	90	-2.77	
	V15	5.07	3	264	6.13	20.17	87	2.92	
	V16	4.44	22	247	4.35	28.20	93	3.69	
	V17	4.19	28	260	3.59	24.00	94	-3.69	
	V18	3.67	38	276	2.38	22.33	92	-3.69	
	V19	4.07	30	247	2.85	21.07	89	3.69	
	V20	-		-	-	-	-		
	V21	3.75	35	261	2.33	18.77	91	1.85	
	V22	4.98	8	276	3.50	32.13	89	0.31	
Interaction									
N at same V		NS		NS	NS	NS	2.51		
V at same N		NS		NS	NS	NS	2.28		
Means of F levels:									
F1		4.51	1	250	3.80	24.19	91		
F2		4.49	2	260	3.92	24.78	91	-0.25	
C.D.(0.05)		NS		NS	NS	0.46	NS		
C.V.(%)		8.7		8.13	7.16	2.39	2.08		

Table 4.1(c): Contd.

F-levels	Varieties	NAVSARI						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test wt(g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties								
	V1	4.19	15	267	2.73	21.52	90	-0.46
	V2	4.95	6	255	5.39	27.35	90	-2.62
	V3	4.82	9	277	4.96	26.60	96	3.69
	V4	4.87	7	251	3.23	25.35	94	-0.31
	V5	4.67	11	271	3.33	23.19	90	7.08
	V6	5.07	1	246	3.75	23.20	89	1.23
	V7	-		-	-	-	-	
	V8	4.25	14	255	3.94	29.15	95	-5.54
	V9	4.77	10	252	4.08	26.95	95	-5.54
	V10	4.84	8	268	5.28	25.29	91	-4.46
	V11	5.06	2	252	4.94	25.19	90	-2.00
	V12	5.02	3	242	5.01	22.97	91	-1.54
	V13	3.62	20	242	2.65	24.49	91	3.23
	V14	3.83	17	248	3.10	22.90	91	-2.77
	V15	4.98	4	257	6.07	20.07	88	2.92
	V16	4.32	12	243	4.31	28.14	92	3.69
	V17	4.31	13	250	3.55	23.75	93	-3.69
	V18	3.79	18	271	2.34	21.83	93	-3.69
	V19	3.95	16	238	2.82	20.90	88	3.69
	V20	-		-	-	-	-	
	V21	3.69	19	258	2.29	18.64	90	1.85
	V22	4.97	5	263	3.46	32.23	89	0.31
C.D.(0.05)		0.38		14.74	0.29	0.51	1.62	
C.V.(%)		7.26		5.02	6.49	1.8	1.54	
Expt. Mean		4.50		255	3.86	24.48	91	
Soil type		Clayey						
pH		7.88						
F - levels (kg/ha)								
F1		50:15:0						
F2		100:30:0						
Recmnd N:P:K (kg/ha)		100:30:0						
Varieties								
	V1	IET 30704						
	V2	IET 30574						
	V3	IET 30575						
	V4	IET 30577						
	V5	IET 30587						
	V6	IET 30593						
	V7	-						
	V8	IET 30756						
	V9	IET 30578						
	V10	IET 30589						
	V11	IET 30579						
	V12	IET 30576						
	V13	IET 32043 (GEL)						
	V14	IET 32045 (NIL)						
	V15	Gontra Bidhan-3 (NC);						
	V16	PR 113 (N),						
	V17	Lalat (E & NE),						
	V18	Karjat-7 (W),						
	V19	MTU 1010 (C& S),						
	V20	-						
	V21	Krishna Hamsa(RP)						
	V22	Local check - GR-17 (113-118 days)						
Available N:P:K of soil (kg/ha)		262:35.2:742						

Table 4.1(c): Contd.

F-levels	Varieties	NAWAGAM						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test wt(g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: low input (50% NPK)	V1	5.17	16	274	3.45	21.47	97	
	V2	5.21	12	231	4.38	28.13	96	
	V3	5.72	3	263	3.96	22.73	109	
	V4	5.65	5	266	3.73	24.10	100	
	V5	4.80	20	276	3.62	21.57	97	
	V6	4.89	19	265	3.81	22.30	100	
	V7	-		-	-	-	-	
	V8	2.81	33	283	2.40	24.63	113	
	V9	5.18	15	309	3.85	25.83	101	
	V10	5.24	11	283	4.91	26.63	94	
	V11	4.70	21	266	4.24	22.37	99	
	V12	4.32	23	283	4.12	17.30	97	
	V13	3.99	27	329	2.71	23.67	123	
	V14	2.36	36	297	2.66	19.93	101	
	V15	5.19	13	284	3.77	18.80	94	
	V16	3.98	28	252	2.98	25.93	100	
	V17	3.96	29	329	3.12	20.73	108	
	V18	-		-	-	-	-	
	V19	-		-	-	-	-	
	V20	-		-	-	-	-	
	V21	2.71	35	300	2.20	19.53	119	
	V22	3.72	30	312	2.24	12.93	107	
F2: Optimum input (100% NPK)	V1	5.43	6	304	3.69	25.53	99	4.16
	V2	5.31	9	283	5.29	27.00	98	1.60
	V3	5.96	1	292	4.11	23.73	110	3.84
	V4	5.81	2	301	4.02	24.53	102	2.56
	V5	5.26	10	300	4.35	23.30	114	7.36
	V6	5.19	13	344	4.01	22.80	101	4.80
	V7	-		-	-	-	-	
	V8	3.04	31	306	2.98	25.07	94	3.68
	V9	5.38	7	316	4.02	27.40	99	3.20
	V10	5.70	4	306	5.41	27.83	98	7.36
	V11	4.93	18	289	4.49	23.67	124	3.68
	V12	5.10	17	352	4.24	22.83	99	12.48
	V13	4.24	25	355	2.95	24.13	122	4.00
	V14	2.76	34	319	3.78	22.90	101	6.40
	V15	5.34	8	330	4.73	19.17	95	2.40
	V16	4.14	26	316	4.13	27.93	101	2.56
	V17	4.28	24	374	3.18	23.13	108	5.12
	V18	-		-	-	-	-	
	V19	-		-	-	-	-	
	V20	-		-	-	-	-	
	V21	3.00	32	332	2.60	21.10	119	4.64
	V22	4.43	22	335	2.75	14.80	107	11.36
Interaction								
N at same V		NS		NS	NS	0.95	1.3	
V at same N		NS		NS	NS	0.9	1.26	
Means of F levels:								
F1		4.42	2	283	3.45	22.14	103	
F2		4.74	1	320	3.93	23.71	105	5.07
C.D.(0.05)		0.27		22.55	NS	0.46	0.56	
C.V.(%)		7.01		9.03	29.7	2.42	0.65	

Table 4.1(c): Contd.

F-levels	Varieties	NAWAGAM						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test wt(g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties								
	V1	5.30	4	289	3.57	23.50	98	4.16
	V2	5.26	7	257	4.84	27.57	97	1.60
	V3	5.84	1	277	4.04	23.23	110	3.84
	V4	5.73	2	284	3.88	24.32	101	2.56
	V5	5.03	9	288	3.99	22.44	105	7.36
	V6	5.04	8	304	3.91	22.55	100	4.80
	V7	-		-	-	-	-	
	V8	2.93	16	294	2.69	24.85	104	3.68
	V9	5.28	5	313	3.94	26.62	100	3.20
	V10	5.47	3	295	5.16	27.23	96	7.36
	V11	4.82	10	278	4.37	23.02	111	3.68
	V12	4.71	11	317	4.18	20.07	98	12.48
	V13	4.12	13	342	2.83	23.90	123	4.00
	V14	2.56	18	308	3.22	21.42	101	6.40
	V15	5.27	6	307	4.25	18.99	95	2.40
	V16	4.06	15	284	3.56	26.93	101	2.56
	V17	4.12	12	351	3.15	21.93	108	5.12
	V18	-		-	-	-	-	
	V19	-		-	-	-	-	
	V20	-		-	-	-	-	
	V21	2.86	17	316	2.40	20.32	119	4.64
	V22	4.08	14	323	2.50	13.87	107	11.36
	C.D.(0.05)	0.26		23.67	0.5	0.64	0.89	
	C.V.(%)	4.87		6.81	11.8	2.42	0.75	
	Expt. Mean	4.58		302	3.69	22.93	104	
	Soil type	Clay loam						
	pH	8.08						
	F - levels (kg/ha)							
	F1	50:12.5:0						
	F2	100:25:0						
	Recmnd N:P:K (kg/ha)	100:25:0						
	Varieties							
	V1	IET 30704						
	V2	IET 30574						
	V3	IET 30575						
	V4	IET 30577						
	V5	IET 30587						
	V6	IET 30593						
	V7	-						
	V8	IET 30756						
	V9	IET 30578						
	V10	IET 30589						
	V11	IET 30579						
	V12	IET 30576						
	V13	IET 32043 (GEL)						
	V14	IET 32045 (NIL)						
	V15	Gontra Bidhan-3 (NC);						
	V16	PR 113 (N),						
	V17	Lalat (E & NE),						
	V18	-						
	V19	-						
	V20	-						
	V21	Krishna Hamsa(RP)						
	V22	Local check - GR-21 (120-125 days)						
	Available N:P:K of soil (kg/ha)	188.6:13.4:281.83						

Table 4.1(c): Contd.

F-levels	Varieties	PUDUCHERRY					
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test wt(g)	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: low input (50% NPK)	V1	4.73	21	252	4.95	24.30	
	V2	4.48	31	220	4.57	30.20	
	V3	4.78	19	262	5.78	27.43	
	V4	4.45	32	218	4.22	26.33	
	V5	4.65	24	242	4.88	24.37	
	V6	4.49	30	216	4.12	25.03	
	V7	-		-	-	-	
	V8	4.53	29	226	4.46	16.57	
	V9	4.71	22	248	4.65	31.10	
	V10	4.35	35	203	3.41	29.80	
	V11	4.70	23	245	4.33	22.50	
	V12	4.36	34	210	4.06	26.20	
	V13	4.74	20	257	4.99	25.37	
	V14	4.60	26	237	4.51	28.20	
	V15	4.63	25	234	4.83	25.17	
	V16	4.54	28	230	4.19	23.27	
	V17	4.56	27	232	4.43	29.80	
	V18	-		-	-	-	
	V19	-		-	-	-	
	V20	4.45	32	213	3.96	29.10	
	V21	-		-	-	-	
	V22	3.88	36	209	1.98	17.60	
F2: Optimum input (100% NPK)	V1	5.80	3	291	5.29	24.67	10.70
	V2	5.41	13	254	4.89	30.40	9.30
	V3	5.96	1	304	6.10	27.70	11.80
	V4	5.42	12	252	4.62	26.57	9.70
	V5	5.66	6	278	5.19	24.70	10.10
	V6	5.40	14	250	4.45	25.20	9.10
	V7	-		-	-	-	
	V8	5.48	9	260	4.89	16.90	9.50
	V9	5.73	4	288	5.22	31.50	10.20
	V10	5.29	17	236	3.98	30.20	9.40
	V11	5.68	5	282	4.86	23.00	9.80
	V12	5.34	16	244	4.28	26.63	9.80
	V13	5.86	2	298	5.41	25.63	11.20
	V14	5.55	7	276	5.15	28.60	9.50
	V15	5.52	8	269	5.36	25.77	8.90
	V16	5.44	11	267	4.79	23.43	9.00
	V17	5.48	9	270	4.98	30.60	9.20
	V18	-		-	-	-	
	V19	-		-	-	-	
	V20	5.38	15	247	4.41	29.60	9.30
	V21	-		-	-	-	
	V22	4.97	18	227	2.29	17.70	10.90
Interaction							
N at same V		0.11		4.84	0.07	NS	
V at same N		0.08		22.48	0.07	NS	
Means of F levels:							
F1		4.54	2	231	4.35	25.69	
F2		5.52	1	266	4.79	26.04	9.86
C.D.(0.05)		0.11		30.38	0.04	0.04	
C.V.(%)		2.54		14.76	1.07	0.21	

Table 4.1(c): Contd.

F-levels	Varieties	PUDUCHERRY					
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test wt(g)	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties							
	V1	5.27	3	272	5.12	24.49	10.70
	V2	4.95	12	237	4.73	30.30	9.30
	V3	5.37	1	283	5.94	27.57	11.80
	V4	4.94	14	235	4.42	26.45	9.70
	V5	5.16	6	260	5.04	24.54	10.10
	V6	4.95	12	233	4.29	25.12	9.10
	V7	-		-	-	-	
	V8	5.01	10	243	4.68	16.74	9.50
	V9	5.22	4	268	4.94	31.30	10.20
	V10	4.82	17	220	3.70	30.00	9.40
	V11	5.19	5	263	4.60	22.75	9.80
	V12	4.85	16	227	4.17	26.42	9.80
	V13	5.30	2	278	5.20	25.50	11.20
	V14	5.08	7	257	4.83	28.40	9.50
	V15	5.08	7	252	5.10	25.47	8.90
	V16	4.99	11	248	4.49	23.35	9.00
	V17	5.02	9	251	4.71	30.20	9.20
	V18	-		-	-	-	
	V19	-		-	-	-	
	V20	4.92	15	230	4.19	29.35	9.30
	V21	-		-	-	-	
	V22	4.43	18	218	2.14	17.65	10.90
C.D.(0.05)		0.05		3.42	0.05	0.19	
C.V.(%)		0.94		1.2	0.91	0.65	
Expt. Mean		5.03		249	4.57	25.87	
Soil type		Clayey loam					
pH		7.50					
F - levels (kg/ha)							
	F1	60:20:20					
	F2	120:40:40					
Recmnd N:P:K (kg/ha)		120:40:40					
Varieties							
	V1	IET 30704					
	V2	IET 30574					
	V3	IET 30575					
	V4	IET 30577					
	V5	IET 30587					
	V6	IET 30593					
	V7	-					
	V8	IET 30756					
	V9	IET 30578					
	V10	IET 30589					
	V11	IET 30579					
	V12	IET 30576					
	V13	IET 32043 (GEL)					
	V14	IET 32045 (NIL)					
	V15	Gontra Bidhan-3 (NC);					
	V16	PR 113 (N),					
	V17	Lalat (E & NE),					
	V18	-					
	V19	-					
	V20	US 312,					
	V21	-					
	V22	Local check - White Ponni (135 Days)					
Available N:P:K of soil (kg/ha)		134:37.4:180					

Table 4.1(c): Contd.

F-levels	Varieties	RAJENDRANAGAR					
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: low input (50% NPK)	V1	3.84	27	222	3.67	65	
	V2	3.83	28	213	4.60	66	
	V3	3.74	29	252	4.20	82	
	V4	4.02	24	245	3.43	66	
	V5	4.55	20	215	4.33	64	
	V6	3.95	25	252	3.70	66	
	V7	-		-	-	-	
	V8	3.74	29	225	4.00	82	
	V9	4.74	19	238	4.30	83	
	V10	4.03	23	221	4.10	67	
	V11	4.41	21	225	4.57	67	
	V12	4.24	22	206	4.90	66	
	V13	3.52	34	269	3.23	62	
	V14	3.37	35	227	3.90	66	
	V15	3.35	36	195	4.80	63	
	V16	3.86	26	198	4.57	79	
	V17	3.69	33	242	3.17	61	
	V18	-		-	-	-	
	V19	-		-	-	-	
	V20	-		-	-	-	
	V21	3.74	29	249	2.33	59	
	V22	3.72	32	234	3.23	67	
F2: Optimum input (100% NPK)	V1	5.21	17	266	4.47	65	12.45
	V2	5.56	13	261	5.57	67	15.73
	V3	6.52	4	287	4.27	82	25.27
	V4	5.20	18	326	4.27	66	10.73
	V5	6.18	7	257	4.73	64	14.82
	V6	5.74	11	289	4.73	67	16.27
	V7	-		-	-	-	
	V8	6.21	6	276	4.73	83	22.45
	V9	7.21	1	291	5.10	84	22.45
	V10	5.85	10	253	5.70	68	16.55
	V11	6.86	3	281	5.23	68	22.27
	V12	6.03	8	243	5.07	66	16.27
	V13	6.44	5	305	3.63	63	26.55
	V14	5.26	16	285	4.60	66	17.18
	V15	5.56	13	237	5.30	64	20.09
	V16	6.00	9	273	4.63	81	19.45
	V17	5.66	12	284	3.23	63	17.91
	V18	-		-	-	-	
	V19	-		-	-	-	
	V20	-		-	-	-	
	V21	5.29	15	312	3.07	61	14.09
	V22	6.96	2	280	3.67	68	29.45
Interaction							
N at same V		0.75		NS	NS	NS	
V at same N		0.71		NS	NS	NS	
Means of F levels:							
F1		3.91	2	229	3.95	68.32	
F2		5.99	1	278	4.56	69.33	18.89
C.D.(0.05)		0.39		10.64	0.43	NS	
C.V.(%)		9.56		5.06	12.18	2.2	

Table 4.1(c): Contd.

		RAJENDRANAGAR					
F-levels	Varieties	Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties							
	V1	4.53	15	244	4.07	65.00	12.45
	V2	4.70	12	237	5.09	66.34	15.73
	V3	5.13	6	270	4.24	82.00	25.27
	V4	4.61	14	286	3.85	66.00	10.73
	V5	5.37	3	236	4.53	64.00	14.82
	V6	4.85	11	271	4.22	66.67	16.27
	V7	-		-	-	-	
	V8	4.98	8	251	4.37	82.67	22.45
	V9	5.98	1	264	4.70	83.67	22.45
	V10	4.94	9	237	4.90	67.34	16.55
	V11	5.64	2	253	4.90	67.83	22.27
	V12	5.14	5	224	4.99	65.84	16.27
	V13	4.98	7	287	3.43	62.17	26.55
	V14	4.32	18	256	4.25	66.00	17.18
	V15	4.46	17	216	5.05	63.67	20.09
	V16	4.93	10	236	4.60	80.00	19.45
	V17	4.68	13	263	3.20	62.17	17.91
	V18	-		-	-	-	
	V19	-		-	-	-	
	V20	-		-	-	-	
	V21	4.52	16	280	2.70	60.00	14.09
	V22	5.34	4	257	3.45	67.50	29.45
C.D.(0.05)		0.5		31.14	0.62	0.64	
C.V.(%)		8.81		10.65	12.71	0.81	
Expt. Mean		4.95		254	4.25	68.82	
Soil type		Clay loam					
pH		7.40					
F - levels (kg/ha)							
	F1	60:30:20					
	F2	120:60:40					
Recmnd N:P:K (kg/ha)		120:60:40					
Varieties							
	V1	IET 30704					
	V2	IET 30574					
	V3	IET 30575					
	V4	IET 30577					
	V5	IET 30587					
	V6	IET 30593					
	V7	-					
	V8	IET 30756					
	V9	IET 30578					
	V10	IET 30589					
	V11	IET 30579					
	V12	IET 30576					
	V13	IET 32043 (GEL)					
	V14	IET 32045 (NIL)					
	V15	Gontra Bidhan-3 (NC);					
	V16	PR 113 (N),					
	V17	Lalat (E & NE),					
	V18	-					
	V19	-					
	V20	-					
	V21	Krishna Hamsa(RP)					
	V22	Local check - RNR 15048					
Available N:P:K of soil (kg/ha)		-					

Table 4.1(c): Contd.

F-levels	Varieties	VARANASI						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test wt(g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: low input (50% NPK)	V1	3.03	31	157	35.27	21.90	88	
	V2	3.83	21	162	56.16	25.97	85	
	V3	5.50	3	202	45.59	25.85	95	
	V4	4.50	12	189	35.91	23.73	96	
	V5	2.67	34	109	37.98	22.42	88	
	V6	3.87	20	152	41.56	22.39	96	
	V7	-	-	-	-	-	-	
	V8	2.63	35	141	31.46	26.10	104	
	V9	3.90	19	138	49.88	29.12	101	
	V10	3.60	25	144	37.78	28.00	87	
	V11	5.93	1	152	53.23	26.69	96	
	V12	4.43	13	136	54.20	24.65	95	
	V13	2.87	33	147	24.14	25.46	86	
	V14	3.27	28	154	32.66	23.15	94	
	V15	3.20	29	100	42.58	18.63	89	
	V16	4.37	14	135	48.53	27.94	100	
	V17	4.13	17	172	29.01	24.05	95	
	V18	-	-	-	-	-	-	
	V19	-	-	-	-	-	-	
	V20	-	-	-	-	-	-	
	V21	4.70	9	213	26.54	20.75	89	
	V22	4.20	15	217	32.56	18.83	101	
F2: Optimum input (100% NPK)	V1	4.77	7	148	47.52	26.83	89	13.92
	V2	3.63	24	140	50.49	27.48	84	-1.60
	V3	5.43	4	202	45.36	27.69	96	-0.56
	V4	4.17	16	191	48.49	23.81	96	-2.64
	V5	3.03	31	125	43.16	21.90	87	2.88
	V6	3.43	26	143	43.53	24.06	95	-3.52
	V7	-	-	-	-	-	-	
	V8	3.77	22	169	32.28	26.37	104	9.12
	V9	4.07	18	158	44.63	29.20	102	1.36
	V10	3.77	22	113	46.57	26.77	88	1.36
	V11	5.57	2	143	56.30	26.99	97	-2.88
	V12	4.53	10	122	55.50	27.57	95	0.80
	V13	2.23	36	170	21.85	25.51	86	-5.12
	V14	3.37	27	151	37.03	23.66	96	0.80
	V15	3.13	30	125	48.92	19.25	88	-0.56
	V16	5.07	6	135	48.67	28.81	101	5.60
	V17	4.53	10	171	26.57	23.38	97	3.20
	V18	-	-	-	-	-	-	
	V19	-	-	-	-	-	-	
	V20	-	-	-	-	-	-	
	V21	4.73	8	207	28.36	20.96	90	0.24
	V22	5.40	5	257	28.71	19.44	102	9.60
Interaction								
N at same V		0.99		17.91	4.72	NS	NS	
V at same N		0.9		17.84	4.32	NS	NS	
Means of F levels:								
F1		3.92	2	157	39.72	24.20	94	
F2		4.15	1	159	41.89	24.98	94	1.78
C.D.(0.05)		NS		NS	NS	NS	NS	
C.V.(%)		17.87		3.82	8.18	3.85	0.74	

Table 4.1(c): Contd.

F-levels		VARANASI						
	Varieties	Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test wt(g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties								
	V1	3.90	10	152	41.40	24.37	88	13.92
	V2	3.73	11	151	53.33	26.73	85	-1.60
	V3	5.47	2	202	45.48	26.77	96	-0.56
	V4	4.34	7	190	42.20	23.77	96	-2.64
	V5	2.85	17	117	40.57	22.16	88	2.88
	V6	3.65	13	148	42.55	23.23	95	-3.52
	V7	-		-	-	-	-	
	V8	3.20	15	155	31.87	26.24	104	9.12
	V9	3.99	9	148	47.26	29.16	101	1.36
	V10	3.69	12	128	42.18	27.39	88	1.36
	V11	5.75	1	148	54.77	26.84	97	-2.88
	V12	4.48	6	129	54.85	26.11	95	0.80
	V13	2.55	18	158	23.00	25.49	86	-5.12
	V14	3.32	14	153	34.85	23.41	95	0.80
	V15	3.17	16	113	45.75	18.94	88	-0.56
	V16	4.72	4	135	48.60	28.38	101	5.60
	V17	4.33	8	172	27.79	23.72	96	3.20
	V18	-		-	-	-	-	
	V19	-		-	-	-	-	
	V20	-		-	-	-	-	
	V21	4.72	5	210	27.45	20.86	89	0.24
	V22	4.80	3	237	30.64	19.14	102	9.60
C.D.(0.05)		0.63		12.67	3.06	1.65	1.07	
C.V.(%)		13.64		6.96	6.5	5.82	0.99	
Expt. Mean		4.04		158	40.81	24.59	94	
Soil type		-						
pH		7.10						
F - levels (kg/ha)								
F1		75:30:20						
F2		150:60:40						
Recmnd N:P:K (kg/ha)		150:60:40						
Varieties								
	V1	IET 30704						
	V2	IET 30574						
	V3	IET 30575						
	V4	IET 30577						
	V5	IET 30587						
	V6	IET 30593						
	V7	-						
	V8	IET 30756						
	V9	IET 30578						
	V10	IET 30589						
	V11	IET 30579						
	V12	IET 30576						
	V13	IET 32043 (GEL)						
	V14	IET 32045 (NIL)						
	V15	Gontra Bidhan-3 (NC);						
	V16	PR 113 (N),						
	V17	Lalat (E & NE),						
	V18	-						
	V19	-						
	V20	-						
	V21	Krishna Hamsa(RP)						
	V22	Local check - HUR4-3						
Available N:P:K of soil (kg/ha)		-						

Table 4.1(c): Contd.

F-levels	Varieties	WARANGAL							Over all Mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test wt(g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)		
F1: low input (50% NPK)	V1	7.86	18	325	5.27	27.47	89		4.32	32
	V2	9.86	4	328	4.67	24.73	94		5.03	15
	V3	5.67	34	332	2.90	25.03	86		4.53	28
	V4	8.10	15	321	4.40	30.30	95		4.61	26
	V5	8.81	9	309	5.90	24.57	92		4.56	27
	V6	8.29	12	341	4.97	26.90	95		4.63	25
	V7	-	-	-	-	-	-		3.29	42
	V8	9.29	7	321	3.93	24.07	94		3.88	39
	V9	7.33	25	326	4.67	24.60	90		4.99	16
	V10	8.10	15	312	4.57	27.67	104		4.83	19
	V11	7.29	27	331	4.87	24.00	92		4.69	22
	V12	7.67	20	323	4.83	22.53	93		4.41	30
	V13	8.19	14	315	4.87	29.33	91		3.95	37
	V14	7.43	23	314	3.90	25.90	96		3.89	38
	V15	7.43	23	338	4.30	21.23	86		4.35	31
	V16	6.38	31	329	2.90	21.13	88		4.04	34
	V17	5.71	33	331	4.13	28.43	94		3.99	35
	V18	-	-	-	-	-	-		2.73	44
	V19	-	-	-	-	-	-		3.83	40
	V20	-	-	-	-	-	-		4.64	24
	V21	5.90	32	316	3.37	22.50	96		3.82	41
	V22	-	-	-	-	-	-		3.96	36
F2: Optimum input (100% NPK)	V1	12.57	1	344	5.53	29.03	88	42.82	5.64	3
	V2	10.05	3	353	4.97	25.30	94	1.73	5.78	2
	V3	7.05	29	334	3.70	25.33	84	12.55	5.45	9
	V4	7.71	19	352	4.50	31.70	92	-3.55	5.45	10
	V5	10.67	2	329	6.07	28.43	91	16.91	5.49	7
	V6	8.10	15	337	5.40	29.40	94	-1.73	5.48	8
	V7	-	-	-	-	-	-		4.51	29
	V8	9.24	8	334	4.00	24.57	93	-0.45	4.82	20
	V9	9.76	5	327	5.43	26.83	90	22.09	6.08	1
	V10	7.52	21	326	4.63	28.27	103	-5.27	5.58	5
	V11	8.33	11	331	5.07	25.07	91	9.45	5.58	6
	V12	8.24	13	334	5.13	25.80	93	5.18	5.24	11
	V13	9.57	6	333	5.67	30.17	90	12.55	4.89	18
	V14	7.29	27	326	4.27	27.67	95	-1.27	4.65	23
	V15	7.52	21	332	4.53	21.93	83	0.82	5.24	12
	V16	7.33	25	338	3.03	22.97	88	8.64	5.04	14
	V17	6.81	30	340	4.30	30.80	93	10.00	4.76	21
	V18	-	-	-	-	-	-		2.95	43
	V19	-	-	-	-	-	-		4.07	33
	V20	-	-	-	-	-	-		5.60	4
	V21	8.38	10	323	3.73	27.03	95	22.55	4.91	17
	V22	-	-	-	-	-	-		5.07	13
Interaction										
N at same V		1.85		NS	NS	NS	1.17			
V at same N		1.82		NS	NS	NS	1.09			
Means of F levels:										
F1		7.61	2	324	4.38	25.32	93		4.37	2
F2		8.60	1	335	4.70	27.08	91	9.00	5.29	1
C.D.(0.05)		0.73		7.51	NS	1.62	0.64			
C.V.(%)		10.63		2.67	11.92	7.27	0.81			

Table 4.1(c): Contd.

F- levels	Varieties	WARANGAL							Over all Mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test wt(g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)		
Mean of varieties										
	V1	10.22	1	335	5.40	28.25	88	42.82	4.98	10
	V2	9.96	2	341	4.82	25.02	94	1.73	5.41	2
	V3	6.36	16	333	3.30	25.18	85	12.55	4.99	9
	V4	7.91	9	337	4.45	31.00	93	-3.55	5.03	7
	V5	9.74	3	319	5.99	26.50	91	16.91	5.02	8
	V6	8.20	7	339	5.19	28.15	94	-1.73	5.05	6
	V7	-		-	-	-	-		3.90	21
	V8	9.27	4	328	3.97	24.32	94	-0.45	4.35	18
	V9	8.55	6	326	5.05	25.72	90	22.09	5.54	1
	V10	7.81	11	319	4.60	27.97	104	-5.27	5.20	3
	V11	7.81	10	331	4.97	24.54	92	9.45	5.14	4
	V12	7.96	8	329	4.98	24.17	93	5.18	4.83	11
	V13	8.88	5	324	5.27	29.75	90	12.55	4.42	15
	V14	7.36	13	320	4.09	26.79	95	-1.27	4.27	19
	V15	7.48	12	335	4.42	21.58	85	0.82	4.79	12
	V16	6.86	15	334	2.97	22.05	88	8.64	4.54	13
	V17	6.26	17	336	4.22	29.62	93	10.00	4.38	16
	V18	-		-	-	-	-		2.84	22
	V19	-		-	-	-	-		3.95	20
	V20	-		-	-	-	-		5.12	5
	V21	7.14	14	320	3.55	24.77	96	22.55	4.37	17
	V22	-		-	-	-	-		4.51	14
C.D.(0.05)		1.29		19.34	0.45	3.02	0.77			
C.V.(%)		13.76		5.09	8.66	10.01	0.73			
Expt. Mean		8.10		330	4.54	26.20	92		4.83	
Soil type		Clay soil								
pH		8.30								
F - levels (kg/ha)										
	F1	60:30:20								
	F2	120:60:40								
Recmnd N:P:K (kg/ha)		120:60:40								
Varieties										
	V1	IET 30704								
	V2	IET 30574								
	V3	IET 30575								
	V4	IET 30577								
	V5	IET 30587								
	V6	IET 30593								
	V7	-								
	V8	IET 30756								
	V9	IET 30578								
	V10	IET 30589								
	V11	IET 30579								
	V12	IET 30576								
	V13	IET 32043 (GEL)								
	V14	IET 32045 (NIL)								
	V15	Gontra Bidhan-3 (NC);								
	V16	PR 113 (N),								
	V17	Lalat (E & NE),								
	V18	-								
	V19	-								
	V20	-								
	V21	Krishna Hamsa(RP)								
	V22	-								
Available N:P:K of soil (kg/ha)		125:45:421								

4.1(d) AVT 2 - Irrigated Medium

Seven AVT-2 entries IET 30608, IET 30603, IET 30604, IET 30605, IET 30819, IET 30613, and IET 32047 (NIL) of medium duration were evaluated for their response to nutrients on yield attributes and grain yield at nineteen different locations Viz., **Aduthurai (150:50:50)**, **Chinsurah (80:40:40)**, **Coimbatore (150:50:50)**, **Dhangain (120:60:40)**, **Faizabad (120:60:60)**, **Jagdapur (120:60:30)**, **Karjat (100:50:50)**, **Kaul (150:60:60)**, **Maruteru (90:60:60)**, **Nagina (120:60:40)**, **Navsari (100:30:0)**, **Nawagam (100:25:0)**, **Pantnagar (120:60:40)**, **Puducherry (120:40:40)**, **Pusa (120:60:40)**, **ARI-Rajendranagar (120:60:40)**, **Titabar (60:20:20)**, **Varanasi (120:60:40)** and **Warangal (120:60:40)** under two different levels of nutrient input (50% and 100% RDF). The details and data received from these locations are summarized and presented in Table 4.1 (d).

Application of different nutrient levels (50 and 100% RDF) significantly influenced the grain yield at all the locations except **Karjat**, **Maruteru**, **Navasari** and **Varanasi** indicating application of higher dose is not required at these locations. However, the overall yield improvement was to the tune of 27% with 100% RDF compared to 50% RDF (4.28 t/ha). Higher nutrient response was recorded with 100% RDF at **Rajendranagar** (24.57), **Nagina** (18.20), **Pantnagar** (16.06), **Coimbatore** (16.51), **Faizabad** (15.05), and **Aduthurai** (12.03) due to lower nutrient available status and better yields at 100% RDF.

Grain yield differences among the tested cultures were found to be significant at all the locations except **Maruteru**, **Pusa** and **Warangal**. Among the tested entries higher grain yield was recorded by IET 30608 (6.21 t/ha) and IET 30819 (R) (6.11 t/ha) at **Chinsurah**; IET 30603 (6.03 t/ha) and IET 30605 (5.96 t/ha) at **Coimbatore**; IET 30613 (7.13 t/ha) at **Dhangain**; IET 30603 (5.43 t/ha), IET 30605 (4.89 t/ha) and IET 30604 (4.86 t/ha) at **Faizabad**; IET 30603 (5.01 t/ha) and IET 30608 (5.28 t/ha) at **Karjat**; IET 30605 (6.41 t/ha) and IET 30604 (6.20 t/ha) at **Kaul**; IET 30608 (3.90 t/ha) and IET 30605 (3.88 t/ha) at **Nagina**; IET 30604 (6.23 t/ha) and IET 30603 (6.01 t/ha) at **Nawagam**; IET 30613 (5.44 t/ha) and IET 30604 (5.16 t/ha) at **Pantnagar**; IET 30608 (5.51 t/ha) and IET 30603 (5.37 t/ha) at **Puduchery**; IET 30603 (5.94 t/ha) and IET 30605 (5.51 t/ha) at **Rajendranagar**; IET 30608 (5.24 t/ha) at **Titabar**; IET 30603 (5.94 t/ha) and IET 30605 (4.94 t/ha) at **Varanasi** and IET 30603 (8.53 t/ha) and IET 30604 (8.12 t/ha) at **Warangal** were found promising with higher grain yields.

In this trial, among cultures IET 30603 (5.23 t/ha) followed by IET 30605 (5.17 t/ha), and IET 30604 (5.16 t/ha) were found promising on the basis of overall mean grain yield across the locations. Interaction effect of nutrients and cultures found significant at **Aduthurai**, **Coimbatore**, **Faizabad**, **Kaul**, **Maruteru**, **Nawagam**, **Pantnagar**, **Puducherry**, **Pusa** and **Varanasi** and application of 100% RFD resulted in better yields of cultivars at these locations. Application of 100% RDF of the location (27% higher) found significantly superior to 50% RDF application at all the locations.

Table 4.1 (d): Summary of data on grain yield and ancillary characters of selected Irrigated Medium (Transplanted) cultures grown under transplanted conditions at graded levels of recommended fertilizer doses, kharif 2024.

F-levels	Varieties	ADUTHURAI					
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
F1: Low input 50% NPK	V1	4.33	14	261	2.93	16.33	
	V2	3.12	26	265	3.54	18.43	
	V3	3.33	22	276	4.21	19.70	
	V4	3.33	22	271	3.70	18.60	
	V5	3.67	20	246	2.83	15.53	
	V6	4.33	14	259	4.18	19.77	
	V7	3.16	25	252	3.67	19.60	
	V8	2.94	27	255	5.10	15.73	
	V9	3.56	21	256	2.59	20.20	
	V10	-	-	-	-	-	
	V11	3.31	24	265	2.58	17.17	
	V12	3.79	19	254	2.48	15.27	
	V13	-	-	-	-	-	
	V14	3.96	18	254	4.15	16.17	
	V15	2.91	28	264	2.49	21.30	
	V16	-	-	-	-	-	
	V17	5.21	8	273	5.10	21.63	
F2: Optimum input 100% NPK	V1	5.29	7	281	3.14	17.47	7.68
	V2	4.24	17	278	3.87	19.40	8.96
	V3	4.74	11	292	4.58	20.67	11.28
	V4	4.62	13	291	4.03	19.67	10.32
	V5	5.46	4	268	3.01	16.70	14.32
	V6	6.13	2	276	4.85	21.40	14.40
	V7	4.79	10	274	3.92	21.33	13.04
	V8	4.74	11	284	5.42	16.77	14.40
	V9	5.46	4	282	2.76	21.13	15.20
	V10	-	-	-	-	-	-
	V11	5.79	3	287	2.75	18.53	19.84
	V12	5.21	8	284	2.62	16.57	11.36
	V13	-	-	-	-	-	-
	V14	5.38	6	285	4.31	17.37	11.36
	V15	4.33	14	291	2.65	22.53	11.36
	V16	-	-	-	-	-	-
	V17	6.88	1	299	5.25	23.37	13.36
Interaction							
F at same V		0.36		NS	NS	0.24	
V at same F		0.39		NS	NS	0.23	
F1		3.64	2	261	3.54	18.2	
F2		5.22	1	284	3.80	19.5	12.63
C.D.(0.05)		0.23		3.92	0.05	0.12	
C.V.(%)		5.58		1.53	1.38	0.7	

Table 4.1 (d): Contd.

F-levels	Varieties	ADUTHURAI					
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
Mean of varieties:							
	V1	4.81	3	271	3.04	16.9	7.68
	V2	3.68	13	272	3.71	18.9	8.96
	V3	4.04	9	284	4.40	20.2	11.28
	V4	3.98	10	281	3.87	19.1	10.32
	V5	4.57	5	257	2.92	16.1	14.32
	V6	5.23	2	268	4.52	20.6	14.40
	V7	3.98	10	263	3.80	20.5	13.04
	V8	3.84	12	270	5.26	16.3	14.40
	V9	4.51	7	269	2.68	20.7	15.20
	V10	-	-	-	-	-	-
	V11	4.55	6	276	2.67	17.9	19.84
	V12	4.50	8	269	2.55	15.9	11.36
	V13	-	-	-	-	-	-
	V14	4.67	4	269	4.23	16.8	11.36
	V15	3.62	14	278	2.57	21.9	11.36
	V16	-	-	-	-	-	-
	V17	6.05	1	286	5.18	22.5	13.36
	C.D.(0.05)	0.25		11.25	0.16	0.16	
	C.V. (%)	4.94		3.57	3.68	0.73	
	Expt. Mean	4.43		272	3.67	18.87	
	Soil type	Clay					
	pH	7.20					
	F - levels (kg/ha)						
	F1	75:25:25					
	F2	150:50:50					
	Recommended N:P:K (kg/ha)	150:50:50					
	Varieties						
	V1	IET 30608					
	V2	IET 30603					
	V3	IET 30604					
	V4	IET 30605					
	V5	IET 30819					
	V6	IET 30613					
	V7	IET 32047 (NIL)					
	V8	NC- NDR 359					
	V9	PR121 (N)					
	V10	CR Dhan 300 (E & NE)					
	V11	Karma Mahsuri (C)					
	V12	Akshaydhan (W)					
	V13	Jaya (S)					
	V14	HRI 174					
	V15	WGL 14(RP					
	V16	Hybrid Check					
	V17	Local Check -ADT 49					
	Available N:P:K of soil (kg/ha)	275:42:465					

Table 4.1 (d): Contd.

F-levels	Varieties	CHINSURAH					
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
F1: Low input 50% NPK	V1	5.93	4	343	3.47	94	
	V2	5.27	12	307	3.22	94	
	V3	5.15	13	298	3.29	89	
	V4	5.64	8	305	3.61	91	
	V5	5.92	6	331	3.55	114	
	V6	5.56	10	311	3.32	100	
	V7	3.96	24	277	2.92	102	
	V8	3.89	25	245	2.76	100	
	V9	4.26	23	275	2.79	100	
	V10	-	-	-	-	-	
	V11	4.72	19	289	2.89	91	
	V12	4.98	16	298	3.15	102	
	V13	-	-	-	-	-	
	V14	4.28	22	278	2.97	102	
	V15	3.83	26	232	2.76	100	
	V16	-	-	-	-	-	
	V17	-	-	-	-	-	
F2: Optimum input 100% NPK	V1	6.49	1	350	3.76	94	7.00
	V2	5.75	7	335	3.47	94	6.00
	V3	5.62	9	330	3.32	94	5.88
	V4	6.05	3	351	3.75	100	5.13
	V5	6.29	2	342	3.63	114	4.63
	V6	5.93	4	328	3.62	104	4.63
	V7	4.75	17	303	3.15	102	9.88
	V8	4.41	20	290	3.03	100	6.50
	V9	4.73	18	299	3.16	100	5.88
	V10	-	-	-	-	-	-
	V11	5.12	14	307	3.39	91	5.00
	V12	5.52	11	314	3.29	102	6.75
	V13	-	-	-	-	-	-
	V14	5.06	15	305	3.18	102	9.75
	V15	4.34	21	269	3.11	100	6.38
	V16	-	-	-	-	-	-
	V17	-	-	-	-	-	-
Interaction							
F at same V		NS		12.23	0.13	NS	
V at same F		NS		11.8	0.13	NS	
F1		4.88	2	292	3.13	98	
F2		5.39	1	317	3.37	100	6.41
C.D.(0.05)		0.03		1.46	0.01	0.11	
C.V.(%)		0.54		0.49	0.37	0.11	

Table 4.1 (d): Contd.

F-levels	Varieties	CHINSURAH					
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
Mean of varieties:							
	V1	6.21	1	347	3.62	94	7.00
	V2	5.51	5	321	3.35	94	6.00
	V3	5.39	6	314	3.31	92	5.88
	V4	5.85	3	328	3.68	96	5.13
	V5	6.11	2	337	3.59	114	4.63
	V6	5.75	4	320	3.47	102	4.63
	V7	4.36	11	290	3.04	102	9.88
	V8	4.15	12	268	2.90	100	6.50
	V9	4.50	10	287	2.98	100	5.88
	V10	-	-	-	-	-	-
	V11	4.92	8	298	3.14	91	5.00
	V12	5.25	7	306	3.22	102	6.75
	V13	-	-	-	-	-	-
	V14	4.67	9	292	3.08	102	9.75
	V15	4.09	13	251	2.94	100	6.38
	V16	-	-	-	-	-	-
	V17	-	-	-	-	-	-
	C.D.(0.05)	0.14		8.65	0.09	2.99	
	C.V. (%)	2.42		2.45	2.46	2.59	
	Expt. Mean	5.13		304	3.25	99	
	Soil type	Clay loam					
	pH	7.20					
	F - levels (kg/ha)						
	F1	40:20:20					
	F2	80:40:40					
	Recommended N:P:K (kg/ha)	80:40:40					
	Varieties						
	V1	IET 30608					
	V2	IET 30603					
	V3	IET 30604					
	V4	IET 30605					
	V5	IET 30819					
	V6	IET 30613					
	V7	IET 32047 (NIL)					
	V8	NC- NDR 359					
	V9	PR121 (N)					
	V10	CR Dhan 300 (E & NE)					
	V11	Karma Mahsuri (C)					
	V12	Akshaydhan (W)					
	V13	Jaya (S)					
	V14	HRI 174					
	V15	WGL 14(RP					
	V16	Hybrid Check					
	V17	Local Check					
	Available N:P:K of soil (kg/ha)	-					

Table 4.1 (d): Contd.

F-levels	Varieties	COIMBATORE					
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
F1: Low input 50% NPK	V1	4.68	17	284	3.02	103	
	V2	4.8	15	298	3.17	106	
	V3	4.07	28	206	2.12	97	
	V4	4.76	16	288	3.08	105	
	V5	4.47	21	243	2.68	106	
	V6	4.16	26	216	2.17	104	
	V7	4.56	19	271	2.87	106	
	V8	4.11	27	206	2.16	98	
	V9	4.53	20	262	2.83	97	
	V10	-	-	-	-	-	
	V11	4.26	24	232	2.33	105	
	V12	4.22	25	218	2.22	104	
	V13	-	-	-	-	-	
	V14	4.57	18	280	2.92	102	
	V15	4.38	22	231	2.56	98	
	V16	-	-	-	-	-	
	V17	4.33	23	227	2.47	104	
F2: Optimum input 100% NPK	V1	7.1	3	382	3.18	104	19.36
	V2	7.25	1	397	3.35	107	19.60
	V3	5.85	14	298	2.21	97	14.24
	V4	7.16	2	385	3.22	106	19.20
	V5	6.41	7	346	2.82	107	15.52
	V6	6.06	12	314	2.32	104	15.20
	V7	6.58	5	366	2.96	107	16.16
	V8	5.92	13	303	2.27	98	14.48
	V9	6.52	6	358	2.92	97	15.92
	V10	-	-	-	-	-	-
	V11	6.27	10	330	2.57	106	16.08
	V12	6.18	11	318	2.47	104	15.68
	V13	-	-	-	-	-	-
	V14	6.86	4	377	3.07	103	18.32
	V15	6.32	8	338	2.72	98	15.52
	V16	-	-	-	-	-	-
	V17	6.31	9	331	2.66	104	15.84
Interaction							
<i>F at same V</i>		0.15		5.1	0.05	NS	
<i>V at same F</i>		0.06		17.09	0.06	NS	
F1		4.42	2	247	2.61	103	
F2		6.49	1	346	2.77	103	16.51
C.D.(0.05)		0.19		22.3	0.01	NS	
C.V.(%)		3.62		8.00	0.23	0.80	

Table 4.1 (d): Contd.

F-levels	Varieties	COIMBATORE					
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
Mean of varieties:							
	V1	5.89	3	333	3.10	104	19.36
	V2	6.03	1	347	3.26	107	19.60
	V3	4.96	14	252	2.17	97	14.24
	V4	5.96	2	337	3.15	106	19.20
	V5	5.44	7	294	2.75	107	15.52
	V6	5.11	12	265	2.25	104	15.20
	V7	5.57	5	319	2.92	107	16.16
	V8	5.02	13	254	2.22	98	14.48
	V9	5.53	6	310	2.88	97	15.92
	V10	-	-	-	-	-	-
	V11	5.27	10	281	2.45	105	16.08
	V12	5.20	11	268	2.35	104	15.68
	V13	-	-	-	-	-	-
	V14	5.72	4	329	3.00	103	18.32
	V15	5.35	8	284	2.64	98	15.52
	V16	-	-	-	-	-	-
	V17	5.32	9	279	2.57	104	15.84
	C.D.(0.05)	0.04		3.61	0.04	0.54	
	C.V. (%)	0.71		1.05	1.28	0.45	
	Expt. Mean	5.45		297	2.69	103	
	Soil type	-					
	pH	8.12					
	F - levels (kg/ha)						
	F1	75:25:25					
	F2	150:50:50					
	Recommended N:P:K (kg/ha)	150:50:50					
	Varieties						
	V1	IET 30608					
	V2	IET 30603					
	V3	IET 30604					
	V4	IET 30605					
	V5	IET 30819					
	V6	IET 30613					
	V7	IET 32047 (NIL)					
	V8	NC- NDR 359					
	V9	PR121 (N)					
	V10	CR Dhan 300 (E & NE)					
	V11	Karma Mahsuri (C)					
	V12	Akshaydhan (W)					
	V13	Jaya (S)					
	V14	HRI 174					
	V15	WGL 14(RP					
	V16	Hybrid Check					
	V17	Local Check -CO-56 (135 Days)					
	Available N:P:K of soil (kg/ha)	232:23:438					

Table 4.1 (d): Contd.

F-levels	Varieties	DHANGAIN						Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	
F1: Low input 50% NPK	V1	5.87	9	279	6.09	29.5	100	
	V2	5.71	12	276	5.42	24.8	103	
	V3	5.73	11	277	5.44	28.5	106	
	V4	5.68	13	273	4.74	24.1	102	
	V5	4.57	23	237	3.52	14.5	114	
	V6	6.16	8	282	6.53	27.9	113	
	V7	-	-	-	-	-	-	
	V8	5.58	14	272	4.58	29.5	102	
	V9	4.47	24	232	3.21	28.5	102	
	V10	-	-	-	-	-	-	
	V11	4.68	22	248	4.03	18.1	105	
	V12	5.02	21	262	4.09	27.4	102	
	V13	-	-	-	-	-	-	
	V14	5.42	17	267	4.41	25.0	103	
	V15	-	-	-	-	-	-	
	V16	-	-	-	-	-	-	
	V17	5.16	20	266	4.28	17.9	108	
F2: Optimum input 100% NPK	V1	7.21	2	294	6.13	29.7	101	12.18
	V2	6.88	5	284	5.73	25.3	104	10.64
	V3	6.99	3	293	5.87	30.5	108	11.45
	V4	6.89	4	282	5.59	25.3	103	11.00
	V5	5.38	18	253	3.93	20.4	116	7.36
	V6	8.10	1	304	7.25	28.7	115	17.64
	V7	-	-	-	-	-	-	-
	V8	6.72	6	277	5.48	30.8	103	10.36
	V9	5.18	19	251	3.78	30.1	104	6.45
	V10	-	-	-	-	-	-	-
	V11	5.47	16	259	4.22	18.3	107	7.18
	V12	5.51	15	264	4.26	28.0	103	4.45
	V13	-	-	-	-	-	-	-
	V14	6.42	7	272	4.43	26.0	105	9.09
	V15	-	-	-	-	-	-	-
	V16	-	-	-	-	-	-	-
	V17	5.84	10	269	4.32	20.7	110	6.18
Interaction								
<i>F at same V</i>		NS		NS	NS	1.47	NS	
<i>V at same F</i>		NS		NS	NS	1.58	NS	
F1		5.34	2	264	4.70	24.6	105	
F2		6.38	1	275	5.08	26.2	107	9.50
C.D.(0.05)		0.47		NS	0.28	0.92	0.48	
C.V.(%)		7.92		12.92	5.64	3.57	0.45	

Table 4.1 (d): Contd.

F-levels	Varieties	DHANGAIN						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
Mean of varieties:								
	V1	6.54	2	286	6.11	29.6	100	12.18
	V2	6.30	4	280	5.58	25.0	104	10.64
	V3	6.36	3	285	5.66	29.5	107	11.45
	V4	6.29	5	278	5.17	24.7	102	11.00
	V5	4.98	11	245	3.73	17.4	115	7.36
	V6	7.13	1	293	6.89	28.3	114	17.64
	V7	-	-	-	-	-	-	-
	V8	6.15	6	275	5.03	30.1	102	10.36
	V9	4.83	12	241	3.50	29.3	103	6.45
	V10	-	-	-	-	-	-	-
	V11	5.08	10	254	4.13	18.2	106	7.18
	V12	5.27	9	263	4.18	27.7	103	4.45
	V13	-	-	-	-	-	-	-
	V14	5.92	7	270	4.42	25.5	104	9.09
	V15	-	-	-	-	-	-	-
	V16	-	-	-	-	-	-	-
	V17	5.50	8	267	4.30	19.3	109	6.18
	C.D.(0.05)	0.67		27.59	0.91	1.04	0.61	
	C.V. (%)	9.85		8.86	16.11	3.55	0.5	
	Expt. Mean	5.86		270	4.89	25.40	106	
	Soil type	Clay loam						
	pH	6.56						
	F - levels (kg/ha)							
	F1	60:30:20						
	F2	120:60:40						
	Recommended N:P:K (kg/ha)	120:60:40						
	Varieties							
	V1	IET 30608						
	V2	IET 30603						
	V3	IET 30604						
	V4	IET 30605						
	V5	IET 30819						
	V6	IET 30613						
	V7	IET 32047 (NIL)						
	V8	NC- NDR 359						
	V9	PR121 (N)						
	V10	CR Dhan 300 (E & NE)						
	V11	Karma Mahsuri (C)						
	V12	Akshaydhan (W)						
	V13	Jaya (S)						
	V14	HRI 174						
	V15	WGL 14(RP)						
	V16	Hybrid Check						
	V17	Local Check -Sabour Shree						
	Available N:P:K of soil (kg/ha)	347:48:262						

Table 4.1 (d): Contd.

F-levels	Varieties	FAIZABAD						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
F1: Low input 50% NPK	V1	3.42	15	214	2.70	21.77	102	
	V2	4.32	9	281	3.53	32.77	105	
	V3	3.69	14	265	4.17	22.43	103	
	V4	3.73	13	254	4.00	21.90	106	
	V5	1.98	26	151	1.90	17.07	103	
	V6	3.18	18	251	2.90	27.43	103	
	V7	2.40	23	154	2.83	22.97	101	
	V8	3.06	20	171	3.07	17.57	106	
	V9	2.24	24	187	4.03	20.07	108	
	V10	-	-	-	-	-	-	
	V11	3.09	19	250	2.90	20.80	102	
	V12	2.22	25	129	1.47	16.73	104	
	V13	-	-	-	-	-	-	
	V14	3.06	20	209	2.43	16.97	102	
	V15	-	-	-	-	-	-	
	V16	-	-	-	-	-	-	
	V17	3.26	17	214	3.50	20.33	103	
F2: Optimum input 100% NPK	V1	4.70	7	260	4.03	26.70	106	11.64
	V2	6.54	1	348	5.37	24.53	105	20.18
	V3	6.02	3	297	4.10	23.40	104	21.18
	V4	6.04	2	271	4.03	29.60	108	21.00
	V5	3.84	12	174	2.73	16.43	111	16.91
	V6	5.98	4	296	4.77	33.93	106	25.45
	V7	3.36	16	202	4.03	16.90	106	8.73
	V8	3.88	11	214	2.90	21.50	104	7.45
	V9	3.89	10	215	2.43	16.80	108	15.00
	V10	-	-	-	-	-	-	-
	V11	4.91	6	282	3.80	29.20	107	16.55
	V12	2.64	22	176	2.50	12.27	109	3.82
	V13	-	-	-	-	-	-	-
	V14	4.36	8	229	3.80	20.73	106	11.82
	V15	-	-	-	-	-	-	-
	V16	-	-	-	-	-	-	-
	V17	5.01	5	246	2.80	28.07	107	15.91
Interaction								
<i>F at same V</i>		0.25		14.45	0.39	0.72	2.06	
<i>V at same F</i>		0.21		14.08	0.32	0.61	1.92	
F1		3.05	2	210	3.03	21.45	104	
F2		4.71	1	247	3.64	23.08	107	15.05
<i>C.D.(0.05)</i>		0.19		3	0.3	0.54	0.3	
<i>C.V.(%)</i>		5.04		1.35	9.13	2.5	9.13	

Table 4.1 (d): Contd.

F-levels	Varieties	FAIZABAD						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
Mean of varieties:								
	V1	4.06	6	237	3.37	24.24	104	11.64
	V2	5.43	1	314	4.45	28.65	105	20.18
	V3	4.86	3	281	4.14	22.92	104	21.18
	V4	4.89	2	263	4.02	25.75	107	21.00
	V5	2.91	11	163	2.32	16.75	107	16.91
	V6	4.58	4	274	3.84	30.68	105	25.45
	V7	2.88	12	178	3.43	19.94	103	8.73
	V8	3.47	9	193	2.99	19.54	105	7.45
	V9	3.07	10	201	3.23	18.44	108	15.00
	V10	-	-	-	-	-	-	-
	V11	4.00	7	266	3.35	25.00	105	16.55
	V12	2.43	13	153	1.99	14.50	106	3.82
	V13	-	-	-	-	-	-	-
	V14	3.71	8	219	3.12	18.85	104	11.82
	V15	-	-	-	-	-	-	-
	V16	-	-	-	-	-	-	-
	V17	4.14	5	230	3.15	24.20	105	15.91
	C.D.(0.05)	0.15		10.22	0.23	0.43	1.36	
	C.V. (%)	3.26		3.85	5.89	1.66	1.11	
	Expt. Mean	3.88		229	3.34	22.26	105	
	Soil type	Clay loam						
	pH	7.40						
	F - levels (kg/ha)							
	F1	60:30:20						
	F2	120:60:40						
	Recommended N:P:K (kg/ha)	120:60:40						
	Varieties							
	V1	IET 30608						
	V2	IET 30603						
	V3	IET 30604						
	V4	IET 30605						
	V5	IET 30819						
	V6	IET 30613						
	V7	IET 32047 (NIL)						
	V8	NC- NDR 359						
	V9	PR121 (N)						
	V10	CR Dhan 300 (E & NE)						
	V11	Karma Mahsuri (C)						
	V12	Akshaydhan (W)						
	V13	Jaya (S)						
	V14	HRI 174						
	V15	WGL 14(RP)						
	V16	Hybrid Check						
	V17	Local Check -NDR 2064						
	Available N:P:K of soil (kg/ha)	74:13:22						

Table 4.1 (d): Contd.

F-levels	Varieties	JAGDALPUR					
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
F1: Low input 50% NPK	V1	2.80	27	232	1.73	26.00	
	V2	2.53	28	280	1.60	25.67	
	V3	4.80	7	224	2.37	31.00	
	V4	2.88	25	214	2.37	27.00	
	V5	2.84	26	362	1.63	18.33	
	V6	4.80	7	217	2.67	28.33	
	V7	3.52	20	275	1.63	17.67	
	V8	3.74	17	324	2.70	28.33	
	V9	3.70	18	248	1.63	29.67	
	V10	-	-	-	-	-	
	V11	3.87	16	360	1.63	20.67	
	V12	3.42	21	211	2.47	28.33	
	V13	-	-	-	-	-	
	V14	3.36	22	231	2.03	25.67	
	V15	3.13	24	213	1.77	16.67	
	V16	-	-	-	-	-	
	V17	5.91	2	306	2.67	28.67	
F2: Optimum input 100% NPK	V1	4.18	12	350	1.83	26.67	15.33
	V2	3.68	19	292	2.33	27.00	12.78
	V3	5.44	3	328	2.33	30.00	7.11
	V4	3.31	23	313	2.30	25.67	4.78
	V5	4.05	15	540	1.17	18.00	13.44
	V6	5.44	3	326	2.40	28.00	7.11
	V7	4.08	13	327	2.23	17.00	6.22
	V8	5.34	5	370	2.37	29.00	17.78
	V9	4.26	11	313	1.30	29.67	6.22
	V10	-	-	-	-	-	-
	V11	5.17	6	389	1.90	19.33	14.44
	V12	4.38	10	293	1.90	25.33	10.67
	V13	-	-	-	-	-	-
	V14	4.44	9	307	1.93	25.33	12.00
	V15	4.07	14	275	2.13	17.00	10.44
	V16	-	-	-	-	-	-
	V17	6.36	1	358	2.57	28.33	5.00
Interaction							
F at same V		NS		38.2	3.94	1.67	
V at same F		NS		37.49	3.76	1.36	
F1		3.66	2	264	2.06	25.1	
F2		4.59	1	342	2.05	24.7	10.24
C.D.(0.05)		0.39		9.09	NS	NS	
C.V.(%)		10.08		3.2	10.35	5.69	

Table 4.1 (d): Contd.

F-levels	Varieties	JAGDALPUR					
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
Mean of varieties:							
	V1	3.49	11	291	1.78	26.3	15.33
	V2	3.11	13	286	1.97	26.3	12.78
	V3	5.12	2	276	2.35	30.5	7.11
	V4	3.10	14	264	2.33	26.3	4.78
	V5	3.45	12	451	1.40	18.2	13.44
	V6	5.12	2	272	2.53	28.2	7.11
	V7	3.80	9	301	1.93	17.3	6.22
	V8	4.54	4	347	2.53	28.7	17.78
	V9	3.98	6	281	1.47	29.7	6.22
	V10	-	-	-	-	-	-
	V11	4.52	5	375	1.77	20.0	14.44
	V12	3.90	8	252	2.18	26.8	10.67
	V13	-	-	-	-	-	-
	V14	3.90	7	269	1.98	25.5	12.00
	V15	3.60	10	244	1.95	16.8	10.44
	V16	-	-	-	-	-	-
	V17	6.14	1	332	2.62	28.5	5.00
	C.D.(0.05)	0.55		27.01	2.66	0.96	
	C.V. (%)	11.55		7.7	11.14	3.32	
	Expt. Mean	4.13		303	2.06	24.94	
	Soil type	Clay loam					
	pH	5.80					
	F - levels (kg/ha)						
	F1	50:25:15					
	F2	100:50:30					
	Recommended N:P:K (kg/ha)	100:50:30					
	Varieties						
	V1	IET 30608					
	V2	IET 30603					
	V3	IET 30604					
	V4	IET 30605					
	V5	IET 30819					
	V6	IET 30613					
	V7	IET 32047 (NIL)					
	V8	NC- NDR 359					
	V9	PR121 (N)					
	V10	CR Dhan 300 (E & NE)					
	V11	Karma Mahsuri (C)					
	V12	Akshaydhan (W)					
	V13	Jaya (S)					
	V14	HRI 174					
	V15	WGL 14(RP					
	V16	Hybrid Check					
	V17	Local Check -Samleshwari (115-120 Days)					
	Available N:P:K of soil (kg/ha)	-					

Table 4.1 (d): Contd.

F-levels	Varieties	KARJAT						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
F1: Low input 50% NPK	V1	4.90	9	279	3.24	28.91	96	
	V2	5.14	5	284	3.82	27.89	96	
	V3	4.79	10	276	3.20	26.06	98	
	V4	4.79	10	272	3.04	24.07	93	
	V5	4.08	24	244	2.46	14.48	93	
	V6	4.18	20	255	2.56	15.60	98	
	V7	4.73	14	271	2.95	17.92	98	
	V8	4.18	20	263	2.57	20.87	97	
	V9	4.10	23	245	2.46	17.13	97	
	V10	-	-	-	-	-	-	
	V11	3.49	28	237	2.41	19.65	93	
	V12	4.11	22	250	2.50	24.64	97	
	V13	-	-	-	-	-	-	
	V14	4.07	25	240	2.46	18.16	94	
	V15	4.41	19	266	2.86	14.64	98	
	V16	-	-	-	-	-	-	
	V17	3.98	26	238	2.43	21.80	96	
F2: Optimum input 100% NPK	V1	5.65	2	282	3.72	29.81	102	7.50
	V2	5.77	1	303	4.82	28.79	103	6.30
	V3	5.62	3	282	3.41	26.91	102	8.30
	V4	5.51	4	280	3.19	25.88	102	7.20
	V5	4.66	16	271	2.75	14.59	104	5.80
	V6	4.77	12	277	2.88	16.77	102	5.90
	V7	5.08	6	280	3.14	18.60	104	3.50
	V8	5.04	7	278	2.93	21.10	101	8.60
	V9	4.68	15	273	2.81	18.25	104	5.80
	V10	-	-	-	-	-	-	-
	V11	3.65	27	240	2.63	20.05	104	1.60
	V12	4.75	13	276	2.86	26.40	104	6.40
	V13	-	-	-	-	-	-	-
	V14	4.53	17	253	2.71	19.22	103	4.60
	V15	5.04	7	279	3.01	16.24	104	6.30
	V16	-	-	-	-	-	-	-
	V17	4.53	17	245	2.64	22.01	104	5.50
Interaction								
F at same V		NS		NS	NS	NS	2.74	
V at same F		NS		NS	NS	NS	2.38	
F1		4.35	2	259	2.78	20.84	96	
F2		4.95	1	273	3.11	21.76	103	5.95
C.D.(0.05)		NS		NS	NS	0.16	1.92	
C.V.(%)		14.85		7.86	24.65	0.82	2.05	

Table 4.1 (d): Contd.

F-levels	Varieties	KARJAT						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
Mean of varieties:								
	V1	5.28	2	281	3.48	29.36	99	7.50
	V2	5.46	1	293	4.32	28.34	100	6.30
	V3	5.21	3	279	3.31	26.49	100	8.30
	V4	5.15	4	276	3.12	24.98	98	7.20
	V5	4.37	11	258	2.61	14.54	99	5.80
	V6	4.48	8	266	2.72	16.19	100	5.90
	V7	4.91	5	275	3.05	18.26	101	3.50
	V8	4.61	7	270	2.75	20.99	99	8.60
	V9	4.39	10	259	2.64	17.69	101	5.80
	V10	-	-	-	-	-	-	-
	V11	3.57	14	239	2.52	19.85	98	1.60
	V12	4.43	9	263	2.68	25.52	100	6.40
	V13	-	-	-	-	-	-	-
	V14	4.30	12	247	2.59	18.69	99	4.60
	V15	4.73	6	272	2.94	15.44	101	6.30
	V16	-	-	-	-	-	-	-
	V17	4.26	13	241	2.54	21.91	100	5.50
	C.D.(0.05)	0.41		16.58	0.44	0.75	1.68	
	C.V. (%)	7.6		5.39	13.02	3.04	1.46	
	Expt. Mean	4.65		266	2.95	21.30	99	
	Soil type	-						
	pH	-						
	F - levels (kg/ha)							
	F1	50:25:25				-		
	F2	100:50:50						
	Recommended N:P:K (kg/ha)	100:50:50						
	Varieties							
	V1	IET 30608						
	V2	IET 30603						
	V3	IET 30604						
	V4	IET 30605						
	V5	IET 30819						
	V6	IET 30613						
	V7	IET 32047 (NIL)						
	V8	NC- NDR 359						
	V9	PR121 (N)						
	V10	CR Dhan 300 (E & NE)						
	V11	Karma Mahsuri (C)						
	V12	Akshaydhan (W)						
	V13	Jaya (S)						
	V14	HRI 174						
	V15	WGL 14(RP						
	V16	Hybrid Check						
	V17	Local Check -KJT-8 (140-145 Days)						
	Available N:P:K of soil (kg/ha)	-						

Table 4.1 (d): Contd.

F-levels	Varieties	KAUL					
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
F1: Low input 50% NPK	V1	5.85	8	264	2.82	26.17	
	V2	4.49	20	220	2.50	24.37	
	V3	5.76	9	269	2.78	25.87	
	V4	6.01	6	270	2.81	26.20	
	V5	4.55	19	221	2.54	23.73	
	V6	-	-	-	-	-	
	V7	-	-	-	-	-	
	V8	4.10	22	230	2.44	24.57	
	V9	5.86	7	266	2.75	26.33	
	V10	-	-	-	-	-	
	V11	4.56	18	203	2.48	24.03	
	V12	4.25	21	215	2.49	24.03	
	V13	-	-	-	-	-	
	V14	5.11	15	246	2.67	23.67	
	V15	-	-	-	-	-	
	V16	-	-	-	-	-	
	V17	5.76	9	261	2.77	26.07	
F2: Optimum input 100% NPK	V1	6.47	3	305	2.98	26.17	4.59
	V2	5.55	12	246	2.64	24.10	7.85
	V3	6.63	2	288	2.87	25.23	6.44
	V4	6.80	1	298	3.00	26.67	5.85
	V5	5.03	16	255	2.63	24.27	3.56
	V6	-	-	-	-	-	-
	V7	-	-	-	-	-	-
	V8	4.89	17	255	2.65	24.33	5.85
	V9	6.38	4	286	2.99	26.27	3.85
	V10	-	-	-	-	-	-
	V11	5.33	13	247	2.75	23.70	5.70
	V12	5.56	11	252	2.62	25.23	9.70
	V13	-	-	-	-	-	-
	V14	5.21	14	281	2.77	25.17	0.74
	V15	-	-	-	-	-	-
	V16	-	-	-	-	-	-
	V17	6.07	5	286	2.83	26.47	2.30
Interaction							
F at same V		0.37		NS	NS	0.87	
V at same F		0.37		NS	NS	0.88	
F1		5.12	2	242	2.64	25.00	
F2		5.81	1	273	2.79	25.24	5.13
C.D.(0.05)		0.12		3.53	NS	NS	
C.V.(%)		2.04		1.29	6.66	1.04	

Table 4.1 (d): Contd.

F-levels	Varieties	KAUL					
		Grain Yield (t/ha)	Rank	Panicle/m² (No.)	Panicle wt (g)	Test wt (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
Mean of varieties:							
	V1	6.16	3	285	2.90	26.17	4.59
	V2	5.02	7	233	2.57	24.24	7.85
	V3	6.20	2	279	2.83	25.55	6.44
	V4	6.41	1	284	2.91	26.44	5.85
	V5	4.79	10	238	2.59	24.00	3.56
	V6	-	-	-	-	-	-
	V7	-	-	-	-	-	-
	V8	4.50	11	243	2.55	24.45	5.85
	V9	6.12	4	276	2.87	26.30	3.85
	V10	-	-	-	-	-	-
	V11	4.95	8	225	2.62	23.87	5.70
	V12	4.91	9	233	2.56	24.63	9.70
	V13	-	-	-	-	-	-
	V14	5.16	6	263	2.72	24.42	0.74
	V15	-	-	-	-	-	-
	V16	-	-	-	-	-	-
	V17	5.92	5	274	2.80	26.27	2.30
	C.D.(0.05)	0.26		13.46	0.1	0.62	
	C.V. (%)	4.12		4.48	3.17	2.12	
	Expt. Mean	5.46		257	2.72	25.12	
	Soil type	Clay Loam					
	pH	8.00					
	F - levels (kg/ha)						
	F1	75:30:30					
	F2	150:60:60					
	Recommended N:P:K (kg/ha)	150:60:60					
	Varieties						
	V1	IET 30608					
	V2	IET 30603					
	V3	IET 30604					
	V4	IET 30605					
	V5	IET 30819					
	V6	IET 30613					
	V7	IET 32047 (NIL)					
	V8	NC- NDR 359					
	V9	PR121 (N)					
	V10	CR Dhan 300 (E & NE)					
	V11	Karma Mahsuri (C)					
	V12	Akshaydhan (W)					
	V13	Jaya (S)					
	V14	HRI 174					
	V15	WGL 14(RP)					
	V16	Hybrid Check					
	V17	Local Check -HKR 127 (140 Days)					
	Available N:P:K of soil (kg/ha)	160:16:320					

Table 4.1 (d): Contd.

F-levels	Varieties	MARUTERU						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
F1: Low input 50% NPK	V1	4.44	21	286	3.92	23.17	98	
	V2	4.64	17	296	3.18	22.33	88	
	V3	5.32	4	239	4.17	23.33	88	
	V4	5.18	7	272	4.06	22.27	88	
	V5	6.47	1	311	2.62	23.27	98	
	V6	5.18	7	244	4.67	21.70	98	
	V7	-	-	-	-	-	-	
	V8	4.00	24	262	2.69	24.20	98	
	V9	4.84	15	306	2.83	22.30	97	
	V10	-	-	-	-	-	-	
	V11	4.28	22	258	3.79	14.40	98	
	V12	4.85	14	269	3.39	18.70	97	
	V13	-	-	-	-	-	-	
	V14	4.81	16	229	4.93	15.33	97	
	V15	4.63	18	284	5.38	15.27	89	
	V16	-	-	-	-	-	-	
	V17	-	-	-	-	-	-	
F2: Optimum input 100% NPK	V1	4.57	19	261	3.31	19.30	100	1.24
	V2	5.14	10	332	3.18	21.47	99	4.76
	V3	5.30	6	265	4.26	23.57	99	-0.19
	V4	6.33	2	345	4.09	24.27	99	10.95
	V5	6.15	3	312	2.64	22.93	102	-3.05
	V6	5.17	9	244	4.54	21.03	98	-0.10
	V7	-	-	-	-	-	-	-
	V8	4.23	23	276	3.56	24.23	100	2.19
	V9	5.31	5	314	3.29	22.11	99	4.48
	V10	-	-	-	-	-	-	-
	V11	4.48	20	265	3.79	14.13	99	1.90
	V12	4.95	12	321	3.40	18.57	102	0.95
	V13	-	-	-	-	-	-	-
	V14	5.04	11	242	5.21	15.83	99	2.19
	V15	4.92	13	315	5.36	15.27	97	2.76
	V16	-	-	-	-	-	-	-
	V17	-	-	-	-	-	-	-
Interaction								
F at same V		0.53		27.96	0.43	1.03	1.87	
V at same F		0.45		35.51	0.35	1.01	1.72	
F1		4.89	2	271	3.80	20.52	95	
F2		5.13	1	291	3.89	20.23	100	2.34
C.D.(0.05)		NS		NS	NS	NS	1.14	
C.V.(%)		7.59		10.48	8.73	2.16	1.16	

Table 4.1 (d): Contd.

F-levels	Varieties	MARUTERU						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
Mean of varieties:								
	V1	4.51	10	274	3.62	21.24	99	1.24
	V2	4.89	8	314	3.18	21.90	94	4.76
	V3	5.31	3	252	4.22	23.45	94	-0.19
	V4	5.76	2	309	4.08	23.27	94	10.95
	V5	6.31	1	312	2.63	23.10	100	-3.05
	V6	5.18	-	244	4.61	21.37	98	-0.10
	V7	-	-	-	-	-	-	-
	V8	4.12	12	269	3.13	24.22	99	2.19
	V9	5.08	5	310	3.06	22.21	98	4.48
	V10	-	-	-	-	-	-	-
	V11	4.38	11	262	3.79	14.27	99	1.90
	V12	4.90	7	295	3.40	18.64	100	0.95
	V13	-	-	-	-	-	-	-
	V14	4.93	6	235	5.07	15.58	98	2.19
	V15	4.78	-	300	5.37	15.27	93	2.76
	V16	-	-	-	-	-	-	-
	V17	-	-	-	-	-	-	-
	C.D.(0.05)	NS		19.77	NS	0.71	NS	
	C.V. (%)	5.51		6.04	5.58	3.01	1.08	
	Expt. Mean	5.01		281	3.84	20.37	97	
	Soil type	-						
	pH	5.80						
	F - levels (kg/ha)							
	F1	45:30:30						
	F2	90:60:60						
	Recommended N:P:K (kg/ha)	90:60:60						
	Varieties							
	V1	IET 30608						
	V2	IET 30603						
	V3	IET 30604						
	V4	IET 30605						
	V5	IET 30819						
	V6	IET 30613						
	V7	IET 32047 (NIL)						
	V8	NC- NDR 359						
	V9	PR121 (N)						
	V10	CR Dhan 300 (E & NE)						
	V11	Karma Mahsuri (C)						
	V12	Akshaydhan (W)						
	V13	Jaya (S)						
	V14	HRI 174						
	V15	WGL 14(RP						
	V16	Hybrid Check						
	V17	Local Check						
	Available N:P:K of soil (kg/ha)	119:14:273						

Table 4.1 (d): Contd.

F-levels	Varieties	NAGINA						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
F1: Low input 50% NPK	V1	2.87	14	288	2.78	23.86	112	
	V2	2.83	16	268	2.77	23.71	120	
	V3	2.73	17	258	2.76	23.47	114	
	V4	2.85	15	274	2.78	23.75	105	
	V5	2.55	23	238	2.66	22.48	123	
	V6	2.59	22	242	2.64	22.87	125	
	V7	2.67	20	244	2.72	23.17	115	
	V8	2.73	17	255	2.74	23.45	105	
	V9	2.64	21	243	2.69	23.13	113	
	V10	-	-	-	-	-	-	
	V11	2.70	19	252	2.74	23.54	110	
	V12	2.54	24	238	2.61	22.45	114	
	V13	-	-	-	-	-	-	
	V14	2.35	26	224	2.55	22.36	112	
	V15	2.45	25	237	2.62	22.33	110	
	V16	-	-	-	-	-	-	
	V17	-	-	-	-	-	-	
F2: Optimum input 100% NPK	V1	4.92	1	374	3.14	23.86	113	18.64
	V2	4.62	8	368	3.13	23.71	121	16.27
	V3	4.87	3	360	3.12	23.47	114	19.45
	V4	4.90	2	372	3.14	23.75	106	18.64
	V5	4.47	10	284	2.99	23.16	125	17.45
	V6	4.62	8	292	3.00	23.14	126	18.45
	V7	4.74	6	342	3.12	23.21	115	18.82
	V8	4.77	4	357	3.13	23.45	105	18.55
	V9	4.73	7	305	3.05	23.17	113	19.00
	V10	-	-	-	-	-	-	-
	V11	4.76	5	355	3.13	23.23	111	18.73
	V12	4.43	11	280	2.94	23.13	114	17.18
	V13	-	-	-	-	-	-	-
	V14	4.32	13	279	2.83	22.96	112	17.91
	V15	4.38	12	270	2.91	22.97	110	17.55
	V16	-	-	-	-	-	-	-
	V17	-	-	-	-	-	-	-
Interaction								
F at same V		NS		18.19	0.03	0.2	NS	
V at same F		NS		18.82	0.03	0.18	NS	
F1		2.65	2	251	2.70	23.12	114	
F2		4.66	1	326	3.05	23.32	114	18.20
C.D.(0.05)		0.19		8.96	0.02	0.12	NS	
C.V.(%)		5.25		3.19	0.69	0.54	0.81	

Table 4.1 (d): Contd.

F-levels	Varieties	NAGINA						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
Mean of varieties:								
	V1	3.90	1	331	2.96	23.86	112	18.64
	V2	3.73	6	318	2.95	23.71	120	16.27
	V3	3.80	3	309	2.94	23.47	114	19.45
	V4	3.88	2	323	2.96	23.75	106	18.64
	V5	3.51	10	261	2.83	22.82	124	17.45
	V6	3.61	9	267	2.82	23.01	126	18.45
	V7	3.71	7	293	2.92	23.19	115	18.82
	V8	3.75	4	306	2.94	23.45	105	18.55
	V9	3.69	8	274	2.87	23.15	113	19.00
	V10	-	-	-	-	-	-	-
	V11	3.73	5	303	2.94	23.39	110	18.73
	V12	3.49	11	259	2.78	22.79	114	17.18
	V13	-	-	-	-	-	-	-
	V14	3.34	13	251	2.69	22.66	112	17.91
	V15	3.42	12	253	2.77	22.65	110	17.55
	V16	-	-	-	-	-	-	-
	V17	-	-	-	-	-	-	-
	C.D.(0.05)	0.26		12.86	0.02	0.13	1.02	
	C.V. (%)	6.13		3.84	0.57	0.48	0.77	
	Expt. Mean	3.66		288	2.87	23.22	114	
	Soil type	-						
	pH	7.70						
	F - levels (kg/ha)							
	F1	60:30:20						
	F2	120:60:40						
	Recommended N:P:K (kg/ha)	120:60:40						
	Varieties							
	V1	IET 30608						
	V2	IET 30603						
	V3	IET 30604						
	V4	IET 30605						
	V5	IET 30819						
	V6	IET 30613						
	V7	IET 32047 (NIL)						
	V8	NC- NDR 359						
	V9	PR121 (N)						
	V10	CR Dhan 300 (E & NE)						
	V11	Karma Mahsuri (C)						
	V12	Akshaydhan (W)						
	V13	Jaya (S)						
	V14	HRI 174						
	V15	WGL 14(RP						
	V16	Hybrid Check						
	V17	Local Check						
	Available N:P:K of soil (kg/ha)	21:18:209						

Table 4.1 (d): Contd.

F-levels	Varieties	NAVSARI						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
F1: Low input 50% NPK	V1	4.53	6	236	2.11	26.44	89	
	V2	4.38	12	241	3.06	30.32	95	
	V3	3.63	25	238	3.96	24.69	93	
	V4	3.90	19	241	2.97	22.15	106	
	V5	3.57	27	240	2.29	14.89	98	
	V6	4.05	15	234	2.96	23.62	98	
	V7	-	-	-	-	-	-	
	V8	4.51	8	236	4.54	29.44	91	
	V9	3.72	23	239	2.54	24.82	97	
	V10	-	-	-	-	-	-	
	V11	4.39	11	260	2.35	15.50	99	
	V12	3.76	21	237	2.52	24.08	101	
	V13	3.56	28	234	4.27	26.80	84	
	V14	3.60	26	233	2.99	23.11	102	
	V15	-	-	-	-	-	-	
	V16	4.42	9	254	3.91	18.13	83	
	V17	4.80	2	240	3.86	30.12	84	
F2: Optimum input 100% NPK	V1	4.56	5	236	2.21	26.51	91	0.46
	V2	4.42	9	249	3.12	31.14	90	0.62
	V3	3.71	24	251	4.11	25.46	88	1.23
	V4	3.97	16	252	3.09	22.45	91	1.08
	V5	3.95	17	247	2.30	15.63	89	5.85
	V6	3.75	22	249	2.95	23.67	91	-4.62
	V7	-	-	-	-	-	-	-
	V8	4.64	3	252	4.66	29.61	91	2.00
	V9	4.30	13	257	2.58	24.52	98	8.92
	V10	-	-	-	-	-	-	-
	V11	4.52	7	264	2.35	15.56	99	2.00
	V12	4.07	14	246	2.48	24.50	101	4.77
	V13	3.85	20	241	4.28	27.04	85	4.46
	V14	3.94	18	245	2.97	23.22	101	5.23
	V15	-	-	-	-	-	-	-
	V16	4.62	4	267	3.91	18.50	84	3.08
	V17	4.91	1	252	3.90	30.84	84	1.69
Interaction								
F at same V		NS		NS	NS	NS	2.52	
V at same F		NS		NS	NS	NS	2.17	
F1		4.06	2	240	3.17	23.9	94	
F2		4.23	1	251	3.21	24.2	92	2.63
C.D.(0.05)		NS		NS	0.04	NS	1.8	
C.V.(%)		9.87		7.01	1.25	1.43	2.06	

Table 4.1 (d): Contd.

F-levels	Varieties	NAVSARI						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
Mean of varieties:								
	V1	4.55	3	236	2.16	26.5	90	0.46
	V2	4.40	6	245	3.09	30.7	92	0.62
	V3	3.67	14	244	4.04	25.1	90	1.23
	V4	3.94	8	247	3.03	22.3	99	1.08
	V5	3.76	12	244	2.30	15.3	94	5.85
	V6	3.90	10	242	2.96	23.6	95	-4.62
	V7	-	-	-	-	-	-	-
	V8	4.58	2	244	4.60	29.5	91	2.00
	V9	4.01	7	248	2.56	24.7	98	8.92
	V10	-	-	-	-	-	-	-
	V11	4.46	5	262	2.35	15.5	99	2.00
	V12	3.92	9	242	2.50	24.3	101	4.77
	V13	3.71	13	238	4.28	26.9	85	4.46
	V14	3.77	11	239	2.98	23.2	102	5.23
	V15	-	-	-	-	-	-	-
	V16	4.52	4	260	3.91	18.3	83	3.08
	V17	4.86	1	246	3.88	30.5	84	1.69
	C.D.(0.05)	0.39		14.24	0.17	0.66	1.54	
	C.V. (%)	8.08		5.01	4.71	2.39	1.43	
	Expt. Mean	4.14		245	3.19	24.03	93	
	Soil type	Clay						
	pH	7.88						
	F - levels (kg/ha)							
	F1	50:15:0						
	F2	100:30:0						
	Recommended N:P:K (kg/ha)	100:30:0						
	Varieties							
	V1	IET 30608						
	V2	IET 30603						
	V3	IET 30604						
	V4	IET 30605						
	V5	IET 30819						
	V6	IET 30613						
	V7	IET 32047 (NIL)						
	V8	NC- NDR 359						
	V9	PR121 (N)						
	V10	CR Dhan 300 (E & NE)						
	V11	Karma Mahsuri (C)						
	V12	Akshaydhan (W)						
	V13	Jaya (S)						
	V14	HRI 174						
	V15	WGL 14(RP)						
	V16	Hybrid Check- GRH-2						
	V17	Local Check - GNR 3 (120-125 Days)						
	Available N:P:K of soil (kg/ha)	258:34:788						

Table 4.1 (d): Contd.

F-levels	Varieties	NAWAGAM						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
F1: Low input 50% NPK	V1	5.21	15	277	4.43	22.90	105	
	V2	5.78	7	275	3.83	24.87	107	
	V3	5.84	5	260	4.20	21.47	110	
	V4	5.37	10	292	3.99	23.00	105	
	V5	3.82	25	279	2.45	17.20	121	
	V6	5.35	11	248	4.79	22.13	114	
	V7	3.36	26	293	3.02	13.67	109	
	V8	5.10	16	259	3.47	27.47	100	
	V9	4.25	23	304	2.64	25.57	98	
	V10	-	-	-	-	-	-	
	V11	4.19	24	304	3.33	16.67	107	
	V12	5.04	17	255	3.21	18.33	107	
	V13	-	-	-	-	-	-	
	V14	5.34	12	288	4.29	21.83	106	
	V15	-	-	-	-	-	-	
	V16	-	-	-	-	-	-	
	V17	4.95	19	280	3.70	15.83	105	
F2: Optimum input 100% NPK	V1	5.95	3	293	4.70	22.17	106	11.84
	V2	6.23	2	302	4.05	26.00	108	7.20
	V3	6.61	1	312	4.26	26.73	112	12.32
	V4	5.78	7	346	4.05	23.13	105	6.56
	V5	4.42	22	305	2.55	18.37	121	9.60
	V6	5.85	4	273	4.95	25.00	115	8.00
	V7	4.96	18	314	3.26	16.50	111	25.60
	V8	5.41	9	307	3.60	27.97	101	4.96
	V9	4.84	20	337	2.82	26.13	99	9.44
	V10	-	-	-	-	-	-	-
	V11	4.53	21	371	3.46	19.93	106	5.44
	V12	5.33	13	286	3.53	21.13	109	4.64
	V13	-	-	-	-	-	-	-
	V14	5.82	6	342	4.44	22.17	108	7.68
	V15	-	-	-	-	-	-	-
	V16	-	-	-	-	-	-	-
	V17	5.32	14	321	4.41	16.53	106	5.92
Interaction								
<i>F at same V</i>		0.44		NS	NS	1.04	NS	
<i>V at same F</i>		0.45		NS	NS	1.01	NS	
F1		4.89	2	278	3.64	20.84	107	
F2		5.47	1	316	3.85	22.44	108	9.17
C.D.(0.05)		0.13		36.14	NS	0.49	NS	
C.V.(%)		2.66		12.49	17.33	2.32	1.19	

Table 4.1 (d): Contd.

F-levels	Varieties	NAWAGAM						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
Mean of varieties:								
	V1	5.58	4	285	4.57	22.54	105	11.84
	V2	6.01	2	288	3.94	25.44	108	7.20
	V3	6.23	1	286	4.23	24.10	111	12.32
	V4	5.58	6	319	4.02	23.07	105	6.56
	V5	4.12	13	292	2.50	17.79	121	9.60
	V6	5.60	3	261	4.87	23.57	115	8.00
	V7	4.16	12	303	3.14	15.09	110	25.60
	V8	5.26	7	283	3.54	27.72	101	4.96
	V9	4.55	10	321	2.73	25.85	98	9.44
	V10	-	-	-	-	-	-	-
	V11	4.36	11	337	3.40	18.30	107	5.44
	V12	5.19	8	271	3.37	19.73	108	4.64
	V13	-	-	-	-	-	-	-
	V14	5.58	4	315	4.37	22.00	107	7.68
	V15	-	-	-	-	-	-	-
	V16	-	-	-	-	-	-	-
	V17	5.14	9	301	4.06	16.18	106	5.92
	C.D.(0.05)	0.32		27	0.71	0.72	0.88	
	C.V. (%)	5.25		7.83	16.3	2.85	0.71	
	Expt. Mean	5.18		297	3.75	21.64	108	
	Soil type	Clay loam						
	pH	8.08						
	F - levels (kg/ha)							
	F1	50:12.5:0						
	F2	100:25:0						
	Recommended N:P:K (kg/ha)	100:25:0						
	Varieties							
	V1	IET 30608						
	V2	IET 30603						
	V3	IET 30604						
	V4	IET 30605						
	V5	IET 30819						
	V6	IET 30613						
	V7	IET 32047 (NIL)						
	V8	NC- NDR 359						
	V9	PR121 (N)						
	V10	CR Dhan 300 (E & NE)						
	V11	Karma Mahsuri (C)						
	V12	Akshaydhan (W)						
	V13	Jaya (S)						
	V14	HRI 174						
	V15	WGL 14(RP						
	V16	Hybrid Check						
	V17	Local Check - GAR 13 (125-130 Days)						
	Available N:P:K of soil (kg/ha)	188:13:281						

Table 4.1 (d): Contd.

F-levels	Varieties	PANTNAGAR						Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	
F1: Low input 50% NPK	V1	4.09	17	218	2.16	27.71	77	
	V2	4.26	15	191	2.51	24.55	82	
	V3	4.31	14	216	2.37	28.41	82	
	V4	4.00	21	212	2.18	24.46	86	
	V5	2.88	24	178	2.26	28.41	92	
	V6	4.48	13	220	2.43	25.27	93	
	V7	4.01	20	188	2.49	29.40	88	
	V8	3.96	22	195	2.28	28.26	85	
	V9	4.19	16	183	2.55	25.87	84	
	V10	4.04	19	198	2.37	23.22	90	
	V11	-	-	-	-	-	-	
	V12	-	-	-	-	-	-	
	V13	-	-	-	-	-	-	
	V14	-	-	-	-	-	-	
	V15	3.75	23	170	2.51	26.97	97	
	V16	-	-	-	-	-	-	
	V17	4.09	17	211	2.21	27.75	92	
F2: Optimum input 100% NPK	V1	5.96	3	245	2.66	27.75	76	17.00
	V2	5.96	3	261	2.49	24.95	82	15.45
	V3	6.00	2	272	2.46	28.63	81	15.36
	V4	5.88	5	264	2.48	24.72	84	17.09
	V5	5.88	5	261	2.37	28.95	94	27.27
	V6	6.39	1	255	2.72	25.72	88	17.36
	V7	5.54	9	242	2.63	29.68	84	13.91
	V8	5.38	11	249	2.50	28.73	81	12.91
	V9	5.77	7	267	2.43	26.08	85	14.36
	V10	5.23	12	241	2.47	23.43	80	10.82
	V11	-	-	-	-	-	-	-
	V12	-	-	-	-	-	-	-
	V13	-	-	-	-	-	-	-
	V14	-	-	-	-	-	-	-
	V15	5.52	10	259	2.39	27.05	89	16.09
	V16	-	-	-	-	-	-	-
	V17	5.75	8	271	2.43	28.03	82	15.09
Interaction								
F at same V		0.26		12.82	0.2	NS	4.41	
V at same F		0.25		15.88	0.16	NS	3.14	
F1		4.01	2	198	2.36	26.69	87	
F2		5.77	1	257	2.50	26.98	84	16.06
C.D.(0.05)		0.15		12.91	NS	0.24	NS	
C.V.(%)		2.96		5.59	6.96	0.89	4.78	

Table 4.1 (d): Contd.

F-levels	Varieties	PANTNAGAR						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
Mean of varieties:								
	V1	5.03	4	232	2.41	27.73	77	17.00
	V2	5.11	3	226	2.50	24.75	82	15.45
	V3	5.16	2	244	2.42	28.52	82	15.36
	V4	4.94	6	238	2.33	24.59	85	17.09
	V5	4.38	12	220	2.32	28.68	93	27.27
	V6	5.44	1	238	2.58	25.50	90	17.36
	V7	4.78	8	215	2.56	29.54	86	13.91
	V8	4.67	9	222	2.39	28.50	83	12.91
	V9	4.98	5	225	2.49	25.98	85	14.36
	V10	4.64	10	220	2.42	23.33	85	10.82
	V11	-	-	-	-	-	-	-
	V12	-	-	-	-	-	-	-
	V13	-	-	-	-	-	-	-
	V14	-	-	-	-	-	-	-
	V15	4.64	10	214	2.45	27.01	93	16.09
	V16	-	-	-	-	-	-	-
	V17	4.92	7	241	2.32	27.89	87	15.09
	C.D.(0.05)	0.18		9.07	0.11	0.2	2.22	
	C.V. (%)	3.09		3.42	3.96	0.64	2.23	
	Expt. Mean	4.89		228	2.43	26.83	86	
	Soil type	Silt Loam						
	pH	7.50						
	F - levels (kg/ha)							
	F1	60:30:20						
	F2	120:60:40						
	Recommended N:P:K (kg/ha)	120:60:40						
	Varieties							
	V1	IET 30608						
	V2	IET 30603						
	V3	IET 30604						
	V4	IET 30605						
	V5	IET 30819						
	V6	IET 30613						
	V7	IET 32047 (NIL)						
	V8	NC- NDR 359						
	V9	PR121 (N)						
	V10	CR Dhan 300 (E & NE)						
	V11	Karma Mahsuri (C)						
	V12	Akshaydhan (W)						
	V13	Jaya (S)						
	V14	HRI 174						
	V15	WGL 14(RP						
	V16	Hybrid Check						
	V17	Local Check -PD-26						
	Available N:P:K of soil (kg/ha)	222:38:212						

Table 4.1 (d): Contd.

F-levels	Varieties	PUDUCHERRY					
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
F1: Low input 50% NPK	V1	4.68	12	247	4.63	27.05	
	V2	4.51	13	238	4.19	27.52	
	V3	3.79	21	176	2.47	32.91	
	V4	4.28	16	216	3.94	24.54	
	V5	4.23	17	209	3.44	19.64	
	V6	4.45	14	230	3.46	28.45	
	V7	-	-	-	-	-	
	V8	-	-	-	-	-	
	V9	3.70	22	168	3.43	25.66	
	V10	-	-	-	-	-	
	V11	4.17	18	199	3.04	22.30	
	V12	4.36	15	220	3.61	20.05	
	V13	-	-	-	-	-	
	V14	3.98	19	193	3.08	21.93	
	V15	-	-	-	-	-	
	V16	-	-	-	-	-	
	V17	3.84	20	188	3.22	21.00	
F2: Optimum input 100% NPK	V1	6.33	1	321	4.98	27.18	16.50
	V2	6.22	2	312	4.40	27.69	17.10
	V3	5.31	10	229	2.68	33.32	15.20
	V4	5.76	5	281	4.08	25.00	14.80
	V5	5.66	6	273	3.61	19.83	14.30
	V6	6.07	3	300	3.74	28.78	16.20
	V7	-	-	-	-	-	-
	V8	-	-	-	-	-	-
	V9	5.21	11	220	3.63	25.71	15.10
	V10	-	-	-	-	-	-
	V11	5.62	7	260	3.24	22.45	14.50
	V12	5.91	4	288	4.01	20.08	15.50
	V13	-	-	-	-	-	-
	V14	5.37	8	252	3.29	22.07	13.90
	V15	-	-	-	-	-	-
	V16	-	-	-	-	-	-
	V17	5.32	9	245	3.48	21.13	14.80
Interaction							
<i>F at same V</i>		0.25		2.42	0.05	NS	
<i>V at same F</i>		0.07		23.38	0.05	NS	
F1		4.18	2	208	3.50	24.64	
F2		5.71	1	271	3.74	24.84	15.26
C.D.(0.05)		0.34		32.73	0.03	0.04	
C.V.(%)		6.4		12.91	0.67	0.15	

Table 4.1 (d): Contd.

F-levels	Varieties	PUDUCHERRY					
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
Mean of varieties:							
	V1	5.51	1	284	4.81	27.12	16.50
	V2	5.37	2	275	4.30	27.61	17.10
	V3	4.55	10	203	2.58	33.12	15.20
	V4	5.02	5	248	4.01	24.77	14.80
	V5	4.95	6	241	3.53	19.74	14.30
	V6	5.26	3	265	3.60	28.62	16.20
	V7	-	-	-	-	-	-
	V8	-	-	-	-	-	-
	V9	4.46	11	194	3.53	25.69	15.10
	V10	-	-	-	-	-	-
	V11	4.90	-	230	3.14	22.38	14.50
	V12	5.14	-	254	3.81	20.07	15.50
	V13	-	-	-	-	-	-
	V14	4.68	-	223	3.19	22.00	13.90
	V15	-	-	-	-	-	-
	V16	-	-	-	-	-	-
	V17	4.58	9	216	3.35	21.07	14.80
	C.D.(0.05)	0.05		1.71	0.03	0.2	
	C.V. (%)	0.8		0.61	0.78	0.7	
	Expt. Mean	4.94		239	3.62	24.74	
	Soil type	Clay loam					
	pH	5.33					
	F - levels (kg/ha)						
	F1	60:20:20					
	F2	120:40:40					
	Recommended N:P:K (kg/ha)	120:40:40					
	Varieties						
	V1	IET 30608					
	V2	IET 30603					
	V3	IET 30604					
	V4	IET 30605					
	V5	IET 30819					
	V6	IET 30613					
	V7	IET 32047 (NIL)					
	V8	NC- NDR 359					
	V9	PR121 (N)					
	V10	CR Dhan 300 (E & NE)					
	V11	Karma Mahsuri (C)					
	V12	Akshaydhan (W)					
	V13	Jaya (S)					
	V14	HRI 174					
	V15	WGL 14(RP)					
	V16	Hybrid Check					
	V17	Local Check - BPT 5201(125-130 Days)					
	Available N:P:K of soil (kg/ha)	123:22:103					

Table 4.1 (d): Contd.

F-levels	Varieties	PUSA						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
F1: Low input 50% NPK	V1	3.77	15	240	2.12	22.07	98	
	V2	3.46	20	221	2.00	22.00	102	
	V3	3.77	15	245	2.13	21.60	95	
	V4	3.43	22	214	1.93	22.47	104	
	V5	3.32	25	203	1.84	23.03	110	
	V6	3.34	24	212	1.87	22.03	107	
	V7	3.42	23	215	1.91	22.33	110	
	V8	3.66	18	226	2.08	22.70	98	
	V9	3.47	19	206	1.77	23.53	100	
	V10	-	-	-	-	-	-	
	V11	3.44	21	211	1.71	22.87	107	
	V12	3.27	27	191	1.63	24.00	99	
	V13	-	-	-	-	-	-	
	V14	3.19	28	196	1.86	22.83	101	
	V15	3.31	26	207	1.70	22.47	110	
	V16	-	-	-	-	-	-	
	V17	3.75	17	242	2.04	21.73	85	
F2: Optimum input 100% NPK	V1	4.99	1	285	2.48	22.57	97	11.09
	V2	4.65	7	269	2.32	22.27	100	10.82
	V3	4.90	2	284	2.52	22.20	93	10.27
	V4	4.72	5	263	2.29	23.07	102	11.73
	V5	4.64	9	253	2.24	23.67	108	12.00
	V6	4.50	11	257	2.26	22.50	106	10.55
	V7	4.70	6	262	2.27	23.13	108	11.64
	V8	4.84	3	269	2.42	23.13	96	10.73
	V9	4.65	7	250	2.12	23.87	98	10.73
	V10	-	-	-	-	-	-	-
	V11	4.60	10	252	2.12	23.47	105	10.55
	V12	4.35	13	230	2.11	24.33	98	9.82
	V13	-	-	-	-	-	-	-
	V14	4.22	14	232	2.21	23.40	99	9.36
	V15	4.37	12	245	2.26	22.97	108	9.64
	V16	-	-	-	-	-	-	-
	V17	4.79	4	275	2.46	22.40	84	9.45
Interaction								
F at same V		0.34		13.93	0.1	0.54	1.7	
V at same F		0.29		17.4	0.08	0.54	1.72	
F1		3.47	2	216	1.90	22.55	102	
F2		4.64	1	259	2.29	23.07	100	10.60
C.D.(0.05)		0.25		14.2	0.08	0.2	0.47	
C.V.(%)		6.48		6.36	4	0.94	0.49	

Table 4.1 (d): Contd.

F-levels	Varieties	PUSA						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
Mean of varieties:								
	V1	4.38	1	262	2.30	22.32	98	11.09
	V2	4.06	8	245	2.16	22.14	101	10.82
	V3	4.34	2	265	2.33	21.90	94	10.27
	V4	4.08	5	239	2.11	22.77	103	11.73
	V5	3.98	10	228	2.04	23.35	109	12.00
	V6	3.92	11	235	2.07	22.27	107	10.55
	V7	4.06	6	238	2.09	22.73	109	11.64
	V8	4.25	4	248	2.25	22.92	97	10.73
	V9	4.06	6	228	1.95	23.70	99	10.73
	V10	-	-	-	-	-	-	-
	V11	4.02	9	232	1.92	23.17	106	10.55
	V12	3.81	13	211	1.87	24.17	99	9.82
	V13	-	-	-	-	-	-	-
	V14	3.71	14	214	2.04	23.12	100	9.36
	V15	3.84	12	226	1.98	22.72	109	9.64
	V16	-	-	-	-	-	-	-
	V17	4.27	3	259	2.25	22.07	85	9.45
	C.D.(0.05)	NS		9.85	NS	NS	NS	
	C.V. (%)	4.32		3.58	2.25	1.43	1.04	
	Expt. Mean	4.05		238	2.10	22.81	101	
	Soil type	Sandy loam						
	pH	8.40						
	F - levels (kg/ha)							
	F1	60:30:20						
	F2	120:60:40						
	Recommended N:P:K (kg/ha)	120:60:40						
	Varieties							
	V1	IET 30608						
	V2	IET 30603						
	V3	IET 30604						
	V4	IET 30605						
	V5	IET 30819						
	V6	IET 30613						
	V7	IET 32047 (NIL)						
	V8	NC- NDR 359						
	V9	PR121 (N)						
	V10	CR Dhan 300 (E & NE)						
	V11	Karma Mahsuri (C)						
	V12	Akshaydhan (W)						
	V13	Jaya (S)						
	V14	HRI 174						
	V15	WGL 14(RP						
	V16	Hybrid Check						
	V17	Local Check - Rajendra Saraswati(110-115 Days)						
	Available N:P:K of soil (kg/ha)	-						

Table 4.1 (d): Contd.

F-levels	Varieties	RAJENDRANGAR ARI					
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
F1: Low input 50% NPK	V1	3.57	24	229	3.80	67	
	V2	4.78	15	276	3.80	79	
	V3	4.10	16	274	4.11	75	
	V4	4.06	17	249	3.74	76	
	V5	3.90	20	233	2.22	82	
	V6	3.97	19	241	4.33	79	
	V7	3.40	27	219	3.25	80	
	V8	3.90	20	240	4.14	70	
	V9	3.41	26	225	2.82	66	
	V10	-	-	-	-	-	
	V11	3.33	28	203	2.97	77	
	V12	3.58	23	230	3.14	73	
	V13	-	-	-	-	-	
	V14	3.60	22	232	3.66	78	
	V15	4.00	18	249	2.41	78	
	V16	-	-	-	-	-	
	V17	3.52	25	227	2.20	67	
F2: Optimum input 100% NPK	V1	6.02	12	264	4.42	69	22.27
	V2	7.10	1	334	4.16	79	21.09
	V3	6.57	6	280	5.45	75	22.45
	V4	6.95	3	291	3.92	77	26.27
	V5	6.75	4	283	3.31	83	25.91
	V6	6.75	4	290	5.16	82	25.27
	V7	6.30	9	270	3.53	81	26.36
	V8	5.94	13	247	5.31	71	18.55
	V9	6.28	10	269	3.47	67	26.09
	V10	-	-	-	-	-	-
	V11	5.93	14	254	3.41	79	23.64
	V12	7.01	2	323	4.03	74	31.18
	V13	-	-	-	-	-	-
	V14	6.54	8	271	4.16	78	26.73
	V15	6.27	11	265	3.51	79	20.64
	V16	-	-	-	-	-	-
	V17	6.55	7	279	2.24	68	27.55
Interaction F at same V		NS		21.09	NS	0.55	
V at same F		NS		20.8	NS	0.56	
F1		3.79	2	238	3.33	75	
F2		6.50	1	280	4.01	76	24.57
C.D.(0.05)		0.77		5.66	0.3	0.1	
C.V.(%)		15.85		2.33	8.83	0.14	

Table 4.1 (d): Contd.

F-levels	Varieties	RAJENDRANGAR ARI					
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
Mean of varieties:							
	V1	4.80	13	247	4.11	68	22.27
	V2	5.94	1	305	3.98	79	21.09
	V3	5.34	4	277	4.78	75	22.45
	V4	5.51	2	270	3.83	77	26.27
	V5	5.33	5	258	2.77	83	25.91
	V6	5.36	3	266	4.75	81	25.27
	V7	4.85	11	245	3.39	81	26.36
	V8	4.92	10	244	4.73	70	18.55
	V9	4.85	12	247	3.15	67	26.09
	V10	-	-	-	-	-	-
	V11	4.63	14	229	3.19	78	23.64
	V12	5.30	6	277	3.59	74	31.18
	V13	-	-	-	-	-	-
	V14	5.07	8	252	3.91	78	26.73
	V15	5.14	7	257	2.96	79	20.64
	V16	-	-	-	-	-	-
	V17	5.04	9	253	2.22	68	27.55
	C.D.(0.05)	0.47		14.92	0.46	0.4	
	C.V. (%)	7.96		4.97	10.81	0.45	
	Expt. Mean	5.15		259	3.67	75	
	Soil type	Clay loam					
	pH	7.20					
	F - levels (kg/ha)						
	F1	60:30:20					
	F2	120:60:40					
	Recommended N:P:K (kg/ha)	120:60:40					
	Varieties						
	V1	IET 30608					
	V2	IET 30603					
	V3	IET 30604					
	V4	IET 30605					
	V5	IET 30819					
	V6	IET 30613					
	V7	IET 32047 (NIL)					
	V8	NC- NDR 359					
	V9	PR121 (N)					
	V10	CR Dhan 300 (E & NE)					
	V11	Karma Mahsuri (C)					
	V12	Akshaydhan (W)					
	V13	Jaya (S)					
	V14	HRI 174					
	V15	WGL 14(RP					
	V16	Hybrid Check					
	V17	Local Check - RNR 15048					
	Available N:P:K of soil (kg/ha)	-					

Table 4.1 (d): Contd.

F-levels	Varieties	TITABAR					
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
F1: Low input 50% NPK	V1	5.18	8	249	2.60	23.43	
	V2	4.78	13	243	2.53	25.43	
	V3	4.03	26	232	2.57	26.07	
	V4	4.34	22	223	3.23	22.87	
	V5	4.67	16	241	2.97	25.47	
	V6	4.37	21	226	5.67	27.47	
	V7	3.98	27	216	2.33	16.77	
	V8	4.54	18	239	3.60	25.97	
	V9	4.42	19	243	3.43	25.00	
	V10	-	-	-	-	-	
	V11	4.10	24	247	3.17	24.20	
	V12	5.33	5	265	2.60	24.90	
	V13	-	-	-	-	-	
	V14	3.98	27	244	4.00	23.77	
	V15	4.06	25	240	3.10	23.50	
	V16	-	-	-	-	-	
	V17	5.00	11	232	3.37	24.57	
F2: Optimum input 100% NPK	V1	5.30	6	265	3.53	25.07	2.00
	V2	5.13	9	255	3.03	26.43	5.83
	V3	5.19	7	243	2.43	25.83	19.33
	V4	5.49	3	233	3.47	23.13	19.17
	V5	5.03	10	279	2.97	24.87	6.00
	V6	4.65	17	243	5.67	27.43	4.67
	V7	4.87	12	252	3.00	16.93	14.83
	V8	5.64	2	245	3.70	26.53	18.33
	V9	4.77	15	280	2.63	24.63	5.83
	V10	-	-	-	-	-	-
	V11	4.30	23	254	3.70	25.07	3.33
	V12	5.92	1	270	4.17	26.53	9.83
	V13	-	-	-	-	-	-
	V14	4.78	13	249	3.07	24.17	13.33
	V15	4.38	20	246	3.27	24.07	5.33
	V16	-	-	-	-	-	-
	V17	5.39	4	268	3.07	26.13	6.50
Interaction							
<i>F at same V</i>		NS		18.22	0.51	1.01	
<i>V at same F</i>		NS		18.75	0.48	0.88	
F1		4.48	2	239	3.23	24.24	
F2		5.06	1	256	3.41	24.77	9.60
C.D.(0.05)		0.36		8.45	NS	NS	
C.V.(%)		8.01		3.64	8.83	3.1	

Table 4.1 (d): Contd.

F-levels	Varieties	TITABAR					
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
Mean of varieties:							
	V1	5.24	2	257	3.07	24.25	2.00
	V2	4.96	5	249	2.78	25.93	5.83
	V3	4.61	8	238	2.50	25.95	19.33
	V4	4.92	6	228	3.35	23.00	19.17
	V5	4.85	7	260	2.97	25.17	6.00
	V6	4.51	10	235	5.67	27.45	4.67
	V7	4.43	11	234	2.67	16.85	14.83
	V8	5.09	4	242	3.65	26.25	18.33
	V9	4.60	9	262	3.03	24.82	5.83
	V10	-	-	-	-	-	-
	V11	4.20	14	250	3.44	24.64	3.33
	V12	5.63	1	267	3.39	25.72	9.83
	V13	-	-	-	-	-	-
	V14	4.38	12	247	3.54	23.97	13.33
	V15	4.22	13	243	3.19	23.79	5.33
	V16	-	-	-	-	-	-
	V17	5.20	3	250	3.22	25.35	6.50
	C.D.(0.05)	0.75		12.88	0.34	0.62	
	C.V. (%)	13.51		4.5	8.89	2.18	
	Expt. Mean	4.77		247	3.32	24.51	
	Soil type	Clay loam					
	pH	5.40					
	F - levels (kg/ha)						
	F1	30:10:20					
	F2	60:20:40					
	Recommended N:P:K (kg/ha)	60:20:40					
	Varieties						
	V1	IET 30608					
	V2	IET 30603					
	V3	IET 30604					
	V4	IET 30605					
	V5	IET 30819					
	V6	IET 30613					
	V7	IET 32047 (NIL)					
	V8	NC- NDR 359					
	V9	PR121 (N)					
	V10	CR Dhan 300 (E & NE)					
	V11	Karma Mahsuri (C)					
	V12	Akshaydhan (W)					
	V13	Jaya (S)					
	V14	HRI 174					
	V15	WGL 14(RP)					
	V16	Hybrid Check					
	V17	Local Check -Numoli (130 Days)					
	Available N:P:K of soil (kg/ha)	-					

Table 4.1 (d): Contd.

F-levels	Varieties	VARANASI						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
F1: Low input 50% NPK	V1	3.39	18	195	35.17	25.97	110	
	V2	5.74	2	222	50.37	25.63	109	
	V3	4.44	9	188	39.53	26.43	110	
	V4	4.72	5	189	33.63	25.73	109	
	V5	2.72	24	192	26.53	20.33	119	
	V6	3.34	19	174	49.40	27.43	113	
	V7	1.63	28	183	23.13	16.63	117	
	V8	3.03	22	160	34.43	29.87	100	
	V9	2.69	25	185	27.13	26.43	106	
	V10	-	-	-	-	-	-	
	V11	3.97	15	190	31.63	26.87	110	
	V12	2.75	23	181	29.73	26.23	113	
	V13	-	-	-	-	-	-	
	V14	4.44	9	180	30.97	23.73	103	
	V15	3.05	21	182	29.33	17.70	114	
	V16	-	-	-	-	-	-	
	V17	3.69	17	196	27.27	22.97	110	
F2: Optimum input 100% NPK	V1	4.30	11	207	32.27	26.17	110	7.58
	V2	6.13	1	204	42.77	24.90	109	3.25
	V3	5.23	3	212	40.77	28.43	110	6.58
	V4	5.15	4	199	41.70	22.63	110	3.58
	V5	3.33	20	178	24.97	20.60	117	5.08
	V6	4.29	12	183	48.70	27.20	115	7.92
	V7	2.62	26	197	24.17	16.17	116	8.25
	V8	2.37	27	140	36.60	27.00	99	-5.50
	V9	4.48	8	220	30.03	28.93	106	14.92
	V10	-	-	-	-	-	-	-
	V11	3.83	16	254	28.40	18.40	110	-1.17
	V12	4.60	6	200	30.33	26.13	109	15.42
	V13	-	-	-	-	-	-	-
	V14	4.23	13	232	39.00	23.83	103	-1.75
	V15	4.09	14	220	39.07	24.40	112	8.67
	V16	-	-	-	-	-	-	-
	V17	4.49	7	231	26.93	22.43	109	6.67
Interaction								
<i>F at same V</i>		1.02		13.65	3.87	2.18	NS	
<i>V at same F</i>		0.85		15.88	3.82	2.15	NS	
F1		3.54	2	187	33.45	24.43	110	
F2		4.22	1	205	34.69	24.09	110	5.68
C.D.(0.05)		NS		11.4	NS	NS	NS	
C.V.(%)		21.35		6.19	4.73	3.86	1.69	

Table 4.1 (d): Contd.

F-levels	Varieties	VARANASI						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
Mean of varieties:								
	V1	3.85	7	201	33.72	26.07	110	7.58
	V2	5.94	1	213	46.57	25.27	109	3.25
	V3	4.84	3	200	40.15	27.43	110	6.58
	V4	4.94	2	194	37.67	24.18	109	3.58
	V5	3.03	12	185	25.75	20.47	118	5.08
	V6	3.82	8	179	49.05	27.32	114	7.92
	V7	2.13	14	190	23.65	16.40	116	8.25
	V8	2.70	13	150	35.52	28.44	99	-5.50
	V9	3.59	10	203	28.58	27.68	106	14.92
	V10	-	-	-	-	-	-	-
	V11	3.90	6	222	30.02	22.64	110	-1.17
	V12	3.68	9	191	30.03	26.18	111	15.42
	V13	-	-	-	-	-	-	-
	V14	4.34	4	206	34.99	23.78	103	-1.75
	V15	3.57	11	201	34.20	21.05	113	8.67
	V16	-	-	-	-	-	-	-
	V17	4.09	5	214	27.10	22.70	109	6.67
	C.D.(0.05)	0.6		9.65	2.7	1.52	2.44	
	C.V. (%)	13.43		4.25	6.85	5.42	1.92	
	Expt. Mean	3.88		196	34.07	24.26	110	
	Soil type	Loam						
	pH	7.30						
	F - levels (kg/ha)							
	F1	75:25:20						
	F2	150:50:40						
	Recommended N:P:K (kg/ha)	150:50:40						
	Varieties							
	V1	IET 30608						
	V2	IET 30603						
	V3	IET 30604						
	V4	IET 30605						
	V5	IET 30819						
	V6	IET 30613						
	V7	IET 32047 (NIL)						
	V8	NC- NDR 359						
	V9	PR121 (N)						
	V10	CR Dhan 300 (E & NE)						
	V11	Karma Mahsuri (C)						
	V12	Akshaydhan (W)						
	V13	Jaya (S)						
	V14	HRI 174						
	V15	WGL 14(RP)						
	V16	Hybrid Check						
	V17	Local Check -HUR 105						
	Available N:P:K of soil (kg/ha)	-						

Table 4.1 (d): Contd.

F-levels	Varieties	WARANGAL							Over all mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)		
F1: Low input 50% NPK	V1	7.60	14	317	4.83	23.73	92		4.58	19
	V2	7.53	15	322	5.00	24.57	96		4.64	17
	V3	7.20	17	337	4.17	26.13	88		4.55	21
	V4	7.73	12	319	4.33	23.27	98		4.56	20
	V5	6.67	22	330	3.30	17.70	106		4.05	28
	V6	7.17	18	316	5.77	24.53	104		4.48	22
	V7	7.30	16	345	3.63	16.37	101		3.72	33
	V8	6.97	20	320	4.57	28.53	94		4.11	25
	V9	6.33	25	323	3.90	25.67	93		4.02	30
	V10	-	-	-	-	-	-		4.04	29
	V11	6.53	23	332	3.50	16.70	99		4.06	27
	V12	6.33	25	339	3.43	26.00	95		4.10	26
	V13	-	-	-	-	-	-		3.56	34
	V14	6.00	27	334	4.07	20.47	98		4.17	24
	V15	6.00	27	330	3.90	15.40	95		3.84	32
	V16	-	-	-	-	-	-		4.42	23
	V17	7.00	19	321	3.70	12.77	98		4.64	16
F2: Optimum input 100% NPK	V1	8.17	8	304	5.57	28.43	91	5.18	5.69	6
	V2	9.53	1	296	5.53	24.67	94	18.18	5.83	1
	V3	9.03	2	313	5.73	27.50	87	16.64	5.77	3
	V4	8.50	6	301	4.50	23.90	96	7.00	5.78	2
	V5	8.53	5	292	3.43	20.33	104	16.91	5.26	8
	V6	8.60	4	301	5.87	26.80	103	13.00	5.73	4
	V7	8.33	7	317	4.07	17.33	100	9.36	5.05	15
	V8	7.87	9	312	5.10	29.17	91	8.18	5.11	12
	V9	6.47	24	293	4.20	26.67	93	1.27	5.15	11
	V10	-	-	-	-	-	-	-	5.23	9
	V11	6.93	21	301	4.33	17.97	99	3.64	5.07	14
	V12	7.80	11	308	3.73	26.77	94	13.36	5.23	10
	V13	-	-	-	-	-	-	-	3.85	31
	V14	8.73	3	306	4.80	25.83	97	24.82	5.29	7
	V15	7.87	9	314	4.00	15.57	94	17.00	5.07	13
	V16	-	-	-	-	-	-	-	4.62	18
	V17	7.67	13	309	3.83	13.07	96	6.09	5.70	5
Interaction										
<i>F at same V</i>		NS		NS	NS	NS	NS			
<i>V at same F</i>		NS		NS	NS	NS	NS			
F1		6.88	2	327	4.15	21.56	97		4.28	2
F2		8.15	1	305	4.62	23.14	96	11.47	5.42	1
C.D.(0.05)		0.12		0.62	1.11	0.21	NS			
C.V.(%)		2.9		0.69	15.74	5.08	16.09			

Table 4.1 (d): Contd.

F-levels	Varieties	WARANGAL							Over all mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)		
Mean of varieties:										
	V1	7.89	4	311	5.20	26.08	92	5.18	5.14	5
	V2	8.53	1	309	5.27	24.62	95	18.18	5.23	1
	V3	8.12	2	325	4.95	26.82	88	16.64	5.16	4
	V4	8.12	2	310	4.42	23.59	97	7.00	5.17	2
	V5	7.60	7	311	3.37	19.02	105	16.91	4.65	9
	V6	7.89	4	309	5.82	25.67	103	13.00	5.10	6
	V7	7.82	6	331	3.85	16.85	101	9.36	4.39	16
	V8	7.42	8	316	4.84	28.85	93	8.18	4.61	11
	V9	6.40	14	308	4.05	26.17	93	1.27	4.59	12
	V10	-	-	-	-	-	-	-	4.64	10
	V11	6.73	13	317	3.92	17.34	99	3.64	4.56	13
	V12	7.07	11	323	3.58	26.39	94	13.36	4.67	8
	V13	-	-	-	-	-	-	-	3.71	17
	V14	7.37	9	320	4.44	23.15	98	24.82	4.73	7
	V15	6.94	12	322	3.95	15.49	95	17.00	4.45	15
	V16	-	-	-	-	-	-	-	4.52	14
	V17	7.34	10	315	3.77	12.92	97	6.09	5.17	3
	C.D.(0.05)	NS		0.68	0.81	0.58	NS			
	C.V. (%)	8.65		0.61	9.25	11.42	6.02			
	Expt. Mean	7.51		316	4.39	22.35	96		4.85	
	Soil type	Clay								
	pH	8.56								
	F - levels (kg/ha)									
	F1	60:30:20								
	F2	120:60:40								
	Recommended N:P:K (kg/ha)	120:60:40								
	Varieties									
	V1	IET 30608								
	V2	IET 30603								
	V3	IET 30604								
	V4	IET 30605								
	V5	IET 30819								
	V6	IET 30613								
	V7	IET 32047 (NIL)								
	V8	NC- NDR 359								
	V9	PR121 (N)								
	V10	CR Dhan 300 (E & NE)								
	V11	Karma Mahsuri (C)								
	V12	Akshaydhan (W)								
	V13	Jaya (S)								
	V14	HRI 174								
	V15	WGL 14(RP)								
	V16	Hybrid Check								
	V17	Local Check -WGL 962 (135 Days)								
	Available N:P:K of soil (kg/ha)	132:55:410								

4. 1(e) AVT 2 - AL & ISTVT

Saline tolerant cultures (Twelve) Viz., IET 31055, IET 31053, IET 31050, IET 31048, IET 31080, IET 31051, IET 31045, IET 31044, IET 32053, IET 32052, IET 32055 and IET 32056 were evaluated for its response to different doses of nutrients on grain yield at **Kanpur (150:60:60)** and **Navasari(120:30:0)**. The details and data received from these locations are summarized and presented in Table 4.1(e).

Application of RDF doses influence the grain yield significantly at both the locations and higher dose of 100% RDF save higher grain yield of 3.08 t/ha at Kanpur, and 2.46 t/ha at Navasari.

Grain yield differences among the tested cultures was found to be significant at both locations and IET entries found non promising over checks. Interaction effects among RFD x varieties on grain yield was found to be non-significant. Mean over the locations, standard and local checks performance was superior over test entries.

In this trial, 100% RDF was found to be promising however, exhibited higher nutrient efficiency (2.51). IET cultures were not found to be promising over other local checks as the performance of standard checks promising. Hence, among IET cultures, IET 31051 and IET 31045 at Kanpur while, IET 31045 and IET 31044 were promising at Navasari.

Table 4.1(e): Summary of data on grain yield and ancillary characters of selected AET AL&ISTVT cultures grown under transplanted conditions at graded levels of recommended fertilizer doses, kharif 2024.

F-levels	Varieties	KANPUR					
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Plant height (cm)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: Low input (50% NPK)	V1	2.43	31	262	90.60	86	
	V2	2.88	15	269	89.30	85	
	V3	2.37	32	277	90.40	92	
	V4	2.53	26	276	81.13	86	
	V5	2.51	27	260	93.67	88	
	V6	3.04	9	271	91.80	89	
	V7	3.02	11	278	89.70	91	
	V8	2.49	29	280	85.40	88	
	V9	2.48	30	276	90.83	91	
	V10	2.89	13	285	89.83	83	
	V11	2.64	25	264	84.77	89	
	V12	2.50	28	281	86.60	85	
	V13	3.75	2	282	87.67	90	
	V14	2.80	21	273	94.87	85	
	V15	-		-	-	-	
	V16	2.76	22	271	90.80	84	
	V17	2.69	24	278	65.80	99	
	V18	-		-	-	-	
F2: Optimum input (100% NPK)	V1	2.81	20	277	106.83	84	2.81
	V2	3.30	4	287	101.30	83	3.11
	V3	2.73	23	291	104.77	90	2.67
	V4	2.89	13	291	96.47	88	2.67
	V5	2.88	15	281	106.53	85	2.74
	V6	3.34	3	286	109.00	88	2.22
	V7	3.30	4	291	103.50	89	2.07
	V8	2.88	15	289	98.30	87	2.89
	V9	2.88	15	293	108.50	88	2.96
	V10	3.13	6	293	104.63	85	1.78
	V11	2.97	12	273	96.33	87	2.44
	V12	2.82	19	288	98.83	87	2.37
	V13	4.04	1	302	98.80	87	2.15
	V14	3.07	8	285	110.23	83	2.00
	V15	-		-	-	-	
	V16	3.13	6	283	103.57	82	2.74
	V17	3.03	10	294	77.00	97	2.52
	V18	-		-	-	-	
Interaction							
F at same V		NS		NS	NS	NS	
V at same F		NS		NS	NS	NS	
F1		2.74	2	274	87.70	88	
F2		3.08	1	288	101.54	87	2.51
C.D.(0.05)		0.06		8.1	3.48	NS	
C.V.(%)		2.44		3.29	4.19	2.65	

Table 4.1(e): Contd.

F-levels	Varieties	KANPUR					
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Plant height (cm)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties:							
	V1	2.62	15	269	98.72	85	2.81
	V2	3.09	4	278	95.30	84	3.11
	V3	2.55	16	284	97.59	91	2.67
	V4	2.71	10	284	88.80	87	2.67
	V5	2.70	11	271	100.10	87	2.74
	V6	3.19	2	279	100.40	89	2.22
	V7	3.16	3	285	96.60	90	2.07
	V8	2.69	12	285	91.85	88	2.89
	V9	2.68	13	285	99.67	90	2.96
	V10	3.01	5	289	97.23	84	1.78
	V11	2.81	9	269	90.55	88	2.44
	V12	2.66	14	285	92.72	86	2.37
	V13	3.90	1	292	93.24	89	2.15
	V14	2.94	7	279	102.55	84	2.00
	V15	-		-	-	-	
	V16	2.95	6	277	97.19	83	2.74
	V17	2.86	8	286	71.40	98	2.52
	V18	-		-	-	-	
	C.D.(0.05)	0.12		8.18	2.61	2.72	
	C.V. (%)	3.49		2.52	2.38	2.69	
	Expt. Mean	2.91		281	94.62	88	
	Soil type	Sandy clay loam					
	pH	9.60					
	F - levels (kg/ha)						
	F1	75:30:30					
	F2	150:60:60					
	Recommended N:P:K (kg/ha)	150:60:60					
	Varieties						
	V1	IET 31055					
	V2	IET 31053					
	V3	IET 31050					
	V4	IET 31048					
	V5	IET 31080					
	V6	IET 31051					
	V7	IET 31045					
	V8	IET 31044					
	V9	IET 32053					
	V10	IET 32052					
	V11	IET 32055					
	V12	IET 32056					
	V13	CSR-36					
	V14	CSR-10					
	V15	-					
	V16	CSR-23					
	V17	Pusa-44					
	V18	-					
	Available N:P:K of soil (kg/ha)	294:47.8:1246					

Table 4.1(e): Contd.

F-levels	Varieties	NAVSARI							Over all mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)		
F1: Low input (50% NPK)	V1	2.25	17	255	3.15	21.57	97		2.34	32
	V2	2.09	33	251	3.49	20.37	90		2.49	24
	V3	2.09	33	244	3.06	19.30	89		2.23	35
	V4	2.23	20	249	3.15	23.17	89		2.38	30
	V5	2.11	29	242	2.85	21.77	95		2.31	33
	V6	2.16	27	249	3.01	20.63	95		2.60	16
	V7	2.54	8	260	3.47	14.37	95		2.78	10
	V8	2.50	9	260	3.37	13.87	96		2.50	22
	V9	2.10	30	238	3.23	23.20	97		2.29	34
	V10	2.29	16	247	3.37	23.17	99		2.59	18
	V11	2.15	28	240	3.46	20.40	108		2.40	29
	V12	2.19	25	245	3.05	14.83	111		2.35	31
	V13	2.10	30	247	2.87	22.20	98		2.93	5
	V14	2.10	30	242	2.56	23.33	90		2.45	27
	V15	2.20	23	253	3.23	24.13	96		2.20	36
	V16	2.09	33	238	2.46	23.37	93		2.43	28
	V17	2.23	20	251	2.80	23.00	99		2.46	26
	V18	3.44	2	255	3.49	24.53	100		3.44	2
F2: Optimum input (100% NPK)	V1	2.60	6	264	3.46	22.73	95	4.67	2.71	11
	V2	2.33	13	255	3.60	20.90	89	3.20	2.82	8
	V3	2.24	19	253	3.13	20.47	87	2.00	2.49	23
	V4	2.31	15	262	3.22	23.30	88	1.07	2.60	16
	V5	2.22	22	264	2.99	22.07	92	1.47	2.55	20
	V6	2.49	10	264	3.23	21.13	92	4.40	2.92	6
	V7	2.71	4	269	3.60	14.93	92	2.27	3.01	4
	V8	2.72	3	262	3.45	14.70	95	2.93	2.80	9
	V9	2.09	33	251	3.34	23.57	94	-0.13	2.49	24
	V10	2.62	5	273	3.51	23.57	98	4.40	2.88	7
	V11	2.33	13	269	3.61	21.03	107	2.40	2.65	14
	V12	2.18	26	260	3.25	15.03	109	-0.13	2.50	21
	V13	2.38	11	260	3.26	23.63	97	3.73	3.21	3
	V14	2.20	23	251	2.75	23.70	89	1.33	2.64	15
	V15	2.58	7	269	3.41	24.83	93	5.07	2.58	19
	V16	2.25	17	260	2.89	24.17	92	2.13	2.69	13
	V17	2.37	12	260	2.99	24.13	97	1.87	2.70	12
	V18	3.59	1	289	3.61	24.93	97	2.00	3.59	1
Interaction										
F at same V		NS		NS	NS	NS	NS			
V at same F		NS		NS	NS	NS	NS			
F1		2.27	2	248	3.12	20.96	96		2.50	2
F2		2.46	1	263	3.29	21.60	94	2.48	2.77	1
C.D.(0.05)		0.11		12.4	0.17	0.61	NS			
C.V.(%)		5.47		5.86	6.5	3.45	2.52			

Table 4.1(e): Contd.

F-levels	Varieties	NAVSARI							Over all mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)		
Mean of varieties:										
	V1	2.43	5	260	3.31	22.15	96	4.67	2.52	11
	V2	2.21	12	253	3.55	20.64	89	3.20	2.65	6
	V3	2.17	15	249	3.10	19.89	88	2.00	2.36	18
	V4	2.27	9	256	3.19	23.24	88	1.07	2.49	13
	V5	2.17	15	253	2.92	21.92	93	1.47	2.43	14
	V6	2.33	7	257	3.12	20.88	94	4.40	2.76	4
	V7	2.63	2	265	3.54	14.65	94	2.27	2.89	3
	V8	2.61	3	261	3.41	14.29	96	2.93	2.65	7
	V9	2.10	18	244	3.29	23.39	96	-0.13	2.39	17
	V10	2.46	4	260	3.44	23.37	98	4.40	2.73	5
	V11	2.24	10	255	3.54	20.72	108	2.40	2.52	11
	V12	2.19	13	252	3.15	14.93	110	-0.13	2.42	15
	V13	2.24	10	253	3.07	22.92	98	3.73	3.07	2
	V14	2.15	17	247	2.66	23.52	89	1.33	2.54	10
	V15	2.39	6	261	3.32	24.48	94	5.07	2.39	16
	V16	2.17	14	249	2.68	23.77	93	2.13	2.56	9
	V17	2.30	8	256	2.90	23.57	98	1.87	2.58	8
	V18	3.52	1	272	3.55	24.73	98	2.00	3.52	1
	C.D.(0.05)	0.3		11.34	0.23	0.65	2.82			
	C.V. (%)	10.84		3.85	6.27	2.66	2.56			
	Expt. Mean	2.36		256	3.20	21.28	95		2.63	
	Soil type	-								
	pH	8.50								
	F - levels (kg/ha)									
	F1	60:15:0								
	F2	120:30:0								
	Recommended N:P:K (kg/ha)	120:30:0								
	Varieties									
	V1	IET 31055								
	V2	IET 31053								
	V3	IET 31050								
	V4	IET 31048								
	V5	IET 31080								
	V6	IET 31051								
	V7	IET 31045								
	V8	IET 31044								
	V9	IET 32053								
	V10	IET 32052								
	V11	IET 32055								
	V12	IET 32056								
	V13	CSR-36								
	V14	CSR-10								
	V15	FL 478								
	V16	CSR-23								
	V17	Pusa-44								
	V18	Local check - GNR-5 (130 days)								
	Available N:P:K of soil (kg/ha)	289.5:52.4:1963								

4.1(f) AVT 2 - Aerobic

Aerobic rice cultivation is a system where rice is grown under aerated conditions without standing water as against the usual transplanted flooded rice which is grown just like wheat crop. Rice is grown on dry but irrigated as per the need of the crop same as other irrigated dry (ID) crops such as Wheat and Barley. The crop is provided with irrigation water depending upon the season, evapotranspiration and specific needs of the crop. It is characterized by the presence of air in the soil medium and its limited water requirement as compared to the flooded irrigated rice.

One AVT-2 entry IET 30919, was evaluated against CR Dhan 201, DR Dhan 54, CR Dhan 202, AAUDR-1, MAS946-1 DRRH4 and local check for their response to two fertilizer levels on grain yield at seven locations viz., **Jagdalpur (120:60:40), Kaul (150:60:60), Kota (120:60:40), Ludhiana (150:30:30), Nawagam (80:25:0), Pantnagar (120:60:40) and Raipur (100:60:40)**. The data received from these locations are summarized and presented in Table 4.1(f).

Different doses of RDF exhibited significant differences on grain yield at all the locations except **Nawagam**. Application of 100% RDF recorded higher yield at **Kaul (5.57 t/ha), Kota (4.92 t/ha), Ludhiana (6.39 t/ha), Nawagam (5.06 t/ha), Pantnagar (5.07 t/ha) and Raipur (4.58 t/ha)**. Nutrient response (kg grain / kg N) was higher at 100 % RDF over 50% RDF at **Kaul (8.97), Kota (6.27), Ludhiana (7.62) Nawagam (8.38), Pantnagar (8.50) and Raipur (8.69)**

Grain yield of cultures differed significantly at all locations. Among the cultures tested, IET 30919 recorded higher yield at **Jagdalpur (7.85 t/ha)**, at **Kaul (5.70 t/ha)** and **Kota (4.80 t/ha)**; **Nawagam (5.43t/ha)** and **Pantnagar (5.50 t/ha)**, Average over the locations, the performance of IET 30919 (5.65 t/ha) was found to be promising nearly better yields at most of the locations ; Interaction effects of RDF doses and varieties was found to be significant at all the locations except **Jagdalpur, Kota, Nawagam and Raipur** where, 100% RDF realised higher grain yield with test cultures.

Summarized over the locations, application of 100% RDF was found to be promising (12% higher grain yield) and also exhibited higher nutrient response. IET 30919 was found to be promising with higher grain yield (5.85 t/ha) across the locations.

Table 4.1(f): Summary of data on grain yield and ancillary characters of selected AET Aerobic cultures at graded levels of recommended fertilizer doses, kharif 2024.

F-levels	Varieties	JAGDALPUR						KAUL					
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)	Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1- Lower Input (50% of RDF)	V1	8.20	1	322	2.67	20.7		5.08	7	257.33	2.33	24.83	
	V2	5.32	11	242	2.33	25.7		4.65	10	245.33	2.07	24.6	
	V3	-	-	-	-	-		-	-	-	-	-	
	V4	3.13	13	455	2.00	29.0		3.93	13	216.33	1.7	24.13	
	V5	6.01	8	346	2.00	28.3		3.94	12	217.33	1.52	22.9	
	V7	7.47	4	343	2.00	27.3		4.63	11	246.33	2.15	24.43	
	V8	7.48	3	279	2.00	29.3		3.31	14	220.33	1.85	23.9	
	V9	6.32	5	157	1.67	27.7		5	9	254	2.24	24.87	
	V1	7.50	2	437	2.67	21.0	-8.00	6.32	1	302	2.97	24.93	9.19
F2 - Optimum Input (100% of RDF)	V2	4.49	12	464	2.00	24.7	-9.49	5.47	4	261	2.35	23.67	6.07
	V3	-	-	-	-	-	-	-	-	-	-	-	-
	V4	2.90	14	400	2.00	29.3	-2.63	5.08	7	246.33	2.14	23.97	8.52
	V5	5.61	10	522	2.00	29.0	-4.57	5.36	5	243	1.79	23.9	10.52
	V7	5.70	9	415	2.00	25.0	-20.23	5.66	3	281	2.53	25.17	7.63
	V8	6.02	7	356	3.00	28.7	-16.69	5.24	6	250.67	2	23.6	14.30
	V9	6.04	6	347	1.67	26.7	-3.20	5.89	2	280.67	2.91	24.93	6.59
	Interaction												
	F at same V	NS		46.64	NS	NS		0.64		NS	0.23	NS	
Mean of F levels	V at same F	NS		74.91	NS	NS		0.39		NS	0.22	NS	
	F1	6.28	1	306	2.10	26.86		4.36	2	237	1.98	24.24	
	F2	5.47	2	420	2.19	26.33	-9.26	5.57	1	266	2.38	24.31	8.97
C.D.(0.05) C.V.(%)		0.54		79.18	NS	NS		0.69		14.95	0.12	NS	
		6.93		16.42	14.4	7.41		10.39		4.48	4.23	1.96	

Table 4.1(f): Contd.

F-levels		Varieties	JAGDALPUR						KAUL				
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)	Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties:													
V1		7.85	1	379	2.67	20.84	-8.00	5.70	1	280	2.65	24.88	9.19
V2		4.91	6	353	2.17	25.17	-9.49	5.06	4	253	2.21	24.14	6.07
V3		-	-	-	-	-	-	-	-	-	-	-	-
V4		3.02	7	427	2.00	29.17	-2.63	4.51	6	231	1.92	24.05	8.52
V5		5.81	5	434	2.00	28.67	-4.57	4.65	5	230	1.66	23.40	10.52
V6		6.59	3	379	2.00	26.17	-20.23	5.15	3	264	2.34	24.80	7.63
V7		6.75	2	317	2.50	29.00	-16.69	4.28	7	236	1.93	23.75	14.30
V8		6.18	4	252	1.67	27.17	-3.20	5.45	2	267	2.58	24.90	6.59
C.D.(0.05)		1.08		32.98	0.39	1.67		0.27		17.31	0.16	0.69	
C.V. (%)		15.41		7.62	15.27	5.27		4.6		5.77	6.03	2.38	
Expt. Mean		5.87		363	2.14	26.60		4.97		252	2.18	24.27	
Soil type		Clay loam						Clay loam					
pH		5.80						8.00					
N - levels (kg/ha)		50:25:12.5						75:30:30					
F1		100:50:25						150:60:60					
F2		100:50:30						150:60:60					
Recommended N:P:K (kg/ha)													
Varieties													
V1		IET 30919						IET 30919					
V2		CR Dhan 201(NC)						CR Dhan 201(NC)					
V3		CR Dhan 202 (N, E, NE & C)						CR Dhan 202 (N, E, NE & C)					
V4		AAUDR-1 (W)						AAUDR-1 (W)					
V5		MAS 946-1 (S)						MAS 946-1 (S)					
V6		DRR Dhan 54						DRR Dhan 54					
V7		DRRH 4						DRRH4					
V8		Local Check-Bastar Dhan (110 Days)						Local Check					
Available N:P:K of soil (kg/ha)		-						160:16:320					

Table 4.1(f): Contd.

F-levels	Varieties	KOTA					LUDHIANA						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)	Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1- Lower Input (50% of RDF)	V1	4.46	7	207.67	4.9	17.41		4.91	11	275	2.83	20.67	
	V2	3.75	11	220.33	3.86	21.77		6.05	7	310	2.75	25.67	
	V3	3.89	10	197.67	3.98	20.79		-	-	-	-	-	
	V4	-	-	-	-	-		4.16	14	318	2.14	29	
	V5	3.64	12	199.67	3.04	25.3		5.74	9	305	2.31	28.33	
	V7	4.15	9	200.67	4.86	25.93		4.69	12	303	3.05	27.33	
	V8	5.47	2	214.33	5.53	24.47		6.50	5	312	2.79	29.33	
	V9	-	-	-	-	-		7.06	4	345	2.97	27.67	
	V1	5.14	3	230.33	5.27	17.96	6.18	5.59	10	350	2.87	21	6.48
F2 - Optimum Input (100% of RDF)	V2	4.53	6	240.33	4.42	22.36	7.09	6.36	6	360	2.83	24.67	2.95
	V3	4.69	5	213.67	4.37	21.45	7.27	-	-	-	-	-	-
	V4	-	-	-	-	-	-	4.46	13	360	2.03	29.33	2.86
	V5	4.38	8	219.33	3.45	25.53	6.73	7.51	2	370	2.44	29	16.86
	V7	4.71	4	217.67	5.38	26.23	5.09	5.85	8	332	3.09	25	11.05
	V8	6.05	1	233	5.81	25.11	5.27	7.11	3	358	2.93	28.67	5.81
	V9	-	-	-	-	-	-	7.83	1	375	3.11	26.67	7.33
	Interaction	NS		NS	NS			0.58		NS	NS	NS	
	F at same V	NS		NS	NS			0.54		NS	NS	NS	
Mean of F levels													
	F1	4.23	2	207	4.36	22.61		5.59	2	310	2.69	26.86	
	F2	4.92	1	226	4.78	23.11	6.27	6.39	1	358	2.76	26.33	7.62
C.D.(0.05) C.V.(%)		0.59		13.01	0.32	NS		0.36		38.24	NS	NS	
		9.07		4.2	4.8	1.64		4.59		8.63	3.29	7.41	

Table 4.1(f): Contd.

F-levels		Varieties	KOTA					LUDHIANA						
Mean of varieties:			Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)	Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
V1			4.80	2	219	5.09	17.69	6.18	5.25	6	313	2.85	20.84	6.48
V2			4.14	5	230	4.14	22.07	7.09	6.21	4	335	2.79	25.17	2.95
V3			4.29	4	206	4.18	21.12	7.27	-	-	-	-	-	-
V4			-	-	-	-	-	-	4.31	7	339	2.09	29.17	2.86
V5			4.01	6	210	3.25	25.42	6.73	6.63	3	338	2.38	28.67	16.86
V6			4.43	3	209	5.12	26.08	5.09	5.27	5	318	3.07	26.17	11.05
V7			5.76	1	224	5.67	24.79	5.27	6.81	2	335	2.86	29.00	5.81
V8			-	-	-	-	-	-	7.45	1	360	3.04	27.17	7.33
C.D.(0.05)			0.42		14.3	0.39	0.73		0.39		27.2	0.19	1.67	
C.V. (%)			7.66		5.49	7.16	2.64		5.40		6.84	5.98	5.27	
Expt. Mean			4.57		216	4.57	22.86		5.99		334	2.72	26.60	
Soil type			Clay						Sandy Loam					
pH			7.49						7.70					
N - levels (kg/ha)			60:30:20						75:15:15					
F1			120:60:40						150:30:30					
F2			120:60:40						150:30:30					
Recommended N:P:K (kg/ha)														
Varieties														
V1			IET 30919						IET 30919					
V2			CR Dhan 201(NC)						CR Dhan 201(NC)					
V3			CR Dhan 202 (N, E, NE & C)						CR Dhan 202 (N, E, NE & C)					
V4			AAUDR-1 (W)						AAUDR-1 (W)					
V5			MAS 946-1 (S)						MAS 946-1 (S)					
V6			DRR Dhan 54						DRR Dhan 54					
V7			DRRH 4						DRRH 4					
V8			Local Check						Local Check					
Available N:P:K of soil (kg/ha)			215:30:369						165:25:210					

Table 4.1(f): Contd.

F-levels	Varieties	NAWAGAM					PANTNAGAR						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)	Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1- Lower Input (50% of RDF)	V1	5.09	7	129	4.4	16.5		5.21	4	211	2.73	19.29	
	V2	4.98	9	129	4	20.97		3.54	12	194	2	21.64	
	V3	-	-	-	-	-		-	-	-	-	-	
	V4	3.17	14	136	2.41	28.83		3.88	11	302	1.55	25.26	
	V5	4.09	12	141	2.67	19.73		-	-	-	-	-	
	V7	4.6	11	120	4.53	25.43		3.97	9	181	2.62	24.73	
	V8	5.19	5	118	4.95	25.55		3.96	10	230	2.03	24.71	
	V9	5.22	4	116	4.3	17		4.2	7	212	2.15	30.62	
	V1	5.76	1	138	4.65	17.83	12.76	5.78	1	272	2.34	19.82	5.18
F2 - Optimum Input (100% of RDF)	V2	5.15	6	145	4.4	21.27	3.24	4.05	8	204	2.35	21.95	4.64
	V3	-	-	-	-	-	-	-	-	-	-	-	-
	V4	3.96	13	152	2.58	29.2	15.05	5.11	5	313	1.88	25.55	11.18
	V5	4.61	10	155	2.81	20.37	9.90	-	-	-	-	-	-
	V7	5	8	138	4.74	25.63	7.62	5.59	2	244	2.53	24.82	14.73
	V8	5.64	2	134	5.22	25.77	8.57	5.36	3	248	2.36	24.87	12.73
	V9	5.3	3	143	4.41	17.87	1.52	4.52	6	241	2.05	30.81	2.91
	Interaction												
	F at same V	NS		NS	NS	NS		0.68		13.72	0.24	NS	
V at same F	Mean of F levels	NS		NS	NS	NS		0.42		13.26	0.17	NS	
	F1	4.62	2	127	3.89	22.00		4.13	2	222	2.18	24.38	
	F2	5.06	1	144	4.12	22.56	8.38	5.07	1	254	2.25	24.64	8.56
	C.D.(0.05)	NS		14.4	0.13	NS		0.73		5.54	NS	0.18	
	C.V.(%)	9.17		8.01	2.37	2.39		11.05		1.63	7.13	0.51	

Table 4.1(f): Contd.

F-levels		Varieties	NAWAGAM						PANTNAGAR					
			Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)	Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties:			5.43	1	134	4.53	17.17	12.76	5.50	1	242	2.54	19.56	5.18
V1			5.07	4	137	4.20	21.12	3.24	3.80	6	199	2.18	21.80	4.64
V2			-	-	-	-	-	-	-	-	-	-	-	-
V3			3.57	7	144	2.50	29.02	15.05	4.50	4	307	1.72	25.41	11.18
V4			4.35	6	148	2.74	20.05	9.90	-	-	-	-	-	-
V5			4.80	5	129	4.64	25.53	7.62	4.78	2	213	2.58	24.78	14.73
V6			5.42	2	126	5.09	25.66	8.57	4.66	3	239	2.20	24.79	12.73
V7			5.26	3	130	4.36	17.44	1.52	4.36	5	227	2.10	30.72	2.91
V8														
C.D.(0.05)			0.39		11.59	0.31	0.5		0.29		9.7	0.12	0.33	
C.V. (%)			6.76		7.19	6.39	1.87		5.31		3.39	4.53	1.12	
Expt. Mean			4.84		135	4.01	22.28		4.60		238	2.22	24.51	
Soil type			Clay loam											
pH			7.95											
N - levels (kg/ha)														
F1			40:12:5:0											
F2			80:25:0											
Recommended N:P:K (kg/ha)			80:25:0											
Varieties														
V1			IET 30919											
V2			CR Dhan 201(NC)											
V3			CR Dhan 202 (N, E, NE & C)											
V4			AAUDR-1 (W)											
V5			MAS 946-1 (S)											
V6			DRR Dhan 54											
V7			DRRH 4											
V8			Local Check- Mahisagar (120-125 Days)											
Available N:P:K of soil (kg/ha)			170.48:21.25:193.10											

Table 4.1(f): Contd.

F-levels	Varieties	RAIPUR						Over all mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)		
F1- Lower Input (50% of RDF)	V1	4.79	6	222	3.18	16.47		5.39	5
	V2	3.73	11	165	2.6	21		4.57	12
	V3	-	-	-	-	-		3.89	14
	V4	0.94	14	166	1.18	27.63		3.20	16
	V5	3.38	12	154	1.74	26.08		4.47	13
	V7	4	10	182	2.82	25		4.79	10
	V8	4.82	5	233	3.36	25.8		5.25	8
	V9	4.35	8	183	2.93	19.37		5.36	6
	V1	5.2	4	260	3.79	17.4	4.10	5.90	1
F2 - Optimum Input (100% of RDF)	V2	4.48	7	220	3.54	22.2	7.50	4.93	9
	V3	-	-	-	-	-	-	4.69	11
	V4	1.5	13	191	2.61	28.86	5.60	3.84	15
	V5	4.34	9	206	3.65	27.15	9.60	5.30	7
	V7	5.27	3	220	3.9	26.37	12.70	5.40	4
	V8	5.81	1	269	3.73	26.97	9.90	5.89	2
	V9	5.49	2	260	3.49	21.77	11.40	5.85	3
	Interaction								
	F at same V	NS		NS	NS	NS			
V at same F	V at same F	NS		NS	NS	NS			
	Mean of F levels								
	F1	3.72		186	2.54	23.05		4.70	2
	F2	4.58		232	3.53	24.39	8.69	5.29	1
	C.D.(0.05)	0.67		31.41	0.49	NS			
	C.V.(%)	12.1		11.3	12.19	5.79			

Table 4.1(f): Contd.

F-levels	Varieties	RAIPUR						Over all mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)		
Mean of varieties:	V1	5	7	241	3.48	16.9	4.10	5.65	1
	V2	4.1	12	193	3.07	21.6	7.50	4.75	6
	V3	-	-	-	-	-	-	4.29	7
	V4	1.22	15	178	1.9	28.2	5.60	3.52	8
	V5	3.86	12	180	2.7	26.6	9.60	4.88	5
	V6	4.64	8	201	3.36	25.7	12.70	5.09	4
	V7	5.32	4	251	3.54	26.4	9.90	5.57	3
	V8	4.92	5	222	3.21	20.6	11.40	5.60	2
C.D.(0.05) C.V. (%) Expt. Mean Soil type pH N - levels (kg/ha) F1 F2 Recommended N:P:K (kg/ha)		0.5		25.23	0.54	0.89			
		10.13		10.11	14.84	3.14			
		4.15							
	Vertisols								
	7.1								
	50:30:20								
	100:60:40								
	100:60:40								
Varieties	IET 30919								
	CR Dhan 201(NC)								
	CR Dhan 202 (N, E, NE & C)								
	AAUDR-1 (W)								
	MAS 946-1 (S)								
	DRR Dhan 54								
	DRRH 4								
	Local Check Indira Aerobic-1 (115 Days)								
Available N:P:K of soil (kg/ha)	179.7:207:302.3								

4.1(g) AVT 2 - MS

Five entries (IET 30959, IET 30961, IET 31001, IET 29019 and IET 32072(R)) of medium slender group were evaluated for their response to two levels of nutrients (50% and 100% RDF) on grain yield at nine different locations i.e., **Dhangain (120:60:40)**, **Faizabad (120:60:40)**, **Karjat (100:50:50)**, **Kaul (150:60:60)**, **Mandya (100:50:50)**, **Maruteru (90:60:60)**, **Nagina (120:60:40)**, **Nawagam (100:25:0)** and **Raipur (120:60:40)**. The details and data received from these locations are summarized and presented in Table 4.1 (g).

RDF doses significantly influenced the grain yield at all locations (except **Faizabad** only) and the significant increase in grain yield was observed with 100% RDF at all the locations. Application of 100% RDF recorded higher grain yield at **Dhangain** (5.25), **Faizabad** (4.62 t/ha), **Karjat** (4.31 t/ha), **Kaul** (5.69 t/ha), **Mandya** (6.14 t/ha), **Maruteru** (6.15 t/ha), **Nagina** (4.56 t/ha), **Nawagam** (6.07 t/ha) and **Raipur** (6.70 t/ha). Average over the locations, higher mean grain yield of 5.53 t/ha was recorded with 100% RDF with 12% higher yield over 50% of RDF. Higher nutrient response was (kg grain/kg nutrient) recorded with 100% RDF at **Nagina** (16.18), **Nawagam** (12.37), **Mandya** (10.66) and **Raipur** (9.55) over other centres.

Grain yield differences among the tested cultures were also found to be significant all locations. Significantly higher mean maximum grain yield was recorded by IET 30957 at **Raipur**; IET 30961 at **Maruteru** (7.51 t/ha) and IET 29019 at **Nawagam** (6.95 t/ha), **Kaul** (6.32 t/ha), **Dhangain** (6.07t/ha) and at **Nagina** (4.03 t/ha). The interaction effect between fertilizer levels and varieties was found to be non-significant at all the locations except at **Kaul**, **Maruteru** and **Nagina**. Mean over the locations, cultivar IET 30961 (6.26 t/ha) followed by IET 29019 (6.20 t/ha) were found to be promising on 100% RDF application and recorded better yields over other test entries.

In this trial, application of 100% RDF was found to be promising (12% higher yield) and also exhibited higher nutrient response. Entries viz., IET 30961 and IET 29019 (6.21 and 6.20 t/ha) respectively and IET 30957 (6.01 t/ha) were found to be promising with better yields over other test entries and checks at 100% of RDF application at respective locations.

Table 4.1g: Summary of data on grain yield and ancillary characters of selected AET MS cultures grown under transplanted conditions at low and optimum recommended fertilizer doses, Kharif 2024.

F-levels	Varieties	DHANGAIN						FAIZABAD						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)	Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: Low input (50% NPK)	V1	4.85	9	306	6.05	18.13	104		4.49	8	226	14.40	110	
	V2	5.48	6	329	6.25	22.33	105		3.59	16	172	14.80	105	
	V3	4.00	14	295	4.24	18.33	100		4.47	9	241	17.52	113	
	V4	4.27	12	298	4.57	19.27	95		3.28	19	203	15.77	112	
	V5	2.38	20	251	2.95	16.93	115		5.51	4	277	19.30	107	
	V6	4.41	11	304	4.64	15.60	107		5.57	3	267	17.73	111	
	V7	-	-	-	-	-	-		2.94	22	158	12.21	111	
	V8	3.98	15	285	3.92	14.80	109		3.41	18	211	16.37	108	
	V9	2.70	19	272	3.34	19.07	117		4.04	14	247	20.38	109	
	V10	3.70	16	278	3.57	16.33	108		3.51	17	228	16.18	113	
	V11	4.04	13	298	4.50	13.87	107		3.24	21	206	13.54	113	
F2: Optimum input (100% NPK)	V1	6.18	2	326	6.10	19.40	105	12.09	4.87	6	273	15.86	116	3.45
	V2	6.65	1	336	6.56	23.33	106	10.64	4.19	10	222	16.34	108	5.45
	V3	5.53	5	316	4.87	18.53	100	13.91	4.97	5	280	19.15	117	4.55
	V4	5.86	4	322	5.06	19.67	96	14.45	4.01	15	221	16.84	104	6.64
	V5	3.29	18	295	3.23	17.33	117	8.27	5.97	2	333	21.68	113	4.18
	V6	5.89	3	325	5.77	15.80	108	13.45	6.52	1	337	19.53	115	8.64
	V7	-	-	-	-	-	-		3.27	20	183	13.48	116	3.00
	V8	5.41	7	306	4.26	15.27	110	13.00	4.17	11	262	17.89	114	6.91
	V9	3.67	17	279	3.53	19.40	118	8.82	4.63	7	285	21.75	113	5.36
	V10	4.79	10	290	3.70	16.73	110	9.91	4.15	12	267	17.56	116	5.82
	V11	5.24	8	294.00	4.20	14.67	108	10.91	4.11	13	240	14.15	116	7.91
Interaction F at same V V at same F		NS		NS	NS	NS	NS	NS	NS		14.35	NS	3.68	
		NS		NS	NS	NS	NS		NS		14.99	NS	3.81	
F1 F2		3.98	2	292	4.40	17.47	107		4.00	2	221	16.20	110	
		5.25	1	309	4.73	18.01	108	11.55	4.62	1	264	17.66	113	5.63
C.D.(0.05) C.V.(%)		0.35		NS	NS	NS	0.14		0.14		7.82	0.9	1.88	
		6.77		12.96	15.42	7.5	0.12		3.16		3.04	5.01	1.59	

Table 4.1g: Contd.

F-levels		Varieties	DHANGAIN							FAIZABAD					
			Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)	Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties:															
	V1		5.52	2	316	6.08	18.77	105	12.09	4.68	4	250	15.13	113	3.45
	V2		6.07	1	333	6.41	22.83	106	10.64	3.89	6	197	15.57	107	5.45
	V3		4.77	5	306	4.56	18.43	100	13.91	4.72	3	260	18.34	115	4.55
	V4		5.07	4	310	4.82	19.47	95	14.45	3.65	10	212	16.31	108	6.64
	V5		2.84	10	273	3.09	17.13	116	8.27	5.74	2	305	20.49	110	4.18
	V6		5.15	3	315	5.21	15.70	107	13.45	6.05	1	302	18.63	113	8.64
	V7		-	-	-	-	-	-	-	3.11	11	170	12.85	113	3.00
	V8		4.70	6	295	4.09	15.04	109	13.00	3.79	8	237	17.13	111	6.91
	V9		3.19	9	276	3.44	19.24	117	8.82	4.34	5	266	21.07	111	5.36
	V10		4.25	8	284	3.64	16.53	109	9.91	3.83	7	248	16.87	115	5.82
	V11		4.64	7	296	4.35	14.27	108	10.91	3.68	9	223	13.85	114	7.91
	C.D.(0.05)		0.61		34.61	0.66	1.05	0.65		0.23		10.15	0.52	2.61	
	C.V. (%)		11.31		9.88	12.39	5.05	0.52		4.47		3.58	2.62	2.00	
	Expt. Mean		4.62		300	4.57	17.74	107		4.31		243	16.93	112	
	Soil type		Clay loam							Sandy loam					
	pH		6.56							7.40					
	F - levels (kg/ha)														
	F1		60:30:20							60:30:20					
	F2		120:60:40							120:60:40					
	Recommended N:P:K		120:60:40							120:60:40					
	Varieties														
	V1		IET 30957							IET 30957					
	V2		IET 30961							IET 30961					
	V3		IET 31001							IET 31001					
	V4		IET 29019							IET 29019					
	V5		IET 32072 (GEL)							IET 32072 (GEL)					
	V6		WGL 14 (NC 1)							WGL 14 (NC 1)					
	V7		BPT 5204 (NC 2)							BPT 5204 (NC 2)					
	V8		Improved Samba Mahsuri (N, E & C)							Improved Samba Mahsuri (N, E & C)					
	V9		Ketekejoa (NE)							Ketekejoa (NE)					
	V10		Karijat-6 (W)							Karijat-6 (W)					
	V11		Local Check - R. Sweta (140-145 days)							Local Check (Samba Mahsur)					
	Available N:P:K		75:13:22							75:13:22					

Table 4.1g: Contd.

F-levels	Varieties	KARJAT						KAUL						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)	Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: Low input (50% NPK)	V1	4.70	9	244	3.08	26.4	96		5.75	6	264	2.78	26.2	
	V2	4.40	10	240	2.57	28.0	98		4.47	17	223	2.43	24.3	
	V3	5.26	5	288	3.42	24.4	98		5.68	8	268	2.78	25.7	
	V4	5.01	7	275	3.16	25.4	94		5.89	4	266	2.84	26.3	
	V5	2.35	17	207	1.53	23.9	98		4.67	14	225	2.50	23.6	
	V6	5.06	6	282	3.27	22.9	95		4.40	18	230	2.47	24.5	
	V7	-	-	-	-	-	-		-	-	-	-	-	
	V8	3.32	14	211	2.07	21.7	93		4.82	13	208	2.45	23.9	
	V9	1.79	20	172	1.27	20.7	96		-	-	-	-	-	
	V10	2.22	19	202	1.42	19.5	98		4.59	16	221	2.48	23.6	
	V11	3.71	13	238	2.16	23.7	99		5.73	7	261	2.77	25.9	
F2: Optimum input (100% NPK)	V1	5.57	3	275	3.17	27.0	106	8.70	6.06	3	295	2.93	26.3	2.30
	V2	4.75	8	273	2.75	30.0	104	3.50	5.44	10	248	2.68	24.5	7.19
	V3	5.90	1	337	4.65	25.7	107	6.40	6.45	2	285	2.84	25.8	5.70
	V4	5.44	4	317	3.76	26.7	102	4.30	6.74	1	294	2.96	26.6	6.30
	V5	2.89	15	244	2.46	25.1	105	5.40	5.12	12	254	2.57	24.4	3.33
	V6	5.62	2	321	3.84	23.1	101	5.60	4.63	15	255	2.63	24.6	1.70
	V7	-	-	-	-	-	-	-	-	-	-	-	-	-
	V8	3.80	12	249	2.55	22.3	104	4.80	5.42	11	253	2.66	23.8	4.44
	V9	2.35	17	207	1.37	22.9	104	5.60	-	-	-	-	-	-
	V10	2.70	16	244	1.63	21.5	104	4.80	5.52	9	249	2.55	25.1	6.89
	V11	4.04	11	271	2.74	24.4	107	3.30	5.82	5	282	2.81	26.1	0.67
Interaction F at same V V at same F		NS		NS	0.3	NS	1.58		0.37		NS	NS	NS	
		NS		NS	0.38	NS	1.53		0.38		NS	NS	NS	
F1 F2		3.78	2	236	2.40	23.65	96		5.11	2	241	2.61	24.90	
		4.31	1	274	2.89	24.84	104	5.24	5.69	1	268	2.74	25.24	4.28
C.D.(0.05) C.V.(%)		NS		3.58	0.31	0.33	0.38		0.21		9.65	NS	NS	
		13.32		1.26	10.72	1.21	0.34		3.39		3.24	6.46	3.18	

Table 4.1g: Contd.

F-levels		Varieties	KARJAT							KAUL					
Mean of varieties:			Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)	Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
V1			5.14	4	260	3.13	26.65	101	8.70	5.91	3	280	2.86	26.28	2.30
V2			4.58	5	256	2.66	28.96	101	3.50	4.96	7	235	2.56	24.40	7.19
V3			5.58	1	312	4.04	25.02	103	6.40	6.07	2	277	2.81	25.75	5.70
V4			5.23	3	296	3.46	26.07	98	4.30	6.32	1	280	2.90	26.48	6.30
V5			2.62	8	226	2.00	24.52	102	5.40	4.90	8	240	2.54	23.99	3.33
V6			5.34	2	301	3.56	23.01	98	5.60	4.52	9	243	2.55	24.54	1.70
V7			-	-	-	-	-	-	-	-	-	-	-	-	-
V8			3.56	7	230	2.31	21.98	98	4.80	5.12	5	231	2.56	23.85	4.44
V9			2.07	10	189	1.32	21.79	100	5.60	-	-	-	-	-	-
V10			2.46	9	223	1.53	20.46	101	4.80	5.06	6	235	2.52	24.35	6.89
V11			3.88	6	254	2.45	24.04	103	3.30	5.78	4	272	2.79	25.99	0.67
C.D.(0.05)			0.19		40.33	0.21	0.97	1.12		0.26		14.01	0.12	0.65	
C.V. (%)			3.97		13.57	6.96	3.44	0.96		4.11		4.72	3.73	2.22	
Expt. Mean			4.04		255	2.64	24.25	100		5.40		255	2.67	25.07	
Soil type			-							Clay loam					
pH			-							8.00					
F - levels (kg/ha)															
F1			50:25:25							75:30:30					
F2			100:50:50							150:60:60					
Recommended N:P:K			100:50:50							150:60:60					
Varieties															
V1			IET 30957							IET 30957					
V2			IET 30961							IET 30961					
V3			IET 31001							IET 31001					
V4			IET 29019							IET 29019					
V5			IET 32072 (GEL)							IET 32072 (GEL)					
V6			WGL 14 (NC 1)							WGL 14 (NC 1)					
V7			BPT 5204 (NC 2)							BPT 5204 (NC 2)					
V8			Improved Samba Mahsuri (N, E & C)							Improved Samba Mahsuri (N, E & C)					
V9			Ketekejoha (NE)							Ketekejoha (NE)					
V10			Karijat-6 (W)							Karijat-6 (W)					
V11			Local Check - RTN 8 (135 Days)							Local Check - HKR 127(140 Days)					
Available N:P:K			-							160:16:320					

Table 4.1g: Contd.

F-levels	Varieties	MANDYA						MARUTERU						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)	Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: Low input (50% NPK)	V1	5.61	9	325	3.77	19.6	106		4.57	10	298	3.27	18.7	
	V2	6.43	5	314	4.29	22.3	96		7.03	3	403	4.06	17.6	
	V3	4.46	14	325	3.20	19.1	94		6.00	6	267	3.57	13.5	
	V4	5.99	6	317	3.86	18.9	98		6.00	6	302	3.43	20.5	
	V5	4.47	13	283	4.20	15.4	98		4.56	12	249	4.62	13.7	
	V6	4.09	15	314	3.20	17.8	100		-	-	-	-	-	
	V7	-	-	-	-	-	-		-	-	-	-	-	
	V8	3.78	16	323	2.49	15.6	98		4.32	14	292	3.03	12.7	
	V9	-	-	-	-	-	-		-	-	-	-	-	
	V10	-	-	-	-	-	-		4.46	13	268	2.31	11.9	
	V11	5.72	8	293	3.25	26.7	91		-	-	-	-	-	13.62
F2: Optimum input (100% NPK)	V1	6.74	4	346	3.84	19.7	106	11.30	6.00	6	302	3.12	19.1	13.62
	V2	7.73	1	350	4.32	22.4	96	13.00	7.99	1	328	4.39	18.2	9.14
	V3	5.78	7	341	3.62	19.3	94	13.20	6.26	4	257	3.46	13.6	2.48
	V4	7.00	2	344	4.29	19.3	99	10.10	7.06	2	295	3.61	20.3	10.10
	V5	4.84	12	303	4.48	15.5	98	3.70	6.06	5	259	4.55	13.2	14.29
	V6	5.13	10	324	4.31	18.5	100	10.40	-	-	-	-	-	-
	V7	-	-	-	-	-	-	-	-	-	-	-	-	-
	V8	5.04	11	335	2.64	15.7	97	12.60	4.57	10	278	3.04	13.3	2.38
	V9	-	-	-	-	-	-	-	-	-	-	-	-	-
	V10	-	-	-	-	-	-	-	5.13	9	261	2.44	12.2	6.38
	V11	6.82	3	331	4.42	28.4	91	11.00	-	-	-	-	-	-
Interaction														
F at same V		NS		NS	NS	NS	NS		0.40		NS	NS	NS	
		NS		NS	NS	NS	NS		0.38		NS	NS	NS	
V at same F														
F1		5.07	2	312	3.53	19.42	98		5.28	2	297	3.47	15.52	
F2		6.14	1	334	3.99	19.86	98	10.66	6.15	1	283	3.52	15.71	8.34
C.D.(0.05)		NS		NS	NS	NS	NS		0.12		NS	NS	NS	
		17.32		8.68	19.56	3.72	1.18		1.55		5.68	3.52	9.66	
C.V.(%)														

Table 4.1g: Contd.

F-levels		Varieties	MANDYA						MARUTERU						
Mean of varieties:			Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)	Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
V1			6.18	4	335	3.81	19.61	106	11.30	5.29	5	300	3.20	18.92	13.62
V2			7.08	1	332	4.31	22.32	96	13.00	7.51	1	365	4.23	17.87	9.14
V3			5.12	5	333	3.41	19.24	94	13.20	6.13	3	262	3.52	13.57	2.48
V4			6.50	2	330	4.08	19.12	99	10.10	6.53	2	299	3.52	20.39	10.10
V5			4.66	6	293	4.34	15.45	98	3.70	5.31	4	254	4.59	13.48	14.29
V6			4.61	7	319	3.76	18.15	100	10.40	-	-	-	-	-	-
V7			-	-	-	-	-	-	-	-	-	-	-	-	-
V8			4.41	8	329	2.57	15.69	98	12.60	4.45	7	285	3.04	13.02	2.38
V9			-	-	-	-	-	-	-	-	-	-	-	-	-
V10			-	-	-	-	-	-	-	4.80	6	265	2.38	12.08	6.38
V11			6.27	3	312	3.84	27.56	91	11.00	-	-	-	-	-	-
C.D.(0.05)			0.86		25.46	0.62	1.31	0.71		0.29		24.69	0.24	1.04	
C.V. (%)			12.97		6.67	14.05	5.64	0.61		4.19		7.15	5.67	5.59	
Expt. Mean			5.60		323	3.76	19.64	98		5.72		290	3.49	15.62	
Soil type			Red sandy loam												
pH			8.01												
F - levels (kg/ha)															
F1			50:25:25												
F2			100:50:50												
Recommended N:P:K			100:50:50												
Varieties															
V1			IET 30957												
V2			IET 30961												
V3			IET 31001												
V4			IET 29019												
V5			IET 32072 (GEL)												
V6			WGL 14 (NC 1)												
V7			BPT 5204 (NC 2)												
V8			Improved Samba Mahsuri (N, E & C)												
V9			Ketekejoa (NE)												
V10			Karjat-6 (W)												
V11			Local Check- KMP 220												
Available N:P:K			262:79:256												

Table 4.1g: Contd.

F-levels	Varieties	NAGINA					NAWAGAM							
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Days 50% flowerin g	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)	Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowerin g	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: Low input (50% NPK)	V1	2.96	12	216	2.86	122		5.66	12	252	3.37	17.8	116	
	V2	2.95	13	212	3.06	124		5.29	15	232	3.42	16.8	113	
	V3	2.97	11	197	3.06	111		5.68	11	220	3.21	16.7	106	
	V4	3.10	10	206	3.18	109		6.46	3	248	3.85	18.9	104	
	V5	2.64	16	205	3.11	126		5.07	16	210	4.12	11.9	117	
	V6	2.93	14	199	2.90	113		5.60	14	288	3.06	14.8	115	
	V7	-	-	-	-	-		-	-	-	-	-	-	
	V8	2.32	17	220	3.12	120		4.99	17	279	2.33	12.3	113	
	V9	2.85	15	218	3.08	114		3.59	20	319	2.02	18.2	117	
	V10	2.29	18	198	3.16	124		4.77	19	237	2.60	13.2	107	
	V11	-	-	-	-	-		5.81	8	218	3.67	14.4	104	
F2: Optimum input (100% NPK)	V1	4.68	3	338	3.36	122	15.64	5.94	7	268	3.60	15.2	116	4.48
	V2	4.61	4	317	3.38	124	15.09	6.97	2	278	3.80	19.6	115	26.88
	V3	4.90	2	311	3.43	112	17.55	6.18	4	250	3.51	18.7	107	8.00
	V4	4.96	1	337	3.50	109	16.91	7.43	1	268	4.18	17.2	106	15.52
	V5	4.32	7	326	3.47	126	15.27	5.74	9	229	4.36	17.1	113	10.72
	V6	4.56	5	313	3.21	113	14.82	6.08	5	295	3.44	14.7	116	7.68
	V7	-	-	-	-	-	-	-	-	-	-	-	-	-
	V8	4.31	8	330	3.46	120	18.09	5.65	13	292	2.46	13.7	112	10.56
	V9	4.42	6	321	3.45	114	14.27	4.92	18	342	2.11	14.7	118	21.28
	V10	4.27	9	305	3.52	124	18.00	5.74	9	257	2.66	12.9	107	15.52
	V11	-	-	-	-	-	-	6.00	6	260	4.00	14.9	103	3.04
Interaction F at same V V at same F		0.14		NS	NS	NS		NS		NS	NS	0.78	1.51	
		0.16		NS	NS	NS		NS		NS	NS	0.74	1.75	
F1 F2		2.78	2	208	3.06	118		5.29	2	250	3.17	15.49	111	
		4.56	1	322	3.42	118	16.18	6.07	1	274	3.41	15.87	111	12.37
C.D.(0.05) C.V.(%)		0.12		8.93	0.05	NS		0.74		18.09	NS	0.10	NS	
		2.70		2.88	1.36	0.35		11.70		6.21	7.92	0.58	1.03	

Table 4.1g: Contd.

F-levels		Varieties	NAGINA					NAWAGAM							
			Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)	Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties:															
V1			3.82	3	277	3.11	122	15.64	5.80	6	260	3.49	16.50	116	4.48
V2			3.78	4	265	3.22	124	15.09	6.13	2	255	3.61	18.22	114	26.88
V3			3.94	2	254	3.25	112	17.55	5.93	3	235	3.36	17.69	106	8.00
V4			4.03	1	271	3.34	109	16.91	6.95	1	258	4.02	18.07	105	15.52
V5			3.48	7	266	3.29	126	15.27	5.41	7	219	4.24	14.47	115	10.72
V6			3.75	-	256	3.06	113	14.82	5.84	5	292	3.25	14.74	116	7.68
V7			-	-	-	-	-	-	-	-	-	-	-	-	-
V8			3.32	8	275	3.29	120	18.09	5.32	8	285	2.40	13.03	113	10.56
V9			3.64	-	270	3.27	114	14.27	4.26	10	330	2.07	16.42	118	21.28
V10			3.28	9	252	3.34	124	18.00	5.26	9	247	2.63	13.04	107	15.52
V11			-	-	-	-	-	-	5.91	4	239	3.84	14.65	104	3.04
C.D.(0.05)			0.10		17.45	0.05	0.93		0.64		27.83	0.25	0.55	1.07	
C.V.(%)			2.33		5.64	1.27	0.68		9.69		9.10	6.44	3.00	0.82	
Expt. Mean			3.67		265	3.24	118		5.68		262	3.29	15.68	111	
Soil type			-						-						
pH			7.70						8.35						
F - levels (kg/ha)															
F1			60:30:20						50:12:5:0						
F2			120:60:40						100:25:0						
Recommended N:P:K			120:60:40						100:25:0						
Varieties															
V1			IET 30957						IET 30957						
V2			IET 30961						IET 30961						
V3			IET 31001						IET 31001						
V4			IET 29019						IET 29019						
V5			IET 32072 (GEL)						IET 32072 (GEL)						
V6			WGL 14 (NC 1)						WGL 14 (NC 1)						
V7			BPT 5204 (NC 2)						BPT 5204 (NC 2)						
V8			Improved Samba Mahsuri (N, E & C)						Improved Samba Mahsuri (N, E & C)						
V9			Ketekejoha (NE)						Ketekejoha (NE)						
V10			Karijat-6 (W)						Karijat-6 (W)						
V11			Local Check						Local Check						
Available N:P:K			21:18.33:209						141:14:301						

Table 4.1g: Contd.

F-levels	Varieties	RAIPUR							Over all mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)		
F1: Low input (50% NPK)	V1	7.27	3	227	4.03	16.9	90		5.10	8
	V2	7.22	4	214	3.95	21.2	95		5.21	7
	V3	6.01	10	178	3.25	16.2	89		4.95	11
	V4	5.72	12	206	3.71	17.0	88		5.08	9
	V5	-	-	-	-	-	-		3.96	18
	V6	5.56	14	228	2.67	16.2	98		4.70	15
	V7	-	-	-	-	-	-		2.94	22
	V8	5.14	15	230	2.95	13.9	97		4.01	
	V9	4.57	17	175	3.02	17.1	116		3.26	
	V10	4.46	18	235	2.42	13.4	101		3.75	
	V11	4.93	16	191	3.44	16.6	93		4.74	14
F2: Optimum input (100% NPK)	V1	8.21	1	258	4.45	18.0	91	8.55	6.03	3
	V2	8.01	2	251	4.93	22.4	95	7.18	6.26	1
	V3	6.45	7	230	5.03	17.1	88	4.00	5.82	4
	V4	6.98	5	244	4.29	18.0	88	11.45	6.16	2
	V5	-	-	-	-	-	-	-	4.78	12
	V6	6.85	6	256	3.75	17.9	98	11.73	5.66	5
	V7	-	-	-	-	-	-	-	3.27	20
	V8	6.19	8	252	3.45	14.7	96	9.55	4.95	
	V9	5.68	13	234	3.62	18.0	117	10.09	4.28	
	V10	5.87	11	264	3.28	14.7	102	12.82	4.77	
	V11	6.09	9	233	4.00	17.7	92	10.55	5.45	6
Interaction F at same V V at same F		NS		NS	NS	NS	NS			
		NS		NS	NS	NS	NS			
F1 F2		5.65	2	209	3.27	16.49	96		4.55	2
		6.70	1	247	4.09	17.62	96	9.55	5.50	1
C.D.(0.05) C.V.(%)		0.82		32.34	0.56	NS	NS			
		11.31		12.11	12.97	7.50	1.60			

Table 4.1g: Contd.

F-levels	Varieties	RAIPUR							Over all mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)		
Mean of varieties:	V1	7.74	1	243	4.24	17.44	91	8.55	5.56	3
	V2	7.62	2	232	4.44	21.79	95	7.18	5.73	1
	V3	6.23	4	204	4.14	16.67	89	4.00	5.39	4
	V4	6.35	3	225	4.00	17.53	88	11.45	5.62	2
	V5	-	-	-	-	-	-	-	4.37	8
	V6	6.21	5	242	3.21	17.04	98	11.73	5.18	5
	V7	-	-	-	-	-	-	-	3.11	11
	V8	5.67	6	241	3.20	14.32	97	9.55	4.48	7
	V9	5.13	9	205	3.32	17.55	117	10.09	3.77	10
	V10	5.17	8	249	2.85	14.02	101	12.82	4.26	9
	V11	5.51	7	212	3.72	17.17	93	10.55	5.09	6
C.D.(0.05) C.V. (%) Expt. Mean		0.72 10.03 6.18		27.72 10.42 228	0.43 10.05 3.68	0.82 4.13 17.06	1.06 0.94 96		5.02	
	Soil type	Vertisols								
	pH	7.10								
F - levels (kg/ha)	F1	60:30:20								
	F2	120:60:40								
Recommended N:P:K (kg/ha)		120:60:40								
	Varieties									
	V1	IET 30957								
	V2	IET 30961								
	V3	IET 31001								
	V4	IET 29019								
	V5	IET 32072 (GEL)								
	V6	WGL 14 (NC 1)								
	V7	BPT 5204 (NC 2)								
	V8	Improved Samba Mahsuri (N, E & C)								
	V9	Ketekejoha (NE)								
	V10	Karjat-6 (W)								
	V11	Local Check								
Available N:P:K		189:20:299								

4.1(h) AVT 2 - Phosphorous efficient cultivars (LPT)

Phosphorus is an important nutrient for rice production but the use efficiency of this nutrient is very low (20-30%) and its deficiency has been identified as one of the major constraints limiting production of rice in most of the Indian soils. Enhancing phosphorus use efficiency (PUE) in rice would offer an affordable, viable option for improving yields and economic returns with reduced inputs to farming community. Further, research studies have revealed that genotypic differences for PUE exist and there is a need to identify the cultivars which are adopted to low P situations and have higher P use efficiency. Hence, the present trial is constituted to evaluate the identified cultures and cultivars with the following objectives: 1) To study the comparative performance of elite lines and cultivars in different levels of Phosphorus and 2) To identify the elite lines for tolerance to low soil P conditions. The trial was conducted at seven locations (**Gangavathi, Karjat, Mandya, Maruteru, Raipur, Ranchi and Varanasi**). Similar to earlier Kharif. Split plot design was adopted with 3 main plots of phosphorus levels (P₁- No Phosphorus (Control) P₂: 50% of recommended P dose at each level of p and P₃: 100 % of recommended dose of P (N and K constant). Subplots consist of twelve (IET 31097, IET 31102, IET 31105, IET 28070, IET 31103, IET 31098, IET 31108, IET 29560, IET 31115 and IET 31096 were compared with Ras, Improved Sambamasuri, BPT 5204 and local check of respective location) advanced cultures and checks (4). The results were summarized and presented in **Table 4.1j** and the salient findings are as followed. The IET cultures viz., IET 31106, IET 31110.

Interaction effect of phosphorus level and advanced cultures on grain yield was found significant only at **Maruteru** and **Varanasi** two levels of 'p' adopted while, higher 'P' application recorded better yields (50 and 100% of recommended P) at all these centers.

Application of 'P' significantly influenced the grain yield at **Gangavathi, Karjat, Mandya, Maruteru, Ranchi, Raipur** and **Varanasi**. Mean maximum grain yield was with 100% RDP (4.93 t/ha) followed by 50% of RDP (4.35 t/ha).

The performance of cultures was significant for grain yield at all locations indicating superiority of cultures over checks. Among the cultures tested, IET 31091 (4.01 t/ha) at **Gangavathi**; IET 31105 (5.22 t/ha) followed by IET 31102 (4.95 t/ha) at **Karjat**; IET 29560 (7.04 t/ha) at **Mandya**; IET 28070 (5.84 t/ha) at **Maruteru** and IET 31110 (7.03 t/ha) at **Raipur** IET 31108 (4.73 t/ha) at **Ranchi**. The standard checks were found promising at all locations during this year.

Mean over the locations (seven locations) all the cultures were 'P' responsive and recorded better yields over standard checks and local checks. where in soil 'P' levels were very high. Among the cultures, across the locations the culture IET 31098 (5.06 t/ha) IET 31103 (4.79 t/ha) and IET 28070 (4.71 t/ha) were found promising and gave better yields over other cultures and IET 31098 (6.03 t/ha) followed by IET 31106 (5.10 t/ha) were found promising with higher yields and higher PUE over checks at most of the locations.

Table 4.1(h): Summary of data on grain yield and ancillary characters of selected AVT LPT cultures grown under transplanted conditions at graded levels of recommended N fertilizer doses, kharif 2024.

P-levels	Varieties	GANGAVATHI						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Tes wt (g)	Days for 50% Flowering	Phosphorous res. (kg grain/kg P) (Base level 0% RDP)
P1: 0% of recommended P dose (N and K is constant)	V1	2.28	24	256	1.70	1.26	84	
	V2	2.27	26	179	3.42	2.04	104	
	V3	1.86	33	203	1.71	2.21	91	
	V4	2.04	30	169	2.22	1.54	91	
	V5	2.56	17	182	2.57	1.90	96	
	V6	1.33	43	186	1.87	2.29	99	
	V7	2.55	18	157	2.32	2.38	91	
	V8	2.59	14	147	3.19	1.73	96	
	V9	1.62	36	182	1.88	2.50	96	
	V10	2.26	27	179	1.51	2.33	89	
	V11	1.10	47	218	1.09	2.13	84	
	V12	3.87	3	228	2.94	2.73	91	
	V13	1.09	48	221	1.37	2.09	80	
	V14	1.37	41	179	1.56	1.34	93	
	V15	1.23	45	164	1.43	1.48	106	
	V16	2.22	28	213	1.58	1.34	89	
P2: 50% of recommended P dose (N and K is constant)	V1	2.84	10	258	1.94	1.19	84	14.93
	V2	2.76	12	192	3.65	2.08	104	13.07
	V3	1.99	31	246	1.98	2.22	91	3.47
	V4	2.28	24	189	2.44	1.51	91	6.40
	V5	2.59	14	239	2.80	1.90	96	0.80
	V6	1.68	35	193	2.05	2.23	99	9.33
	V7	2.83	11	226	2.57	2.44	91	7.47
	V8	2.85	9	189	3.23	1.76	96	6.93
	V9	2.38	22	215	2.28	2.50	96	20.27
	V10	2.40	21	229	1.86	2.27	89	3.73
	V11	1.16	46	253	1.17	2.12	84	1.60
	V12	4.07	2	238	3.16	2.68	91	5.33
	V13	1.43	40	271	1.50	2.04	80	9.07
	V14	1.53	39	201	1.69	1.38	93	4.27
	V15	1.27	44	215	1.55	1.49	106	1.07
	V16	2.36	23	250	1.60	1.37	89	3.73
P3: 100% of recommended P dose (N and K is constant)	V1	2.95	7	299	2.03	1.18	84	8.93
	V2	2.87	8	211	4.17	2.05	104	8.00
	V3	2.19	29	274	2.39	2.21	91	4.40
	V4	2.43	20	200	2.59	1.49	91	5.20
	V5	2.98	6	257	3.25	1.88	103	5.60
	V6	1.90	32	253	2.32	2.28	104	7.60
	V7	3.05	5	249	2.77	2.32	91	6.67
	V8	3.16	4	235	4.17	1.80	96	7.60
	V9	2.69	13	251	2.36	2.59	96	14.27
	V10	2.58	16	335	1.91	2.28	89	4.27
	V11	1.35	42	293	1.33	2.14	84	3.33
	V12	4.10	1	357	3.24	2.69	91	3.07
	V13	1.57	38	319	1.65	2.14	80	6.40
	V14	1.78	34	225	1.82	1.33	93	5.47
	V15	1.60	37	254	1.69	1.50	106	4.93
	V16	2.47	19	297	1.81	1.35	89	3.33

Table 4.1(h): Contd.

P-levels	Varieties	GANGAVATHI						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% Flowering	Phosphorous res. (kg grain/kg P) (Base level 0% RDP)
Interaction	N at same V	NS		33.82	0.28	0.07	1.68	
	V at same N	NS		33.67	0.27	0.07	1.59	
P1		2.02	3	191	2.02	1.96	93	
P2		2.28	2	225	2.22	1.95	93	6.97
P3		2.48	1	269	2.47	1.95	93	6.19
C.D.(0.05)		0.02		9.67	0.1	NS	NS	
C.V.(%)		1.39		7.46	8.27	0.92	1.62	
Mean of varieties:								
V1		2.69	5	271	1.89	1.21	84	11.93
V2		2.63	6	194	3.75	2.06	104	10.53
V3		2.01	11	241	2.03	2.21	91	3.93
V4		2.25	9	186	2.42	1.51	91	5.80
V5		2.71	4	226	2.87	1.89	98	3.20
V6		1.64	12	211	2.08	2.27	101	8.47
V7		2.81	3	211	2.55	2.38	91	7.07
V8		2.87	2	190	3.53	1.76	96	7.27
V9		2.23	10	216	2.17	2.53	96	17.27
V10		2.41	7	248	1.76	2.29	89	4.00
V11		1.20	16	255	1.20	2.13	84	2.47
V12		4.01	1	274	3.11	2.70	91	4.20
V13		1.36	15	270	1.51	2.09	80	7.73
V14		1.56	13	202	1.69	1.35	93	4.87
V15		1.37	14	211	1.56	1.49	106	3.00
V16		2.35	8	253	1.66	1.35	89	3.53
C.D.(0.05)		0.2		19.53	0.16	0.04	0.92	
C.V.(%)		9.57		9.12	7.57	2.27	1.06	
Expt. Mean		2.26		229	2.24	1.95	93	
Soil type		Clay						
pH		8.0						
N - levels (kg/ha)								
P1		0						
P2		37.5						
P3		75						
Recommended NPK (kg/ha)		150:75:75						
Varieties								
V1		IET 31106						
V2		IET 31110						
V3		IET 31097						
V4		IET 31102						
V5		IET 31105						
V6		IET 28070						
V7		IET 31103						
V8		IET 31098						
V9		IET 31108						
V10		IET 29560						
V11		IET 31115						
V12		IET 31096						
V13		Rasi						
V14		Improved Samba Mahsuri						
V15		BPT 5204						
V16		Local check - BPT 5204 (120 Days)						
Available NPK (kg/ha)		-						

Table 4.1(h): Contd.

P-levels	Varieties	KARJAT						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Tes wt (g)	Days for 50% Flowering	Phosphorous res. (kg grain/kg P) (Base level 0% RDP)
P1: 0% of recommended P dose (N and K is constant)	V1	2.93	36	192	2.23	22.14	105	
	V2	3.97	18	264	2.66	19.11	106	
	V3	3.75	22	251	2.56	19.58	99	
	V4	4.03	16	267	2.76	19.56	104	
	V5	4.46	11	271	2.94	23.51	99	
	V6	3.79	19	258	2.58	25.49	105	
	V7	3.41	26	235	2.43	20.90	98	
	V8	3.18	31	228	2.27	19.68	97	
	V9	2.75	40	185	2.09	21.25	105	
	V10	3.10	32	222	2.25	24.45	104	
	V11	2.55	45	168	1.94	28.91	98	
	V12	3.78	20	255	2.57	18.69	99	
	V14	3.02	33	201	2.24	22.95	103	
	V15	2.86	38	188	2.15	19.39	104	
	V16	-		-	-	-	-	
	V17	2.62	44	172	1.99	21.62	98	
P2: 0% of recommended P dose (N and K is constant)	V1	3.22	29	221	2.33	23.54	106	11.60
	V2	4.82	7	271	3.40	19.22	110	34.00
	V3	4.08	15	255	2.79	20.54	100	13.20
	V4	5.21	5	291	2.89	20.40	104	47.20
	V5	5.38	3	297	3.86	24.22	98	36.80
	V6	4.44	12	261	3.37	25.83	106	26.00
	V7	4.00	17	252	2.71	21.20	98	23.60
	V8	3.76	21	231	2.66	20.84	98	23.20
	V9	2.87	37	201	2.10	21.65	106	4.80
	V10	3.64	25	225	2.62	24.64	105	21.60
	V11	2.69	43	192	1.98	29.59	97	5.60
	V12	4.37	14	258	2.98	19.05	104	23.60
	V14	3.29	27	224	2.39	23.85	107	10.80
	V15	3.00	34	205	2.21	20.26	100	5.60
	V16	-		-	-	-	-	
	V17	2.73	41	198	2.04	22.37	107	4.40
P3: 0% of recommended P dose (N and K is constant)	V1	3.24	28	225	2.34	24.10	107	6.20
	V2	5.33	4	284	3.91	20.11	109	27.20
	V3	4.62	9	258	3.15	20.73	99	17.40
	V4	5.61	2	321	3.43	20.61	104	31.60
	V5	5.82	1	352	4.01	25.49	97	27.20
	V6	5.05	6	267	3.54	28.79	105	25.20
	V7	4.56	10	256	3.12	21.80	97	23.00
	V8	4.38	13	251	2.99	21.35	90	24.00
	V9	2.95	35	218	2.16	22.15	105	4.00
	V10	3.74	23	238	2.66	26.10	105	12.80
	V11	2.72	42	195	2.02	30.24	107	3.40
	V12	4.74	8	261	3.16	19.14	98	19.20
	V14	3.69	24	234	2.60	24.78	102	13.40
	V15	3.19	30	222	2.31	20.54	95	6.60
	V16	-		-	-	-	-	
	V17	2.85	39	205	2.08	23.36	105	4.60

Table 4.1(h): Contd.

P-levels	Varieties	KARJAT						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Tes wt (g)	Days for 50% Flowering	Phosphorous res. (kg grain/kg P) (Base level 0% RDP)
Interaction								
	<i>N at same V</i>	NS		NS	NS	0.64	1.95	
	<i>V at same N</i>	NS		NS	NS	0.63	1.99	
	P1	3.35	3	224	2.38	21.82	101	
	P2	3.83	2	239	2.69	22.48	103	19.47
	P3	4.17	1	252	2.90	23.29	101	16.39
	C.D.(0.05)	0.22		17.5	0.12	0.24	0.41	
	C.V.(%)	5.33		6.62	4.24	0.98	0.36	
Mean of varieties:								
	V1	3.13	11	212	2.30	23.26	106	8.90
	V2	4.71	3	273	3.32	19.48	108	30.60
	V3	4.15	6	254	2.83	20.28	99	15.30
	V4	4.95	2	293	3.03	20.19	104	39.40
	V5	5.22	1	306	3.60	24.41	98	32.00
	V6	4.43	4	262	3.16	26.70	105	25.60
	V7	3.99	7	247	2.75	21.30	97	23.30
	V8	3.77	8	236	2.64	20.62	95	23.60
	V9	2.86	13	201	2.12	21.68	105	4.40
	V10	3.49	9	228	2.51	25.06	104	17.20
	V11	2.65	15	185	1.98	29.58	101	4.50
	V12	4.30	5	258	2.90	18.96	100	21.40
	V13	3.33	10	220	2.41	23.86	104	12.10
	V14	3.02	12	205	2.22	20.06	99	6.10
	V15	-		-	-	-	-	
	V16	2.73	14	191	2.04	22.45	103	4.50
	C.D.(0.05)	0.63		26.32	0.41	0.36	1.15	
	C.V.(%)	14.33		9.49	13.2	1.39	0.97	
	Expt. Mean	3.78		238	2.65	22.53	102	
	Soil type	-						
	pH	-						
	N - levels (kg/ha)							
	P1	0						
	P2	25						
	P3	50						
	Recommended NPK (kg/ha)	100:50:50						
	Varieties							
	V1	IET 31106						
	V2	IET 31110						
	V3	IET 31097						
	V4	IET 31102						
	V5	IET 31105						
	V6	IET 28070						
	V7	IET 31103						
	V8	IET 31098						
	V9	IET 31108						
	V10	IET 29560						
	V11	IET 31115						
	V12	IET 31096						
	V13	Rasi						
	V14	Improved Samba Mahsuri						
	V15	-						
	V16	Local check - KJT 7 (115-120 Days)						
	Available NPK (kg/ha)	-						

Table 4.1(h): Contd.

P-levels	Varieties	MANDYA						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Tes wt (g)	Days for 50% Flowering	Phosphorous res. (kg grain/kg P) (Base level 0% RDP)
P1: 0% of recommended P dose (N and K is constant)	V1	5.15	22	327	3.18	15.20	82	
	V2	4.37	27	284	3.35	22.28	105	
	V3	4.42	26	305	3.08	25.88	92	
	V4	5.21	20	291	3.68	15.87	96	
	V5	5.70	15	269	4.50	22.01	104	
	V6	6.17	7	301	4.11	26.52	97	
	V7	6.11	9	275	4.06	28.13	86	
	V8	5.87	12	259	4.65	20.31	88	
	V9	5.05	23	283	2.80	28.65	94	
	V10	6.26	6	294	3.67	25.25	81	
	V11	5.62	16	302	3.05	25.96	83	
	V12	5.28	18	313	3.24	28.63	93	
	V14	5.89	11	318	3.07	24.68	81	
	V15	4.36	28	287	2.91	15.61	94	
	V16	-	-	-	-	-	-	
	V17	-	-	-	-	-	-	
P2: 50% of recommended P dose (N and K is constant)	V1	5.82	14	349	3.87	15.55	82	26.80
	V2	4.66	25	333	3.54	21.26	105	11.60
	V3	5.28	18	337	3.30	23.44	92	34.40
	V4	5.96	10	332	3.82	16.02	96	30.00
	V5	6.80	3	324	4.69	21.12	104	44.00
	V6	6.82	2	326	4.16	26.67	97	26.00
	V7	6.53	5	290	4.21	28.44	86	16.80
	V8	6.60	4	294	4.81	20.57	88	29.20
	V9	5.20	21	338	2.85	28.84	94	6.00
	V10	7.82	1	337	3.90	27.42	81	62.40
	V11	5.85	13	321	3.11	25.66	83	9.20
	V12	5.59	17	328	3.39	28.45	93	12.40
	V14	6.15	8	342	3.21	26.45	81	10.40
	V15	4.92	24	315	3.06	16.40	94	22.40
	V16	-	-	-	-	-	-	
	V17	-	-	-	-	-	-	
P3: 100% of recommended P dose (N and K is constant)	V1	-	-	-	-	-	-	
	V2	-	-	-	-	-	-	
	V3	-	-	-	-	-	-	
	V4	-	-	-	-	-	-	
	V5	-	-	-	-	-	-	
	V6	-	-	-	-	-	-	
	V7	-	-	-	-	-	-	
	V8	-	-	-	-	-	-	
	V9	-	-	-	-	-	-	
	V10	-	-	-	-	-	-	
	V11	-	-	-	-	-	-	
	V12	-	-	-	-	-	-	
	V14	-	-	-	-	-	-	
	V15	-	-	-	-	-	-	
	V16	-	-	-	-	-	-	
	V17	-	-	-	-	-	-	

Table 4.1(h): Contd.

P-levels	Varieties	MANDYA						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Tes wt (g)	Days for 50% Flowering	Phosphorous res. (kg grain/kg P) (Base level 0% RDP)
Interaction N at same V V at same N		NS		NS	NS	NS	NS	
		NS		NS	NS	NS	NS	
	P1	5.45	2	290	3.65	23.28	92	
	P2	6.12	1	325	3.84	23.18	92	26.95
	P3	-		-	-	-	-	
	C.D.(0.05)	0.32		NS	NS	NS	NS	
	C.V.(%)	6.05		17.58	7.4	12.16	0.43	
Mean of varieties:								
	V1	5.49	9	338	3.53	15.38	82	26.80
	V2	4.52	14	309	3.45	21.77	105	11.60
	V3	4.85	12	321	3.19	24.66	92	34.40
	V4	5.59	8	311	3.75	15.95	96	30.00
	V5	6.25	4	297	4.60	21.57	104	44.00
	V6	6.50	2	313	4.14	26.60	97	26.00
	V7	6.32	3	282	4.14	28.29	86	16.80
	V8	6.24	5	277	4.73	20.44	88	29.20
	V9	5.13	11	310	2.83	28.75	94	6.00
	V10	7.04	1	315	3.79	26.34	81	62.40
	V11	5.74	7	312	3.08	25.81	83	9.20
	V12	5.44	10	321	3.32	28.54	93	12.40
	V13	6.02	6	330	3.14	25.57	81	10.40
	V14	4.64	13	301	2.99	16.01	94	22.40
	V15	-		-	-	-	-	
	V16	-		-	-	-	-	
	C.D.(0.05)	0.53		24.72	0.43	1.84	0.32	
	C.V.(%)	8.08		6.89	10.38	6.82	0.31	
	Expt. Mean	5.70		310	3.62	23.26	91	
Soil type		Red sandy loam						
pH		8.02						
N - levels (kg/ha)								
	P1	0						
	P2	25						
	P3	50						
Recommended NPK (kg/ha)		100:50:50						
Varieties								
	V1	IET 31106						
	V2	IET 31110						
	V3	IET 31097						
	V4	IET 31102						
	V5	IET 31105						
	V6	IET 28070						
	V7	IET 31103						
	V8	IET 31098						
	V9	IET 31108						
	V10	IET 29560						
	V11	IET 31115						
	V12	IET 31096						
	V13	Rasi						
	V14	Improved Samba Mahsuri						
	V15	-						
	V16	-						
Available NPK (kg/ha)		295.4:80.28:253.50						

Table 4.1(h): Contd.

P-levels	Varieties	MARUTERU						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Tes wt (g)	Days for 50% Flowering	Phosphorous res. (kg grain/kg P) (Base level 0% RDP)
P1: 0% of recommended P dose (N and K is constant)	V1	2.83	43	226	20.10	14.17	98	
	V2	5.35	9	226	23.65	20.43	101	
	V3	5.87	4	215	23.30	21.92	98	
	V4	3.02	40	253	27.20	14.00	100	
	V5	4.27	30	254	31.10	18.85	99	
	V6	5.90	3	218	38.90	23.62	98	
	V7	5.23	11	226	29.10	22.22	98	
	V8	4.58	21	267	36.80	18.40	99	
	V9	4.30	29	242	35.08	25.50	100	
	V10	4.05	31	216	22.20	15.03	99	
	V11	3.27	39	206	20.50	15.87	98	
	V12	3.02	40	222	24.50	20.81	99	
	V14	2.00	45	170	12.90	20.70	99	
	V15	5.10	13	219	30.80	13.53	102	
	V16	4.64	19	246	30.93	14.13	99	
	V17							
P2: 50% of recommended P dose (N and K is constant)	V1	3.67	35	220	31.20	14.47	99	28.00
	V2	4.38	27	255	35.50	20.93	102	-32.33
	V3	3.43	37	239	36.00	22.90	98	-81.33
	V4	4.95	14	255	24.40	13.63	99	64.33
	V5	4.33	28	232	41.50	19.03	99	2.00
	V6	5.14	12	238	35.20	24.17	97	-25.33
	V7	4.87	17	218	33.90	22.53	100	-12.00
	V8	6.28	2	222	25.10	16.80	98	56.67
	V9	3.89	33	234	35.50	25.73	98	-13.67
	V10	3.37	38	212	20.20	19.23	98	-22.67
	V11	3.94	32	147	6.40	17.80	99	22.33
	V12	4.58	21	217	23.75	20.77	100	52.00
	V14	2.87	42	166	10.01	20.60	97	29.00
	V15	4.89	15	224	22.40	13.87	100	-7.00
	V16	4.66	18	241	24.00	13.73	99	0.67
	V17							
P3: 100% of recommended P dose (N and K is constant)	V1	4.88	16	261	31.20	13.63	97	34.17
	V2	5.40	8	260	51.02	20.27	102	0.83
	V3	4.47	23	266	37.00	22.50	100	-23.33
	V4	4.47	23	255	30.60	14.00	96	24.17
	V5	4.42	26	253	37.20	18.77	91	2.50
	V6	6.47	1	265	40.20	24.50	97	9.50
	V7	5.41	7	255	28.80	23.40	100	3.00
	V8	5.43	5	227	44.80	25.90	96	14.17
	V9	5.29	10	256	30.70	19.43	98	16.50
	V10	4.44	25	244	25.90	19.43	98	6.50
	V11	3.83	34	199	16.00	18.07	100	9.33
	V12	3.49	36	217	30.50	20.50	97	7.83
	V14	2.63	44	198	10.60	21.47	99	10.50
	V15	5.42	6	250	31.60	13.63	105	5.33
	V16	4.64	19	261	33.17	14.27	99	0.00
	V17							

Table 4.1(h): Contd.

P-levels	Varieties	MARUTERU						
		Grain Yield (t/ha)	<i>Rank</i>	Panicle/m ² (No.)	Panicle wt (g)	Tes wt (g)	Days for 50% Flowering	Phosphorous res. (kg grain/kg P) (Base level 0% RDP)
Interaction <i>N at same V</i> <i>V at same N</i>		0.47		24.53	3.2	0.82	2.48	
		0.38		28.72	3.18	0.82	2.36	
P1		4.23	3	227	27.14	18.61	99	
P2		4.35	2	221	27.00	19.08	99	4.04
P3		4.71	1	245	31.95	19.32	98	8.07
<i>C.D.(0.05)</i>		0.36		NS	1.09	0.28	NS	
C.V.(%)		13.99		15.17	6.5	2.56	2.14	
Mean of varieties:								
V1		3.79	12	236	27.50	14.09	98	31.08
V2		5.04	5	247	36.72	20.54	101	-15.75
V3		4.59	7	240	32.10	22.44	99	-52.33
V4		4.15	10	254	27.40	13.88	98	44.25
V5		4.34	9	247	36.60	18.88	96	2.25
V6		5.84	1	240	38.10	24.10	97	-7.92
V7		5.17	3	233	30.60	22.72	99	-4.50
V8		5.43	2	239	35.57	20.37	97	35.42
V9		4.49	8	244	33.76	23.55	99	1.42
V10		3.95	11	224	22.77	17.90	99	-8.08
V11		3.68	14	184	14.30	17.25	99	15.83
V12		3.70	13	219	26.25	20.69	99	29.92
V13		2.50	15	178	11.17	20.92	98	19.75
V14		5.14	4	231	28.27	13.68	103	-0.83
V15		4.65	6	249	29.37	14.04	99	0.33
V16		-		-	-	-	-	
<i>C.D.(0.05)</i>		0.22		14.16	1.83	0.47	1.36	
C.V.(%)		5.33		6.54	6.82	2.65	1.47	
Expt. Mean		4.43		231	28.70	19.00	99	
Soil type		-						
pH		5.80						
N - levels (kg/ha)								
P1		0						
P2		30						
P3		60						
Recommended NPK (kg/ha)		90:60:60						
Varieties								
V1		IET 31106						
V2		IET 31110						
V3		IET 31097						
V4		IET 31102						
V5		IET 31105						
V6		IET 28070						
V7		IET 31103						
V8		IET 31098						
V9		IET 31108						
V10		IET 29560						
V11		IET 31115						
V12		IET 31096						
V13		Rasi						
V14		Improved Samba Mahsuri						
V15		BPT 5204						
V16		Local check -						
Available NPK (kg/ha)		119:14.3:273						

Table 4.1(h): Contd.

P-levels	Varieties	RAIPUR						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Tes wt (g)	Days for 50% Flowering	Phosphorous res. (kg grain/kg P) (Base level 0% RDP)
P1: 0% of recommended P dose (N and K is constant)	V1	5.50	37	226	2.60	11.67	99	
	V2	6.69	7	244	2.91	19.42	104	
	V3	6.06	20	215	3.18	21.33	85	
	V4	5.61	33	232	3.17	15.48	95	
	V5	6.02	22	213	3.05	17.62	101	
	V6	6.05	21	203	4.10	24.26	95	
	V7	5.23	38	192	3.73	25.72	85	
	V8	5.93	24	215	3.92	17.60	95	
	V9	5.56	34	140	2.98	24.78	93	
	V10	5.75	30	231	2.74	22.03	81	
	V11	3.45	44	217	2.56	21.89	76	
	V12	5.62	32	218	3.11	23.81	85	
	V14	2.21	45	208	2.38	22.51	77	
	V15	5.11	39	257	1.88	14.67	100	
	V16	-	-	-	-	-	-	
	V17	5.55	36	266	2.80	18.71	99	
P2: 50% of recommended P dose (N and K is constant)	V1	5.83	29	257	2.95	12.77	99	11.00
	V2	7.00	2	267	3.90	19.66	104	10.33
	V3	6.12	19	242	3.91	23.06	85	2.00
	V4	5.98	23	248	3.37	15.58	95	12.33
	V5	6.35	13	249	4.13	18.36	101	11.00
	V6	6.30	14	223	4.41	24.39	95	8.33
	V7	6.36	11	222	4.65	26.82	85	37.67
	V8	6.50	9	238	4.43	18.87	95	19.00
	V9	5.56	34	231	3.19	27.75	93	0.00
	V10	5.93	24	239	2.93	23.76	81	6.00
	V11	3.68	42	225	2.68	23.55	76	7.67
	V12	5.73	31	239	4.02	25.71	85	3.67
	V14	3.53	43	237	3.32	23.51	77	44.00
	V15	5.89	26	267	2.35	15.00	100	26.00
	V16	-	-	-	-	-	-	
	V17	6.16	18	268	3.08	18.71	99	20.33
P3: 100% of recommended P dose (N and K is constant)	V1	5.85	28	269	3.10	14.84	99	5.83
	V2	7.41	1	292	4.04	21.22	104	12.00
	V3	6.26	16	262	4.29	26.19	85	3.33
	V4	6.28	15	248	3.61	16.41	94	11.17
	V5	6.84	5	268	4.50	18.39	101	13.67
	V6	6.36	11	250	4.66	25.72	95	5.17
	V7	6.93	3	249	5.54	27.92	85	28.33
	V8	6.90	4	265	4.68	19.47	95	16.17
	V9	5.86	27	264	3.41	28.88	93	5.00
	V10	6.20	17	248	3.69	25.03	81	7.50
	V11	4.03	41	260	3.53	24.49	76	9.67
	V12	6.57	8	249	4.07	26.28	85	15.83
	V14	4.51	40	239	3.25	24.24	77	38.33
	V15	6.70	6	276	2.53	15.23	101	26.50
	V16	-	-	-	-	-	-	
	V17	6.47	10	284	3.21	18.85	99	

Table 4.1(h): Contd.

P-levels	Varieties	RAIPUR						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Tes wt (g)	Days for 50% Flowering	Phosphorous res. (kg grain/kg P) (Base level 0% RDP)
Interaction								
N at same V		NS		NS	NS	NS	NS	
V at same N		NS		NS	NS	NS	NS	
	P1	5.62	3	212	3.18	20.16	92	
	P2	5.96	2	240	3.69	21.32	92	11.39
	P3	6.27	1	261	4.10	22.60	92	10.71
C.D.(0.05)		0.6		19.9	0.32	NS	NS	
C.V.(%)		17.67		14.1	15.87	14.69	0.33	
Mean of varieties:								
	V1	5.73	12	251	2.88	13.09	99	8.42
	V2	7.03	1	267	3.62	20.10	104	11.17
	V3	6.15	6	240	3.79	23.53	85	2.67
	V4	5.96	10	243	3.38	15.82	95	11.75
	V5	6.40	3	244	3.89	18.12	101	12.33
	V6	6.24	4	225	4.39	24.79	95	6.75
	V7	6.17	5	221	4.64	26.82	85	33.00
	V8	6.44	2	239	4.34	18.65	95	17.58
	V9	5.66	13	212	3.19	27.14	93	2.50
	V10	5.96	9	239	3.12	23.61	81	6.75
	V11	3.72	14	234	2.92	23.31	76	8.67
	V12	5.97	8	236	3.73	25.27	85	9.75
	V13	3.42	15	228	2.98	23.42	77	41.17
	V14	5.90	11	267	2.25	14.97	100	26.25
	V15	-		-	-	-	-	
	V16	6.06	7	272	3.03	18.76	99	20.33
C.D.(0.05)		0.99		32.88	0.56	2.18	0.41	
C.V.(%)		18.26		14.54	17.26	10.97	0.48	
Expt. Mean		5.79		241	3.48	21.16	91	
Soil type		Vertisol						
pH		7.10						
N - levels (kg/ha)								
	P1	0						
	P2	30						
	P3	60						
Recommended NPK (kg/ha)		100:60:40						
Varieties								
	V1	IET 31106						
	V2	IET 31110						
	V3	IET 31097						
	V4	IET 31102						
	V5	IET 31105						
	V6	IET 28070						
	V7	IET 31103						
	V8	IET 31098						
	V9	IET 31108						
	V10	IET 29560						
	V11	IET 31115						
	V12	IET 31096						
	V13	Rasi						
	V14	Improved Samba Mahsuri						
	V15	-						
	V16	Local check - CG Devbhog(135 days)						
Available NPK (kg/ha)		169.3:18.1:295.4						

Table 4.1(h): Contd.

P-levels	Varieties	RANCHI						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Grains/Panicle (No.)	Tes wt (g)	Days for 50% Flowering	Phosphorous res. (kg grain/kg P) (Base level 0% RDP)
P1: 0% of recommended P dose (N and K is constant)	V1	3.85	36	235	96	25.21	108	
	V2	3.96	34	245	99	25.75	109	
	V3	4.18	26	256	105	27.20	113	
	V4	3.96	34	230	94	24.52	111	
	V5	4.12	29	255	104	26.73	98	
	V6	3.72	39	218	87	22.95	100	
	V7	4.07	31	250	101	27.96	106	
	V8	4.23	24	261	102	27.50	109	
	V9	4.44	19	264	107	27.53	103	
	V10	3.80	38	233	96	24.77	101	
	V11	4.32	22	270	108	28.12	104	
	V12	4.07	31	251	101	26.45	107	
	V14	-		-	-	-	-	
	V15	4.23	24	262	105	27.50	111	
	V16	-		-	-	-	-	
	V17	-		-	-	-	-	
P2: 50% of recommended P dose (N and K is constant)	V1	4.07	31	253	102	25.76	111	7.33
	V2	4.13	27	256	102	25.95	115	5.67
	V3	4.42	21	274	111	27.60	113	8.00
	V4	4.58	14	270	110	24.80	99	20.67
	V5	3.82	37	235	96	26.98	102	-10.00
	V6	4.62	12	273	111	23.30	109	30.00
	V7	4.52	16	279	113	28.21	112	15.00
	V8	4.65	11	287	117	28.10	104	14.00
	V9	4.73	8	291	112	28.15	103	9.67
	V10	4.12	29	254	103	24.96	105	10.67
	V11	4.62	12	285	116	28.47	105	10.00
	V12	4.43	20	274	111	26.91	109	12.00
	V14	-		-	-	-	-	
	V15	4.58	14	283	114	27.77	113	11.67
	V16	-		-	-	-	-	
	V17	-		-	-	-	-	
P3: 100% of recommended P dose (N and K is constant)	V1	4.28	23	265	106	26.00	112	7.17
	V2	4.47	17	277	112	26.13	117	8.50
	V3	4.66	10	288	116	27.93	113	8.00
	V4	4.78	7	283	113	25.13	100	13.67
	V5	4.13	27	256	103	27.20	104	0.17
	V6	4.92	3	292	117	23.88	110	20.00
	V7	4.85	5	299	121	28.75	113	13.00
	V8	4.99	2	309	125	28.80	107	12.67
	V9	5.01	1	297	120	53.95	104	9.50
	V10	4.45	18	275	110	25.21	105	10.83
	V11	4.88	4	303	121	28.90	107	9.33
	V12	4.72	9	292	118	27.30	111	10.83
	V14	-		-	-	-	-	
	V15	4.81	6	298	120	27.97	115	9.67
	V16	-		-	-	-	-	
	V17	-		-	-	-	-	

Table 4.1(h): Contd.

P-levels	Varieties	RANCHI					
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Tes wt (g)	Days for 50% Flowering	Phosphorous res. (kg grain/kg P) (Base level 0% RDP)
Interaction <i>N at same V</i> <i>V at same N</i>		NS		NS	NS	0.83	
		NS		NS	NS	0.85	
P1		4.06	3	247	100	26.20	106
P2		4.39	2	269	108	26.57	107
P3		4.67	1	286	115	29.26	108
C.D.(0.05)		0.11		7.69	1.51	NS	0.18
C.V.(%)		4.06		4.55	2.22	26.23	0.27
Mean of varieties:							
V1		4.07	12	251	101	25.66	110
V2		4.19	10	259	105	25.94	113
V3		4.42	7	273	110	27.58	113
V4		4.44	6	261	106	24.82	103
V5		4.02	13	249	101	26.97	101
V6		4.42	7	261	105	23.38	106
V7		4.48	5	276	112	28.31	110
V8		4.62	2	286	114	28.13	107
V9		4.73	1	284	113	36.54	103
V10		4.12	11	254	103	24.98	104
V11		4.61	3	286	115	28.50	105
V12		4.41	9	272	110	26.89	109
V13		-		-	-	-	-
V14		4.54	4	281	113	27.75	113
V15		-		-	-	-	-
V16		-		-	-	-	-
C.D.(0.05)		0.44		25.45	7.48	NS	0.49
C.V.(%)		10.67		10.08	7.35	26.62	0.48
Expt. Mean		4.39		269	108	27.34	108
Soil type		Clay loam					
pH		6.2					
N - levels (kg/ha)							
P1		0					
P2		30					
P3		60					
Recommended NPK (kg/ha)		120:60:40					
Varieties							
V1		IET 31106					
V2		IET 31110					
V3		IET 31097					
V4		IET 31102					
V5		IET 31105					
V6		IET 28070					
V7		IET 31103					
V8		IET 31098					
V9		IET 31108					
V10		IET 29560					
V11		IET 31115					
V12		IET 31096					
V13		-					
V14		Improved Samba Mahsuri					
V15		-					
V16		-					
Available NPK (kg/ha)		230:36.0:161					

Table 4.1(h): Contd.

N-levels	P-levels	VARANASI							Mean Grain Yield (t/ha)	Rank
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Tes wt (g)	Days for 50% Flowering	Phosphorous res. (kg grain/kg P) (Base level 0% RDP)		
P1: 0% of recommended P dose (N and K is constant)	V1	-		-	-	-	-		3.76	37
	V2	-		-	-	-	-		4.44	16
	V3	-		-	-	-	-		4.36	21
	V4	-		-	-	-	-		3.98	33
	V5	-		-	-	-	-		4.52	13
	V6	-		-	-	-	-		4.49	15
	V7	-		-	-	-	-		4.43	17
	V8	-		-	-	-	-		4.40	18
	V9	-		-	-	-	-		3.95	34
	V10	-		-	-	-	-		4.20	27
	V11	-		-	-	-	-		3.39	44
	V12	-		-	-	-	-		4.27	24
	V14	-		-	-	-	-		2.84	48
	V15	-		-	-	-	-		3.84	35
	V16	-		-	-	-	-		2.94	47
	V17	-		-	-	-	-		3.46	41
P2: 50% of recommended P dose (N and K is constant)	V1	4.38	10	172	19.08	11.86	105		4.26	25
	V2	0.82	30	159	13.66	15.77	106		4.08	30
	V3	3.64	18	197	18.05	20.03	99		4.14	28
	V4	1.74	29	144	27.64	13.68	109		4.39	19
	V5	3.19	24	145	19.99	13.86	106		4.64	10
	V6	2.93	25	149	26.56	21.12	110		4.56	12
	V7	5.01	6	151	24.57	24.03	110		4.87	4
	V8	6.05	1	159	25.35	17.05	109		5.24	1
	V9	4.30	12	159	27.09	24.91	107		4.13	29
	V10	3.24	23	177	19.53	21.77	105		4.36	20
	V11	3.35	21	147	17.69	21.28	108		3.61	39
	V12	3.96	15	187	20.57	23.92	99		4.68	7
	V14	3.44	20	166	20.00	20.27	86		3.45	42
	V15	1.97	27	152	19.37	12.97	113		3.83	36
	V16	-		-	-	-	-		2.97	46
	V17	3.57	19	148	18.26	15.82	105		3.71	38
P3: 100% of recommended P dose (N and K is constant)	V1	5.82	3	178	22.06	12.18	105	72.00	4.50	14
	V2	3.26	22	153	23.38	15.50	107	122.00	4.79	6
	V3	5.26	4	169	23.37	21.56	100	81.00	4.58	11
	V4	1.91	28	150	19.77	12.20	110	8.50	4.25	26
	V5	3.66	17	159	26.22	16.80	105	23.50	4.64	9
	V6	4.86	7	177	19.37	20.15	110	96.50	4.93	3
	V7	4.17	14	163	25.58	23.37	110	-42.00	4.83	5
	V8	6.00	2	166	25.31	16.16	109	-2.50	5.14	2
	V9	4.28	13	140	25.26	24.35	107	-1.00	4.35	22
	V10	4.32	11	182	21.87	20.23	106	54.00	4.29	23
	V11	3.84	16	169	18.39	21.45	110	24.50	3.44	43
	V12	4.43	9	183	20.56	22.72	100	23.50	4.68	8
	V14	5.03	5	182	21.99	24.26	85	79.50	3.49	40
	V15	2.32	26	161	15.97	12.62	113	17.50	4.04	32
	V16	-		-	-	-	-		3.12	45
	V17	4.47	8	158	18.27	13.93	104.67	45.00	4.07	31

Table 4.1(h): Contd.

P-levels	Varieties	VARANASI							Mean Grain Yield (t/ha)	Rank
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Tes wt (g)	Days for 50% Flowering	Phosphorous res. (kg grain/kg P) (Base level 0% RDP)		
Interaction		0.71		19.08	3.36	1.82	NS			
N at same V		0.69		21.51	3.06	1.82	NS			
V at same N										
P1		-		-	-	-	-		4.12	3
P2		3.51	2	160	21.75	18.67	107		4.35	2
P3		4.31	1	164	22.78	18.54	107	39.68	4.43	1
C.D.(0.05)		0.32		NS	NS	NS	NS			
C.V.(%)		9.28		9.6	10.55	3.51	1.25			
Mean of varieties:										
V1		5.10	2	175	20.57	12.02	105	72.00	4.28	9
V2		2.04	14	156	18.52	15.64	107	122.00	4.31	8
V3		4.45	4	183	20.71	20.80	99	81.00	4.37	7
V4		1.83	15	147	23.71	12.94	109	8.50	4.16	11
V5		3.43	12	152	23.11	15.33	105	23.50	4.62	4
V6		3.90	9	163	22.97	20.64	110	96.50	4.71	3
V7		4.59	3	157	25.08	23.70	110	-42.00	4.79	2
V8		6.03	1	162	25.33	16.61	109	-2.50	5.06	1
V9		4.29	5	149	26.18	24.63	107	-1.00	4.20	10
V10		3.78	10	180	20.70	21.00	106	54.00	4.39	6
V11		3.60	11	158	18.04	21.37	109	24.50	3.60	14
V12		4.20	7	185	20.57	23.32	100	23.50	4.57	5
V13		4.24	6	174	21.00	22.27	85	79.50	3.48	15
V14		2.15	13	157	17.67	12.80	113	17.50	3.85	12
V15		-		-	-	-	-		3.01	16
V16		4.02	8	153	18.27	14.88	105		3.79	13
C.D.(0.05)		0.49		13.49	2.16	1.29	0.97			
C.V.(%)		10.93		7.14	8.69	6	0.79			
Expt. Mean		3.84		163	21.49	18.53	105		4.31	
Soil type		-								
pH		7.4								
N - levels (kg/ha)										
P1		0								
P2		20								
P3		40								
Recommended NPK (kg/ha)		150:40:05								
Varieties										
V1		IET 31106								
V2		IET 31110								
V3		IET 31097								
V4		IET 31102								
V5		IET 31105								
V6		IET 28070								
V7		IET 31103								
V8		IET 31098								
V9		IET 31108								
V10		IET 29560								
V11		IET 31115								
V12		IET 31096								
V13		Rasi								
V14		Improved Samba Mahsuri								
V15		-								
V16		Local check - HUR 156								
Available NPK (kg/ha)		-								

4.1i AET – AVT 2 - LNT

Evaluation of identified cultures and cultivars for enhancing nitrogen use efficiency in irrigated rice

The productivity of rice is very low due to imbalanced and excessive use of nitrogen fertilizers by the farmers. It has been reported that the apparent recovery efficiency of applied nitrogen is approximately about 30-33% whereas, the remaining amount of N is either lost through surface runoff, leaching, volatilization or denitrification and further adds to increased cost of production and environmental degradation. The use of efficient and economical rates of nitrogen fertilizer as well as N efficient cutlivars one important for enhancing crop productivity and maintaining environmental sustainability. To achieve this, it is imperative to identify high nitrogen efficient cultivars which can minimize the losses enhance the productivity with lower 'N' input. Large numbers of rice cultivars have been released in India so far, but the question is that whether these cultivars are capable of utilizing the nitrogen efficiently and there by enhance NUE. Inter varietal differences for nitrogen use efficiency has been reported by many researchers. Therefore, there is a need to identify the cultivars which can efficiently utilize the N and to develop a sustainable nitrogen rate recommendation for these cultivars which can further give enhanced yield and resource use efficiency. Hence the present trial is constituted to evaluate the identified cultures (NIL's) and cultivars with the following objective: 1) To study the comparative performance of elite lines and cultivars under different levels of nitrogen. The trial was conducted at seven locations (**Gangavathi, Karjat, Kaul, Mandya, Maruteru, Raipur, Ranchi and Varanasi**). Split plot design was adopted with 3 main plots of nitrogen levels (N₁- No nitrogen, N₂: 50 %of recommended N dose (P and K is constant) and N₃: 100 % of recommended dose of N (P and K constant). Subplots consists of 13 advanced cultures along with four checks and one local check. The results were summarized and presented in **Table 4.1(i)** and the salient findings are as followed.

Interaction effect of nitrogen level and advanced cultures on grain yield was found significant at **Gangavathi, Mandya, Maruteru and Varanasi**. However, the objective is to find out suitable and efficient cultivars under low recommended N application for reducing Nitrogen input without any yield penalty.

In **Gangavathi**, the cultures were evaluated only at all three levels of Nitrogen i.e. 0, 50% and 100% of RDN and found significant effect on grain yield further there is N significant difference of cultivars on grain yield. Among the cultures, the grain yield of IET 31004, IET 31135 and IET 31131 were promising interms of higher grain yield (2.96 t/ha to 3.60 t/ha) which were superior to variety Swarna (1.93 t/ha). Application g100 >, RDN (2.64 t/ha was significantly superior to both 50% N 0 nitrogen (1.78 to 2.29 t/ha)

In clay loam soils of **Karjat**, all cultures performed better under 50% and 100% of RDN over no 'N' application. Among the cultures, IET 31134 (5.10 t/ha) and IET 31135

(4.26 t/ha) found promising with higher grain yield. Among nitrogen levels 100% RDN resulted significantly highest grain yield (3.90 t/ha) and significantly superior over 50% RDN (3.39 t/ha). All the cultures performed significantly superior at 100% RDN over 50% RDN.

At **Mandya**, interaction effect of nitrogen level and advanced cultures on grain yield was significant. Among nitrogen levels (50% RDN and no 'N' application), 50% N application gave significantly higher grain yield of 5.01 t/ha over no N application (4.22 t/ha). Among advanced cultures IET 31135 (5.34 t/ha) resulted the mean higher grain yield followed by IET 31128 (5.16 t/ha) Mean over 'N' levels, the highest agronomic efficiency of N was recorded in IET 31117(27.80), IET 31124 (26.00) IET 31120(25.20) followed by IET 31134 (22.40) and found superior over checks tested due to better yield at 50% RDN application.

At **Maruteru**, interaction effect 'N' levels and cultivars, 'N' levels as well cultivars were found significant (0, 50 and 100% RDN application). Application of RDN @ 100% (4.79) found significantly superior to 50% RDN (4.52 t/ha) and no 'N' application (4.30 t/ha). Cultures were significantly superior in recording better yield at higher 'N' application (100% RDN). Further, among cultures IET 31120 (6.47 t/ha) followed by IET 31124(6.28 t/ha) and IET 31135(5.52 t/ha) found significantly promising over other cultures and checks with better Nitrogen response (5.33 17.00 kg grain/kg N)

At **Raipur**, the cultures tested at three levels of N application (0, 50, 100% RDN). The interaction effect was not significant, however, most of the cultures recorded significantly higher grain yield at 100% of RDN. Application of 100% RDN gave significantly higher grain yield of (6.47 t/ha) over 50% RDN (4.90 t/ha). Among the cultures, IET 31135 (5.57 t/ha) followed by IET 31124 (4.89 t/ha) which were comparable with Swarna (5.40 t/ha) in terms of grain yield.

At **Ranchi**, three levels of 'N' (0,50,100% RDN) was applied for evaluation of cultures and their response. Interaction effect of 'N' levels vs cultures was non-significant. Application of 100% RDN (4.32 t/ha) was significantly higher over 50% (3.88 t/ha) and no N application (1.75 t/ha). Mean over the 'N' levels, the culture IET 31120 (3.63 t/ha) followed by IET 31131(3.59 t/ha) were found promising over other cultures and checks. (Swarna)

At **Varanasi**, the cultures were evaluated at two levels of RDN i.e. 50% and 100%RDN (120:60:40). Application of 100% RDN gave significantly higher grain yield of (4.79 t/ha) over 50% RDN (3.56 t/ha) with better nutrient response of (20.42 lg grain/kg N). Among the cultures, only IET 31124 and IET 31118 (5.14 to 4.73 t/ha) were found promising over other cultures and comparable with Swarna (5.39 t/ha)

Trial results compiled for seven locations to identify N efficient cultivars revealed that IET 31004, IET 31135, IET 31124, IET 31134 (4.27 to 4.61 t/ha) are the high yielding and high nitrogen use efficient cultivars and promising over other cultures across the locations. Most of the cultures performed well under 100% of RDN (Higher 'N') dose but less duration in 50% of the 'N' dose.

Table 4.1(i): Summary of data on grain yield and ancillary characters of selected AET LNT cultures grown under transplanted conditions at graded levels of recommended N fertilizer doses, kharif 2024.

N-levels	Varieties	GANGAVATHI						
		Grain Yield (t/ha)	Ran k	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% Flowering	Nitrogen. res. (kg grain/kg N) (Base level 50% RDN)
N1: No nitrogen (Control) (P and K is constant)	V1	2.04	32	179	2.66	1.91	92	
	V2	1.34	50	164	1.47	1.42	97	
	V3	2.65	13	233	2.22	2.33	92	
	V4	1.87	36	164	2.28	2.28	105	
	V5	2.29	24	206	2.08	2.45	92	
	V6	1.31	51	171	1.76	2.36	94	
	V7	2.30	23	181	3.21	2.07	85	
	V8	2.02	33	225	1.64	2.07	90	
	V9	2.09	29	207	1.64	2.40	92	
	V10	2.33	22	199	2.94	1.73	90	
	V11	1.18	53	113	2.24	2.58	92	
	V12	1.40	44	157	1.94	2.13	97	
	V13	2.48	18	215	3.10	2.66	97	
	V14	1.53	42	147	2.42	1.89	104	
	V15	1.12	54	175	1.37	1.88	81	
	V16	1.27	52	188	1.65	1.31	95	
	V17	1.48	43	190	1.71	1.36	106	
	V18	1.36	45	143	1.66	1.74	88	
N2: 50% of recommended N dose (P and K is constant)	V1	2.45	19	211	3.46	1.82	92	5.47
	V2	1.36	45	169	2.16	1.61	97	0.27
	V3	3.15	9	281	2.65	2.30	92	6.67
	V4	1.97	34	172	2.66	2.35	105	1.33
	V5	2.94	11	238	2.44	2.46	92	8.67
	V6	1.36	45	196	2.09	2.33	94	0.67
	V7	3.18	8	224	3.64	2.12	85	11.73
	V8	2.25	25	276	1.85	2.00	90	3.07
	V9	2.63	14	231	1.94	2.53	92	7.20
	V10	2.89	12	226	2.93	1.69	90	7.47
	V11	1.36	45	139	2.62	2.61	92	2.40
	V12	2.25	25	171	2.46	2.18	97	11.33
	V13	4.06	2	260	3.70	2.71	97	21.07
	V14	2.09	29	176	2.63	1.90	104	7.47
	V15	1.36	45	217	1.77	2.05	81	3.20
	V16	1.61	40	210	2.16	1.36	95	4.53
	V17	2.07	31	258	1.90	1.52	106	7.87
	V18	2.24	27	253	1.98	1.31	88	11.73
N3: 100% of recommended N dose	V1	2.61	16	222	3.94	1.77	92	3.80
	V2	1.69	38	211	2.81	1.96	97	2.33
	V3	3.28	7	306	3.30	2.41	92	4.20
	V4	2.44	20	239	2.93	2.39	105	3.80
	V5	3.40	4	267	2.76	2.45	92	7.40
	V6	1.82	37	264	2.62	3.16	94	3.40
	V7	3.39	5	250	4.60	2.16	85	7.27
	V8	2.63	14	275	2.33	1.97	90	4.07
	V9	2.98	10	267	2.42	2.50	92	5.93
	V10	3.31	6	261	3.07	1.71	90	6.53
	V11	1.62	39	156	2.82	2.65	92	2.93
	V12	2.44	20	194	2.65	2.22	97	6.93
	V13	4.26	1	285	3.87	2.65	97	11.87
	V14	2.17	28	211	2.82	1.83	104	4.27
	V15	1.55	41	251	2.08	2.10	81	2.87
	V16	1.89	35	231	2.51	1.37	95	4.13
	V17	2.49	17	289	2.09	1.40	106	6.73
	V18	3.51	3	307	2.30	1.26	88	14.33

Table 4.1(i): Contd.

N-levels	Varieties	GANGAVATHI						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% Flowering	Nitrogen. res. (kg grain/kg N) (Base level 50% RDN)
Interaction N at same V V at same N N1 N2 N3 C.D.(0.05) C.V.(%) Mean of varieties: V1 V2 V3 V4 V5 V6 V7 V8 V9 V10 V11 V12 V13 V14 V15 V16 V17 V18 C.D.(0.05) C.V.(%) Expt. Mean Soil type pH N - levels (kg/ha) N1 N2 N3 Recommended NPK (kg/ha) Varieties V1 V2 V3 V4 V5 V6 V7 V8 V9 V10 V11 V12 V13 V14 V15 V16 V17 V18 Available NPK (kg/ha)	0.38		37.8	0.34	0.24	NS		
	0.38		38.13	0.33	0.24	NS		
	1.78	3	181	2.11	2.03	94		
	2.29	2	217	2.50	2.05	94	6.79	
	2.64	1	249	2.88	2.11	94	5.71	
	0.06		12.6	0.16	NS	NS		
	4.84		10.93	11.65	6.71	0.08		
	2.37	8	204	3.35	1.83	92	4.63	
	1.46	16	181	2.15	1.66	97	1.30	
	3.03	2	273	2.72	2.35	92	5.43	
	2.09	10	192	2.62	2.34	105	2.57	
	2.88	4	237	2.43	2.45	92	8.03	
	1.50	15	210	2.16	2.62	94	2.03	
	2.96	3	218	3.82	2.12	85	9.50	
	2.30	9	259	1.94	2.01	90	3.57	
	2.57	6	235	2.00	2.48	92	6.57	
	2.84	5	229	2.98	1.71	90	7.00	
	1.39	17	136	2.56	2.61	92	2.67	
	2.03	11	174	2.35	2.18	97	9.13	
	3.60	1	253	3.56	2.67	97	16.47	
	1.93	13	178	2.62	1.87	104	5.87	
	1.34	18	214	1.74	2.01	81	3.03	
	1.59	14	209	2.11	1.35	95	4.33	
	2.01	12	246	1.90	1.43	106	7.30	
	2.37	7	234	1.98	1.44	88	13.03	
	0.22		21.82	0.19	0.14	0.07		
	10.58		10.82	8.13	7.04	0.08		
	2.24		216	2.50	2.06	94		
	-							
	-							
0								
75								
150								
150:75:75								
IET 31134								
IET 29579								
IET 31135								
IET 31120								
IET 31119								
IET 31118								
IET 31131								
IET 30269								
IET 31128								
IET 31124								
IET 31117								
IET 29581								
IET 31004								
Swarna								
Rasi								
Improved Samba Mahsuri								
BPT 5204								
Local check - RNR 15048 (120 Days)								
-								

Table 4.1(i): Contd.

N-levels	Varieties	KARJAT						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% Flowering	Nitrogen. res. (kg grain/kg N) (Base level 0% RDN)
N1: No nitrogen (Control) (P and K is constant)	V1	4.16	7	239	3.19	26.11	93	
	V2	2.90	34	173	2.76	22.59	93	
	V3	3.75	13	219	3.08	27.34	102	
	V4	3.07	30	179	2.85	23.22	91	
	V5	3.01	31	176	2.84	21.23	100	
	V6	2.70	39	166	2.63	20.89	93	
	V7	2.64	42	159	2.63	20.58	97	
	V8	3.52	19	199	3.03	24.67	91	
	V9	3.34	23	192	2.95	25.18	97	
	V10	3.48	20	196	3.01	24.88	85	
	V11	2.83	36	170	2.72	20.79	93	
	V12	-		-	-	-	-	
	V13	-		-	-	-	-	
	V14	2.35	45	136	2.50	23.59	101	
	V15	2.55	43	149	2.60	19.67	88	
	V16	2.41	44	136	2.56	20.53	88	
	V17	-		-	-	-	-	
	V18	3.23	26	182	2.93	18.32	99	
N2: 50% of recommended N dose (P and K is constant)	V1	4.95	3	245	3.26	28.41	86	15.80
	V2	3.25	25	202	2.85	25.29	101	7.00
	V3	4.04	8	242	3.10	29.50	91	5.80
	V4	3.41	22	206	2.95	25.87	99	6.80
	V5	3.34	23	206	2.89	24.87	92	6.60
	V6	3.00	32	179	2.81	24.87	90	6.00
	V7	2.86	35	176	2.69	22.67	100	4.40
	V8	3.92	10	242	3.05	27.16	102	8.00
	V9	3.58	16	212	3.00	28.35	101	4.80
	V10	3.78	12	229	3.04	28.30	100	6.00
	V11	3.18	29	199	2.81	23.37	96	7.00
	V12	-		-	-	-	-	
	V13	-		-	-	-	-	
	V14	2.66	40	166	2.59	26.13	100	6.20
	V15	2.73	38	173	2.62	20.80	109	3.60
	V16	2.66	40	169	2.60	21.09	91	5.00
	V17	-		-	-	-	-	
	V18	3.53	18	209	2.97	19.22	84	6.00
N3: 100% of recommended N dose	V1	6.19	1	305	3.85	29.42	92	20.30
	V2	3.61	15	242	2.86	26.27	96	7.10
	V3	4.98	2	302	3.29	30.57	100	12.30
	V4	3.85	11	252	2.96	26.78	93	7.80
	V5	3.71	14	245	2.92	26.12	96	7.00
	V6	3.46	21	232	2.81	25.68	109	7.60
	V7	3.23	26	209	2.80	24.12	83	5.90
	V8	4.53	4	278	3.18	28.28	96	10.10
	V9	4.23	6	272	3.07	28.69	94	8.90
	V10	4.33	5	275	3.10	28.40	108	8.50
	V11	3.57	17	239	2.85	25.52	101	7.40
	V12	-		-	-	-	-	
	V13	-		-	-	-	-	
	V14	2.77	37	182	2.62	27.10	99	4.20
	V15	3.19	28	206	2.78	22.18	104	6.40
	V16	2.93	33	203	2.63	23.52	99	5.20
	V17	-		-	-	-	-	
	V18	3.98	9	258	2.98	20.09	104	7.50

Table 4.1(i): Contd.

N-levels	Varieties	KARJAT						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% Flowering	Nitrogen. res. (kg grain/kg N) (Base level 0% RDN)
Interaction	N at same V	NS		NS	NS	0.48	2.82	
	V at same N	NS		NS	NS	0.46	2.76	
	N1	3.06	3	178	2.82	22.64	94	
	N2	3.39	2	203	2.88	25.06	96	6.60
	N3	3.90	1	246	2.98	26.18	98	8.41
	C.D.(0.05)	0.2		NS	NS	0.24	1.15	
	C.V.(%)	5.1		21.96	9	0.9	1.08	
Mean of varieties:								
	V1	5.10	1	263	3.43	27.98	90	18.05
	V2	3.25	9	206	2.82	24.72	97	7.05
	V3	4.26	2	254	3.16	29.14	97	9.05
	V4	3.44	7	212	2.92	25.29	94	7.30
	V5	3.35	8	209	2.88	24.07	96	6.80
	V6	3.05	11	192	2.75	23.81	97	6.80
	V7	2.91	12	181	2.71	22.46	93	5.15
	V8	3.99	3	240	3.09	26.70	96	9.05
	V9	3.72	5	225	3.01	27.41	97	6.85
	V10	3.86	4	233	3.05	27.19	97	7.25
	V11	3.19	10	202	2.79	23.23	97	7.20
	V12	-		-	-	-	-	
	V13	-		-	-	-	-	
	V14	2.59	15	161	2.57	25.61	100	5.20
	V15	2.82	13	176	2.67	20.88	100	5.00
	V16	2.67	14	169	2.60	21.71	93	5.10
	V17	-		-	-	-	-	
	V18	3.58	6	216	2.96	19.21	95	6.75
	C.D.(0.05)	0.42		25.7	0.22	0.26	1.59	
	C.V.(%)	10.5		10.54	6.44	0.92	1.43	
	Expt. Mean	3.45		209	2.89	24.63	96	
Soil type		-						
pH		-						
N - levels (kg/ha)								
	N1	0						
	N2	50						
	N3	100						
Recommended NPK (kg/ha)		100:50:50						
Varieties								
	V1	IET 31134						
	V2	IET 29579						
	V3	IET 31135						
	V4	IET 31120						
	V5	IET 31119						
	V6	IET 31118						
	V7	IET 31131						
	V8	IET 30269						
	V9	IET 31128						
	V10	IET 31124						
	V11	IET 31117						
	V12	-						
	V13	-						
	V14	Swarna						
	V15	Rasi						
	V16	Improved Samba Mahsuri						
	V17	-						
	V18	Local check - KJT - 7 (115-120 days)						
Available NPK (kg/ha)		-						

Table 4.1(i): Contd.

N-levels	Varieties	MANDYA						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% Flowering	Nitrogen. res. (kg grain/kg N) (Base level 0% RDN)
N1: No nitrogen (Control) (P and K is constant)	V1	4.49	18	266	3.05	18.86	96	
	V2	2.78	32	312	1.59	13.25	107	
	V3	4.90	10	264	3.83	25.08	90	
	V4	4.20	23	308	3.09	23.91	103	
	V5	4.89	11	277	3.49	26.35	96	
	V6	4.34	21	259	3.02	24.20	90	
	V7	4.48	20	237	3.17	21.95	85	
	V8	4.56	17	256	3.17	21.61	83	
	V9	4.49	18	260	3.63	26.46	98	
	V10	3.80	29	253	3.01	17.62	86	
	V11	4.69	15	260	3.30	27.25	90	
	V12	4.31	22	269	2.48	21.58	96	
	V13	3.95	27	263	3.24	25.25	95	
	V14	3.85	28	253	2.42	19.06	106	
	V15	3.61	30	267	1.93	22.16	83	
	V16	4.20	23	307	2.46	13.22	98	
	V17	-		-	-	-	-	
	V18	-		-	-	-	-	
N2: 50% of recommended N dose (P and K is constant)	V1	5.61	4	271	3.25	19.88	96	22.40
	V2	3.08	31	317	2.08	14.62	105	6.00
	V3	5.78	3	273	4.28	26.08	90	17.60
	V4	5.46	6	311	3.19	24.66	103	25.20
	V5	5.37	7	283	3.45	27.91	96	9.60
	V6	5.16	9	275	3.37	26.45	90	16.40
	V7	4.76	13	282	3.29	23.92	85	5.60
	V8	4.75	14	303	3.29	22.56	83	3.80
	V9	5.82	2	288	3.73	26.84	98	26.60
	V10	5.19	8	288	3.25	17.84	86	27.80
	V11	4.81	12	274	3.51	28.72	90	2.40
	V12	5.49	5	279	2.97	22.13	96	23.60
	V13	5.98	1	272	3.39	25.74	95	40.60
	V14	4.10	25	280	2.73	19.06	106	5.00
	V15	4.09	26	282	2.38	22.32	83	9.60
	V16	4.66	16	311	2.73	13.64	98	9.20
	V17	-		-	-	-	-	
	V18	-		-	-	-	-	
N3: 100% of recommended N dose	V1	-		-	-	-	-	
	V2	-		-	-	-	-	
	V3	-		-	-	-	-	
	V4	-		-	-	-	-	
	V5	-		-	-	-	-	
	V6	-		-	-	-	-	
	V7	-		-	-	-	-	
	V8	-		-	-	-	-	
	V9	-		-	-	-	-	
	V10	-		-	-	-	-	
	V11	-		-	-	-	-	
	V12	-		-	-	-	-	
	V13	-		-	-	-	-	
	V14	-		-	-	-	-	
	V15	-		-	-	-	-	
	V16	-		-	-	-	-	
	V17	-		-	-	-	-	
	V18	-		-	-	-	-	

Table 4.1(i): Contd.

N-levels	Varieties	MANDYA						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% Flowering	Nitrogen. res. (kg grain/kg N) (Base level 0% RDN)
Interaction	N at same V	0.62		NS	NS	NS	NS	
	V at same N	0.53		NS	NS	NS	NS	
	N1	4.22	2	268	3.12	22.41	93	
	N2	5.01	1	288	3.34	23.59	93	15.71
	N3	-		-	-	-	-	
	C.D.(0.05)	0.44		10.01	NS	NS	NS	
	C.V.(%)	10.84		4.1	18.67	5.61	0.78	
Mean of varieties:								
	V1	5.05	4	268	3.15	19.37	96	22.40
	V2	2.93	16	314	1.84	13.94	106	6.00
	V3	5.34	1	268	4.06	25.58	90	17.60
	V4	4.83	7	309	3.14	24.29	103	25.20
	V5	5.13	3	280	3.47	27.13	96	9.60
	V6	4.75	8	267	3.20	25.33	90	16.40
	V7	4.62	11	259	3.23	22.94	85	5.60
	V8	4.66	10	279	3.23	22.09	83	3.80
	V9	5.16	2	274	3.68	26.65	98	26.60
	V10	4.50	12	270	3.13	17.73	86	27.80
	V11	4.75	8	267	3.41	27.99	90	2.40
	V12	4.90	6	274	2.73	21.86	96	23.60
	V13	4.97	5	267	3.32	25.50	95	40.60
	V14	3.98	14	266	2.58	19.06	106	5.00
	V15	3.85	15	274	2.16	22.24	83	9.60
	V16	4.43	13	309	2.60	13.43	98	9.20
	V17	-		-	-	-	-	
	V18	-		-	-	-	-	
	C.D.(0.05)	0.38		26.36	0.41	1.16	0.51	
	C.V.(%)	7.1		8.21	11.63	4.54	0.47	
	Expt. Mean	4.61		278	3.06	22.19	94	
Soil type		Red sandy loam						
pH		8.01						
N - levels (kg/ha)								
	N1	0						
	N2	50						
	N3	100						
Recommended NPK (kg/ha)		100:50:50						
Varieties								
	V1	IET 31134						
	V2	IET 29579						
	V3	IET 31135						
	V4	IET 31120						
	V5	IET 31119						
	V6	IET 31118						
	V7	IET 31131						
	V8	IET 30269						
	V9	IET 31128						
	V10	IET 31124						
	V11	IET 31117						
	V12	IET 29581						
	V13	IET 31004						
	V14	Swarna						
	V15	Rasi						
	V16	Improved Samba Mahsuri						
	V17	-						
	V18	-						
Available NPK (kg/ha)		286.2:83.5:254						

Table 4.1(i): Contd.

N-levels	Varieties	MARUTERU						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% Flowering	Nitrogen. res. (kg grain/kg N) (Base level 0% RDN)
N1: No nitrogen (Control) (P and K is constant)	V1	3.55	36	267	40.13	17.49	98	
	V2	3.66	33	265	24.40	13.55	98	
	V3	5.23	13	249	31.73	24.27	98	
	V4	6.55	2	269	42.20	24.21	100	
	V5	4.48	22	250	41.93	24.59	97	
	V6	2.75	42	261	33.63	20.90	87	
	V7	3.22	40	118	25.90	24.88	100	
	V8	5.22	14	230	29.70	17.99	98	
	V9	4.89	19	227	33.83	23.64	87	
	V10	5.63	8	266	37.03	15.63	87	
	V11	4.32	25	249	32.60	20.68	97	
	V12	3.54	37	190	32.57	23.51	98	
	V13	-		-	-	-	-	
	V14	5.43	10	255	34.27	18.52	102	
	V15	2.43	45	164	11.13	16.73	97	
	V16	3.63	34	249	31.30	15.41	103	
	V17	-		-	-	-	-	
	V18	-		-	-	-	-	
N2: 50% of recommended N dose (P and K is constant)	V1	5.54	9	278	31.10	17.50	97	44.22
	V2	4.23	27	285	29.60	13.57	98	12.67
	V3	5.31	12	291	32.03	24.37	98	1.78
	V4	6.33	5	292	40.83	24.57	99	-4.89
	V5	5.03	17	264	32.70	24.47	100	12.22
	V6	3.28	39	273	32.10	20.71	98	11.78
	V7	3.08	41	139	21.43	24.47	103	-3.11
	V8	4.23	27	236	32.40	18.40	90	-22.00
	V9	4.50	21	255	35.20	23.27	102	-8.67
	V10	6.73	1	292	39.37	15.92	84	24.44
	V11	4.22	29	253	33.97	21.30	101	-2.22
	V12	3.95	30	218	31.87	23.20	99	9.11
	V13	-		-	-	-	-	
	V14	5.17	16	271	31.67	18.37	104	-5.78
	V15	2.60	43	156	17.83	16.34	99	3.78
	V16	3.56	35	252	31.93	15.33	105	-1.56
	V17	-		-	-	-	-	
	V18	-		-	-	-	-	
N3: 100% of recommended N dose	V1	5.00	18	330	31.27	18.30	99	16.11
	V2	3.85	31	289	30.10	14.33	99	2.11
	V3	6.03	7	275	31.13	24.20	100	8.89
	V4	6.52	3	353	42.20	24.35	103	-0.33
	V5	6.04	6	261	39.53	24.25	103	17.33
	V6	3.48	38	254	30.67	21.20	99	8.11
	V7	3.73	32	177	32.23	24.87	107	5.67
	V8	4.40	24	269	32.30	19.25	98	-9.11
	V9	5.21	15	305	32.50	23.63	98	3.56
	V10	6.49	4	328	41.10	16.30	84	9.56
	V11	4.51	20	277	29.37	21.53	104	2.11
	V12	4.42	23	260	23.37	23.28	98	9.78
	V13	-		-	-	-	-	
	V14	5.33	11	323	34.00	19.53	107	-1.11
	V15	2.57	44	170	16.90	17.07	98	1.56
	V16	4.31	26	290	30.67	15.37	108	7.56
	V17	-		-	-	-	-	
	V18	-		-	-	-	-	

Table 4.1(i): Contd.

N- levels	Varieties	MARUTERU						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% Flowering	Nitrogen. res. (kg grain/kg N) (Base level 0% RDN)
Table 4.11 (v). Contd.	Interaction							
	N at same V	0.44		33.54	2.62	0.61	2.2	
	V at same N	0.43		38.31	2.55	0.56	2.01	
	N1	4.30	3	234	32.16	20.13	97	
	N2	4.52	2	250	31.60	20.12	98	4.31
	N3	4.79	1	277	31.82	20.50	100	4.91
	C.D.(0.05)	0.18		25.76	NS	NS	1.31	
	C.V.(%)	6.73		17.33	5.9	3.06	2.28	
	Mean of varieties:							
	V1	4.70	7	292	34.17	17.76	98	30.17
	V2	3.91	11	280	28.03	13.82	98	7.39
	V3	5.52	3	272	31.63	24.28	99	5.33
	V4	6.47	1	305	41.74	24.38	101	-2.61
	V5	5.18	5	258	38.05	24.44	100	14.78
	V6	3.17	14	263	32.13	20.94	95	9.94
	V7	3.34	13	145	26.52	24.74	104	1.28
	V8	4.62	8	245	31.47	18.55	95	-15.56
	V9	4.87	6	262	33.84	23.51	96	-2.56
	V10	6.28	2	296	39.17	15.95	85	17.00
	V11	4.35	9	260	31.98	21.17	101	-0.06
	V12	3.97	10	223	29.27	23.33	98	9.44
	V13	-		-	-	-	-	
	V14	5.31	4	283	33.31	18.81	104	-3.44
	V15	2.53	15	164	15.29	16.71	98	2.67
	V16	3.83	12	264	31.30	15.37	106	3.00
	V17	-		-	-	-	-	
	V18	-		-	-	-	-	
	C.D.(0.05)	5.31		283.11	33.31	18.81	104.44	
	C.V.(%)	2.53		163.55	15.29	16.71	97.89	
	Expt. Mean	4.54		254	31.86	20.25	98	
Soil type	-							
pH	5.80							
N - levels (kg/ha)								
N1	0							
N2	45							
N3	90							
Recommended NPK (kg/ha)	90:60:60							
Varieties								
V1	IET 31134							
V2	IET 29579							
V3	IET 31135							
V4	IET 31120							
V5	IET 31119							
V6	IET 31118							
V7	IET 31131							
V8	IET 30269							
V9	IET 31128							
V10	IET 31124							
V11	IET 31117							
V12	IET 29581							
V13	-							
V14	Swarna							
V15	Rasi							
V16	Improved Samba Mahsuri							
V17	-							
V18	-							
Available NPK (kg/ha)	119:14.3:273							

Table 4.1(i): Contd.

N-levels	Varieties	RAIPUR						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% Flowering	Nitrogen. res. (kg grain/kg N) (Base level 0% RDN)
N1: No nitrogen (Control) (P and K is constant)	V1	3.74	39	190	2.32	17.23	84	
	V2	3.56	43	246	1.98	14.93	91	
	V3	3.71	41	188	3.50	25.20	85	
	V4	3.99	36	182	2.72	22.43	95	
	V5	4.01	34	159	2.85	23.90	76	
	V6	3.30	46	170	2.47	22.80	80	
	V7	3.24	48	161	3.01	20.63	83	
	V8	3.54	44	169	2.79	21.06	85	
	V9	3.76	38	192	2.28	25.50	84	
	V10	3.90	37	255	2.47	16.57	81	
	V11	3.25	47	159	2.26	24.17	87	
	V12	3.24	48	180	2.16	20.93	86	
	V13	3.68		171	3.46	25.20	95	
	V14	4.01	34	200	3.17	17.13	96	
	V15	2.26	51	177	1.79	19.47	72	
	V16	3.36	45	230	1.74	13.97	97	
	V17	-		-	-	-	-	
	V18	3.74		212	1.97	15.70	96	
N2: 50% of recommended N dose (P and K is constant)	V1	4.80	26	225	3.13	18.57	84	21.20
	V2	5.23	18	290	2.32	15.63	91	33.40
	V3	5.82	15	243	4.14	26.60	85	42.20
	V4	5.02	23	209	3.87	24.37	95	20.60
	V5	4.52	29	214	3.41	26.57	77	10.20
	V6	4.25	32	209	3.10	24.87	81	19.00
	V7	4.62	28	187	3.43	22.33	85	27.60
	V8	4.84	24	212	3.64	21.52	85	26.00
	V9	5.23	18	245	2.97	26.27	85	29.40
	V10	5.14	22	271	3.50	18.33	81	24.80
	V11	4.48	30	209	3.56	26.17	86	24.60
	V12	5.20	20	208	3.12	22.63	89	39.20
	V13	4.83		233	4.04	26.13	94	23.00
	V14	5.53	17	251	3.83	18.90	97	30.40
	V15	2.74	50	199	2.37	23.63	73	9.60
	V16	4.25	32	270	2.18	15.07	95	17.80
	V17	-		-	-	-	-	
	V18	4.36		233	2.42	18.17	96	12.40
N3: 100% of recommended N dose	V1	6.22	11	261	3.69	19.23	84	24.80
	V2	6.93	3	330	3.13	16.43	91	33.70
	V3	7.18	1	292	4.88	28.20	84	34.70
	V4	6.26	9	249	4.43	25.83	95	22.70
	V5	6.07	13	231	4.58	27.20	80	20.60
	V6	6.22	11	237	3.73	25.40	80	29.20
	V7	5.88	14	238	4.34	24.20	82	26.40
	V8	6.49	7	261	4.48	23.09	86	29.50
	V9	6.48	8	283	4.18	28.17	85	27.20
	V10	6.82	4	341	4.06	19.13	83	29.20
	V11	6.57	6	249	4.36	26.93	86	33.20
	V12	6.24	10	255	3.96	24.17	88	30.00
	V13	7.16		208	4.72	27.27	95	34.80
	V14	6.67	5	304	4.57	22.23	96	26.60
	V15	4.72	27	279	3.20	24.63	72	24.60
	V16	5.55	16	338	2.88	16.47	96	21.90
	V17	-		-	-	-	-	
	V18	5.20		297	3.25	20.23	97	14.60

Table 4.1(i): Contd.

N-levels	Varieties	RAIPUR						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% Flowering	Nitrogen. res. (kg grain/kg N) (Base level 0% RDN)
	Interaction	NS		NS	NS	1.35	1.08	
	<i>N at same V</i>	NS		NS	NS	1.37	1.08	
	<i>V at same N</i>							
	N1	3.64	3	188	2.60	21.31	85	
	N2	4.90	2	229	3.37	22.84	85	25.36
	N3	6.47	1	270	4.17	23.98	85	28.29
	C.D.(0.05)	0.31		15.27	0.24	0.27	NS	
	C.V.(%)	11.78		12	13.56	2.25	0.72	
	Mean of varieties:							
	V1	4.92	9	225	3.05	18.34	84	23.00
	V2	5.24	4	289	2.48	15.66	91	33.55
	V3	5.57	1	241	4.17	26.67	84	38.45
	V4	5.09	7	214	3.67	24.21	95	21.65
	V5	4.87	11	201	3.61	25.89	77	15.40
	V6	4.59	13	205	3.10	24.36	80	24.10
	V7	4.58	14	195	3.59	22.39	83	27.00
	V8	4.96	8	214	3.64	21.89	86	27.75
	V9	5.16	6	240	3.14	26.65	85	28.30
	V10	5.29	3	289	3.34	18.01	81	27.00
	V11	4.77	12	206	3.39	25.76	86	28.90
	V12	4.89	10	214	3.08	22.58	88	34.60
	V13	5.22	5	204	4.07	26.20	95	28.90
	V14	5.40	2	252	3.86	19.42	96	28.50
	V15	3.24	17	218	2.45	22.58	72	17.10
	V16	4.39	16	279	2.27	15.17	96	19.85
	V17	-		-	-	-	-	
	V18	4.43	15	247	2.55	18.03	96	13.50
	C.D.(0.05)	0.47		21.93	0.32	0.79	0.62	
	C.V.(%)	10.32		10.13	10.37	3.84	0.76	
	Expt. Mean	4.86		231	3.26	21.99	87	
	Soil type	Vertisol						
	pH	7.00						
	N - levels (kg/ha)							
	N1	0						
	N2	50						
	N3	100						
	Recommended NPK (kg/ha)	100:60:40						
	Varieties							
	V1	IET 31134						
	V2	IET 29579						
	V3	IET 31135						
	V4	IET 31120						
	V5	IET 31119						
	V6	IET 31118						
	V7	IET 31131						
	V8	IET 30269						
	V9	IET 31128						
	V10	IET 31124						
	V11	IET 31117						
	V12	IET 29581						
	V13	IET 31004						
	V14	Swarna						
	V15	Rasi						
	V16	Improved Samba Mahsuri						
	V17	-						
	V18	Local check - CG Devbhog(135 days)						
	Available NPK (kg/ha)	153.5:18.3:328.5						

Table 4.1(i): Contd.

N-levels	Varieties	RANCHI					
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Test wt (g)	Days for 50% Flowering	Nitrogen. res. (kg grain/kg N) (Base level 0% RDN)
N1: No nitrogen (Control) (P and K is constant)	V1	1.87	26	177	23.70	101	
	V2	1.98	24	156	20.70	104	
	V3	1.73	29	164	21.40	99	
	V4	2.05	23	193	25.60	103	
	V5	1.53	31	145	19.23	98	
	V6	1.47	32	137	18.60	103	
	V7	1.92	25	181	23.80	105	
	V8	1.69	30	138	21.10	113	
	V9	1.46	33	135	18.40	100	
	V10	1.81	27	171	22.90	107	
	V11	-		-	-	-	
	V12	-		-	-	-	
	V13	-		-	-	-	
	V14	1.75	28	165	22.00	112	
	V15	-		-	-	-	
	V16	-		-	-	-	
	V17	-		-	-	-	
	V18	-		-	-	-	
N2: 50% of recommended N dose (P and K is constant)	V1	3.96	16	241	25.30	103	34.83
	V2	3.58	20	217	24.94	105	26.67
	V3	4.02	13	245	25.70	102	38.17
	V4	4.21	10	256	26.10	106	36.00
	V5	3.58	20	218	22.50	100	34.17
	V6	3.93	17	238	25.10	105	41.00
	V7	4.25	9	257	26.70	108	38.83
	V8	3.83	19	232	23.70	111	35.67
	V9	3.36	22	204	21.10	101	31.67
	V10	4.09	12	248	26.13	110	38.00
	V11	-		-	-	-	
	V12	-		-	-	-	
	V13	-		-	-	-	
	V14	4.02	13	261	24.90	114	37.83
	V15	-		-	-	-	
	V16	-		-	-	-	
	V17	-		-	-	-	
	V18	-		-	-	-	
N3: 100% of recommended N dose	V1	4.35	6	263	25.66	105	20.67
	V2	4.02	13	243	23.31	106	17.00
	V3	4.47	4	272	25.47	105	22.83
	V4	4.63	1	281	27.78	109	21.50
	V5	4.11	11	250	23.83	104	21.50
	V6	4.34	8	263	26.04	110	23.92
	V7	4.61	2	281	27.20	78	22.42
	V8	4.35	6	262	24.79	114	22.17
	V9	3.89	18	236	22.56	103	20.25
	V10	4.42	5	268	26.07	114	21.75
	V11	-		-	-	-	
	V12	-		-	-	-	
	V13	-		-	-	-	
	V14	4.53	3	274	27.18	117	23.17
	V15	-		-	-	-	
	V16	-		-	-	-	
	V17	-		-	-	-	
	V18	-		-	-	-	

Table 4.1(i): Contd.

N- levels	Varieties	RANCHI					
		Grain Yield (t/ha)	<i>Rank</i>	Panicle/m ² (No.)	Test wt (g)	Days for 50% Flowering	Nitrogen. res. (kg grain/kg N) (Base level 0% RDN)
Interaction							
<i>N at same V</i>		NS		NS	NS	NS	
<i>V at same N</i>		NS		NS	NS	NS	
	N1	1.75	3	160	21.54	103	
	N2	3.88	2	236	24.73	105	35.50
	N3	4.32	1	262	25.27	105	21.40
	C.D.(0.05)	0.18		10.81	0.43	NS	
	C.V.(%)	7.87		7.18	2.63	9.59	
Mean of varieties:							
	V1	3.39	6	227	24.89	103	27.75
	V2	3.19	9	205	22.98	105	21.83
	V3	3.41	5	227	24.19	102	30.50
	V4	3.63	1	243	26.49	106	28.75
	V5	3.07	10	204	21.85	101	27.83
	V6	3.25	8	213	23.25	106	32.46
	V7	3.59	2	240	25.90	97	30.63
	V8	3.29	7	211	23.20	113	28.92
	V9	2.90	11	192	20.69	102	25.96
	V10	3.44	3	229	25.03	110	29.88
	V11	-		-	-	-	
	V12	-		-	-	-	
	V13	-		-	-	-	
	V14	3.43	4	233	24.69	114	30.50
	V15	-		-	-	-	
	V16	-		-	-	-	
	V17	-		-	-	-	
	V18	-		-	-	-	
	C.D.(0.05)	0.39		19.8	1.93	9.66	
	C.V.(%)	12.44		9.53	8.58	9.72	
	Expt. Mean	3.33		220	23.92	105	
Soil type		Clay loam					
pH		6.3					
N - levels (kg/ha)							
	N1	0					
	N2	60					
	N3	120					
Recommended NPK (kg/ha)		120:60:40					
Varieties							
	V1	IET 31134					
	V2	IET 29579					
	V3	IET 31135					
	V4	IET 31120					
	V5	IET 31119					
	V6	IET 31118					
	V7	IET 31131					
	V8	IET 30269					
	V9	IET 31128					
	V10	IET 31124					
	V11	-					
	V12	-					
	V13	-					
	V14	Swarna					
	V15	-					
	V16	-					
	V17	-					
	V18	-					
Available NPK (kg/ha)		225:34.20:157					

Table 4.1(i): Contd.

N-levels	Varieties	VARANASI							Mean Grain Yield (t/ha)	Rank
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% Flowering	Nitrogen. res. (kg grain/kg N) (Base level 0% RDN)		
N1: No nitrogen (Control) (P and K is constant)	V1	-		-	-	-	-		3.31	41
	V2	-		-	-	-	-		2.70	49
	V3	-		-	-	-	-		3.66	27
	V4	-		-	-	-	-		3.62	29
	V5	-		-	-	-	-		3.37	37
	V6	-		-	-	-	-		2.65	50
	V7	-		-	-	-	-		2.97	47
	V8	-		-	-	-	-		3.43	35
	V9	-		-	-	-	-		3.34	39
	V10	-		-	-	-	-		3.49	34
	V11	-		-	-	-	-		3.25	42
	V12	-		-	-	-	-		3.12	44
	V13	-		-	-	-	-		3.37	36
	V14	-		-	-	-	-		3.15	43
	V15	-		-	-	-	-		2.39	52
	V16	-		-	-	-	-		2.97	45
	V17	-		-	-	-	-		1.48	54
	V18	-		-	-	-	-		2.78	48
N2: 50% of recommended N dose (P and K is constant)	V1	3.50	29	123	25.83	16.24	94		4.40	13
	V2	3.82	24	136	21.23	15.27	103		3.51	33
	V3	3.66	26	146	25.67	26.02	92		4.54	10
	V4	2.54	34	139	26.73	22.17	104		4.13	17
	V5	2.93	32	162	22.01	26.84	105		3.96	26
	V6	4.03	18	182	22.08	22.91	85		3.57	31
	V7	2.74	33	138	28.69	24.84	80		3.64	28
	V8	4.15	17	138	23.09	22.15	85		4.00	24
	V9	3.59	28	154	23.56	23.85	107		4.10	20
	V10	4.58	12	155	25.10	19.97	90		4.63	8
	V11	3.64	27	161	22.50	26.77	88		3.62	30
	V12	3.26	31	135	21.93	22.11	101		4.03	23
	V13	3.83	23	165	22.71	28.24	102		4.68	7
	V14	4.94	9	186	21.45	19.05	105		4.07	21
	V15	4.30	16	179	21.36	21.53	71		2.97	46
	V16	3.37	30	163	19.85	12.87	106		3.35	38
	V17	-		-	-	-	-		2.07	53
	V18	4.00	19	150	19.78	14.14	105		3.53	32
N3: 100% of recommended N dose	V1	5.23	7	152	23.52	18.02	103	28.83	4.93	4
	V2	4.68	10	168	16.97	14.51	104	14.33	4.13	18
	V3	5.41	5	166	23.78	26.71	106	29.17	5.23	2
	V4	4.48	14	171	19.79	18.85	105	32.33	4.70	6
	V5	3.81	25	168	20.67	28.76	106	14.67	4.52	11
	V6	5.43	4	188	24.06	24.60	106	23.33	4.13	19
	V7	3.98	20	188	30.57	20.62	106	20.67	4.14	16
	V8	4.56	13	169	30.49	24.59	106	6.83	4.49	12
	V9	5.41	5	179	26.75	25.41	107	30.33	4.70	5
	V10	5.69	2	228	23.59	16.89	102	18.50	5.18	3
	V11	3.98	20	218	23.13	28.20	103	5.67	4.05	22
	V12	3.88	22	226	22.44	23.83	102	10.33	4.25	15
	V13	5.47	3	170	23.88	24.74	104	27.33	5.63	1
	V14	5.83	1	172	25.51	18.86	107	14.83	4.55	9
	V15	4.59	11	165	16.08	21.70	71	4.83	3.32	40
	V16	5.17	8	178	20.57	12.31	107	30.00	3.97	25
	V17	-		-	-	-	-		2.49	51
	V18	4.47	15	167	15.15	18.66	106	7.83	4.29	14

Table 4.1(i): Contd.

N- levels	Varieties	VARANASI							Mean Grain Yield (t/ha)	Rank
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% Flowering	Nitrogen. res. (kg grain/kg N) (Base level 0% RDN)		
Table 4.1(v). Contd.	Interaction									
	N at same V	0.33		25.25	1.11	1.64	0.96			
	V at same N	0.34		24.8	1.07	1.23	0.94			
	N1	-		-	-	-	-		3.13	3
	N2	3.56	2	149	24.23	22.46	94		3.94	2
	N3	4.79	1	181	23.94	22.47	105	20.42	4.48	1
	C.D.(0.05)	0.07		4.99	NS	NS	0.39			
	C.V.(%)	1.87		3.5	2.57	7.9	0.46			
	Mean of varieties:									
	V1	4.37	8	138	24.68	17.13	99	28.83	4.27	4
	V2	4.25	11	152	19.10	14.89	104	14.33	3.46	16
	V3	4.54	5	156	24.73	26.37	99	29.17	4.52	2
	V4	3.51	15	155	23.26	20.51	105	32.33	4.15	5
	V5	3.37	16	165	21.34	27.80	106	14.67	3.98	9
	V6	4.73	3	185	23.07	23.76	96	23.33	3.58	14
	V7	3.36	17	163	29.63	22.73	93	20.67	3.62	13
	V8	4.36	9	154	26.79	23.37	96	6.83	4.02	7
	V9	4.50	6	166	25.16	24.63	107	30.33	4.12	6
	V10	5.14	2	192	24.35	18.43	96	18.50	4.48	3
	V11	3.81	13	190	22.82	27.49	96	5.67	3.71	11
	V12	3.57	14	180	22.19	22.97	101	10.33	3.87	10
	V13	4.65	4	168	23.30	26.49	103	27.33	4.61	1
	V14	5.39	1	179	23.48	18.96	106	14.83	4.00	8
	V15	4.45	7	172	18.72	21.62	71	4.83	3.04	17
	V16	4.27	10	171	20.21	12.59	107	30.00	3.53	15
	V17	-		-	-	-	-		2.01	18
	V18	4.24	12	159	17.47	16.40	106	7.83	3.65	12
	C.D.(0.05)	0.24		17.85	0.76	0.87	0.66			
	C.V.(%)	4.87		9.25	2.86	3.5	0.58			
	Expt. Mean	4.26		167	22.96	21.54	99		3.90	
	Soil type	-								
	pH	7.3								
	N - levels (kg/ha)									
N1	0									
N2	60									
N3	120									
Recommended NPK (kg/ha)	120:60:40									
Varieties										
V1	IET 31134									
V2	IET 29579									
V3	IET 31135									
V4	IET 31120									
V5	IET 31119									
V6	IET 31118									
V7	IET 31131									
V8	IET 30269									
V9	IET 31128									
V10	IET 31124									
V11	IET 31117									
V12	IET 29581									
V13	IET 31004									
V14	Swarna									
V15	Rasi									
V16	Improved Samba Mahsuri									
V17	-									
V18	Local check - HUR 917									
Available NPK (kg/ha)	-									

4.1(j) AVT 2 – NIL (Second Set)

Fifteen AVT-2 NIL entries (IET 32055, IET 32059, IET 32060, IET 32063, IET 32056, IET 32062, IET 32054, IET 32061, IET 32058, IET 32051, IET 32074, IET 32064, IET 32065, IET 32052 and IET 32053) were evaluated for its response to graded nitrogen levels on grain yield and yield attributes at ten locations i.e. **Coimbatore (150:50:50), Dhangain (120:60:40), Karjat (100:50:50), Ludhiana (105:30:30), Mandya (100:50:50), Maruteru (90:60:60) Nawagam (100:25:0) and Pantnagar (120:60:40), Raipur (100:60:40) and Rewa (80:40:30)** under two levels of RDF (50% and 100% RDF). The details and data received from these locations are summarized and presented in Table 4.1(j).

Application of nutrients significantly influenced the grain yield at all locations except **Maruteru** and the maximum grain yield was recorded at all the locations with 100% RDF with average increase of 20% over 50% RDF. Application of 100% RDF recorded higher grain yields at **Coimbatore (4.92 t/ha), Karjat (3.98 t/ha), Ludhiana (3.03 t/ha), Mandya (5.05 t/ha), Nawagam (5.03 t/ha), Pantnagar (5.11 t/ha), Raipur (4.26 t/ha) and Rewa (2.00 t/ha)**. Higher nutrient response (kg grain/kg nutrient) was recorded with 100% RDF over 50% RDF at **Raipur (12.86), Ludhiana (10.98), Coimbatore (10.82), and Karjat (8.56)**.

Grain yield differences among the tested cultures were found to be significant at all the locations. Significantly higher mean maximum grain yield was recorded by IET 32074 (5.20 t/ha) at **Coimbatore, Ludhiana (4.54 t/ha), Panthnagar (5.57 t/ha)** and comparable with IET 32054 (5.62 t/ha). IET 32059 (6.50 t/ha) at **Dhangain**; IET 32064 (4.59 t/ha) at **Karjat**, IET 32051 (6.29 t/ha) at **Mandya**, IET 32055 (6.09 t/ha) at **Maruteru** and **Raipur (3.89 t/ha)**, IET 32054 (5.59 t/ha) is comparable with local check GAR – 13 (5.60 t/ha) and IET 32060 (2.74 t/ha) at **Rewa** found promising Interaction effects among RDF x varieties was found to be non-significant at all the location except **Coimbatore** and **Panthnagar**. Mean over the locations the performance of IET 32074 (4.4 t/ha), followed by IET 32051 (4.34 t/ha) and IET 32054 (4.29 t/ha) were promising over other cultures, across the location.

In this trial, 100% RDF was found to be promising with 20 % increased grain yield and also exhibited higher nutrient recovery efficiency. IET cultures were found to be promising in terms of higher grain yield at most of the locations however IET 32074, IET 32051 and IET 32054 were found promising and recorded better mean yields.

Table 4.1(j): Summary of data on grain yield and ancillary characters of selected AVT NIL cultures grown under transplanted conditions at graded levels of recommended N fertilizer doses, kharif 2024.

F-levels	Varieties	COIMBATORE					DHANGAIN						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Test wt (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)	Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: Low input (50% NPK)	V1	3.22	24	216.3	18.10		4.85	22	286	3.24	19.00	109	
	V2	4.12	19	245	20.17		5.82	7	316	4.71	17.87	101	
	V3	4.24	18	272	18.07		4.15	28	249	2.92	19.87	100	
	V4	3.17	27	212	19.20		4.66	24	269	3.20	16.73	100	
	V5	3.32	22	233.7	17.10		4.91	20	291	3.29	16.27	111	
	V6	3.22	24	228.3	18.10		5.51	12	307	3.63	20.93	95	
	V7	3.22	24	218.3	17.17		4.95	19	301	3.45	18.60	100	
	V8	3.57	21	265	16.33		4.65	25	266	3.20	19.07	104	
	V9	3.12	28	222	16.10		4.07	29	242	2.86	19.53	103	
	V10	4.06	20	238.7	25.10		5.66	10	312	3.76	26.60	102	
	V11	4.44	13	288.7	21.10		4.54	26	253	3.10	22.33	103	
	V12	3.28	23	225	21.27		4.43	27	251	2.92	20.80	105	
	V13	3.06	29	209.7	19.47		4.01	30	240	2.85	18.87	104	
	V14	4.37	15	287.3	16.43		2.25	32	240	2.59	14.20	112	
	V15	3.05	30	204.7	24.03		5.02	18	313	3.50	23.60	101	
	V16	-		-	-		5.18	16	305	3.55	21.07	104	
F2: Medium input (100% NPK)	V1	4.56	11	249.3	18.43	10.72	5.72	9	287	3.35	20.00	110	7.91
	V2	5.27	4	290	20.43	9.20	7.18	1	321	4.78	18.80	102	12.36
	V3	5.76	3	316.3	18.43	12.16	5.13	17	272	3.06	20.60	101	8.91
	V4	4.53	12	248	19.37	10.88	5.62	11	286	3.34	17.13	102	8.73
	V5	4.78	7	279.3	17.43	11.68	5.75	8	294	3.39	17.87	111	7.64
	V6	4.62	9	273.3	18.50	11.20	6.70	3	312	3.69	21.80	96	10.82
	V7	4.43	14	255.3	17.57	9.68	5.84	6	291	3.48	18.80	101	8.09
	V8	4.81	6	294.3	16.67	9.92	5.46	13	281	3.30	20.07	105	7.36
	V9	4.58	10	259.3	16.53	11.68	4.87	21	271	3.04	20.47	104	7.27
	V10	5.21	5	282.7	25.43	9.20	6.79	2	313	3.84	26.93	103	10.27
	V11	5.95	1	340	21.53	12.08	5.35	14	279	3.18	22.40	104	7.36
	V12	4.78	7	276.7	21.63	12.00	5.29	15	274	3.06	21.60	106	7.82
	V13	4.33	16	241.3	19.80	10.16	4.77	23	268	3.01	19.13	105	6.91
	V14	5.82	2	332	16.63	11.60	3.12	31	254	2.83	14.73	113	7.91
	V15	4.32	17	223.3	24.40	10.16	6.18	5	308	3.54	23.87	101	10.55
	V16	-		-	-		6.60	4	311	3.67	21.53	105	12.91
Interaction F at same V		0.06		7.69	NS		NS		NS	NS	NS	0.55	
V at same F		0.06		8.62	NS		NS		NS	NS	NS	0.47	
F1		3.56	2	238	19.18		4.67	2	277	3.30	19.71	103	
F2		4.92	1	277	19.52	10.82	5.65	1	289	3.41	20.36	104	8.93
C.D.(0.05)		0.02		5.6	0.1		0.3		NS	NS	NS	0.39	
C.V.(%)		0.57		2.4	0.58		6.63		5.13	5.71	4.04	0.43	

Table 4.1(j): Contd.

F- levels	Varieties	COIMBATORE					DHANGAIN						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Test wt (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)	Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties:													
	V1	3.89	10	233	18.3	10.72	5.29	8	287	3.3	19.5	110	7.91
	V2	4.70	4	268	20.3	9.20	6.50	1	319	4.7	18.3	101	12.36
	V3	5.00	3	294	18.3	12.16	4.64	13	261	3.0	20.2	100	8.91
	V4	3.85	11	230	19.3	10.88	5.14	9	277	3.3	16.9	101	8.73
	V5	4.05	7	257	17.3	11.68	5.33	7	293	3.3	17.1	111	7.64
	V6	3.92	9	251	18.3	11.20	6.11	3	310	3.7	21.4	95	10.82
	V7	3.83	13	237	17.4	9.68	5.40	6	296	3.5	18.7	100	8.09
	V8	4.19	6	280	16.5	9.92	5.06	10	274	3.3	19.6	104	7.36
	V9	3.85	11	241	16.3	11.68	4.47	14	257	3.0	20.0	103	7.27
	V10	4.64	5	261	25.3	9.20	6.23	2	312	3.8	26.8	102	10.27
	V11	5.20	1	314	21.3	12.08	4.95	11	266	3.1	22.4	104	7.36
	V12	4.03	8	251	21.5	12.00	4.86	12	262	3.0	21.2	105	7.82
	V13	3.70	14	226	19.6	10.16	4.39	15	254	2.9	19.0	105	6.91
	V14	5.10	2	310	16.5	11.60	2.69	16	247	2.7	14.5	113	7.91
	V15	3.69	15	214	24.2	10.16	5.60	5	310	3.5	23.7	101	10.55
	V16	-		-	-		5.89	4	308	3.6	21.3	104	12.91
	C.D.(0.05)	0.04		5.44	0.33		0.55		17.12	0.48	0.75	0.33	
	C.V.(%)	0.91		1.82	1.48		9.15		5.24	12.38	3.23	0.28	
	Expt. Mean	4.24		258	19.35		5.16		283	3.35	20.03	104	
	Soil type	-					Clay loam						
	pH	-					6.6						
F - levels (kg/ha)													
	F1	75:25:25					60:30:20						
	F2	150:50:50					120:60:40						
Recommended NPK (kg/ha)		150:50:50					120:60:40						
Varieties													
	V1	IET 32055					IET 32055						
	V2	IET 32059					IET 32059						
	V3	IET 32060					IET 32060						
	V4	IET 32063					IET 32063						
	V5	IET 32056					IET 32056						
	V6	IET 32062					IET 32062						
	V7	IET 32054					IET 32054						
	V8	IET 32061					IET 32061						
	V9	IET 32058					IET 32058						
	V10	IET 32051					IET 32051						
	V11	IET 32074					IET 32074						
	V12	IET 32064					IET 32064						
	V13	IET 32065					IET 32065						
	V14	IET 32052					IET 32052						
	V15	IET 32053					IET 32053						
	V16	-					Local check - Sabour Shree (135-140 days)						
Available NPK of soil (kg/ha)		237:24:438					347.5:48.3:262.2						

Table 4.1(j): Contd.

F-levels	Varieties	KARJAT						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: Low input (50% NPK)	V1	3.89	7	360	4.28	22.82	111	
	V2	2.82	20	294	3.43	20.69	103	
	V3	2.55	23	257	2.80	21.20	112	
	V4	2.45	24	257	2.74	19.19	105	
	V5	3.60	12	353	4.25	22.29	104	
	V6	2.64	22	287	2.87	22.28	102	
	V7	-		-	-	-	-	
	V8	2.66	21	290	3.33	22.60	102	
	V9	2.88	19	310	3.57	24.48	102	
	V10	3.38	17	323	3.80	26.87	102	
	V11	3.12	18	317	3.57	25.03	105	
	V12	3.98	5	363	4.82	26.16	102	
	V13	3.46	15	343	4.18	25.73	106	
	V14	-		-	-	-	-	
	V15	-		-	-	-	-	
	V16	-		-	-	-	-	
F2: Medium input (100% NPK)	V1	4.82	2	382	4.80	22.82	105	9.30
	V2	3.65	10	333	3.51	22.00	100	8.30
	V3	3.47	14	317	2.82	22.05	108	9.20
	V4	3.42	16	277	2.84	21.45	108	9.70
	V5	4.44	3	370	4.69	22.21	103	8.40
	V6	3.55	13	330	3.00	22.17	105	9.10
	V7	-		-	-	-	-	
	V8	3.62	11	333	3.44	22.61	106	9.60
	V9	3.71	9	343	3.74	23.23	101	8.30
	V10	3.94	6	356	3.90	28.29	110	5.60
	V11	3.75	8	353	3.75	23.55	104	6.30
	V12	5.20	1	383	4.99	25.14	102	12.20
	V13	4.13	4	366	4.27	23.97	104	6.70
	V14	-		-	-	-	-	
	V15	-		-	-	-	-	
	V16	-		-	-	-	-	
Interaction								
<i>F at same V</i>		NS		NS	NS	1	0.94	
<i>V at same F</i>		NS		NS	NS	1.03	0.97	
F1		3.12	2	313	3.64	23.28	104	
F2		3.98	1	345	3.81	23.29	104	8.56
C.D.(0.05)		0.21		19.25	0.09	NS	NS	
C.V.(%)		5.86		5.77	2.45	0.53	0.2	

Table 4.1(j): Contd.

F-levels	Varieties	KARJAT						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties:								
	V1	4.36	2	371	4.5	22.8	108	9.30
	V2	3.24	8	314	3.5	21.3	101	8.30
	V3	3.01	11	287	2.8	21.6	110	9.20
	V4	2.94	12	267	2.8	20.3	106	9.70
	V5	4.02	3	361	4.5	22.3	103	8.40
	V6	3.10	10	309	2.9	22.2	103	9.10
	V7	-		-	-	-	-	
	V8	3.14	9	312	3.4	22.6	104	9.60
	V9	3.30	7	327	3.7	23.9	101	8.30
	V10	3.66	5	340	3.9	27.6	106	5.60
	V11	3.44	6	335	3.7	24.3	104	6.30
	V12	4.59	1	373	4.9	25.7	102	12.20
	V13	3.80	4	355	4.2	24.9	105	6.70
	V14	-		-	-	-	-	
	V15	-		-	-	-	-	
	V16	-		-	-	-	-	
	C.D.(0.05)	0.7		21.38	0.23	0.73	0.68	
	C.V.(%)	16.95		5.58	5.35	2.7	0.56	
	Expt. Mean	3.55		329	3.72	23.28	104	
	Soil type	Clay loam						
	pH	6.6						
	F - levels (kg/ha)							
	F1	50:25:25						
	F2	105:50:50						
	Recommended NPK (kg/ha)	105:50:50						
	Varieties							
	V1	IET 32055						
	V2	IET 32059						
	V3	IET 32060						
	V4	IET 32063						
	V5	IET 32056						
	V6	IET 32062						
	V7	IET 32054						
	V8	IET 32061						
	V9	IET 32058						
	V10	IET 32051						
	V11	IET 32074						
	V12	IET 32064						
	V13	IET 32065						
	V14	IET 32052						
	V15	IET 32053						
	V16	Local check -						
	Available NPK of soil (kg/ha)	-						

Table 4.1(j): Contd.

F-levels	Varieties	LUDHIANA						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Plant height (cm)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: Low input (50% NPK)	V1	1.54	29	259	2.80	90.93	105	
	V2	1.33	30	300	2.59	88.60	111	
	V3	1.76	28	309	2.58	90.10	90	
	V4	1.77	27	311	3.50	88.50	91	
	V5	1.81	23	292	2.48	90.43	107	
	V6	1.80	24	275	2.97	90.60	101	
	V7	2.52	15	292	2.62	87.30	97	
	V8	1.98	21	296	2.70	83.28	112	
	V9	1.79	25	283	2.62	90.20	91	
	V10	3.70	3	314	2.39	85.63	104	
	V11	3.62	4	292	3.56	99.87	100	
	V12	1.85	22	303	3.30	90.97	105	
	V13	2.30	17	308	3.51	89.33	112	
	V14	2.24	19	259	1.97	85.45	112	
	V15	1.79	25	295	2.79	85.20	94	
	V16	-		-	-	-	-	
F2: Medium input (100% NPK)	V1	3.03	6	314	3.53	95.35	105	18.06
	V2	1.99	20	333	3.27	91.78	113	8.00
	V3	2.74	13	347	3.62	93.47	90	11.88
	V4	2.26	18	321	4.09	90.97	91	5.94
	V5	2.75	12	335	3.31	91.05	107	11.39
	V6	2.94	10	316	3.28	96.53	101	13.82
	V7	3.52	5	324	3.02	93.07	97	12.12
	V8	2.98	9	344	3.11	92.98	112	12.12
	V9	3.00	7	325	2.85	94.18	91	14.67
	V10	3.97	2	322	2.61	90.95	104	3.27
	V11	5.46	1	349	3.97	103.63	101	22.30
	V12	3.00	7	1370	3.67	84.48	106	13.94
	V13	2.84	11	341	4.10	96.07	113	6.55
	V14	2.56	14	264	2.23	88.97	114	3.88
	V15	2.35	16	296	3.07	90.98	94	6.79
	V16	-		-	-	-	-	
Interaction								
F at same V		NS		NS	NS	NS	NS	
V at same F		NS		NS	NS	NS	NS	
F1		2.12	2	292	2.83	89.09	102	
F2		3.03	1	393	3.32	92.96	103	10.98
C.D.(0.05)		0.58		NS	0.05	1.94	NS	
C.V.(%)		24.94		98.05	1.71	2.35	1.35	

Table 4.1(j): Contd.

F-levels	Varieties	LUDHIANA						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties:								
	V1	2.29	10	286	3.2	93.1	105	18.06
	V2	1.66	15	317	2.9	90.2	112	8.00
	V3	2.25	12	328	3.1	91.8	90	11.88
	V4	2.02	14	316	3.8	89.7	91	5.94
	V5	2.28	11	313	2.9	90.7	107	11.39
	V6	2.37	9	296	3.1	93.6	101	13.82
	V7	3.02	3	308	2.8	90.2	97	12.12
	V8	2.48	5	320	2.9	88.1	112	12.12
	V9	2.40	8	304	2.7	92.2	91	14.67
	V10	3.84	2	318	2.5	88.3	104	3.27
	V11	4.54	1	320	3.8	101.8	101	22.30
	V12	2.43	6	836	3.5	87.7	106	13.94
	V13	2.57	4	325	3.8	92.7	113	6.55
	V14	2.40	7	261	2.1	87.2	113	3.88
	V15	2.07	13	296	2.9	88.1	94	6.79
	V16	-		-	-	-	-	
	C.D.(0.05)	0.5		NS	0.3	5.2	1.31	
	C.V.(%)	16.68		97.09	8.46	4.94	1.11	
	Expt. Mean	2.57		343	3.07	91.03	102	
	Soil type	Loam						
	pH	7.9						
	F - levels (kg/ha)							
	F1	52.5:15:15						
	F2	105:30:30						
	Recommended NPK (kg/ha)	105:30:30						
	Varieties							
	V1	IET 32055						
	V2	IET 32059						
	V3	IET 32060						
	V4	IET 32063						
	V5	IET 32056						
	V6	IET 32062						
	V7	IET 32054						
	V8	IET 32061						
	V9	IET 32058						
	V10	IET 32051						
	V11	IET 32074						
	V12	IET 32064						
	V13	IET 32065						
	V14	IET 32052						
	V15	IET 32053						
	V16	Local check -						
	Available NPK of soil (kg/ha)	295:22.1;185						

Table 4.1(j): Contd.

F-levels	Varieties	MANDYA						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: Low input (50% NPK)	V1	4.72	17	304	2.88	17.54	95	
	V2	3.84	27	358	2.60	19.62	110	
	V3	3.05	29	323	3.06	19.39	89	
	V4	2.86	30	328	2.75	18.91	89	
	V5	4.05	23	304	3.24	18.03	94	
	V6	5.03	14	325	3.77	20.85	96	
	V7	5.31	11	337	3.34	18.54	96	
	V8	3.95	25	362	2.45	16.62	111	
	V9	4.01	24	343	2.51	18.04	88	
	V10	5.38	9	289	5.11	30.07	105	
	V11	4.32	21	301	5.01	23.66	93	
	V12	5.46	7	320	3.71	21.43	96	
	V13	5.40	8	300	3.54	20.39	112	
	V14	5.38	9	320	4.01	14.32	100	
	V15	5.21	13	280	4.18	25.96	94	
	V16	-		-	-	-	-	
F2: Medium input (100% NPK)	V1	4.82	16	362	3.01	18.18	95	0.95
	V2	4.31	22	380	2.74	20.58	110	4.48
	V3	3.85	26	330	3.83	21.72	89	7.62
	V4	3.13	28	389	3.00	19.46	89	2.57
	V5	4.42	18	378	3.22	18.65	95	3.52
	V6	5.89	3	349	4.02	22.96	96	8.19
	V7	5.71	5	344	3.52	18	96	3.81
	V8	4.42	18	402	2.75	18.15	111	4.48
	V9	4.38	20	359	2.81	18.56	88	3.52
	V10	7.19	1	342	5.38	30.03	105	17.24
	V11	4.94	15	307	5.41	23.55	93	5.90
	V12	5.64	6	329	4.04	21.21	96	1.71
	V13	6.10	2	325	3.61	19.45	112	6.67
	V14	5.75	4	327	4.07	14.78	100	3.52
	V15	5.27	12	332	4.30	27.87	94	0.57
	V16	-		-	-	-	-	
Interaction								
F at same V		NS		NS	NS	NS	NS	
V at same F		NS		NS	NS	NS	NS	
F1		4.53	2	320	3.48	20.22	98	
F2		5.05	1	350	3.71	20.89	98	4.98
C.D.(0.05)		0.32		1.05	NS	NS	NS	
C.V.(%)		7.4		0.35	18.7	5.17	0	

Table 4.1(j): Contd.

F-levels	Varieties	MANDYA						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties:								
	V1	4.77	8	333	2.9	17.9	95	0.95
	V2	4.08	13	369	2.7	20.1	110	4.48
	V3	3.45	14	326	3.4	20.6	89	7.62
	V4	3.00	15	359	2.9	19.2	89	2.57
	V5	4.24	10	341	3.2	18.3	94	3.52
	V6	5.46	6	337	3.9	21.9	96	8.19
	V7	5.51	5	341	3.4	18.4	96	3.81
	V8	4.19	12	382	2.6	17.4	111	4.48
	V9	4.20	11	351	2.7	18.3	88	3.52
	V10	6.29	1	316	5.2	30.1	105	17.24
	V11	4.63	9	304	5.2	23.6	93	5.90
	V12	5.55	4	324	3.9	21.3	96	1.71
	V13	5.75	2	313	3.6	19.9	112	6.67
	V14	5.57	3	323	4.0	14.6	100	3.52
	V15	5.24	7	306	4.2	26.9	94	0.57
	V16	-		-	-	-	-	
	C.D.(0.05)	0.7		31.01	0.64	1.42	0.3	
	C.V.(%)	12.65		8.01	15.32	5.97	0.26	
	Expt. Mean	4.79		335	3.60	20.56	98	
	Soil type	Red sandy loam						
	pH	7.9						
	F - levels (kg/ha)							
	F1	50:25:25						
	F2	105:50:50						
	Recommended NPK (kg/ha)	105:50:50						
	Varieties							
	V1	IET 32055						
	V2	IET 32059						
	V3	IET 32060						
	V4	IET 32063						
	V5	IET 32056						
	V6	IET 32062						
	V7	IET 32054						
	V8	IET 32061						
	V9	IET 32058						
	V10	IET 32051						
	V11	IET 32074						
	V12	IET 32064						
	V13	IET 32065						
	V14	IET 32052						
	V15	IET 32053						
	V16	Local check -						
	Availabe NPK of soil (kg/ha)	288.40:69.80:268.70						

Table 4.1(j): Contd.

F-levels	Varieties	MARUTERU						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: Low input (50% NPK)	V1	5.60	4	295	29.27	14.17	98	
	V2	3.40	28	238	22.37	14.47	71	
	V3	5.13	13	261	25.10	16.27	99	
	V4	5.33	9	239	32.87	16.63	98	
	V5	4.33	24	261	26.27	15.43	101	
	V6	3.23	30	236	36.20	17.73	99	
	V7	5.53	6	234	24.83	13.80	98	
	V8	4.57	23	350	31.60	15.37	98	
	V9	4.13	25	249	25.90	16.20	97	
	V10	5.63	3	305	31.53	26.30	102	
	V11	4.90	18	291	36.43	18.37	98	
	V12	5.10	14	175	36.93	18.77	98	
	V13	4.87	19	290	27.17	21.67	101	
	V14	4.60	22	293	32.17	13.17	102.00	
	V15	4.67	20	244	24.53	20.47	98	
	V16	-	-	-	-	-	-	
F2: Medium input (100% NPK)	V1	6.57	1	291	27.53	13.83	71	9.24
	V2	3.37	29	195	26.93	15.73	103	-0.29
	V3	5.47	7	233	28.97	15.33	101	3.24
	V4	5.30	11	248	35.63	18.07	102	-0.29
	V5	4.63	21	263	29.47	15.17	102	2.86
	V6	3.67	27	251	38.93	16.47	101	4.19
	V7	5.57	5	258	27.30	13.90	101	0.38
	V8	4.97	17	349	26.93	16.23	102	3.81
	V9	3.93	26	251	26.20	15.90	102	-1.90
	V10	5.67	2	313	34.03	26.10	104	0.38
	V11	5.37	8	272	34.60	18.63	102	4.48
	V12	5.10	14	244	33.53	17.43	103	0.00
	V13	5.33	9	266	26.27	21.13	103	4.38
	V14	5.10	14	334	34.27	13.23	103	4.76
	V15	5.30	11	215	26.47	20.33	101	6.00
	V16	-	-	-	-	-	-	
Interaction								
<i>F at same V</i>		NS		31.16	2.54	NS	NS	
<i>V at same F</i>		NS		35.65	2.36	NS	NS	
F1		4.73	2	264	29.54	17.25	97	
F2		5.02	1	266	30.47	17.17	100	2.75
C.D.(0.05)		NS		NS	NS	NS	1.25	
C.V.(%)		10.5		10.19	5.28	4.78	1.4	

Table 4.1(j): Contd.

F-levels	Varieties	MARUTERU						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties:								
	V1	6.09	1	293	28.4	14.0	85	9.24
	V2	3.39	15	216	24.7	15.1	87	-0.29
	V3	5.30	5	247	27.0	15.8	100	3.24
	V4	5.32	4	244	34.3	17.4	100	-0.29
	V5	4.48	12	262	27.9	15.3	102	2.86
	V6	3.45	14	244	37.6	17.1	100	4.19
	V7	5.55	3	246	26.1	13.9	100	0.38
	V8	4.77	11	350	29.3	15.8	100	3.81
	V9	4.03	13	250	26.1	16.1	100	-1.90
	V10	5.65	2	309	32.8	26.2	103	0.38
	V11	5.14	6	281	35.5	18.5	100	4.48
	V12	5.10	7	209	35.2	18.1	100	0.00
	V13	5.10	7	278	26.7	21.4	102	4.38
	V14	4.85	10	314	33.2	13.2	103	4.76
	V15	4.99	9	230	25.5	20.4	100	6.00
	V16	-		-	-	-	-	
	C.D.(0.05)	0.34		22.03	1.67	1.63	NS	
	C.V.(%)	6		7.19	4.8	8.18	13.77	
	Expt. Mean	4.88		265	30.01	17.21	99	
	Soil type	-						
	pH	5.8						
	F - levels (kg/ha)							
	F1	45:30:30						
	F2	90:60:60						
	Recommended NPK (kg/ha)	90:60:60						
	Varieties							
	V1	IET 32055						
	V2	IET 32059						
	V3	IET 32060						
	V4	IET 32063						
	V5	IET 32056						
	V6	IET 32062						
	V7	IET 32054						
	V8	IET 32061						
	V9	IET 32058						
	V10	IET 32051						
	V11	IET 32074						
	V12	IET 32064						
	V13	IET 32065						
	V14	IET 32052						
	V15	IET 32053						
	V16	Local check -						
	Available NPK of soil (kg/ha)	119:14.3:273						

Table 4.1(j): Contd.

F-levels	Varieties	NAWAGAM						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: Low input (50% NPK)	V1	5.13	13	305	3.01	15.53	105	
	V2	4.19	27	265	2.75	16.53	102	
	V3	4.53	24	296	2.65	16.97	97	
	V4	4.77	19	269	3.12	18.90	106	
	V5	4.87	17	247	2.62	16.43	107	
	V6	4.84	18	282	3.06	23.20	96	
	V7	5.31	7	267	2.67	16.80	104	
	V8	4.67	20	247	2.49	16.87	106	
	V9	5.15	12	264	2.84	17.80	99	
	V10	4.29	26	297	3.78	24.53	105	
	V11	5.18	10	273	3.37	24.17	106	
	V12	3.75	31	273	2.70	19.40	106	
	V13	3.20	32	325	3.35	14.87	107	
	V14	4.06	29	279	3.07	12.83	105	
	V15	4.17	28	282	3.01	20.43	106	
	V16	5.45	4	244	3.11	15.37	95	
F2: Medium input (100% NPK)	V1	5.43	5	328	3.47	15.83	107	4.80
	V2	4.66	21	350	3.80	17.57	102	7.52
	V3	5.05	14	336	3.28	16.67	98	8.32
	V4	4.92	15	366	3.63	18.30	106	2.40
	V5	5.23	9	307	4.06	16.73	107	5.76
	V6	5.16	11	305	3.39	24.30	97	5.12
	V7	5.86	1	336	3.38	16.93	106	8.80
	V8	5.27	8	329	3.04	16.80	106	9.60
	V9	5.57	3	327	3.29	17.93	100	6.72
	V10	4.92	15	348	4.21	24.53	107	10.08
	V11	5.34	6	287	3.47	24.10	106	2.56
	V12	4.32	25	335	3.32	19.30	107	9.12
	V13	3.81	30	332	3.41	15.67	107	9.76
	V14	4.57	22	290	3.90	12.00	106	8.16
	V15	4.57	22	333	3.93	20.63	107	6.40
	V16	5.74	2	346	3.61	15.23	91	4.64
Interaction								
<i>F at same V</i>		NS		36.53	NS	NS	NS	
<i>V at same F</i>		NS		56.42	NS	NS	NS	
F1		4.60	2	276	2.98	18.16	103	
F2		5.03	1	328	3.57	18.28	104	6.86
C.D.(0.05)		0.17		NS	0.2	NS	NS	
C.V.(%)		4.02		21.37	7.13	1.44	1.33	

Table 4.1(j): Contd.

F- levels	Varieties	NAWAGAM						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties:								
	V1	5.28	4	317	3.2	15.7	106	4.80
	V2	4.43	12	307	3.3	17.1	102	7.52
	V3	4.79	10	316	3.0	16.8	98	8.32
	V4	4.85	9	317	3.4	18.6	106	2.40
	V5	5.05	6	277	3.3	16.6	107	5.76
	V6	5.00	7	294	3.2	23.8	97	5.12
	V7	5.59	2	302	3.0	16.9	105	8.80
	V8	4.97	8	288	2.8	16.8	106	9.60
	V9	5.36	3	295	3.1	17.9	100	6.72
	V10	4.61	11	322	4.0	24.5	106	10.08
	V11	5.26	5	280	3.4	24.1	106	2.56
	V12	4.04	15	304	3.0	19.4	106	9.12
	V13	3.51	16	328	3.4	15.3	107	9.76
	V14	4.32	14	284	3.5	12.4	106	8.16
	V15	4.37	13	307	3.5	20.5	107	6.40
	V16	5.60	1	295	3.4	15.3	93	4.64
	C.D.(0.05)	0.33		25.83	0.49	0.57	2.01	
	C.V.(%)	5.94		7.4	13.03	2.69	1.68	
	Expt. Mean	4.81		302	3.27	18.22	104	
	Soil type	Loam						
	pH	7.9						
	F - levels (kg/ha)							
	F1	50:12.5:0						
	F2	100:25:0						
	Recommended NPK (kg/ha)	100:25:0						
	Varieties							
	V1	IET 32055						
	V2	IET 32059						
	V3	IET 32060						
	V4	IET 32063						
	V5	IET 32056						
	V6	IET 32062						
	V7	IET 32054						
	V8	IET 32061						
	V9	IET 32058						
	V10	IET 32051						
	V11	IET 32074						
	V12	IET 32064						
	V13	IET 32065						
	V14	IET 32052						
	V15	IET 32053						
	V16	Local check - GAR 13 (125-130 days)						
	Available NPK of soil (kg/ha)	219.52:17.10:306.70						

Table 4.1(j): Contd.

F-levels	Varieties	PANTNAGAR						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: Low input (50% NPK)	V1	3.84	29	268	1.82	15.30	79	
	V2	2.88	32	233	1.46	16.40	77	
	V3	3.89	28	239	1.75	15.40	77	
	V4	4.14	27	223	2.08	15.57	76	
	V5	3.68	30	257	1.56	14.73	75	
	V6	5.08	9	227	2.47	18.60	81	
	V7	4.86	15	256	2.09	16.67	75	
	V8	4.38	23	282	1.64	15.07	79	
	V9	3.20	31	269	1.43	16.20	80	
	V10	5.08	9	226	2.53	27.43	74	
	V11	5.25	8	213	2.81	19.93	79	
	V12	4.71	17	210	2.49	17.80	84	
	V13	4.38	23	207	2.27	16.90	80	
	V14	4.88	11	211	2.12	13.33	75	
	V15	4.58	20	224	2.25	23.90	76	
	V16	4.62	19	255	2.16	25.73	75	
F2: Medium input (100% NPK)	V1	4.83	16	284	1.93	15.39	73	9.00
	V2	4.28	25	261	1.75	16.56	69	12.73
	V3	4.47	22	278	1.81	15.72	74	5.27
	V4	4.87	13	278	1.88	15.66	70	6.64
	V5	4.88	11	268	1.93	14.95	70	10.91
	V6	5.38	5	299	2.00	18.67	73	2.73
	V7	6.38	1	283	2.21	16.95	70	13.82
	V8	4.71	17	298	1.75	15.22	71	3.00
	V9	4.17	26	286	1.68	16.31	72	8.82
	V10	5.88	3	259	2.46	27.63	71	7.27
	V11	5.88	3	282	2.26	20.30	79	5.73
	V12	5.38	5	295	1.99	17.73	75	6.09
	V13	4.58	20	228	2.49	17.00	76	1.82
	V14	5.92	2	219	3.01	13.33	71	9.45
	V15	4.87	13	259	2.19	24.01	73	2.64
	V16	5.32	7	241	2.41	26.02	80	6.36
Interaction								
<i>F at same V</i>		0.2		8.05	0.09	NS	2.59	
<i>V at same F</i>		0.19		8.6	0.09	NS	2.64	
F1		4.34	2	237	2.06	18.06	78	
F2		5.11	1	270	2.11	18.22	73	7.02
C.D.(0.05)		0.11		4.68	0.02	NS	0.55	
C.V.(%)		2.7		2.1	0.98	1.16	0.83	

Table 4.1(j): Contd.

F-levels	Varieties	PANTNAGAR						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties:								
	V1	4.34	12	276	1.9	15.3	76	9.00
	V2	3.58	16	247	1.6	16.5	73	12.73
	V3	4.18	14	259	1.8	15.6	75	5.27
	V4	4.51	10	251	2.0	15.6	73	6.64
	V5	4.28	13	263	1.7	14.8	72	10.91
	V6	5.23	5	263	2.2	18.6	77	2.73
	V7	5.62	1	270	2.2	16.8	73	13.82
	V8	4.55	9	290	1.7	15.1	75	3.00
	V9	3.69	15	278	1.6	16.3	76	8.82
	V10	5.48	3	242	2.5	27.5	73	7.27
	V11	5.57	2	247	2.5	20.1	79	5.73
	V12	5.05	6	253	2.2	17.8	80	6.09
	V13	4.48	11	218	2.4	17.0	78	1.82
	V14	5.40	4	215	2.6	13.3	73	9.45
	V15	4.73	8	242	2.2	24.0	75	2.64
	V16	4.97	7	248	2.3	25.9	78	6.36
	C.D.(0.05)	0.14		5.69	0.06	0.18	1.86	
	C.V.(%)	2.47		1.94	2.65	0.84	2.15	
	Expt. Mean	4.73		254	2.08	18.14	75	
	Soil type	Silt loam						
	pH	7.5						
	F - levels (kg/ha)							
	F1	60:30:20						
	F2	120:60:40						
	Recommended NPK (kg/ha)	120:60:40						
	Varieties							
	V1	IET 32055						
	V2	IET 32059						
	V3	IET 32060						
	V4	IET 32063						
	V5	IET 32056						
	V6	IET 32062						
	V7	IET 32054						
	V8	IET 32061						
	V9	IET 32058						
	V10	IET 32051						
	V11	IET 32074						
	V12	IET 32064						
	V13	IET 32065						
	V14	IET 32052						
	V15	IET 32053						
	V16	Local check - PD-24 (130-145 days)						
	Available NPK of soil (kg/ha)	222.3:38.5:212.3						

Table 4.1(j): Contd.

F-levels	Varieties	RAIPUR						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: Low input (50% NPK)	V1	3.19	17	244	2.45	16.50	98	
	V2	2.66	32	215	2.26	16.07	99	
	V3	2.90	28	197	1.89	16.27	90	
	V4	2.85	31	218	2.00	16.83	89	
	V5	2.92	27	176	2.10	14.43	98	
	V6	3.00	23	198	2.54	18.87	88	
	V7	2.89	30	248	2.03	14.90	97	
	V8	2.90	28	165	2.26	16.77	98	
	V9	3.04	21	206	2.27	17.23	89	
	V10	2.93	26	211	2.27	21.80	99	
	V11	3.11	19	174	3.09	18.03	97	
	V12	2.98	24	185	2.53	16.77	98	
	V13	2.98	24	200	2.14	16.10	102	
	V14	3.13	18	136	2.71	15.53	99	
	V15	3.04	21	159	2.40	20.73	88	
	V16	3.05	20	188	2.92	18.00	93	
F2: Medium input (100% NPK)	V1	4.58	3	307	2.72	17.47	98	13.90
	V2	4.36	6	244	2.66	17.27	99	17.00
	V3	3.74	15	273	2.51	16.43	89	8.40
	V4	4.32	9	289	2.42	17.27	88	14.70
	V5	3.42	16	275	2.60	14.83	98	5.00
	V6	4.70	2	277	3.40	19.53	88	17.00
	V7	4.81	1	300	2.91	15.83	96	19.20
	V8	4.20	11	295	2.84	18.60	98	13.00
	V9	4.07	13	250	2.77	18.23	89	10.30
	V10	4.34	7	251	3.01	22.57	98	14.10
	V11	4.58	3	237	3.83	19.07	96	14.70
	V12	4.26	10	233	3.35	17.93	97	12.80
	V13	4.49	5	294	3.08	17.07	102	15.10
	V14	4.12	12	242	3.31	16.90	99	9.90
	V15	3.83	14	239	2.94	22.27	89	7.90
	V16	4.33	8	215	3.83	18.97	94	12.80
Interaction								
F at same V		NS		NS	NS	NS	NS	
V at same F		NS		NS	NS	NS	NS	
F1		2.97	2	195	2.37	17.18	95	
F2		4.26	1	264	3.01	18.14	95	12.86
C.D.(0.05)		0.29		33.5	0.26	NS	NS	
C.V.(%)		9.16		16.62	10.91	7.76	0.28	

Table 4.1(j): Contd.

F-levels	Varieties	RAIPUR						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
Mean of varieties:								
	V1	3.89	1	276	2.6	17.0	98	13.90
	V2	3.51	13	230	2.5	16.7	99	17.00
	V3	3.32	15	235	2.2	16.4	90	8.40
	V4	3.59	10	253	2.2	17.1	89	14.70
	V5	3.17	16	226	2.4	14.6	98	5.00
	V6	3.85	2	238	3.0	19.2	88	17.00
	V7	3.85	3	274	2.5	15.4	97	19.20
	V8	3.55	12	230	2.6	17.7	98	13.00
	V9	3.56	11	228	2.5	17.7	89	10.30
	V10	3.64	7	231	2.6	22.2	98	14.10
	V11	3.85	4	206	3.5	18.6	97	14.70
	V12	3.62	9	209	2.9	17.4	98	12.80
	V13	3.74	5	247	2.6	16.6	102	15.10
	V14	3.63	8	189	3.0	16.2	99	9.90
	V15	3.44	14	199	2.7	21.5	89	7.90
	V16	3.69	6	201	3.4	18.5	94	12.80
	C.D.(0.05)	0.41		40.27	0.37	0.81	0.74	
	C.V.(%)	9.71		15.2	11.79	3.98	0.67	
	Expt. Mean	3.62		229	2.69	17.66	95	
	Soil type	Vertisols						
	pH	6.9						
	F - levels (kg/ha)							
	F1	50:30:20						
	F2	100:60:40						
	Recommended NPK (kg/ha)	100:60:40						
	Varieties							
	V1	IET 32055						
	V2	IET 32059						
	V3	IET 32060						
	V4	IET 32063						
	V5	IET 32056						
	V6	IET 32062						
	V7	IET 32054						
	V8	IET 32061						
	V9	IET 32058						
	V10	IET 32051						
	V11	IET 32074						
	V12	IET 32064						
	V13	IET 32065						
	V14	IET 32052						
	V15	IET 32053						
	V16	Local check - CG 1919(130 days)						
	Available NPK of soil (kg/ha)	173.6:19.8:313.7						

Table 4.1(j): Contd.

F-levels	Varieties	REWA							Mean Grain Yield (t/ha)	Rank
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)		
F1: Low input (50% NPK)	V1	1.84	19	9	2.49	19.67	92		3.66	22
	V2	1.98	15	9	3.04	20.87	97		3.02	32
	V3	2.70	2	10	3.44	20.27	87		3.42	28
	V4	1.84	19	10	2.25	18.60	89		3.24	31
	V5	2.43	4	9	3.37	19.33	92		3.45	26
	V6	1.92	18	10	2.47	22.33	87		3.42	27
	V7	1.30	28	9	2.29	20.35	86		3.87	18
	V8	1.83	21	9	2.22	22.33	91		3.39	29
	V9	2.21	10	10	2.38	18.51	89		3.28	30
	V10	1.23	30	9	2.37	19.00	92		3.96	17
	V11	2.28	7	8	3.24	20.33	96		4.02	15
	V12	1.66	24	10	2.47	21.13	95		3.64	23
	V13	2.11	12	9	3.21	22.13	95		3.53	25
	V14	1.26	29	8	2.63	16.33	90		3.74	21
	V15	2.27	9	9	3.23	17.53	86		3.60	24
	V16	-	-	-	-	-	-		4.37	8
F2: Medium input (100% NPK)	V1	1.94	17	11	2.94	19.93	89	1.33	4.51	5
	V2	2.02	13	11	3.43	21.67	95	0.53	3.77	20
	V3	2.77	1	11	4.03	21.67	84	0.93	4.15	11
	V4	1.95	16	12	2.82	19.13	86	1.47	3.86	19
	V5	2.47	3	10	3.83	19.93	90	0.53	4.11	12
	V6	2.00	14	11	2.93	23.07	85	1.07	4.21	9
	V7	1.35	25	10	2.90	20.96	84	0.67	4.70	4
	V8	1.83	21	10	2.67	22.77	88	0.00	4.09	14
	V9	2.28	7	12	2.83	19.37	87	0.93	3.97	16
	V10	1.34	26	11	2.80	20.07	92	1.47	4.72	3
	V11	2.41	5	9	3.72	21.07	93	1.73	4.85	2
	V12	1.79	23	11	2.85	22.03	92	1.73	4.39	7
	V13	2.17	11	11	3.50	23.13	92	0.80	4.20	10
	V14	1.34	26	9	3.00	17.47	87	1.07	4.40	6
	V15	2.35	6	10	3.73	18.33	83	1.07	4.11	13
	V16	-	-	-	-	-	-		5.13	1
Interaction										
<i>F at same V</i>		NS		NS	NS	NS	NS			
<i>V at same F</i>		NS		NS	NS	NS	NS			
F1		1.92	2	9	2.74	19.91	91		3.54	2
F2		2.00	1	11	3.20	20.71	89	1.02	4.27	1
C.D.(0.05)		0.01		0.29	0.24	0.59	1.41			
C.V.(%)		0.49		3.2	8.88	3.2	1.73			

Table 4.1(j): Contd.

F-levels	Varieties	REWA							Mean Grain Yield (t/ha)	Rank
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% Flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)		
Mean of varieties:										
	V1	1.89	10	10	2.7	19.8	91	1.33	4.09	5
	V2	2.00	7	10	3.2	21.3	96	0.53	3.40	16
	V3	2.74	1	11	3.7	21.0	85	0.93	3.78	11
	V4	1.90	9	11	2.5	18.9	88	1.47	3.55	15
	V5	2.45	2	10	3.6	19.6	91	0.53	3.78	12
	V6	1.96	8	11	2.7	22.7	86	1.07	3.82	10
	V7	1.33	13	10	2.6	20.7	85	0.67	4.29	4
	V8	1.83	11	9	2.4	22.6	89	0.00	3.74	13
	V9	2.25	5	11	2.6	18.9	88	0.93	3.62	14
	V10	1.29	15	10	2.6	19.5	92	1.47	4.34	3
	V11	2.35	3	9	3.5	20.7	95	1.73	4.44	2
	V12	1.73	12	11	2.7	21.6	93	1.73	4.01	7
	V13	2.14	6	10	3.4	22.6	94	0.80	3.86	8
	V14	1.30	14	9	2.8	16.9	89	1.07	4.07	6
	V15	2.31	4	9	3.5	17.9	85	1.07	3.85	9
	V16	-		-	-	-	-		4.75	1
	C.D.(0.05)	0.17		1.06	0.23	0.82	4.44			
	C.V.(%)	7.32		9.28	6.84	3.5	4.28			
	Expt. Mean	1.96		10	2.97	20.31	90		3.91	
	Soil type	-								
	pH	-								
	F - levels (kg/ha)									
	F1	40:20:15								
	F2	80:40:30								
	Recommended NPK (kg/ha)	80:40:30								
	Varieties									
	V1	IET 32055								
	V2	IET 32059								
	V3	IET 32060								
	V4	IET 32063								
	V5	IET 32056								
	V6	IET 32062								
	V7	IET 32054								
	V8	IET 32061								
	V9	IET 32058								
	V10	IET 32051								
	V11	IET 32074								
	V12	IET 32064								
	V13	IET 32065								
	V14	IET 32052								
	V15	IET 32053								
	V16	Local check -								
	Available NPK of soil (kg/ha)	-								

4.1(k) NIL – HT (Herbicide Tolerant)

For conducting Advance variety trial 1-NIL (**Herbicide Tolerant Genotypes**), seed was sent to six locations (**Cuttack, Chinsura, Bikramganj, Coimbatore, Nagina, Naira**) to evaluate the performance of fourteen entries with nominated herbicide tolerant lines (NILs) including five susceptible check and one herbicide tolerant check against two herbicides i.e., Imazethapyr and Byspyribac sodium (NC) along with weed free check and weedy check. The results were received from five centers (Cuttack, **Chinsura**, Coimbatore, **Nagina and Naira**) out of which the data of three centers (Chinsura, Nagina and Naira) were rejected due to recording of high yield with one or more the susceptible entries. The results indicated the superiority of the Byspyribac-sodium (4.20 t/ha and 4.48 t/ha) followed by Imazethapyr (3.02 t/ha and 2.79 t/ha) considering the zero yield in susceptible lines (G9, G10, G11 G12 and G13) by Imazethapyr was observed at Cuttack and Coimbatore, respectively. However, higher mean grain yield (4.34 t/ha) was observed with bysphyribac sodium which was comparable to weed free check (4.33 t/ha) with mean over two locations. In case of imazethapyr treatment, the line G7 (5.30 t/ha) exhibited significantly superior grain yield over all other lines but was comparable with G2 (5.20 t/ha) with no or low phytotoxicity to Imazethapyr which might have contributed to higher crop growth and grain yield.

HT- Trial Nominations for 2024 (Trait verification)

Designation	Cross combination	Code
CBHTR 22011	Anna 4 / Robin	G1
CBHTR 22022	CBMAS 14110 / Robin	G2
CBHTR 22001	CO51 / Robin	G3
CBHTR 22002	CO51 / Robin	G4
CR 4431-63-2-1-1	Pooja*4 / Robin	G5
CR 4431-117-3-2-1	Pooja*4 / Robin	G6
CR 4430-1-3-2-1	Swarna Sub 1*4 / Robin	G7
CR 4430-13-19-1-1	Swarna Sub 1*4 / Robin	G8
Anna 4 (Recurrent parent)		G9
CBMAS 14110 (Recurrent parent)		G10
CO 51(Recurrent parent)		G11
Pooja (Recurrent Parent)		G12
Swarna Sub1 (Recurrent Parent)		G13
Robin (Herbicide Tolerant Check)		G14

Table 4.1(k): Summary of data on grain yield and ancillary characters of selected AVT NIL (Herbicide Tolerant) cultures grown under transplanted conditions at graded levels of Weed management, kharif 2024.

Weed management	Varieties	NAIRA					
		Grain Yield (t/ha)	Rank	Straw Yield (t/ha)	Panicle wt (g)	Test wt (g)	No of grains/ panicle
T1: Imazethapyr application	V1	2.16	40	3.62	1.82	17.37	78
	V2	2.61	31	4.24	2.63	15.96	78
	V3	2.23	37	4.50	1.65	24.08	84
	V4	1.96	43	2.93	2.81	17.75	90
	V5	4.17	2	7.57	3.28	18.28	89
	V6	2.98	17	6.01	3.44	22.52	91
	V7	3.88	8	5.69	2.88	20.49	93
	V8	3.22	12	6.13	3.34	20.46	91
	V9	1.00	53	2.33	2.63	19.13	84
	V10	1.17	51	2.85	3.82	20.18	78
	V11	0.95	54	2.28	1.31	18.50	84
	V12	0.75	55	1.77	3.13	22.58	84
	V13	0.75	56	1.63	3.66	23.25	82
	V14	2.46	33	5.08	2.37	19.37	93
T2: Bispyribac sodium application	V1	2.28	36	4.24	1.68	23.75	87
	V2	2.80	20	4.18	2.70	14.74	79
	V3	2.42	34	4.41	2.47	15.84	91
	V4	2.71	23	5.27	2.36	23.24	90
	V5	2.68	26	7.14	2.81	22.70	94
	V6	3.90	6	8.66	3.85	21.40	86
	V7	3.97	3	5.68	3.69	23.68	94
	V8	2.64	28	5.55	3.32	20.48	93
	V9	2.63	29	4.09	2.01	22.59	79
	V10	3.92	5	5.42	2.83	18.91	79
	V11	3.02	16	4.34	2.49	22.31	84
	V12	2.22	38	2.66	2.67	21.97	88
	V13	2.76	21	4.75	3.04	20.00	92
	V14	1.75	50	4.10	1.86	19.29	95
T3: Weed free check	V1	2.30	35	3.75	3.05	19.08	81
	V2	2.66	27	5.24	3.36	21.35	89
	V3	3.18	13	6.28	2.03	15.46	92
	V4	2.68	24	5.73	2.53	21.75	93
	V5	3.53	11	5.90	3.31	16.69	93
	V6	3.96	4	7.49	4.22	26.52	96
	V7	3.68	9	5.28	3.01	20.73	94
	V8	3.13	14	5.44	3.81	22.68	95
	V9	3.10	15	5.32	3.54	21.83	90
	V10	3.89	7	5.41	3.71	23.60	83
	V11	2.61	30	4.52	2.00	21.84	88
	V12	4.25	1	8.28	3.72	25.59	95
	V13	3.67	10	6.32	4.19	20.10	94
	V14	2.17	39	3.39	1.97	15.94	90

Table 4.1(k): Contd.

Weed management	Varieties	NAIRA					
		Grain Yield (t/ha)	Rank	Straw Yield (t/ha)	Panicle wt (g)	Test wt (g)	No of grains/ panicle
T4: Weedy check	V1	1.78	48	2.78	2.00	17.21	72
	V2	1.90	45	2.74	2.46	16.67	85
	V3	1.85	46	3.57	1.50	18.70	89
	V4	1.76	49	3.17	2.03	20.38	84
	V5	2.83	19	4.25	3.30	18.10	89
	V6	2.76	22	6.25	3.70	23.26	90
	V7	1.95	44	3.57	3.11	20.46	91
	V8	1.81	47	3.87	3.39	27.86	95
	V9	2.68	25	4.47	1.97	14.28	79
	V10	2.58	32	3.70	2.97	19.41	77
	V11	2.06	41	3.52	2.03	19.11	91
	V12	2.94	18	5.76	3.72	21.39	94
	V13	2.01	42	3.41	2.30	25.87	82
	V14	1.06	52	2.24	0.99	23.61	89
Interaction							
T at same V		0.83		1.72	0.89	4.78	6
V at same T		0.76		1.47	0.87	4.63	6
Mean of Main Methods							
T1		2.16	3	4.04	2.77	19.99	86
T2		2.84	2	5.04	2.70	20.78	88
T3		3.20	1	5.60	3.18	20.94	91
T4		2.14	4	3.81	2.53	20.45	86
C.D.(0.05)		0.39		0.99	0.29	0.21	2
C.V.(%)		28.36		40.11	19.77	16.12	1
Mean of varieties:							
V1	IET 32131	2.13	13	3.60	2.14	19.35	79
V2	IET 32130	2.49	7	4.10	2.79	17.18	83
V3	Pooja (RP)	2.42	8	4.69	1.91	18.52	89
V4	IET 32123	2.28	11	4.27	2.43	20.78	89
V5	IET 32124	3.30	3	6.22	3.18	18.94	91
V6	Swarna Sub1(RP)	3.40	1	7.10	3.80	23.43	91
V7	Robin (HT Check)	3.37	2	5.06	3.17	21.34	93
V8	CBHTR22001	2.70	5	5.25	3.47	22.87	94
V9	CBHTR22002	2.35	9	4.05	2.54	19.45	83
V10	CO 51 (RP)	2.89	4	4.34	3.33	20.53	79
V11	CBHTR22011	2.16	12	3.67	1.96	20.44	87
V12	Anna 4 (RP)	2.54	6	4.61	3.31	22.89	90
V13	CBHTR22022	2.30	10	4.03	3.30	22.30	87
V14	CBMAS14110(RP)	1.86	14	3.70	1.80	19.55	92
C.D.(0.05)		0.38		0.73	0.43	2.31	3
C.V. (%)		18.21		19.60	19.20	13.91	4
Expt. Mean		2.58		4.62	2.79	20.54	88
Soil type							
pH							
Recommended NPK (kg/ha)							
Available N:P:K of soil (kg/ha)							

Table 4.1(k): Contd.

Weed management	Varieties	COIMBATORE				CHINSURAH				
		Grain Yield (t/ha)	Rank	Straw Yield (t/ha)	Panicle/m ² (No.)	Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)
T1: Imazethapyr application	V1	5.29	2	7.04	327	5.13	25	366	3.29	19.06
	V2	5.14	5	6.82	314	5.99	14	428	2.66	22.19
	V3	4.59	21	6.01	263	5.47	21	375	3.06	21.14
	V4	3.58	34	5.03	208	4.92	29	357	3.48	24.05
	V5	3.52	36	4.97	214	6.78	2	457	3.67	20.14
	V6	3.73	31	5.32	232	6.50	6	443	2.63	18.16
	V7	4.38	25	5.94	256	5.93	15	414	3.17	22.57
	V8	4.77	18	6.34	287	5.58	17	401	2.78	22.80
	V9	0.00	52	0.00	0	4.19	36	329	3.62	22.12
	V10	0.00	53	0.00	0	5.32	23	372	3.02	19.22
	V11	0.00	54	0.00	0	3.67	39	294	2.89	24.87
	V12	0.00	55	0.00	0	5.52	19	393	2.62	20.48
	V13	0.00	56	0.00	0	0.25	56	84	0.83	18.84
	V14	4.02	26	5.63	223	3.72	38	302	3.38	25.80
T2: Bispyribac sodium application	V1	5.18	4	6.61	312	4.18	37	306	3.30	6.49
	V2	4.97	9	6.32	307	5.03	28	387	2.60	21.77
	V3	4.41	23	5.90	246	4.77	33	349	2.98	20.88
	V4	3.58	35	5.13	210	4.32	35	317	3.39	23.35
	V5	3.50	37	4.97	221	6.63	4	442	3.58	20.02
	V6	3.77	30	5.24	225	6.25	10	430	2.64	18.34
	V7	4.39	24	5.94	244	6.24	11	422	3.09	22.09
	V8	4.70	19	6.22	280	5.38	22	414	2.70	22.29
	V9	4.78	17	6.41	267	4.59	34	337	3.53	21.71
	V10	4.90	11	6.58	254	5.08	27	398	2.94	19.24
	V11	4.90	12	6.45	284	4.83	31	363	2.82	24.05
	V12	5.02	8	6.65	276	6.48	7	435	2.75	20.32
	V13	4.80	16	6.40	224	4.80	32	352	2.33	18.92
	V14	3.90	28	5.44	223	3.41	40	294	3.30	24.84
T3: Weed free check	V1	5.32	1	6.89	334	5.17	24	340	3.37	19.71
	V2	5.19	3	6.72	326	6.06	12	397	2.76	22.64
	V3	4.69	20	6.22	276	5.79	16	372	3.14	21.66
	V4	3.71	32	5.37	217	4.89	30	312	3.55	24.37
	V5	3.68	33	5.24	230	6.35	8	411	3.74	20.72
	V6	3.83	29	6.32	245	6.86	1	465	2.73	18.87
	V7	4.42	22	6.04	267	6.25	9	403	3.25	22.99
	V8	4.82	15	6.42	292	6.00	13	385	2.87	23.21
	V9	4.90	13	6.58	275	5.53	18	362	3.69	22.57
	V10	4.92	10	6.61	269	6.62	5	428	3.10	19.86
	V11	5.05	7	6.84	283	5.49	20	356	2.98	25.14
	V12	5.11	6	6.71	289	6.64	3	447	2.72	21.04
	V13	4.86	14	6.34	246	5.12	26	331	2.64	19.51
	V14	3.93	27	5.45	238	2.65	42	306	3.46	26.01

Table 4.1(k): Contd.

Weed management	Varieties	COIMBATORE				CHINSURAH				
		Grain Yield (t/ha)	Rank	Straw Yield (t/ha)	Panicle/m ² (No.)	Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)
T4: Weedy check	V1	1.43	38	2.56	114	0.55	54	187	2.64	17.90
	V2	1.40	39	2.58	115	1.41	48	218	2.16	21.15
	V3	1.31	40	2.44	108	1.16	50	204	2.46	20.06
	V4	1.18	48	2.37	106	1.62	47	227	2.78	23.07
	V5	1.28	41	2.43	91	2.55	43	276	2.93	19.01
	V6	1.20	47	2.35	81	2.72	41	280	2.14	16.96
	V7	1.14	49	2.34	75	1.78	45	245	2.55	21.54
	V8	1.06	51	2.25	76	1.64	46	230	2.25	21.78
	V9	1.27	43	2.45	84	1.18	49	210	2.89	21.07
	V10	1.20	45	2.35	77	1.10	51	197	2.43	18.06
	V11	1.25	44	2.37	79	0.50	55	182	2.33	23.92
	V12	1.09	50	2.26	72	2.34	44	256	2.13	19.37
	V13	1.27	42	2.44	92	0.83	53	190	2.07	17.67
	V14	1.20	46	2.42	101	0.97	52	193	2.71	24.89
Interaction										
T at same V		0.09		0.10	11	0.20		33.85	0.33	2.55
V at same T		0.09		0.09	10	0.19		33.10	0.32	2.53
Mean of Main Methods										
T1		2.79	3	3.79	166	4.93	3	380	3.14	22.02
T2		4.48	2	6.03	257	5.14	2	375	3.00	21.53
T3		4.60	1	6.27	270	5.67	1	358	2.94	20.46
T4		1.23	4	2.40	91	1.45	4	221	2.46	20.31
C.D.(0.05)		0.03		0.04	6	0.08		11.553	0.11	0.78
C.V.(%)		1.80		1.54	6	3.55		6.486	7.12	6.90
Mean of varieties:										
V1	IET 32131	4.30	1	5.80	272	3.76	11	300	3.15	15.79
V2	IET 32130	4.18	2	5.61	266	4.62	6	358	2.55	21.94
V3	Pooja (RP)	3.76	4	5.14	225	4.30	8	325	2.91	20.94
V4	IET 32123	3.01	8	4.47	184	3.94	9	303	3.30	23.71
V5	IET 32124	2.99	9	4.41	190	5.58	2	397	3.48	19.97
V6	Swarna Sub1(RP)	3.10	7	4.82	196	5.58	1	405	2.54	18.08
V7	Robin (HT Check)	3.57	5	5.06	210	5.05	4	371	3.02	22.30
V8	CBHTR22001	3.84	3	5.31	233	4.65	5	358	2.65	22.52
V9	CBHTR22002	2.74	13	3.86	157	3.87	10	310	3.43	21.87
V10	CO 51 (RP)	2.75	12	3.89	150	4.53	7	349	2.87	19.10
V11	CBHTR22011	2.80	11	3.91	161	3.62	12	299	2.76	24.49
V12	Anna 4 (RP)	2.81	10	3.93	161	5.25	3	383	2.56	20.30
V13	CBHTR22022	2.73	14	3.79	142	2.75	13	239	1.97	18.74
V14	CBMAS14110(RP)	3.26	6	4.73	196	2.69	14	274	3.21	25.39
C.D.(0.05)		0.05		0.05	5	0.10		16.55	0.16	1.26
C.V. (%)		1.73		1.24	3	2.78		6.13	6.93	7.40
Expt. Mean		3.27		4.62	196	4.30		333.57	2.88	21.08
Soil type										
pH										
Recommended NPK (kg/ha)		150:50:50				80:40:40				
Available N:P:K of soil (kg/ha)						-				

Table 4.1(k): Contd.

Weed management	Varieties	CUTTAK				NAGINA				Mean Grain Yield (t/ha)	Rank
		Grain Yield (t/ha)	Rank	Straw Yield (t/ha)	Panicle/m ² (No.)	Grain Yield (t/ha)	Rank	Panicle wt (g)	Test wt (g)		
T1: Imazethapyr application	V1	4.29	20	6.51	375	4.31	21	2.65	23.90	4.24	22
	V2	5.27	3	7.15	449	4.20	32	2.63	23.93	4.64	11
	V3	3.83	29	7.73	460	4.41	9	2.66	23.58	4.11	27
	V4	3.59	33	6.87	439	4.30	22	2.62	23.94	3.67	36
	V5	5.40	2	9.69	456	4.48	8	2.68	24.02	4.87	3
	V6	5.16	4	8.26	424	4.34	14	2.67	23.99	4.54	13
	V7	6.21	1	9.83	412	4.21	30	2.63	23.54	4.92	2
	V8	4.75	14	9.53	345	4.19	33	2.60	23.64	4.50	14
	V9	0.00	52	0.00	0	0.00	53	0.00	0.00	1.04	54
	V10	0.00	53	0.00	0	4.08	37	2.65	23.83	2.11	41
	V11	0.00	54	0.00	0	0.00	54	0.00	0.00	0.92	55
	V12	0.00	55	0.00	0	0.00	55	0.00	0.00	1.26	53
	V13	0.00	56	0.00	0	0.00	56	0.00	0.00	0.20	56
	V14	3.70	30	5.78	500	4.64	3	2.69	23.70	3.71	35
T2: Bispyribac sodium application	V1	3.85	28	5.52	392	4.32	16	2.65	24.04	3.96	29
	V2	3.63	31	5.26	417	4.23	29	2.63	23.95	4.13	25
	V3	3.47	37	4.68	447	4.49	6	2.61	23.54	3.91	31
	V4	4.39	19	4.93	455	4.32	18	2.64	23.99	3.86	32
	V5	5.02	9	4.65	403	4.51	5	2.68	23.95	4.47	15
	V6	5.02	7	4.67	414	4.35	12	2.67	23.99	4.66	8
	V7	4.87	12	8.74	358	4.30	23	2.65	23.54	4.75	6
	V8	4.48	18	10.64	353	4.26	25	2.57	23.64	4.29	19
	V9	3.60	32	4.56	297	4.19	34	2.63	23.70	3.96	30
	V10	3.52	34	4.42	228	4.21	31	2.62	23.83	4.33	17
	V11	3.48	36	5.14	320	4.10	35	2.59	23.76	4.07	28
	V12	3.87	26	4.38	379	3.90	38	2.63	23.79	4.30	18
	V13	4.73	15	7.76	301	4.25	26	2.63	23.74	4.27	20
	V14	4.84	13	4.67	484	4.66	2	2.69	23.70	3.71	34
T3: Weed free check	V1	3.42	38	6.63	375	4.38	11	2.63	23.92	4.12	26
	V2	3.87	27	5.24	504	4.32	17	2.63	23.94	4.42	16
	V3	3.16	43	5.86	463	4.49	7	2.63	23.53	4.26	21
	V4	3.41	39	5.75	444	4.34	15	2.65	23.93	3.81	33
	V5	5.11	6	5.13	423	4.62	4	2.68	23.60	4.66	9
	V6	5.15	5	6.66	442	4.39	10	2.68	23.88	4.84	5
	V7	5.02	8	9.11	387	4.34	13	2.66	23.93	4.74	7
	V8	5.02	10	10.27	358	4.31	19	2.63	23.68	4.66	10
	V9	3.17	42	6.46	348	4.29	24	2.63	23.76	4.20	23
	V10	4.59	17	7.84	340	4.31	20	2.62	23.85	4.87	4
	V11	3.51	35	5.91	377	4.23	28	2.60	23.74	4.18	24
	V12	4.61	16	4.36	410	4.09	36	2.62	23.85	4.94	1
	V13	4.94	11	8.35	315	4.25	27	2.62	23.75	4.57	12
	V14	1.80	51	5.43	493	4.70	1	2.70	23.95	3.05	37

Table 4.1(k): Contd.

Weed management	Varieties	CUTTAK				NAGINA				Mean Grain Yield (t/ha)	Rank
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)		Grain Yield (t/ha)	Rank	Panicle wt (g)	Test wt (g)		
T4: Weedy check	V1	2.40	48	4.89	229	1.53	44	2.61	23.28	1.54	50
	V2	2.72	44	4.07	335	1.49	46	2.62	23.36	1.78	46
	V3	2.34	49	4.11	321	1.59	41	2.62	792.27	1.65	49
	V4	2.54	46	2.98	333	1.53	43	2.62	23.03	1.73	48
	V5	3.93	23	4.26	255	1.62	40	2.64	22.36	2.44	39
	V6	4.18	21	5.04	274	1.58	42	2.64	22.39	2.49	38
	V7	3.95	22	6.43	231	1.50	45	2.61	23.22	2.06	42
	V8	3.88	25	7.36	210	1.47	47	2.61	23.31	1.97	43
	V9	2.41	47	3.47	213	1.33	49	2.60	23.42	1.77	47
	V10	3.32	41	4.67	132	1.41	48	2.60	23.49	1.92	44
	V11	2.62	45	3.34	208	1.24	51	2.60	23.19	1.53	51
	V12	3.40	40	3.39	267	1.19	52	2.59	23.17	2.19	40
	V13	3.90	24	5.17	145	1.28	50	2.59	23.34	1.86	45
	V14	1.98	50	3.27	366	1.89	39	2.63	23.02	1.42	52
Interaction											
T at same V		1.06		1.63	80.27	0.16		0.03	292.95		
V at same T		1.04		1.56	76.43	0.16		0.03	288.16		
Mean of Main Methods											
T1		3.02	4	5.10	276	3.08	3	1.89	17.00	3.20	3
T2		4.20	1	5.72	375	4.29	2	2.63	23.80	4.19	2
T3		4.05	2	6.64	406	4.36	1	2.64	23.81	4.38	1
T4		3.11	3	4.46	252	1.47	4	2.61	78.06	1.88	4
C.D.(0.05)		0.34		0.64	32.44	0.03		0.01	94.96		
C.V.(%)		17.82		21.87	18.58	1.95		0.46	498.61		
Mean of varieties:											
V1	IET 32131	3.49	6	5.89	343	3.63	5	2.64	23.78	3.46	7
V2	IET 32130	3.87	5	5.43	426	3.56	8	2.63	23.79	3.74	5
V3	Pooja (RP)	3.20	9	5.59	423	3.74	3	2.63	215.73	3.48	6
V4	IET 32123	3.49	7	5.13	418	3.62	6	2.63	23.72	3.27	9
V5	IET 32124	4.87	3	5.93	384	3.81	2	2.67	23.48	4.11	3
V6	Swarna Sub1(RP)	4.88	2	6.16	389	3.66	4	2.66	23.56	4.13	1
V7	Robin (HT Check)	5.01	1	8.53	347	3.59	7	2.64	23.55	4.12	2
V8	CBHTR22001	4.53	4	9.45	317	3.56	9	2.60	23.57	3.86	4
V9	CBHTR22002	2.29	14	3.62	215	2.45	11	1.97	17.72	2.74	12
V10	CO 51 (RP)	2.86	12	4.23	175	3.50	10	2.62	23.75	3.31	8
V11	CBHTR22011	2.40	13	3.60	226	2.39	13	1.95	17.67	2.68	14
V12	Anna 4 (RP)	2.97	11	3.03	264	2.30	14	1.96	17.70	3.17	10
V13	CBHTR22022	3.39	8	5.32	190	2.45	12	1.96	17.71	2.72	13
V14	CBMAS14110(RP)	3.08	10	4.79	461	3.97	1	2.68	23.59	2.97	11
C.D.(0.05)		0.52		0.78	38.22	0.08		0.01	144.08		
C.V. (%)		17.94		17.62	14.44	2.99		0.65	498.97		
Expt. Mean		3.59		5.48	327	3.30		2.44	35.67		
Soil type											
pH											
Recommended NPK (kg/ha)		-				120:60:40					
Available N:P:K of soil (kg/ha)		-				0.889919					

Table 4.1(k): Contd.

Location	Cutback										Coimbatore							
	Grain Yield (t/ha)										Grain Yield (t/ha)							
	Main plot										Main plot							
	Imazeth apyr	Rank	Bispyri bac sodium (NC)	Rank	Weed free check (Without weeds)	Rank	Weedy check (No weeding to be done)	Rank	Avera ge of sub plot	Imazetha pyr	Rank	Bispyri bac sodium (NC)	Rank	Weed free check (Without weeds)	Rank	Weedy check (No weeding to be done)	Rank	
G1	4.29	6	3.850	9	3.420	10	2.40	12		5.29	1	5.18	1	5.32	1	1.43	1	
G2	5.27	3	3.627	10	3.867	8	2.72	8		5.14	2	4.97	2	5.19	2	1.40	2	
G3	3.83	7	3.473	14	3.160	13	2.34	13		4.59	4	4.41	9	4.69	9	1.31	3	
G4	3.59	9	4.393	7	3.413	11	2.54	10		3.58	8	3.58	13	3.71	13	1.18	11	
G5	5.40	2	5.017	2	5.107	2	3.93	3		3.52	9	3.50	14	3.68	14	1.28	4	
G6	5.16	4	5.023	1	5.147	1	4.18	1		3.73	7	3.77	12	3.83	12	1.20	10	
G7	6.21	1	4.873	3	5.020	3	3.95	2		4.38	5	4.39	10	4.42	10	1.14	12	
G8	4.75	5	4.477	6	5.017	4	3.88	5		4.77	3	4.70	8	4.82	8	1.06	14	
G9	0.00		3.600	11	3.167	12	2.41	11		0.00		4.78	7	4.90	6	1.27	6	
G10	0.00		3.523	12	4.590	7	3.32	7		0.00		4.90	4	4.92	5	1.20	8	
G11	0.00		3.480	13	3.507	9	2.62	9		0.00		4.90	4	5.05	4	1.25	7	
G12	0.00		3.867	8	4.610	6	3.40	6		0.00		5.02	2	5.11	3	1.09	13	
G13	0.00		4.727	5	4.943	5	3.90	4		0.00		4.80	6	4.86	7	1.27	5	
G14	3.70	8	4.840	4	1.800	14	1.98	14		4.02	6	3.90	11	3.93	11	1.20	8	
Average	3.02		4.20		4.06		3.11			2.79		4.48		4.60		1.23		
CD (0.05)																		

Table 4.1(k): Contd.

Location	Naira										Chinsura						
	Grain Yield (t/ha)										Grain Yield (t/ha)						
	Main plot										Main plot						
	Imazeth apyr	Rank	Bispyri bac sodium (NC)	Rank	Weed free check (Without weeds)	Rank	Weedy check (No weeding to be done)	Rank	Aver age of sub plot	Imazetha pyr	Rank	Bispyri bac sodium (NC)	Rank	Weed free check (Without weeds)	Rank	Weedy check (No weeding to be done)	Rank
G1	2.16	8	2.28	12	2.30	13	1.78	12		5.13	9	4.18	13	5.17	11	0.55	13
G2	2.61	5	2.80	5	2.66	11	1.90	9		5.99	3	5.03	7	6.06	6	1.41	7
G3	2.23	7	2.42	11	3.18	7	1.85	10		5.47	7	4.77	10	5.79	8	1.16	9
G4	1.96	9	2.71	7	2.68	10	1.76	13		4.92	10	4.32	12	4.89	13	1.62	6
G5	4.17	1	2.68	8	3.53	6	2.83	2		6.78	1	6.63	1	6.35	4	2.55	2
G6	2.98	4	3.90	3	3.96	2	2.76	3		6.50	2	6.25	3	6.86	1	2.72	1
G7	3.88	2	3.97	1	3.68	4	1.95	8		5.93	4	6.24	4	6.25	5	1.78	4
G8	3.22	3	2.64	9	3.13	8	1.81	11		5.58	5	5.38	5	6.00	7	1.64	5
G9	1.00	11	2.63	10	3.10	9	2.68	4		4.19	11	4.59	11	5.53	9	1.18	8
G10	1.17	10	3.92	2	3.89	3	2.58	5		5.32	8	5.08	6	6.62	3	1.10	10
G11	0.95	12	3.02	4	2.61	12	2.06	6		3.67	13	4.83	8	5.49	10	0.50	14
G12	0.75	13	2.22	13	4.25	1	2.94	1		5.52	6	6.48	2	6.64	2	2.34	3
G13	0.75	14	2.76	6	3.67	5	2.01	7		0.25	14	4.80	9	5.12	12	0.83	12
G14	2.46	6	1.75	14	2.17	14	1.06	14		3.72	12	3.41	14	2.65	14	0.97	11
Average	2.16		2.84		3.20		2.14			4.93		5.14		5.67		1.45	

Table 4.1(k): Contd.

Location	Nagina										Mean of 2 Locations									
	Grain Yield (t/ha)										Grain Yield (t/ha)									
	Main plot										Main plot									
	Imazethapyr	Rank	Bispyribac sodium (NC)	Rank	Weed free check (Without weeds)	Rank	Weedy check (No weeding to be done)	Rank	Average of sub plot	Imazethapyr	Rank	Bispyribac sodium (NC)	Rank	Weed free check (Without weeds)	Rank	Weedy check (No weeding to be done)	Rank	Over all Mean		
G1	4.31	5	4.32	5	4.38	5	1.53	6		4.79	3	4.50	4	4.37	9	1.91	10	3.89		
G2	4.20	8	4.23	10	4.32	8	1.49	8		5.20	2	4.30	8	4.53	6	2.06	8	4.02		
G3	4.41	3	4.49	3	4.49	3	1.59	3		4.21	7	3.96	14	3.93	12	1.83	13	3.48		
G4	4.30	6	4.32	6	4.34	7	1.53	5		3.59	9	3.99	13	3.56	13	1.86	11	3.25		
G5	4.48	2	4.51	2	4.62	2	1.62	2		4.46	5	4.26	9	4.39	8	2.61	2	3.93		
G6	4.34	4	4.35	4	4.39	4	1.58	4		4.44	6	4.34	7	4.49	7	2.69	1	3.99		
G7	4.21	7	4.30	7	4.34	6	1.50	7		5.30	1	4.61	2	4.72	5	2.54	4	4.29		
G8	4.19	9	4.26	8	4.31	9	1.47	9		4.76	4	4.59	3	4.92	1	2.47	5	4.18		
G9	0.00		4.19	12	4.29	11	1.33	11		0.00		4.19	12	4.03	11	1.84	12	2.51		
G10	4.08	10	4.21	11	4.31	9	1.41	10		0.00		4.21	10	4.76	4	2.26	6	2.81		
G11	0.00		4.10	13	4.23	13	1.24	13		0.00		4.20	11	4.28	10	1.94	9	2.60		
G12	0.00		3.90	14	4.09	14	1.19	14		0.00		4.45	5	4.86	3	2.24	7	2.89		
G13	0.00		4.25	9	4.25	12	1.28	12		0.00		4.77	1	4.90	2	2.59	3	3.06		
G14	4.64	1	4.66	1	4.70	1	1.89	1		3.86	8	4.36	6	2.86	14	1.59	14	3.17		
Average	3.08		4.29		4.36		1.47			2.90		4.34		4.33	9	2.17		3.43		
CD (0.05)										0.18										
										0.26										

4.1 I AET – AVT 1 BAS HT

Performance of near isogenic lines of Pusa Basmati 1509 carrying resistance to bacterial leaf blight, blast and herbicide tolerance in AVT1-BT NIL

A total of two NIL entries namely, IET32296 and IET32297 carrying the bacterial blight resistance genes *xa13+Xa21*; blast resistance genes *Pi2+Pi54*; and herbicide tolerance *AHAS^{rb}* were evaluated for yield and grain quality in the AVT1-NIL trial along with its recurrent parent Pusa Basmati 1509. These entries were evaluated for bacterial leaf blight and blast resistance in a separate trial under NSN conducted in hot spot regions in the Basmati GI locations to determine the resistance of NILs for bacterial leaf blight and blast disease.

Further, both the entries along with its recurrent parent Pusa Basmati 1509 and checks Pusa Basmati 1, Pusa Basmati 1121 and Pusa Basmati 1985 were evaluated under dryDSR conditions with following treatments across four locations namely, IARI, Ludhiana, Nagina and Kaul.

- Treatment 1 : Imazethapyr 10% SL @2.0g/L applied at 18-22 DAS
 Treatment 2 : Manual Weeding
 Treatment 3 : Untreated control (weedy check)

Data from four locations namely, New Delhi, Ludhiana, Kaul and Nagina were analysed and the data is presented in following table:

Treatment	Entry	IET No	Kaul	IARI	PAU	NGN	Mean
T ₁ : Imazethapyr 10% SL (X dose)	1914	32296	0.0	0.0	0.0	0.0	0.0
	1915	32297	4.6	5.2	4.8	4.8	4.9
	1923	PB 1121	0.0	0.0	0.0	0.0	0.0
	1924	PB 1	0.0	0.0	0.0	0.0	0.0
	1927	PB 1509 (RP)	0.0	0.0	0.0	0.0	0.0
	Check	PB 1985	4.5	3.6	4.9	4.9	4.5
T ₂ : Manual Weeding	1914	32296	4.1	4.0	4.1	4.9	4.1
	1915	32297	4.8	3.3	4.9	4.9	4.3
	1923	PB 1121	4.0	3.8	2.8	4.8	3.8
	1924	PB 1	3.9	3.1	2.0	4.9	3.5
	1927	PB 1509 (RP)	4.2	3.6	4.7	4.0	4.1
	Check	PB 1985	4.7	4.3	4.8	4.7	4.6
T ₃ : Untreated Control (Weedy check)	1914	32296	1.5	0.0	0.0	1.6	0.5
	1915	32297	1.5	5.6	0.0	1.5	2.4
	1923	PB1121	1.1	0.0	0.0	1.5	0.6
	1924	PB 1	1.2	0.0	0.0	1.4	0.6
	1927	PB 1509 (RP)	1.6	3.1	0.0	1.4	1.5
	Check	PB 1985	1.4	4.5	0.0	1.5	1.9
		CD (0.05)	1.0	0.6	0.6	0.4	0.5

Conclusion:

The entry IET 32297 and the check Pusa Basmati 1985 were tolerant to the herbicide Imazethapyr. The entry IET 32296 and checks Pusa Basmati 1121, Pusa Basmati 1 and Pusa Basmati 1509 (RP) were sensitive to imazethapyr.

On overall mean basis, the entry IET 32297 was significantly superior to the recurrent parent Pusa Basmati 1509 and on par with check PB1985. It yielded significantly superior at IARI and PAU, while performed on par with the check PB1985 at Kaul and Nagina.

4.1m AET – AVT 2 BT

Fourteen BT cultures (IET 32296, IET 32297, IET 32298, PB 1, IET 30533, IET 30535, IET 31306, IET 31307, PB 1509, PB 1121, PB 1, Pusa RH 10, Taraori Basmati, PB 1509) and one Local Check were evaluated for its response to nutrient application in terms of grain yield and yield attributes at four locations i.e., **Kaul (90:30:0)**, **Ludhiana (40:30:30)**, **Nagina (120:60:40)** and **Pantnagar (120:60:40)** under two different nutrient levels (50% and 100% RFD). The details and data received from these locations are summarized and presented in Table 4.1(m).

Application of different RDF doses (50% and 100% RDF) significantly influenced the grain yield at all locations except (**Ludhiana**) and the maximum increase in grain yield was observed at most of the locations and higher nutrient response (5.25 to 20.14 kg grain/kg Nutrient). Application of 100% RDF recorded significantly higher grain yields at **Kaul** (5.52 t/ha), **Nagina** (4.65 t/ha) and **Pantnagar** (4.16 t/ha). Higher nutrient response was recorded with 100% RDF at **Kaul** (20.14 kg grain /kg Nutrient) followed by **Nagina** (18.43 kg grain /kg Nutrient).

Grain yield differences among the tested cultures were significant at all locations. Significantly higher mean maximum grain yield was recorded by IET cultures at all the locations over local checks. At **Kaul**, IET 30533 (5.61 t/ha) followed by IET 32298 (5.51 t/ha); while, at **Ludhiana** IET 31307 (4.51 t/ha) followed by IET 32297 (4.44 t/ha); and at **Nagina** IET 32296 (3.91 t/ha) followed by IET 32297 (3.8 t/ha) IET 32298 (3.74 t/ha); at **Pantnagar** IET 30535 (4.67 t/ha); followed by IET 30533 (4.65 t/ha) were found promising and superior to the entries. Among the entries tested at all locations, mean grain yield of IET culture IET 31307 (4.32 t/ha) was higher followed by IET 32298 (4.32 t/ha) and found promising.

In this trial application of 100% RFD was found promising and most of the IET cultures (IET 31307 and 32298) were superior (4.32 t/ha) to Local checks.

Table 4.1.1(m): Summary of data on grain yield and ancillary characters of selected AET BT cultures grown under transplanted conditions at graded levels of recommended fertilizer doses, kharif 2024.

F- levels	Varieties	KAUL						LUDHIANA						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)	Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
F1	V1	3.95	26	301	1.65	25.9		4.10	15	290	2.85	27.17	95	
	V2	3.95	26	303	1.65	24.5		4.31	13	315	2.42	27.56	93	
	V3	4.96	17	305	1.68	26.1		3.73	21	276	2.53	26.77	95	
	V4	4.88	18	335	1.77	26.3		4.32	11	301	2.39	24.60	101	
	V5	5.00	16	344	1.79	26.2		2.15	29	272	3.04	24.79	100	
	V6	4.33	23	314	1.80	25.2		3.84	20	256	3.05	24.53	104	
	V7	3.72	28	298	1.51	25.9		4.50	7	320	2.29	26.20	95	
	V8	4.53	21	318	1.86	26.3		4.52	6	292	2.85	28.27	96	
	V9	3.96	25	310	1.60	25.5		4.08	16	303	2.70	27.42	95	
	V10	3.62	29	290	1.48	26.4		3.91	19	286	2.13	25.27	108	
	V11	3.57	30	297	1.60	25.2		4.62	4	289	2.59	24.80	103	
	V12	4.76	20	329	1.70	27.9		3.64	23	297	3.30	24.17	100	
	V13	4.22	24	304	1.68	25.2		2.36	27	295	1.56	25.57	105	
	V14	4.35	22	303	1.61	26.4		4.07	17	313	2.38	24.90	93	
	V15	4.81	19	293	1.66	25.6		3.71	22	313	2.64	25.20	103	
F2	V1	5.12	14	342	1.89	26.9	19.50	4.68	3	348	3.03	27.17	95	11.60
	V2	5.26	9	350	1.71	26.3	21.83	4.57	5	347	2.64	27.30	95	5.20
	V3	6.06	2	388	1.94	25.6	18.33	4.88	1	308	2.77	26.70	98	23.00
	V4	5.96	4	375	1.97	26.4	18.00	4.32	11	315	2.90	24.63	101	0.00
	V5	6.21	1	394	1.98	26.6	20.17	2.37	26	295	3.19	24.87	100	4.40
	V6	5.30	8	346	1.87	25.8	16.17	3.53	25	281	3.11	24.40	104	-6.20
	V7	5.26	9	363	1.86	24.9	25.67	4.38	9	350	2.56	26.20	93	-2.40
	V8	6.04	3	367	1.91	27.4	25.17	4.49	8	317	2.93	27.30	94	-0.60
	V9	5.25	11	350	1.89	26.0	21.50	4.78	2	327	2.73	27.17	93	14.00
	V10	5.47	7	339	1.81	26.8	30.83	1.85	30	333	2.20	25.30	107	-41.20
	V11	5.55	6	332	1.77	25.2	33.00	3.54	24	333	2.59	24.70	103	-21.60
	V12	5.76	5	366	1.94	25.0	16.67	4.02	18	330	3.55	24.17	101	7.60
	V13	5.19	13	347	1.88	26.4	16.17	2.26	28	316	1.72	25.67	106	-2.00
	V14	5.09	15	332	1.72	25.6	12.33	4.38	9	347	2.72	24.83	95	6.20
	V15	5.22	12	366	2.01	26.5	6.83	4.31	13	349	2.88	25.20	103	12.00

Table 4.1.1.(m): Contd.

F- levels		Varieties		KAUL					LUDHIANA							
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)	Grain Yield (t/ha)	Ra nk	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)		
Interaction																
F at same V																
V at same F																
F1																
F2																
C.D.(0.05)																
C.V.(%)																
Mean of varieties:																
V1		4.54	14	322	1.77	26.39	19.50	4.39	5	319	2.94	27.17	95	11.60		
V2		4.61	10	327	1.68	25.40	21.83	4.44	2	331	2.53	27.43	94	5.20		
V3		5.51	2	347	1.81	25.87	18.33	4.31	7	292	2.65	26.74	97	23.00		
V4	Pusa Basmati 1	5.42	3	355	1.87	26.34	18.00	4.32	6	308	2.65	24.62	101	0.00		
V5	IET 30533	5.61	1	369	1.89	26.40	20.17	2.26	15	284	3.12	24.83	100	4.40		
V6	IET 30535	4.82	7	330	1.84	25.52	16.17	3.69	12	268	3.08	24.47	104	-6.20		
V7	IET 31306	4.49	15	331	1.69	25.43	25.67	4.44	2	335	2.43	26.20	94	-2.40		
V8	IET 31307	5.29	4	342	1.89	26.87	25.17	4.51	1	304	2.89	27.79	95	-0.60		
V9	Pusa Basmati 1509	4.61	10	330	1.75	25.72	21.50	4.43	4	315	2.72	27.30	94	14.00		
V10	Pusa Basmati 1121	4.55	13	315	1.65	26.60	30.83	2.88	13	310	2.17	25.29	108	-41.20		
V11	Pusa Basmati 1	4.56	12	314	1.69	25.22	33.00	4.08	9	311	2.59	24.75	103	-21.60		
V12	Pusa RH 10	5.26	5	348	1.82	26.47	16.67	3.83	11	314	3.43	24.17	101	7.60		
V13	Taraori Basmati	4.71	9	326	1.78	25.82	16.17	2.31	14	306	1.64	25.62	105	-2.00		
V14	Pusa Basmati 1509	4.72	8	317	1.67	25.97	12.33	4.23	8	330	2.55	24.87	94	6.20		
V15	Local Check	5.02	6	329	1.84	26.05	6.83	4.01	10	331	2.76	25.20	103	12.00		
C.D.(0.05)																
C.V. (%)																
Expt. Mean																
Soil type																
pH																
N - levels (kg/ha)																
F1																
F2																
Recommended N:P:K																
V15																
Local Check - PB 1121																
160:16:360																
Local Check - Punjab Basmati 7																
270:16:133																

Table 4.1.1(m): Contd.

F- levels	Varieties	NAGINA						PANTNAGAR						Over all mean	Rank	
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)	Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering			Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
F1	V1	2.89	16	229	2.77	93		4.04	12	259	1.80	26.33	65		3.75	20
	V2	2.78	17	223	2.76	93		3.25	24	323	1.20	27.70	65		3.57	23
	V3	2.70	20	219	2.74	92		3.17	27	272	1.41	28.20	77		3.64	22
	V4	2.27	30	202	2.72	115		3.75	16	236	1.86	25.67	72		3.81	19
	V5	2.73	18	207	2.74	105		4.25	9	174	2.82	23.93	65		3.53	26
	V6	2.73	18	221	2.77	104		4.33	7	267	1.88	24.77	64		3.81	18
	V7	2.60	24	209	2.77	84		3.33	23	265	1.51	26.40	70		3.54	25
	V8	2.67	22	216	2.66	86		3.92	14	279	1.74	20.17	75		3.91	16
	V9	2.68	21	218	2.62	92		2.42	30	229	1.38	27.30	72		3.29	29
	V10	2.58	27	209	2.66	107		3.25	24	254	1.49	27.37	71		3.34	28
	V11	2.30	29	196	2.75	116		3.75	16	217	2.02	27.40	65		3.56	24
	V12	2.60	24	213	2.75	101		4.38	6	230	2.27	23.23	64		3.85	17
	V13	2.35	28	203	2.72	109		3.25	24	181	2.24	23.27	72		3.05	30
	V14	2.59	26	210	2.75	90		3.04	29	257	1.46	28.87	66		3.51	27
	V15	2.64	23	214	2.77	98		3.54	22	246	1.71	25.90	71		3.68	21
F2	V1	4.92	1	348	2.86	93	18.45	3.75	16	269	1.71	27.07	66	-2.64	4.62	7
	V2	4.83	2	341	2.84	93	18.64	4.50	5	343	1.49	28.30	65	11.36	4.79	2
	V3	4.71	4	339	2.84	93	18.27	4.33	7	284	1.76	28.73	65	10.55	5.00	1
	V4	4.35	15	292	2.84	115	18.91	4.00	13	250	1.89	25.73	69	2.27	4.66	5
	V5	4.60	11	300	2.85	106	17.00	5.04	1	200	2.93	24.33	70	7.18	4.56	11
	V6	4.75	3	340	2.84	104	18.36	5.00	2	275	2.17	24.90	71	6.09	4.65	6
	V7	4.59	12	301	2.85	85	18.09	3.08	28	273	1.39	27.10	65	-2.27	4.33	13
	V8	4.66	6	335	2.71	87	18.09	3.75	16	289	1.49	20.47	67	-1.55	4.74	4
	V9	4.67	5	337	2.67	93	18.09	3.58	21	251	1.71	28.47	66	10.55	4.57	9
	V10	4.61	10	305	2.73	107	18.45	4.08	11	264	1.76	28.07	70	7.55	4.00	14
	V11	4.52	14	285	2.84	116	20.18	4.63	4	214	2.50	27.80	64	8.00	4.56	10
	V12	4.63	8	314	2.84	101	18.45	4.75	3	225	2.43	23.83	65	3.36	4.79	2
	V13	4.58	13	297	2.85	110	20.27	3.92	14	181	2.55	23.30	71	6.09	3.99	15
	V14	4.62	9	309	2.84	90	18.45	3.75	16	243	1.88	29.30	67	6.45	4.46	12
	V15	4.64	7	322	2.85	99	18.18	4.17	10	229	2.17	26.17	69	5.73	4.59	8

Table 4.1.1(m): Contd.

F- levels	Varieties	NAGINA						PANTNAGAR						Over all mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)	Grain Yield (t/ha)	Rank	Panicle e/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)	
Interaction F at same V V at same F C.D.(0.05) C.V.(%) Mean of varieties:		NS		16.24	0.02	NS		NS		6.85	0.1	0.39	5.71		
		NS		15.98	0.02	NS		NS		6.76	0.09	0.3	4.78		
	F1	2.61	2	213	2.73	99	18.53	3.58	2	246	1.79	25.77	69		2
	F2	4.65	1	318	2.82	99		4.16	1	253	1.99	26.24	67	5.25	1
		0.45		3.92	0.01	NS		0.28		1.73	0.07	0.32	NS		
		13.6		1.63	0.24	1.29		7.96		0.76	4.22	1.35	6.98		
		3.91	1	289	2.82	93	18.45	3.90	5	264	1.76	26.70	66	-2.64	6
	V1 IET 32296	3.81	2	282	2.80	93	18.64	3.88	6	333	1.35	28.00	65	11.36	6
	V2 IET 32297	3.71	4	279	2.79	93	18.27	3.75	10	278	1.59	28.47	71	10.55	2
	V3 IET 32298	3.31	15	247	2.78	115	18.91	3.88	6	243	1.88	25.70	70	2.27	4
	V4 Pusa Basmati 1	3.67	6	254	2.80	106	17.00	4.65	2	187	2.88	24.13	67	7.18	10
	V5 IET 30533	3.74	3	281	2.81	104	18.36	4.67	1	271	2.03	24.84	68	6.09	5
	V6 IET 30535	3.60	12	255	2.81	84	18.09	3.21	14	269	1.45	26.75	68	-2.27	12
	V7 IET 31306	3.67	6	275	2.69	87	18.09	3.84	9	284	1.62	20.32	71	-1.55	1
	V8 IET 31307	3.68	5	278	2.65	92	18.09	3.00	15	240	1.55	27.89	69	10.55	13
C.D.(0.05) C.V.(%) Expt. Mean Soil type pH N - levels (kg/ha) F1 F2 Recommended N:P:K V15 Available N:P:K		3.60	11	257	2.70	107	18.45	3.67	11	259	1.63	27.72	70	7.55	14
	V9 Pusa Basmati 1509	3.41	14	241	2.80	116	20.18	4.19	4	216	2.26	27.60	64	8.00	9
	V10 Pusa Basmati 1121	3.62	9	263	2.80	101	18.45	4.57	3	227	2.35	23.53	65	3.36	2
	V11 Pusa Basmati 1	3.47	13	250	2.79	109	20.27	3.59	12	181	2.40	23.29	71	6.09	2
	V12 Pusa RH 10	3.61	10	260	2.80	90	18.45	3.40	13	250	1.67	29.09	67	6.45	11
	V13 Taraori Basmati	3.64	8	268	2.81	99	18.18	3.86	8	237	1.94	26.04	70	5.73	8
	V14 Pusa Basmati 1509														
	V15 Local Check														
		0.3		11.48	0.02	0.99		0.58		4.85	0.06	0.22	3.38		
		7.23		3.74	0.48	0.87		12.94		1.68	2.81	0.72	4.3		
		3.68		270	2.80	100		4.01		261	1.89	26.60	68		
		-						Silt loan							
		7.70						7.40							
		60:30:20						60:30:20							
		120:60:40						120:60:40							
		120:60:40						120:60:40							
		Local Check - PB 1847						Local Check - PB 1121							
		21:18.33:209						231:22:221							

4.1(n) AVT 2 - Early (Direct Seeded)

Five AVT-2 entries (IET 30330, IET 31193, IET 31185, IET 31170 and IET 31163) were evaluated for their response to low and optimum level of nutrients application (50 and 100% RDF) on grain yield in comparison to standard varieties i.e. Sahbhagidhan, CO 53, MTU 1010, BVD 111, Samleshwari, Baramidhan-2 at five locations viz; **Coimbatore (100:50:50), Jagdalpur (100:60:30), Raipur (120:60:60), Ranchi (60:40:30) and Rewa (50:30:20)**. The experiments were conducted in a split plot design at all the locations. The main plot treatments were two levels of fertilizer input (50% and 100% RDF) and cultures assigned to sub plots. The data received from these locations are summarized and presented in **Table 4.1w**. The evaluation was done at 50% RDF at **Rewa** center.

Application of different doses of RDF (50% and 100%) exhibited significant influence on grain yield at all locations except at **Jagdalpur** only. Grain yield increased with increasing level of input from 50% to 100% RFD at these locations. Application of 100% NPK recorded significantly higher yield at **Coimbatore** (4.82 t/ha), **Raipur** (4.02 t/ha) and **Ranchi** (3.80 t/ha) and **Rewa** (3.96 t/ha). Nutrient response (kg grain / kg nutrient) was higher at 100 % RDF at **Raipur** (7.39) followed by **Coimbatore** (12.55) compared to 50% NPK.

Grain yield differences among the tested genotypes were significant at all the locations example **Jagdalpur** Significant mean maximum yield was recorded by IET 31163 at **Coimbatore** (4.35 t/ha), and at **Raipur** (5.02 t/ha), IET 31170 (3.96 t/ha) at **Ranchi** found promising.

In conclusion, 100% of RDF was found promising across the locations with 22% higher grain yield and IET 31163 (4.34t/ha) followed by IET 30330 (4.28 t/ha) t/ha) were found promising with higher grain yield across the locations among the tested cultures.

Table 4.1n: Summary of data on grain yield and ancillary characters of selected AET Early (Direct Seeded) cultures grown under transplanted conditions at low and optimum recommended fertilizer doses, kharif 2024.

F-levels	Varieties	COIMBATORE						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test weight (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: Low input (50% NPK)	V1	3.25	12	213	1.77	23.03	81	
	V2	3.00	13	202	1.70	22.30	81	
	V3	2.87	14	183	1.68	26.27	81	
	V4	3.45	9	229	1.93	20.60	82	
	V5	3.52	8	243	2.13	21.10	85	
	V6	3.31	11	222	1.82	22.37	81	
	V7	3.38	10	246	1.89	22.00	86	
F2: Medium input (100% NPK)	V1	4.80	5	260	2.62	23.47	82	12.40
	V2	4.64	6	252	2.55	23.10	82	13.12
	V3	4.43	7	235	2.38	27.07	81	12.48
	V4	4.93	2	286	2.82	21.23	83	11.84
	V5	5.18	1	335	2.98	21.83	86	13.28
	V6	4.87	4	279	2.66	23.83	81	12.48
	V7	4.91	3	313	2.78	23.13	86	12.24
Interaction								
F at same V		NS		9.61	0.07	0.41	NS	
V at same F		NS		12.85	0.06	0.39	NS	
Mean of F level								
F1		3.25	2	220	1.85	22.52	83	
F2		4.82	1	280	2.68	23.38	83	12.55
C.D.(0.05)		0.03		11.89	0.07	0.26	NS	
C.V.(%)		0.56		3.58	2.19	0.84	0.97	
Mean of varieties:								
V1		4.03	5	237	2.20	23.25	82	12.40
V2		3.82	6	227	2.13	22.70	82	13.12
V3		3.65	7	209	2.03	26.67	81	12.48
V4		4.19	2	258	2.38	20.92	83	11.84
V5		4.35	1	289	2.56	21.47	86	13.28
V6		4.09	4	251	2.24	23.10	81	12.48
V7		4.15	3	279	2.34	22.57	86	12.24
C.D.(0.05)		0.07		6.79	0.04	0.28	0.65	
C.V. (%)		1.43		2.28	1.54	1.01	0.66	
Expt. Mean		4.04		250	2.27	22.95	83	
Soil type		Clay loam						
pH		8.10						
F - levels (kg/ha)								
F1		75:25:25						
F2		150:50:50						
Recommended N:P:K (kg/ha)		150:50:50						
Varieties								
V1		IET 30330						
V2		IET 31193						
V3		IET 31185						
V4		IET 31170						
V5		IET 31163						
V6		Sahabgadhian (NC)						
V7		Local check - CO 53 (1115 days)						
Available N:P:K		212:22:418						

Table 4.1n: Contd.

F-levels	Varieties	JAGDALPUR						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test weight (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: Low input (50% NPK)	V1	5.33	7	213	3.47	25.33	77	
	V2	4.33	14	185	3.27	29.67	76	
	V3	4.53	12	316	3.53	26.67	79	
	V4	4.60	11	230	2.80	24.33	77	
	V5	5.13	8	234	3.47	24.00	85	
	V6	4.80	10	163	3.20	27.33	82	
	V7	4.40	13	223	4.07	25.33	89	
F2: Medium input (100% NPK)	V1	6.10	1	231	4.33	26.00	79	8.80
	V2	5.37	6	210	3.73	30.33	80	11.89
	V3	5.43	4	333	4.40	27.67	82	10.29
	V4	5.60	3	350	3.60	26.00	79	11.43
	V5	5.73	2	315	4.20	25.33	89	6.86
	V6	5.43	4	215	4.13	30.00	83	7.20
	V7	4.87	9	243	4.73	26.33	90	5.37
Interaction								
F at same V		NS		19.47	NS	NS	NS	
V at same F		NS		23.13	NS	NS	NS	
Mean of F level								
F1		4.73	2	224	3.40	26.09	81	
F2		5.50	1	271	4.16	27.38	83	8.83
C.D.(0.05)		NS		18.53	0.15	NS	1.25	
C.V.(%)		23.57		5.64	2.94	4.58	1.14	
Mean of varieties:								
V1		5.72	1	222	3.90	25.67	78	8.80
V2		4.85	6	198	3.50	30.00	78	11.89
V3		4.98	5	325	3.97	27.17	80	10.29
V4		5.10	4	290	3.20	25.17	78	11.43
V5		5.43	2	275	3.84	24.67	87	6.86
V6		5.12	3	189	3.67	28.67	83	7.20
V7		4.64	7	233	4.40	25.83	90	5.37
C.D.(0.05)		NS		13.76	0.37	0.8	1.12	
C.V. (%)		10.95		4.67	8.16	2.5	1.15	
Expt. Mean		5.12		247	3.78	26.74	82	
Soil type		Clay loam						
pH		5.60						
F - levels (kg/ha)								
F1		50:25:12.5						
F2		100:50:25						
Recommended N:P:K (kg/ha)		100:50:25						
Varieties								
V1		IET 30330						
V2		IET 31193						
V3		IET 31185						
V4		IET 31170						
V5		IET 31163						
V6		Sahabhagidhan (NC)						
V7		Local check - Samleswari (115-120 days)						
Available N:P:K of soil (kg/ha)		-						

Table 4.1n: Contd.

F-levels	Varieties	RAIPUR						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test weight (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: Low input (50% NPK)	V1	4.04	6	275	2.43	22.27	90	
	V2	2.09	13	253	1.87	23.23	72	
	V3	2.78	10	241	2.27	22.17	76	
	V4	1.93	14	205	1.90	18.80	77	
	V5	4.37	4	293	2.44	19.37	93	
	V6	2.63	12	233	2.14	23.27	82	
	V7	4.09	5	295	2.18	22.73	82	
F2: Medium input (100% NPK)	V1	4.60	3	311	2.91	25.73	90	4.67
	V2	3.09	9	305	2.19	24.90	74	8.33
	V3	3.76	7	302	2.85	25.07	75	8.17
	V4	2.70	11	268	2.52	20.37	77	6.42
	V5	5.67	1	393	3.44	21.30	93	10.83
	V6	3.23	8	289	2.80	25.27	82	5.00
	V7	5.09	2	342	3.12	24.47	84	8.33
Interaction								
F at same V		NS		NS	NS	NS	1.52	
V at same F		NS		NS	NS	NS	1.52	
Mean of F level								
F1		3.13	2	256	2.18	21.69	82	
F2		4.02	1	316	2.83	23.87	82	7.39
C.D.(0.05)		0.51		44.14	0.41	NS	NS	
C.V.(%)		10.73		11.62	12.21	7.52	0.68	
Mean of varieties:								
V1		4.32	3	293	2.67	24.00	90	4.67
V2		2.59	6	279	2.03	24.07	73	8.33
V3		3.27	4	272	2.56	23.62	75	8.17
V4		2.32	7	237	2.21	19.59	77	6.42
V5		5.02	1	343	2.94	20.34	93	10.83
V6		2.93	5	261	2.47	24.27	82	5.00
V7		4.59	2	318	2.65	23.60	83	8.33
C.D.(0.05)		0.63		50.77	0.52	0.67	1.07	
C.V. (%)		14.77		14.89	17.3	2.48	1.1	
Expt. Mean		3.58		286	2.50	22.78	82	
Soil type		Vertisol						
pH		7.10						
F - levels (kg/ha)								
F1		60:30:30						
F2		120:60:60						
Recommended N:P:K (kg/ha)		120:60:60						
Varieties								
V1		IET 30330						
V2		IET 31193						
V3		IET 31185						
V4		IET 31170						
V5		IET 31163						
V6		Sahabgadhian (NC)						
V7		Local check - SCG Barani Dhan-2 (112 days)						
Available N:P:K of soil (kg/ha)		171.8:23.3:441.7						

Table 4.1n: Contd.

F-levels	Varieties	RANCHI						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	No. of grains / panicle	Test weight (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)
F1: Low input (50% NPK)	V1	3.27	12	200	86	24.70	83	
	V2	3.67	8	227	94	25.45	85	
	V3	3.36	11	207	86	24.10	86	
	V4	3.86	5	231	100	25.67	85	
	V5	3.18	13	192	72	26.20	81	
	V6	3.72	6	225	92	24.70	80	
	V7	3.15	14	187	75	24.80	67	
F2: Medium input (100% NPK)	V1	3.72	6	217	95	26.10	87	6.00
	V2	3.92	4	250	105	26.30	89	3.33
	V3	4.12	1	260	108	25.83	90	10.13
	V4	4.05	2	247	109	26.70	88	2.53
	V5	3.44	9	210	88	27.60	86	3.47
	V6	3.96	3	249	106	25.90	84	3.20
	V7	3.38	10	206	83	26.00	71	3.07
Interaction								
F at same V		NS		NS	NS	NS	NS	
V at same F		NS		NS	NS	NS	NS	
Mean of F level								
F1		3.46	2	210	87	25.09	81	
F2		3.80	1	234	99	26.35	85	4.53
C.D.(0.05)		0.31		13.24	6.61	1.07	0.54	
C.V.(%)		6.44		4.49	5.36	3.12	0.49	
Mean of varieties:								
V1		3.50	5	209	91	25.40	85	6.00
V2		3.80	3	239	100	25.88	87	3.33
V3		3.74	4	234	97	24.97	88	10.13
V4		3.96	1	239	104	26.19	86	2.53
V5		3.31	6	201	80	26.90	83	3.47
V6		3.84	2	237	99	25.30	82	3.20
V7		3.27	7	196	79	25.40	69	3.07
C.D.(0.05)		0.36		28.8	8.1	NS	0.58	
C.V. (%)		8.34		10.89	7.33	5.4	0.58	
Expt. Mean		3.63		222	93	25.72	83	
Soil type		-						
pH		5.80						
F - levels (kg/ha)								
F1		40:20:15						
F2		80:40:30						
Recommended N:P:K (kg/ha)		80:40:30						
Varieties								
V1		IET 30330						
V2		IET 31193						
V3		IET 31185						
V4		IET 31170						
V5		IET 31163						
V6		Sahabhagidhan (NC)						
V7		Local check - BVD1112 (100 days)						
Available N:P:K of soil (kg/ha)		310.34:156:205						

Table 4.1n: Contd.

F-levels	Varieties	REWA							Over all mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle Weight (g)	Test weight (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 50% RDF)		
F1: Low input (50% NPK)	V1	3.53	10	211	2.05	22.51	95		3.88	9
	V2	3.33	14	267	2.10	21.94	92		3.28	14
	V3	3.45	12	233	2.33	23.64	78		3.40	13
	V4	3.63	7	189	1.92	22.83	78		3.49	12
	V5	3.43	13	211	2.30	24.17	94		3.93	8
	V6	3.73	5	278	2.73	24.59	78		3.64	11
	V7	3.92	4	244	2.89	26.06	76		3.79	10
F2: Medium input (100% NPK)	V1	4.12	3	244	3.20	22.90	94	7.87	4.67	2
	V2	3.54	9	267	3.13	22.77	94	2.80	4.11	7
	V3	3.63	7	267	3.30	24.27	89	2.40	4.27	5
	V4	3.53	10	222	2.50	23.17	79	-1.33	4.16	6
	V5	3.71	6	267	3.83	24.77	84	3.73	4.75	1
	V6	4.52	2	244	3.37	24.80	79	10.53	4.40	4
	V7	4.67	1	300	3.23	26.83	78	10.00	4.58	3
Interaction										
F at same V		0.07		NS	0.57	NS	6.09			
V at same F		0.05		NS	0.45	NS	6.41			
Mean of F level										
F1		3.57	2	233	2.33	23.68	84		3.63	2
F2		3.96	1	259	3.22	24.22	85	5.14	4.42	1
C.D.(0.05)		0.07		18.08	0.5	0.32	NS			
C.V.(%)		1.36		5.54	13.52	1.01	1.55			
Mean of varieties:										
V1		3.83	3	228	2.63	22.71	95	7.87	4.28	2
V2		3.44	7	267	2.62	22.36	93	2.80	3.70	7
V3		3.54	6	250	2.82	23.96	84	2.40	3.84	5
V4		3.58	4	206	2.21	23.00	78	-1.33	3.83	6
V5		3.57	5	239	3.07	24.47	89	3.73	4.34	1
V6		4.13	2	261	3.05	24.70	78	10.53	4.02	4
V7		4.30	1	272	3.06	26.45	77	10.00	4.19	3
C.D.(0.05)		0.03		43.08	0.32	0.54	4.53			
C.V. (%)		0.76		14.70	9.56	1.89	4.48			
Expt. Mean		3.77		246	2.78	23.95	85		4.03	
Soil type		-								
pH		-								
F - levels (kg/ha)										
F1		40:20:15								
F2		80:40:30								
Recommended N:P:K (kg/ha)		80:40:30								
Varieties										
V1		IET 30330								
V2		IET 31193								
V3		IET 31185								
V4		IET 31170								
V5		IET 31163								
V6		Sahabgaidhan (NC)								
V7		Local check - IR 64								
Available N:P:K of soil (kg/ha)		-								

4. 1(o) AVT 2 - Rainfed Shallow Lowland

Eight AVT-2cultures (IET 32130, IET 32123 and IET 32124 IET 31237, IET 32121, IET 32122, IET 31204, IET 32131) of rainfed shallow land were evaluated for its response to RDF on grain yield at **Chinsurah (80:40:40)**, **Dhangain (120:60:40)**, **Ghaghraghat (120:60:60)**, and **Titabar (60:20:40)** The entries tested under two levels of RDF (50% and 100% RDF). The details and data received are summarized and presented in **Table 4.1(o)**.

RDF doses of nutrient application significantly influenced the grain yield at all the locations,except **Titabar** The mean maximum increase in grain yield was recorded with 100% RDF (4.05 t/ha) with higher nutrient response ranging from 3.00 to 13.09 kg grain/kg nutrient over 50% RDF at different locations.

Grain yield differences among the tested cultures were significant at **Chinsurah**, **Dhangain**, and **Ghagharaghat**, only wherein IET 32121 (5.33 t/ha) recorded significantly higher grain yield followed by check variety at **Chinsurah** while IET 32123(6.61t/ha) is comparable with Sabour Hira local check (6.58 t/ha) at **Dhangain**; IET 31237 (3.70 t/ha) at **Ghaghraghat** and IET 32124 (5.47 t/ha) were comparable with local checks of respective locations. Interaction effects between cultures and nutrient levels were significant at Chinsurah and **Dhangain**. All the cultivars were found to be promising and significant at 100% RDF over 50% RDF.

In this trial, 100% RDF was found to be promising and also exhibited higher nutrient recovery efficiency. Among the IET cultures, IET 32123 (4.11t/ha) followed by IET 32121 (4.06 t/ha) were found promising in terms of higher mean grain yield and nutrient response and on par with Swarna Sub-1 (4.09 t/ha).

Table 4.1(o): Summary of data on grain yield and ancillary characters of selected AET RSL cultures grown under transplanted conditions at graded levels of recommended fertilizer doses, kharif 2024.

F-levels	Varieties	CHINSURAH				
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
F1: Low input (50% NPK)	V1	4.57	10	288	3.10	
	V2	5.04	5	311	3.26	
	V3	4.23	12	285	3.12	
	V4	4.03	16	275	2.89	
	V5	4.23	12	272	2.88	
	V6	3.87	17	266	2.71	
	V7	4.62	9	280	3.02	
	V8	3.87	17	250	2.56	
	V9	4.83	7	304	3.29	
	V10	3.47	21	235	2.22	
	V11	3.24	22	240	2.52	
F2: Optimum input (100% NPK)	V1	5.31	3	330	3.75	9.25
	V2	5.62	1	350	3.86	7.25
	V3	4.91	6	310	3.55	8.50
	V4	4.50	11	298	3.25	5.88
	V5	4.74	8	317	3.52	6.38
	V6	4.21	14	293	3.35	4.25
	V7	5.11	4	325	3.74	6.13
	V8	4.04	15	314	3.29	2.13
	V9	5.55	2	343	3.55	9.00
	V10	3.73	20	284	3.52	3.25
	V11	3.87	17	271	3.17	7.88
Interaction						
F at same V		0.17		12.1	0.13	
V at same F		0.18		11.66	0.13	
F1		4.42	2	286	3.05	
F2		5.02	1	321	3.59	7.45
C.D.(0.05)		0.03		2.15	0.03	
C.V.(%)		0.63		0.69	1.01	
Mean of varieties:						
V1		4.94	3	309	3.43	9.25
V2		5.33	1	331	3.56	7.25
V3		4.57	5	298	3.34	8.50
V4		4.27	7	287	3.07	5.88
V5		4.49	6	295	3.20	6.38
V6		4.04	8	280	3.03	4.25
V7		4.87	4	303	3.38	6.13
V8		3.96	9	282	2.93	2.13
V9		5.19	2	324	3.42	9.00
V10		3.60	10	260	2.87	3.25
V11		3.56	11	256	2.85	7.88
C.D.(0.05)		0.13		8.56	0.09	
C.V. (%)		2.48		2.5	2.49	
Expt. Mean		4.72		304	3.32	

Table 4.1(o): Contd.

F-levels	Varieties	CHINSURAH				
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
Soil type		Clay loam				
pH		7.10				
N - levels (kg/ha)						
F1		40:20:20				
F2		80:40:40				
Recommended NPK (kg/ha)		80:40:40				
Varieties						
V1		IET 31237				
V2		IET 32121				
V3		IET 32122				
V4		IET 31204				
V5		IET 32131				
V6		IET 32130				
V7		IET 32123				
V8		IET 32124				
V9		Swarna Sub 1 (NC)				
V10		Pooja (ZC)				
V11		Local check - Sujala (140-145 days)				
Available N:P:K of soil (kg/ha)		-				

Table 4.1(o): Contd.

F-levels	Varieties	NRRI, CUTTACK						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days to 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
F1: Low input (50% NPK)	V1	5.08	14	225	4.20	29.20	101	
	V2	5.43	8	229	2.97	31.43	103	
	V3	4.65	22	185	3.13	26.40	104	
	V4	5.58	7	182	3.30	30.80	102	
	V5	5.69	5	281	3.23	30.47	135	
	V6	5.15	13	266	3.30	30.63	135	
	V7	5.82	4	238	3.20	31.63	106	
	V8	4.80	20	263	2.97	30.00	107	
	V9	5.24	11	195	3.17	32.90	104	
	V10	4.84	18	300	3.50	32.53	150	
	V11	4.83	19	206	3.23	25.07	137	
F2: Optimum input (100% NPK)	V1	5.84	3	227	4.60	29.60	111	6.94
	V2	5.18	12	234	3.10	31.70	111	-2.27
	V3	4.71	21	165	3.30	29.77	113	0.61
	V4	6.10	1	241	3.47	30.07	112	4.73
	V5	5.85	2	270	3.57	31.43	140	1.45
	V6	5.27	10	267	3.40	31.07	140	1.09
	V7	5.62	6	193	3.33	32.90	114	-1.82
	V8	4.94	15	358	3.43	30.97	114	1.27
	V9	5.33	9	199	3.47	33.43	113	0.79
	V10	4.90	16	276	3.80	32.27	155	0.58
	V11	4.87	17	244	3.63	27.60	144	0.42
Interaction								
F at same V		1.419		78.44	0.354	4.52	0.229	
V at same F		1.334		80.14	0.300	3.84	0.240	
F1		5.29	2	220	3.37	29.66	109	
F2		5.54	1	227	3.61	30.51	117	2.29
C.D.(0.05)		0.73		20.85	0.24	3.05	0.00	
C.V.(%)		13.16		8.26	6.59	9.42	0.00	
Mean of varieties:								
	V1	5.46	4	226	4.40	29.40	106	6.94
	V2	5.31	5	232	3.03	31.57	107	-2.27
	V3	4.68	11	175	3.22	28.08	109	0.61
	V4	5.84	1	212	3.38	30.43	107	4.73
	V5	5.77	2	276	3.40	30.95	138	1.45
	V6	5.21	7	267	3.35	30.85	138	1.09
	V7	5.72	3	216	3.27	32.27	110	-1.82
	V8	4.87	8	311	3.20	30.48	111	1.27
	V9	5.28	6	197	3.32	33.17	109	0.79
	V10	4.87	9	288	3.65	32.40	153	0.58
	V11	4.85	10	225	3.43	26.33	141	0.42
C.D.(0.05)		0.94		56.67	0.21	2.71	0.00	
C.V. (%)		15.36		20.37	5.31	7.62	0.12	
Expt. Mean		5.41		224	3.49	30.09	113	

Table 4.1(o): Contd.

F-levels	Varieties	NRRI, CUTTACK						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days to 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
Soil type		-						
pH		-						
N - levels (kg/ha)								
F1		60:30:20						
F2		120:60:40						
Recommended NPK (kg/ha)		120:60:40						
Varieties								
V1		IET 31237						
V2		IET 32121						
V3		IET 32122						
V4		IET 31204						
V5		IET 32131						
V6		IET 32130						
V7		IET 32123						
V8		IET 32124						
V9		Swarna Sub 1 (NC)						
V10		Pooja (ZC)						
V11		Local check -						
Available N:P:K of soil (kg/ha)		-						

Table 4.1(o): Contd.

F-levels	Varieties	DHANGAIN						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days to 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
F1: Low input (50% NPK)	V1	5.27	16	227	2.84	28.93	113	
	V2	5.48	13	234	3.27	19.87	113	
	V3	5.02	17	221	2.74	20.80	113	
	V4	4.39	21	209	2.51	22.93	114	
	V5	4.77	20	215	2.66	20.73	122	
	V6	5.54	11	246	3.53	20.60	123	
	V7	5.59	10	248	4.25	20.33	114	
	V8	5.54	11	238	3.31	19.47	115	
	V9	4.95	18	219	2.74	21.40	113	
	V10	3.97	22	192	676.18	17.60	121	
	V11	5.46	15	228	2.88	21.13	116	
F2: Optimum input (100% NPK)	V1	6.86	6	233	3.13	31.13	115	14.45
	V2	7.26	5	239	3.30	19.87	113	16.18
	V3	6.48	8	226	2.93	21.40	114	13.27
	V4	5.48	13	211	2.83	23.27	115	9.91
	V5	6.05	9	221	2.90	21.53	124	11.64
	V6	7.47	3	250	3.66	22.07	124	17.55
	V7	7.63	2	252	5.02	24.33	116	18.55
	V8	7.44	4	247	3.37	20.67	116	17.27
	V9	6.81	7	221	2.92	25.40	115	16.91
	V10	4.85	19	206	2.51	20.20	123	8.00
	V11	7.69	1	236	3.29	21.60	119	20.27
Interaction								
F at same V		0.6		NS	NS	2.06	0.76	
V at same F		0.59		NS	NS	1.26	0.75	
F1		4.99	2	221	2.80	22.65	115	
F2		6.43	1	226	3.02	23.44	116	13.09
C.D.(0.05)		0.28		NS	NS	NS	0.34	
C.V.(%)		4.44		8.14	736.5	9.28	0.28	
Mean of varieties:								
	V1	6.07	6	230	2.99	30.03	114	14.45
	V2	6.37	5	237	3.29	19.87	113	16.18
	V3	5.75	8	223	2.84	21.10	114	13.27
	V4	4.94	10	210	2.67	23.10	114	9.91
	V5	5.41	9	218	2.78	21.13	123	11.64
	V6	6.51	3	248	3.60	21.34	124	17.55
	V7	6.61	1	250	4.64	22.33	115	18.55
	V8	6.49	4	243	3.34	20.07	116	17.27
	V9	5.88	7	220	2.83	23.40	114	16.91
	V10	4.41	11	199	339.35	18.90	122	8.00
	V11	6.58	2	232	3.09	21.37	118	20.27
C.D.(0.05)		0.42		28.44	NS	0.89	0.53	
C.V. (%)		6.06		10.68	736.6	3.46	0.39	
Expt. Mean		5.71		224	2.91	23.05	116	

Table 4.1(o): Contd.

F-levels	Varieties	DHANGAIN						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days to 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
Soil type		Clay loam						
pH		6.56						
N - levels (kg/ha)								
F1		60:30:20						
F2		120:60:40						
Recommended NPK (kg/ha)		120:60:40						
Varieties								
V1		IET 31237						
V2		IET 32121						
V3		IET 32122						
V4		IET 31204						
V5		IET 32131						
V6		IET 32130						
V7		IET 32123						
V8		IET 32124						
V9		Swarna Sub 1 (NC)						
V10		Pooja (ZC)						
V11		Local check - Sabour Hira (150-155 days)						
Available N:P:K of soil (kg/ha)		347.5:48.3:262.2						

Table 4.1(o): Contd.

F-levels	Varieties	GHAGHRAGHAT						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days to 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
F1: Low input (50% NPK)	V1	3.59	11	130	3.70	23.47	117	
	V2	3.24	18	134	3.67	24.53	116	
	V3	3.48	12	162	3.30	21.53	124	
	V4	3.39	15	127	3.77	24.50	120	
	V5	3.15	20	136	3.27	21.20	115	
	V6	3.22	19	113	3.50	21.90	133	
	V7	3.40	14	121	3.30	22.20	123	
	V8	3.32	17	121	3.37	20.30	124	
	V9	3.71	10	120	3.37	22.60	120	
	V10	-	-	-	-	-	-	
	V11	3.38	16	124	3.30	21.03	124	
F2: Optimum input (100% NPK)	V1	3.93	5	120	3.80	23.63	122	3.09
	V2	4.05	1	139	3.70	24.27	118	7.36
	V3	3.96	3	130	3.07	21.97	123	4.36
	V4	4.03	2	134	3.80	24.37	116	5.82
	V5	3.46	13	142	3.27	21.10	124	2.82
	V6	3.91	6	124	3.37	21.70	119	6.27
	V7	3.84	7	138	3.63	22.33	125	4.00
	V8	3.77	8	122	3.40	21.13	117	4.09
	V9	3.74	9	144	3.43	21.67	127	0.27
	V10	-	-	-	-	-	-	
	V11	3.94	4	142	3.40	21.27	127	5.09
Interaction								
<i>F at same V</i>		NS		NS	NS	NS	NS	
<i>V at same F</i>		NS		NS	NS	NS	NS	
F1		3.37	2	138	3.54	23.05	118	
F2		3.89	1	133	3.53	23.07	121	4.69
C.D.(0.05)		0.43		NS	NS	NS	NS	
C.V.(%)		10.75		7.69	2.07	3.67	4.16	
Mean of varieties:								
	V1	3.76	1	125	3.75	23.55	120	3.09
	V2	3.65	6	137	3.69	24.40	117	7.36
	V3	3.72	3	146	3.19	21.75	124	4.36
	V4	3.71	4	130	3.79	24.44	118	5.82
	V5	3.31	10	139	3.27	21.15	119	2.82
	V6	3.57	8	119	3.44	21.80	126	6.27
	V7	3.62	7	130	3.47	22.27	124	4.00
	V8	3.55	9	122	3.39	20.72	120	4.09
	V9	3.73	2	132	3.40	22.14	123	0.27
	V10	-	-	-	-	-	-	
	V11	3.66	5	133	3.35	21.15	125	5.09
C.D.(0.05)		NS		24.88	0.3	1.18	NS	
C.V. (%)		6.93		16.19	7.28	4.5	6.32	
Expt. Mean		3.63		135	3.54	23.06	120	

Table 4.1(o): Contd.

F-levels	Varieties	GHAGHRAGHAT						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days to 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
	Soil type	Sand32.2;Silt:48.6 & Clay:16.2						
	pH	7.40						
	N - levels (kg/ha)							
	F1	60:30:20						
	F2	120:60:40						
	Recommended NPK (kg/ha)	120:60:40						
	Varieties							
	V1	IET 31237						
	V2	IET 32121						
	V3	IET 32122						
	V4	IET 31204						
	V5	IET 32131						
	V6	IET 32130						
	V7	IET 32123						
	V8	IET 32124						
	V9	Swarna Sub 1 (NC)						
	V10	-						
	V11	Local check - BPT 5204						
	Available N:P:K of soil (kg/ha)	200:24:234						

Table 4.1(o): Contd.

F-levels	Varieties	TITABAR							Over all mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days to 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)		
F1: Low input (50% NPK)	V1	4.53	12	265	4.97	20.90	121		3.84	14
	V2	5.40	1	245	3.57	21.80	124		4.10	12
	V3	4.67	10	249	3.87	23.60	131		3.67	18
	V4	4.90	7	244	2.83	24.33	110		3.72	17
	V5	4.20	15	254	2.63	22.97	110		3.67	19
	V6	4.73		229	2.80	24.77	129		3.75	15
	V7	5.27		282	2.60	19.50	125		4.12	11
	V8	4.77		246	2.57	20.87	123		3.72	16
	V9	5.33		277	3.23	20.63	123		4.01	13
	V10								3.07	22
	V11	4.27		240	4.57	23.97	105		3.53	20
F2: Optimum input (100% NPK)	V1	5.20	4	255	4.60	20.60	125	11.17	4.52	3
	V2	4.50	13	259	4.63	22.40	125	-15.00	4.44	4
	V3	5.20	4	256	3.50	20.20	133	8.83	4.21	7
	V4	5.03	6	237	4.23	23.93	110	2.17	4.19	8
	V5	4.67	10	292	4.23	22.87	110	7.83	4.13	10
	V6	5.27		268	3.50	25.13	131	9.00	4.36	5
	V7	5.67		296	2.83	21.33	126	6.67	4.65	1
	V8	5.17		271	2.30	20.73	125	6.67	4.23	6
	V9	5.97		278	3.47	21.77	121	10.67	4.57	2
	V10								3.37	21
	V11	4.53		250	4.70	25.73	105	4.33	4.15	9
Interaction										
F at same V		NS		NS	0.74	0.91	1.25			
V at same F		NS		NS	0.73	0.81	1.21			
F1		4.74	2	251	3.57	22.72	119		3.80	2
F2		4.92	1	260	4.24	22.00	121	3.00	4.30	1
C.D.(0.05)		NS		NS	0.32	NS	0.63			
C.V.(%)		7.7		6.61	8.05	2.44	0.47			
Mean of varieties:										
	V1	4.87	8	260	4.79	20.75	123	11.17	4.18	4
	V2	4.95	6	252	4.10	22.10	124	-15.00	4.27	3
	V3	4.94	7	252	3.69	21.90	132	8.83	3.94	8
	V4	4.97	5	241	3.53	24.13	110	2.17	3.95	7
	V5	4.44	9	273	3.43	22.92	110	7.83	3.90	9
	V6	5.00	3	249	3.15	24.95	130	9.00	4.05	5
	V7	5.47	2	289	2.72	20.42	126	6.67	4.38	1
	V8	4.97	4	258	2.44	20.80	124	6.67	3.97	6
	V9	5.65	1	277	3.35	21.20	122	10.67	4.29	2
	V10	-		-	-	-	-		3.22	11
	V11	4.40	10	245	4.64	24.85	105	4.33	3.84	10
C.D.(0.05)		0.63		16.94	0.52	0.58	0.86			
C.V. (%)		10.89		5.57	12.3	2.2	0.61			
Expt. Mean		4.83		256	3.91	22.36	120		4.05	

Table 4.1(o): Contd.

F-levels	Varieties	TITABAR							Over all mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days to 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)		
Soil type pH N - levels (kg/ha) F1 F2 Recommended NPK (kg/ha) Varieties V1 V2 V3 V4 V5 V6 V7 V8 V9 V10 V11 Available N:P:K of soil (kg/ha)	Soil type	Clay loam								
	pH	5.70								
	N - levels (kg/ha)									
	F1	30:10:20								
	F2	60:20:40								
	Recommended NPK (kg/ha)	60:20:40								
	Varieties									
	V1	IET 31237								
	V2	IET 32121								
	V3	IET 32122								
	V4	IET 31204								
	V5	IET 32131								
	V6	IET 32130								
	V7	IET 32123								
	V8	IET 32124								
	V9	Swarna Sub 1 (NC)								
	V10	-								
	V11	Local check - Numoli m (130-135 days)								
	Available N:P:K of soil (kg/ha)	-								

4. 1(p) AVT 2 - Semi-Deep Water

The grain yield performance of SDW cultures and response to nutrient levels of three selected IET cultures (IET 29031, IET 29026 and IET 31258) were evaluated against two standard checks (CR Dhan 506, Rajashree) at three locations viz., **Chinsurah (80:40:40)**, **Ghaghrahat(120:60:40)** and **Pusa (150:80:50)**. The data received from these locations are summarized and presented in **Table 4.1(p)**.

The cultivars differed significantly for grain yield at both the locations (**Chinsurah** and **Pusa**). The mean maximum grain yield was recorded by IET 29026 at **Chinsurah** (5.03 t/ha) and **Pusa** (3.76 t/ha). The performance of standard checks was at par to test cultures at **Ghaghrahat** both the locations. No significant difference was observed at **Ghaghrahat**.

RDF dose significantly influenced the grain yield at **Ghaghrahat**, **Chinsurah** and **Pusa** locations and the increase in grain yield with 100% of RDF was to the tune of 36%. Interaction effects between cultivars RDF dose for grain yield were non-significant at all locations.

In this trial, IET 29031, IET 29026 IET 31258 cultures were evaluated against high yielding standard checks (CR Dhan 506 and Rajashree) at three locations. Over the locations, maximum grain yield was recorded by IET 29031 (4.41 t/ha) followed by IET 29026 (4.31 t/ha) and are suitable at 100% of RDF among the tested cultures.

Table 4.1p: Summary of data on grain yield and ancillary characters of selected AVT-2 AET SDW cultures grown under transplanted conditions at graded levels of recommended fertilizer doses, kharif 2024.

F-levels	Varieties	CHINSURAH						Nutri. res. (kg grain/ kg Nutri.) (Base level 100% RDF)
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle (g)	wt	Days to 50% flowering	
F1: Low input (50% NPK)	V1	4.38	7	250	2.97		131	
	V2	4.45	6	294	2.85		131	
	V3	3.53	10	216	2.75		138	
	V4	3.98	8	250	2.89		130	
	V5	3.61	9	262	2.77		130	
F2: Optimum input (100% NPK)	V1	5.4	2	335	3.55		134	12.75
	V2	5.61	1	340	3.93		134	14.50
	V3	4.67	5	263	2.98		138	14.25
	V4	5.28	3	328	3.34		131	16.25
	V5	5.04	4	305	3.21		130	17.88
Interaction								
N at same V		NS		11.86	0.12		NS	
V at same N		NS		10.81	0.13		NS	
F1		3.99	2	254	2.85		132	
F2		5.20	1	314	3.40		133	15.13
C.D.(0.05)		0.04		2.63	0.02		NS	
C.V.(%)		0.55		0.59	0.44		1.89	
Mean of varieties:								
	V1	4.89	2	293	3.26		133	12.75
	V2	5.03	1	317	3.39		133	14.50
	V3	4.10	5	240	2.87		138	14.25
	V4	4.63	3	289	3.12		131	16.25
	V5	4.33	4	284	2.99		130	17.88
C.D.(0.05)		0.14		8.39	0.09		3.51	
C.V.(%)		2.45		2.41	2.38		2.16	
Expt. Mean		4.60		284	3.12		133	
Soil type		Clay loam						
pH		7.2						
F - levels (kg/ha)								
	F1	40:20:20						
	F2	80:40:40						
Recomd NPK (kg/ha)		80:40:40						
Varieties								
	V1	IET 29031						
	V2	IET 29026						
	V3	IET 31258						
	V4	NC: CR Dhan 506						
	V5	Local check - Rajdeep (150-155 d)						
Available NPK of soil (kg/ha)		-						

Table 4.1p: Contd.

F-levels	Varieties	NRRI, CUTTACK						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days to 50% flowering	Nutri. res. (kg grain/ kg Nutri.) (Base level 100% RDF)
F1: Low input (50% NPK)	V1	4.28	10	269	4.61	30.53	103	
	V2	4.70	8	332	4.15	25.43	105	
	V3	5.85	2	427	4.64	33.40	87	
	V4	4.95	5	298	5.88	26.03	105	
	V5	4.82	7	301	4.20	23.30	107	
F2: Optimum input (100% NPK)	V1	4.41	9	297	4.80	30.97	101	1.16
	V2	4.88	6	325	4.21	26.40	103	1.67
	V3	6.01	1	433	4.75	33.90	82	1.45
	V4	5.14	3	311	6.15	27.77	107	1.75
	V5	4.99	4	361	4.37	24.27	108	1.55
Interaction								
N at same V		0.29		35.34	0.55	1.61	3.66	
V at same N		0.25		26.44	0.36	1.45	3.60	
F1		4.92	2	325	4.69	27.74	101	
F2		5.09	1	345	4.86	28.66	100	1.52
C.D.(0.05)		0.21		29.14	0.49	1.08	1.99	
C.V.(%)		2.67		5.53	6.55	2.43	1.25	
Mean of varieties:								
V1		4.35	5	283	4.70	30.75	102	1.16
V2		4.79	4	329	4.18	25.92	104	1.67
V3		5.93	1	430	4.70	33.65	85	1.45
V4		5.05	2	305	6.02	26.90	106	1.75
V5		4.91	3	331	4.29	23.78	108	1.55
C.D.(0.05)		0.18		18.70	0.25	1.02	2.54	
C.V.(%)		2.91		4.56	4.30	2.97	2.06	
Expt. Mean		5.00		335	4.78	28.20	101	
Soil type		-						
pH		-						
F - levels (kg/ha)								
F1		60:30:20						
F2		120:60:40						
Recomd NPK (kg/ha)		120:60:40						
Varieties								
V1		IET 29031						
V2		IET 29026						
V3		IET 31258						
V4		NC: CR Dhan 506						
V5		Local check -						
Available NPK of soil (kg/ha)		-						

Table 4.1p: Contd.

F-levels	Varieties	GHAGHRAGHAT						
		Grain Yield (t/ha)	<i>Rank</i>	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days to 50% flowering	Nutri. res. (kg grain/ kg Nutri.) (Base level 100% RDF)
F1: Low input (50% NPK)	V1	3.39	8	110	3.77	24.50	122	
	V2	3.59	6	120	3.70	23.47	119	
	V3	3.48	7	112	3.40	21.53	109	
	V4	3.38	9	104	3.30	21.03	120	
	V5	3.22	10	101	3.50	21.90	118	
F2: Optimum input (100% NPK)	V1	3.89	5	115	3.80	24.47	126	4.55
	V2	3.93	3	111	3.80	24.40	126	3.09
	V3	3.96	1	114	3.27	22.27	127	4.36
	V4	3.94	2	101	3.40	21.27	138	5.09
	V5	3.91	4	102	3.17	21.70	129	6.27
Interaction								
<i>N at same V</i>		NS		NS	NS	NS	NS	
<i>V at same N</i>		NS		NS	NS	NS	NS	
F1		3.41	2	109	3.53	22.49	118	
F2		3.93	1	109	3.49	22.82	129	4.67
C.D.(0.05)		0.15		NS	NS	NS	NS	
C.V.(%)		2.59		4.5	7.87	3.01	14.35	
Mean of varieties:								
V1		3.64	4	113	3.79	24.49	124	4.55
V2		3.76	1	116	3.75	23.94	122	3.09
V3		3.72	2	113	3.34	21.90	118	4.36
V4		3.66	3	103	3.35	21.15	129	5.09
V5		3.57	5	101	3.34	21.80	124	6.27
C.D.(0.05)		NS		10.85	0.26	1.21	NS	
C.V.(%)		5.7		8.13	6.11	4.35	7.03	
Expt. Mean		3.67		109	3.51	22.65	123	
Soil type		Sand loam						
pH		7.4						
F - levels (kg/ha)								
F1		60:30:20						
F2		120:60:40						
Recomd NPK (kg/ha)		120:60:40						
Varieties								
V1		IET 29031						
V2		IET 29026						
V3		IET 31258						
V4		NC: CR Dhan 506						
V5		Local check - NDGR702						
Available NPK of soil (kg/ha)		200:24:234						

Table 4.1p: Contd.

F-levels	Varieties	KARIM						
		Grain Yield (t/ha)	<i>Rank</i>	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days to 50% flowering	Nutri. res. (kg grain/ kg Nutri.) (Base level 100% RDF)
F1: Low input (50% NPK)	V1	4.70	6	256	5.08	22.20	118	
	V2	4.60	8	255	4.97	19.83	117	
	V3	3.41	10	250	4.36	18.60	117	
	V4	5.14	4	267	5.92	27.07	117	
	V5	5.71	2	271	6.10	27.20	118	
F2: Optimum input (100% NPK)	V1	5.08	5	261	5.15	22.77	117	3.49
	V2	4.65	7	258	5.04	19.93	118	0.43
	V3	4.20	9	257	4.42	19.20	117	7.18
	V4	5.44	3	274	5.96	27.20	118	2.73
	V5	5.79	1	284	6.17	27.53	118	0.68
Interaction								
<i>N at same V</i>		0.04		5.33	0.07	1.12	1.46	
<i>V at same N</i>		0.05		5.03	0.07	0.63	1.53	
F1		4.71	2	260	5.29	22.98	117	
F2		5.03	1	267	5.35	23.33	118	2.91
C.D.(0.05)		0.01		3.26	0.03	1.04	0.57	
C.V.(%)		0.06		0.79	0.30	2.87	0.31	
Mean of varieties:								
	V1	4.89	3	259	5.12	22.48	118	3.49
	V2	4.63	4	257	5.01	19.88	118	0.43
	V3	3.80	5	254	4.39	18.90	117	7.18
	V4	5.29	2	271	5.94	27.13	118	2.73
	V5	5.75	1	278	6.14	27.37	118	0.68
C.D.(0.05)		0.03		3.55	0.05	0.44	1.08	
C.V.(%)		0.54		1.10	0.79	1.56	0.75	
Expt. Mean		4.87		263	5.32	23.15	118	
Soil type		-						
pH		-						
F - levels (kg/ha)								
	F1	60:30:20						
	F2	120:60:40						
Recomd NPK (kg/ha)		120:60:40						
Varieties								
	V1	IET 29031						
	V2	IET 29026						
	V3	IET 31258						
	V4	NC: CR Dhan 506						
		Local check						
	V5	-						
Available NPK of soil (kg/ha)		-						

Table 4.1p: Contd.

F-levels	Varieties	PUSA							Over all mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days to 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)		
F1: Low input (50% NPK)	V1	3.6	7	279	2.46	22.31	125		4.07	9
	V2	3.04	8	251	2.41	22.63	128		4.08	8
	V3	2.79	10	218	2.32	22.80	131		3.81	10
	V4	2.99	9	256	2.47	22.79	123		4.09	7
	V5	3.63	6	284	2.67	22.62	109		4.20	6
F2: Optimum input (100% NPK)	V1	5.73	1	318	3.56	23.38	121	15.21	4.90	3
	V2	5.22	4	300	3.34	23.34	125	15.57	4.86	4
	V3	4.97	5	293	3.04	23.30	129	15.57	4.76	5
	V4	5.31	3	307	3.22	23.56	120	16.57	5.02	2
	V5	5.72	2	320	3.66	23.62	105	14.93	5.09	1
Interaction										
N at same V		NS		NS	NS	NS	NS			
V at same N		NS		NS	NS	NS	NS			
F1		3.21	2	258	2.47	22.63	123		4.05	2
F2		5.39	1	308	3.36	23.44	120	15.57	4.93	1
C.D.(0.05)		0.94		32.56	0.26	0.16	1.6			
C.V.(%)		13.89		7.33	5.73	0.43	0.84			
Mean of varieties:										
	V1	4.67	2	299	3.01	22.85	123	15.21	4.49	3
	V2	4.13	4	276	2.88	22.99	127	15.57	4.47	4
	V3	3.88	5	256	2.68	23.05	130	15.57	4.29	5
	V4	4.15	3	282	2.85	23.18	122	16.57	4.56	2
	V5	4.68	1	302	3.17	23.12	107	14.93	4.64	1
C.D.(0.05)		0.3		27.56	0.2	NS	2.09			
C.V.(%)		5.77		7.96	5.51	0.91	1.4			
Expt. Mean		4.30		283	2.92	23.04	122		4.49	
Soil type		Sandy loam								
pH		8.5								
F - levels (kg/ha)										
F1		75:40:25								
F2		150:80:50								
Recomd NPK (kg/ha)		150:80:50								
Varieties										
V1		IET 29031								
V2		IET 29026								
V3		IET 31258								
V4		NC: CR Dhan 506								
V5		Local check - Rajshree(150-155 days)								
Available NPK of soil (kg/ha)		186:25.2:125								

4.1q AET – AVT 2 Boro

The grain yield performance of one boro culture IET 29624 and its response to nutrient levels was evaluated against one standard check (Swarna) along with one local check (Naveen) under two graded levels of nutrient (50 and 100% of recommended dose of nutrient) at **NRRI Cuttack** during 2023-24 *boro* season. The data received this location is summarized and presented in **Table 4.1q**.

The cultures differed significantly for grain yield at **NRRI Cuttack** location. The mean maximum grain yield was recorded by standard check Swarna (5.87 t/ha) and IET 29624 (4.41 t/ha) was not on par with the standard check in terms of grain yield and grain yield efficiency index.

RDF doses significantly influenced the grain yield and the increase in grain yield with 100% of RDF was 25% with better nutrient response of 5.74 kg grain/kg nutrient. Interaction effects between cultivars x RDF levels for grain yield was non-significant.

In this trial, one IET 29624 and its response to nutrient levels was evaluated against one standard check (Swarna) along with one local check (Naveen) under two graded levels of nutrient (50 and 100% of recommended dose of nutrient) at **NRRI Cuttack**. The maximum grain yield was recorded by standard check Swarna (5.87 t/ha) and found promising over IET 29624 at 100% of RDF application.

Table 4.1(q): Summary of data on grain yield and ancillary characters of selected AET BORO cultures grown under transplanted conditions at graded levels of fertilizer doses, Boro season 2023-24.

F-levels	Varieties	NRRI CUTTACK						
		Grain Yield (t/ha)	Rank	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days 50% flowering	Nutri. res. (kg grain/kg Nutri.) (Base level 100% RDF)
F1	V1	4.10	6	640	1.09	20.17	117	
	V2	5.64	2	372	2.66	23.89	116	
	V3	4.42	5	355	2.17	22.70	91	
F2	V1	4.71	4	701	1.28	22.27	121	6.78
	V2	6.09	1	410	3.21	25.80	119	5.00
	V3	4.91	3	399	2.37	24.57	92	5.44
Interaction								
F at same V		NS		NS	0.2	NS	NS	
V at same F		NS		NS	0.27	NS	NS	
F1		4.72	2	456	1.97	22.25	108	
F2		5.24	1	503	2.29	24.21	111	5.74
C.D.(0.05)		NS		15.63	0.28	1.44	1.26	
C.V.(%)		5.81		1.61	6.48	3.07	0.57	
Mean of varieties:								
	V1	4.41	3	671	1.19	21.22	119	6.78
	V2	5.87	1	391	2.94	24.85	118	5.00
	V3	4.67	2	377	2.27	23.64	91	5.44
C.D.(0.05)		0.76		43.58	0.14	1.38	1.65	
C.V. (%)		11.43		6.83	4.96	4.45	1.13	
Expt. Mean		4.98		480	2.13	23.23	109	
Soil type		-						
pH		-						
F - levels (kg/ha)								
	F1	50:20:20						
	F2	100:40:40						
Recommended N:P:K (kg/ha)		100:40:40						
Varieties								
	V1	IET 29624						
	V2	Swarna (NC)						
	V3	Naveen (LC)						
Available N:P:K of soil (kg/ha)		182:24:235						

4.1(r) Grain Yield Efficiency Index values (GYEI):

Grain yield is the best measure for evaluation of given genotype in the screening experiments for its efficiency. Further, field screening results can be interpreted using the grain yield efficiency index (GYEI) for identifying efficient, stable, suitable and promising cultures at various levels of nutrient application.

Grain yield efficiency Index (GYEI) was computed for genotype evaluation using the following formula in the present Nitrogen variety evaluation trial.

$$\text{GYEI} = \frac{(\text{Yield at low nutrient level}) (\text{Yield at high nutrient level})}{(\text{Experimental mean yield at low nutrient level}) \times (\text{Experimental mean yield at high nutrient level})}$$

Tolerant genotypes have a (GYEI) of 1 or higher and the susceptible ones have a GYEI in the range of 0 to 0.50 and the genotypes between these two limits (0.50 to 1.00) are considered intermediate types. The results of these trials, if utilized meticulously not only aid to develop promising cultivars but also to reduce the cost of cultivation in rice production.

Based on the GYEI values few promising cultivars identified in different groups is furnished below:

Based on the Grain yield efficiency index GYEI values (stable and efficient genotypes), the identified cultures were viz., IET 30513 (1.11) in AVT-2 EH; IET 30641 (1.14), IET 30636 (1.08), IET 30565 (1.15), IET 30555 (1.09), IET 30561 (1.12), IET 30657 (1.11), IET 30642 (1.12), IET 30656 (1.06), IET 30669 (1.11) and IET 30690 (1.21) in AVT-2 E-TP; IET 30330 (1.13) and IET 31163 (1.16) in AVT-2 E(DS); IET 30704 (1.05), IET 30574 (1.26), IET 30575 (1.07), IET 30577 (1.09), IET 30587 (1.08), IET 30593 (1.10), IET 30578 (1.31), IET 30589 (1.17), IET 30579 (1.13) and IET 30576 (1.00) in AVT-2 IME; IET 30608 (1.12), IET 30603 (1.16), IET 30604 (1.13), IET 30605 (1.14) and IET 30613 (1.11) in AVT-IM; IET 31053 (1.01), IET 31051 (1.09), IET 31045 (1.21), IET 31044 (1.01) and IET 32052 (1.08) in AL&ISTVT; IET 30919 (1.28) in AVT-2 Aerobic; IET 30957 (1.23), IET 30961 (1.30), IET 31001 (1.15) and IET 29019 (1.25) in AVT-2 MS; IET 32055 (1.09), IET 32054 (1.20), IET 32051 (1.24), IET 32074 (1.29), IET 32064 (1.06) and IET 32052 (1.09) in AVT-2 NIL; 1914 (1.06), 1915 (1.05), 1916 (1.11), 1917 (1.09), 1919 (1.08), 1921 (1.13) and 1925 (1.13) in AVT-2 BT; IET 29031 (1.00) in AVT-2 SDW; IET 31237 (1.06), IET 32121 (1.11), IET 32130 (1.00) and IET 32123 (1.17) in AVT-2 RSL; IET 31110 (1.01), IET 31105 (1.14), IET 28070 (1.15), IET 31103 (1.21), IET 31098 (1.34), IET 29560 (1.00) and IET 31096 (1.12) in AVT-2 LPT; IET 31134 (1.21), IET 31135 (1.35), IET 31120 (1.16), IET 31119 (1.05), IET 30269 (1.06), IET 31128 (1.10), IET 31124 (1.34), IET 29581 (1.00) and IET 31004 (1.39) in AVT-2 LNT were identified as higher nutrient use and efficient cultures during Kharif 2024. These cultures can be recommended for low input management.

Table. 4.1(r): Identification of cultures based on the GYEI values in different groups of cultivars.

AVT-2 MH (Irrigated)			AVT-2 E-TP			AVT-2 E-DS			AVT-2-IME (TP)		
Nutrient-Level	Varieties	GYEI	Nutrient-Level	Varieties	GYEI	Nutrient-Level	Varieties	GYEI	Nutrient-Level	Varieties	GYEI
F2	IET 29654	0.81	F2	IET 30641	1.14	F2	IET 30330	1.13	F2	IET 30704	1.05
	IET 30513	1.11		IET 30651	0.84		IET 31193	0.84		IET 30574	1.26
	Maniphace 1(NE)	2.95		IET 30636	1.08		IET 31185	0.90		IET 30575	1.07
	Vivek Dhan 62	0.91		IET 30565	1.15		IET 31170	0.91		IET 30577	1.09
	VL Dhan 65	2.91		IET 30555	1.09		IET 31163	1.16		IET 30587	1.08
	Local Check	0.97		IET 30561	1.12		Sahabgaidhan (NC)	1.00		IET 30593	1.10
				IET 30657	1.11		Local check	1.08		IET 30573	0.64
				IET 30642	1.12					IET 30756	0.81
				IET 30656	1.06					IET 30578	1.31
				IET 30669	1.11					IET 30589	1.17
				IET 30690	1.21					IET 30579	1.13
				CO-51 (NC)	0.82					IET 30576	1.00
				PR 124 (N)	0.96					IET 32043 (GEL)	0.84
				Narendra 97(E)	0.62					IET 32045 (NIL)	0.78
				Luit (NE)	0.66					Gontra Bidhan-3 (NC);	0.99
				MTU 1153 (S)	1.07					PR 113 (N),	0.88
				Local Check	1.07					Lalat (E & NE),	0.82
										Karjat-7 (W),	0.35
										MTU 1010 (C&S),	0.67
										US 312	1.12
										Krishna	0.81
										Hamsa(RP)	0.87
										Local check	
	Mean	1.61		Mean	1.01		Mean	0.99		Mean	0.95

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AVT-2 IM (TP)			AL & ISTVT		AVT-2 Aerobic		AVT-2 MS	
Nutrient-Level	Varities	GYEI	Nutrient-Level	Varities	GYEI	Nutrient-Level	Varities	GYEI
F2	IET 30608	1.12	F2	IET 31055	0.91	F2	IET 30919	1.28
	IET 30603	1.16		IET 31053	1.01		CR Dhan 201(NC)	0.91
	IET 30604	1.13		IET 31050	0.80		CR Dhan 202 (N, E, NE & C)	0.73
	IET 30605	1.14		IET 31048	0.89		AAUDR-1 (W)	0.49
	IET 30819	0.92		IET 31080	0.85		MAS 946-1 (S)	0.95
	IET 30613	1.11		IET 31051	1.09		DRR Dhan 54	1.04
	IET 32047 (NIL)	0.81		IET 31045	1.21		DRRH 4	1.24
	NC- NDR 359	0.91		IET 31044	1.01		Local check	1.26
	PR121 (N)	0.89		IET 32053	0.82			
	CR Dhan 300 (E & NE)	0.91		IET 32052	1.08			
	Karma Mahsuri (C)	0.89		IET 32055	0.92			
	Akshaydhan (W)	0.92		IET 32056	0.85			
	Jaya (S)	0.59		CSR-36	1.36			
	HRI 174	0.95		CSR-10	0.93			
	WGL 14(RP)	0.84		FL 478	0.82			
Hybrid Check	0.88	CSR-23	0.94					
Local check	1.14	Pusa-44	0.96					
		Local check	1.78					
Mean		0.96	Mean		1.01	Mean		0.99
							Mean	0.93

Table. 4.1(r): Cntd...

AVT-2 NIL			AVT-2 BT			AVT-2 SDW			AVT-2 RSL			AVT-2 BORO		
Nutrient-Level	Varieties	GYEI	Nutrient-Level	Varieties	GYEI	Nutrient-Level	Varieties	GYEI	Nutrient-Level	Varieties	GYEI	Nutrient-Level	Varieties	GYEI
F2	IET 32055	1.09	F2	1914	1.06	F2	IET 29031	1.00	F2	IET 31237	1.06	F2	IET 29624	0.78
	IET 32059	0.75		1915	1.05		IET 29026	0.99		IET 32121	1.11		Swarna (NC)	1.39
	IET 32060	0.94		1916	1.11		IET 31258	0.91		IET 32122	0.95		Local check	0.88
	IET 32063	0.83		1917	1.09		NC: CR Dhan 506	1.03		IET 31204	0.95			
	IET 32056	0.94		1918	0.99		Local check	1.07		IET 32131	0.93			
	IET 32062	0.95		1919	1.08					IET 32130	1.00			
	IET 32054	1.20		1920	0.94					IET 32123	1.17			
	IET 32061	0.92		1921	1.13					IET 32124	0.96			
	IET 32058	0.86		1922	0.92					Swarna Sub 1 (NC)	1.12			
	IET 32051	1.24		1923	0.82					Poolja (ZC)	0.63			
	IET 32074	1.29		1924	0.99					Local check	0.90			
	IET 32064	1.06		1925	1.13									
	IET 32065	0.98		1926	0.74									
	IET 32052	1.09		1927	0.96									
	IET 32053	0.98		Local check	1.03									
	Local check	1.48												
	Mean	1.04		Mean	1.00		Mean	1.00		Mean	0.98		Mean	1.02

Table. 4.1(r): Cntd...

AVT-2 LPT						Mean GYEI of P2 & P3	Rank
Nutrient- Level	Varieties	GYEI	Nutrient- Level	Varieties	GYEI		
P2	IET 31106	0.89	P3	IET 31106	0.99	0.94	10
	IET 31110	1.01		IET 31110	1.01	1.01	6
	IET 31097	1.01		IET 31097	0.98	0.99	8
	IET 31102	0.97		IET 31102	0.97	0.97	9
	IET 31105	1.17		IET 31105	1.12	1.14	4
	IET 28070	1.14		IET 28070	1.17	1.15	3
	IET 31103	1.21		IET 31103	1.22	1.21	2
	IET 31098	1.29		IET 31098	1.40	1.34	1
	IET 31108	0.91		IET 31108	0.93	0.92	11
	IET 29560	1.02		IET 29560	0.97	1.00	7
	IET 31115	0.68		IET 31115	0.64	0.66	14
	IET 31096	1.11		IET 31096	1.13	1.12	5
	Rasi	0.55		Rasi	0.62	0.59	15
	Improved Samba Mahsuri	0.82		Improved Samba Mahsuri	0.80	0.81	12
	BPT 5204	0.49		BPT 5204	0.48	0.48	16
	Local check	0.72		Local check	0.78	0.75	13
	Mean	0.94		Mean	0.95	0.94	

AVT-2 LNT						Mean GYEI of N2 & N3	Rank
Nutrient- Level	Varieties	GYEI	Nutrient- Level	Varieties	GYEI		
N2	IET 31134	1.18	N3	IET 31134	1.23	1.21	4
	IET 29579	0.77		IET 29579	0.82	0.80	15
	IET 31135	1.35		IET 31135	1.34	1.35	2
	IET 31120	1.22		IET 31120	1.10	1.16	5
	IET 31119	1.08		IET 31119	1.01	1.05	8
	IET 31118	0.77		IET 31118	0.83	0.80	14
	IET 31131	0.88		IET 31131	0.85	0.87	12
	IET 30269	1.11		IET 30269	1.02	1.06	7
	IET 31128	1.11		IET 31128	1.09	1.10	6
	IET 31124	1.31		IET 31124	1.36	1.34	3
	IET 31117	0.96		IET 31117	0.83	0.89	11
	IET 29581	1.02		IET 29581	0.97	1.00	10
	IET 31004	1.28		IET 31004	1.49	1.39	1
	Swarna	1.04		Swarna	1.05	1.05	9
	Rasi	0.58		Rasi	0.56	0.57	17
	Improved Samba Mahsuri	0.81		Improved Samba Mahsuri	0.75	0.78	16
	BPT 5204	0.25		BPT 5204	0.29	0.27	18
	Local check	0.80		Local check	0.86	0.83	13
	Mean	0.97		Mean	0.97	0.97	

Table. 4.1. (s): Identification of cultures performing better with low level of Nutrients application based on the % yield reduction at 50 % of RDF and 100% of RDF

Group	Group	Entry No	50	100	Difference -50	(%) Reduction
MH	V1	IET 29654	2.53	3.00	0.47	15.67
	V2	IET 30513	3.02	3.45	0.43	12.38
	V3	Maniphace 1(NE)	4.79	5.77	0.98	16.98
	V4	Vivek Dhan 62	2.72	3.16	0.44	13.94
	V5	VL Dhan 65	5.04	5.42	0.38	7.01
	V6	Local Check	2.78	3.27	0.49	14.90
E(TP)	V1	IET 30641	4.40	5.23	0.83	15.81
	V2	IET 30651	3.77	4.48	0.70	15.73
	V3	IET 30636	4.30	5.06	0.76	15.07
	V4	IET 30565	4.50	5.17	0.67	12.95
	V5	IET 30555	4.33	5.08	0.75	14.70
	V6	IET 30561	4.44	5.08	0.64	12.51
	V7	IET 30657	4.48	5.01	0.53	10.53
	V8	IET 30642	4.41	5.13	0.73	14.19
	V9	IET 30656	4.30	4.97	0.67	13.47
	V10	IET 30669	4.32	5.20	0.88	16.97
	V11	IET 30690	4.55	5.36	0.81	15.09
	V12	CO-51 (NC)	3.83	4.32	0.49	11.37
	V13	PR 124 (N)	4.06	4.76	0.70	14.68
	V14	Narendra 97(E)	3.22	3.88	0.65	16.86
	V15	Luit (NE)	3.41	3.91	0.50	12.77
	V16	MTU 1153 (S)	4.31	5.00	0.70	13.90
	V17	Local Check	4.24	5.10	0.86	16.81
E(DS)	V1	IET 30330	3.88	4.67	0.78	16.80
	V2	IET 31193	3.28	4.11	0.83	20.14
	V3	IET 31185	3.40	4.27	0.88	20.50
	V4	IET 31170	3.49	4.16	0.67	16.05
	V5	IET 31163	3.93	4.75	0.82	17.28
	V6	Sahabghadidhan (NC)	3.64	4.40	0.76	17.36
	V7	Local check	3.79	4.58	0.80	17.36
Group	Group	Entry No	50	100	Difference -50	(%) Reduction
IME (TP)	V1	IET 30704	4.32	5.64	1.32	23.38
	V2	IET 30574	5.03	5.78	0.75	12.96
	V3	IET 30575	4.53	5.45	0.93	16.97
	V4	IET 30577	4.61	5.45	0.84	15.35
	V5	IET 30587	4.56	5.49	0.93	16.95
	V6	IET 30593	4.63	5.48	0.85	15.59
	V7	IET 30573	3.29	4.51	1.22	27.07
	V8	IET 30756	3.88	4.82	0.94	19.51
	V9	IET 30578	4.99	6.08	1.10	18.04
	V10	IET 30589	4.83	5.58	0.76	13.55
	V11	IET 30579	4.69	5.58	0.89	15.92
	V12	IET 30576	4.41	5.24	0.83	15.80
	V13	IET 32043 (GEL)	3.95	4.89	0.94	19.21
	V14	IET 32045 (NIL)	3.89	4.65	0.76	16.30
	V15	Gontra Bidhan-3 (NC)	4.35	5.24	0.89	16.93
	V16	PR 113 (N),	4.04	5.04	1.00	19.81
	V17	Lalat (E & NE),	3.99	4.76	0.78	16.33
	V18	Karjat-7 (W),	2.73	2.95	0.22	7.45
	V19	MTU 1010 (C& S),	3.83	4.07	0.24	5.90
	V20	US 312	4.64	5.60	0.97	17.23
	V21	Krishna Hamsa(RP)	3.82	4.91	1.10	22.31
	V22	Local check	3.96	5.07	1.11	21.85

Table. 4.1. (s): Cntd....

Group	Group	Entry No	50	100	Difference -50	(%) Reduction
IM (TP)	V1	IET 30608	4.58	5.69	1.11	19.46
	V2	IET 30603	4.64	5.83	1.20	20.51
	V3	IET 30604	4.55	5.77	1.22	21.12
	V4	IET 30605	4.56	5.78	1.22	21.06
	V5	IET 30819	4.05	5.26	1.21	23.07
	V6	IET 30613	4.48	5.73	1.24	21.73
	V7	IET 32047 (NIL)	3.72	5.05	1.33	26.31
	V8	NC- NDR 359	4.11	5.11	1.00	19.59
	V9	PR121 (N)	4.02	5.15	1.13	21.99
	V10	CR Dhan 300 (E & NE)	4.04	5.23	1.19	22.75
	V11	Karma Mahsuri (C)	4.06	5.07	1.01	19.88
	V12	Akshaydhan (W)	4.10	5.23	1.13	21.57
	V13	Jaya (S)	3.56	3.85	0.29	7.53
	V14	HRI 174	4.17	5.29	1.12	21.13
	V15	WGL 14(RP	3.84	5.07	1.23	24.26
	V16	Hybrid Check	4.42	4.62	0.20	4.33
	V17	Local check	4.64	5.70	1.06	18.58

Group	Group	Entry No	50	100	Difference -50	(%) Reduction
AL&ISTVT	V1	IET 31055	2.34	2.71	0.37	13.49
	V2	IET 31053	2.49	2.82	0.33	11.72
	V3	IET 31050	2.23	2.49	0.26	10.26
	V4	IET 31048	2.38	2.60	0.22	8.46
	V5	IET 31080	2.31	2.55	0.24	9.41
	V6	IET 31051	2.60	2.92	0.32	10.81
	V7	IET 31045	2.78	3.01	0.23	7.49
	V8	IET 31044	2.50	2.80	0.31	10.89
	V9	IET 32053	2.29	2.49	0.20	7.85
	V10	IET 32052	2.59	2.88	0.29	9.91
	V11	IET 32055	2.40	2.65	0.26	9.62
	V12	IET 32056	2.35	2.50	0.16	6.20
	V13	CSR-36	2.93	3.21	0.29	8.88
	V14	CSR-10	2.45	2.64	0.19	7.02
	V15	FL 478	2.20	2.58	0.38	14.73
	V16	CSR-23	2.43	2.69	0.27	9.85
	V17	Pusa-44	2.46	2.70	0.24	8.89
	V18	Local check	3.44	3.59	0.15	4.18

Group	Group	Entry No	50	100	Difference -50	(%) Reduction
Aerobic	V1	IET 30919	5.39	5.90	0.51	8.60
	V2	CR Dhan 201(NC)	4.57	4.93	0.36	7.27
	V3	CR Dhan 202 (N, E, NE & C)	3.89	4.69	0.80	17.06
	V4	AAUDR-1 (W)	3.20	3.84	0.63	16.51
	V5	MAS 946-1 (S)	4.47	5.30	0.84	15.75
	V6	DRR Dhan 54	4.79	5.40	0.61	11.30
	V7	DRRH 4	5.25	5.89	0.64	10.91
	V8	Local check	5.36	5.85	0.49	8.33

Table. 4.1. (s): Cntd....

Group	Group	Entry No	50	100	Difference -50	(%) Reduction
MS	V1	IET 30957	5.13	6.01	0.88	14.69
	V2	IET 30961	5.17	6.21	1.04	16.72
	V3	IET 31001	5.07	5.86	0.80	13.56
	V4	IET 29019	5.18	6.20	1.02	16.47
	V5	IET 32072 (GEL)	4.18	4.99	0.81	16.23
	V6	WGL 14 (NC 1)	4.74	5.63	0.88	15.69
	V7	BPT 5204 (NC 2)	2.94	3.27	0.33	10.09
	V8	Improved Samba Mahsuri (N, E & C)	4.01	4.89	0.88	18.01
	V9	Ketekejoha (NE)	3.37	4.40	1.03	23.45
	V10	Karjat-6 (W)	3.76	4.77	1.01	21.21
	V11	Local Check	4.86	5.48	0.62	11.37

Group	Group	Entry No	50	100	Difference -50	(%) Reduction
NIL	V1	IET 32055	3.66	4.51	0.85	18.75
	V2	IET 32059	3.02	3.77	0.74	19.73
	V3	IET 32060	3.42	4.15	0.73	17.60
	V4	IET 32063	3.24	3.86	0.61	15.91
	V5	IET 32056	3.45	4.11	0.67	16.23
	V6	IET 32062	3.42	4.21	0.79	18.86
	V7	IET 32054	3.87	4.70	0.84	17.78
	V8	IET 32061	3.39	4.09	0.70	17.11
	V9	IET 32058	3.28	3.97	0.68	17.26
	V10	IET 32051	3.96	4.72	0.75	15.97
	V11	IET 32074	4.02	4.85	0.83	17.08
	V12	IET 32064	3.64	4.39	0.74	16.97
	V13	IET 32065	3.53	4.20	0.67	15.93
	V14	IET 32052	3.74	4.40	0.66	14.95
	V15	IET 32053	3.60	4.11	0.51	12.42
	V16	Local check	4.37	5.13	0.76	14.75

Group	Group	Entry No	50	100	Difference -50	(%) Reduction
BT	V1	1914	3.75	4.62	0.87	18.90
	V2	1915	3.57	4.79	1.22	25.42
	V3	1916	3.64	5.00	1.36	27.13
	V4	1917	3.81	4.66	0.85	18.30
	V5	1918	3.53	4.56	1.02	22.45
	V6	1919	3.81	4.65	0.84	18.03
	V7	1920	3.54	4.33	0.79	18.26
	V8	1921	3.91	4.74	0.83	17.42
	V9	1922	3.29	4.57	1.29	28.12
	V10	1923	3.34	4.00	0.66	16.55
	V11	1924	3.56	4.56	1.00	21.93
	V12	1925	3.85	4.79	0.95	19.73
	V13	1926	3.05	3.99	0.94	23.64
	V14	1927	3.51	4.46	0.95	21.24
	V15	Local check	3.68	4.59	0.91	19.85

Group	Group	Entry No	50	100	Difference -50	(%) Reduction
SDW	V1	IET 29031	4.07	4.90	0.83	16.98
	V2	IET 29026	4.08	4.86	0.78	16.10
	V3	IET 31258	3.81	4.76	0.95	19.96
	V4	NC: CR Dhan 506	4.09	5.02	0.93	18.61
	V5	Local check	4.20	5.09	0.89	17.51

Table. 4.1. (s): Cntd....

Group	Gro up	Entry No	0% RDP	50% RDP	100% RDP	0-50% differe nce	Reduct ion %	50- 100% differe nce	Reduct ion %	Mean Grain Yield differe nce	Mean Reduct ion %
AVT 2 LPT	V1	IET 31106	3.76	4.26	4.50	0.50	11.84	0.24	5.37	0.37	8.61
	V2	IET 31110	4.44	4.08	4.79	-0.35	-8.66	0.71	14.79	0.18	3.06
	V3	IET 31097	4.36	4.14	4.58	-0.22	-5.31	0.44	9.60	0.11	2.15
	V4	IET 31102	3.98	4.39	4.25	0.41	9.29	-0.14	-3.27	0.13	3.01
	V5	IET 31105	4.52	4.64	4.64	0.12	2.49	0.00	0.10	0.06	1.29
	V6	IET 28070	4.49	4.56	4.93	0.07	1.49	0.37	7.41	0.22	4.45
	V7	IET 31103	4.43	4.87	4.83	0.44	9.05	-0.05	-0.95	0.20	4.05
	V8	IET 31098	4.40	5.24	5.14	0.84	16.12	-0.10	-1.91	0.37	7.10
	V9	IET 31108	3.95	4.13	4.35	0.18	4.34	0.21	4.92	0.20	4.63
	V10	IET 29560	4.20	4.36	4.29	0.16	3.59	-0.07	-1.67	0.04	0.96
	V11	IET 31115	3.39	3.61	3.44	0.23	6.31	-0.17	-4.97	0.03	0.67
	V12	IET 31096	4.27	4.68	4.68	0.40	8.61	0.00	-0.02	0.20	4.30
	V13	Rasi	2.84	3.45	3.49	0.61	17.66	0.03	0.98	0.32	9.32
	V14	Improved Samba Mahsuri	3.84	3.83	4.04	-0.01	-0.33	0.21	5.23	0.10	2.45
	V15	BPT 5204	2.94	2.97	3.12	0.03	1.01	0.16	4.97	0.09	2.99
	V16	Local check	3.46	3.71	4.07	0.24	6.52	0.36	8.86	0.30	7.69

Group	Gro up	Entry No	0% RDP	50% RDP	100% RDP	0-50% differe nce	Reduct ion %	50- 100% differe nce	Reduct ion %	Mean Grain Yield differe nce	Mean Reduct ion %
AVT 2 LNT	V1	IET 31134	3.31	4.40	4.93	1.09	24.84	0.53	10.78	0.81	17.81
	V2	IET 29579	2.70	3.51	4.13	0.80	22.92	0.62	15.08	0.71	19.00
	V3	IET 31135	3.66	4.54	5.23	0.88	19.35	0.69	13.11	0.78	16.23
	V4	IET 31120	3.62	4.13	4.70	0.51	12.40	0.56	11.97	0.54	12.19
	V5	IET 31119	3.37	3.96	4.52	0.59	14.91	0.56	12.49	0.58	13.70
	V6	IET 31118	2.65	3.57	4.13	0.93	25.97	0.55	13.39	0.74	19.68
	V7	IET 31131	2.97	3.64	4.14	0.67	18.53	0.50	11.97	0.59	15.25
	V8	IET 30269	3.43	4.00	4.49	0.57	14.28	0.50	11.07	0.53	12.68
	V9	IET 31128	3.34	4.10	4.70	0.76	18.61	0.60	12.74	0.68	15.67
	V10	IET 31124	3.49	4.63	5.18	1.14	24.56	0.55	10.59	0.84	17.58
	V11	IET 31117	3.25	3.62	4.05	0.36	9.99	0.44	10.74	0.40	10.36
	V12	IET 29581	3.12	4.03	4.25	0.91	22.52	0.22	5.06	0.56	13.79
	V13	IET 31004	3.37	4.68	5.63	1.31	27.91	0.95	16.96	1.13	22.44
	V14	Swarna	3.15	4.07	4.55	0.92	22.58	0.48	10.49	0.70	16.53
	V15	Rasi	2.39	2.97	3.32	0.58	19.39	0.35	10.65	0.47	15.02
	V16	Improved Samba Mahsuri	2.97	3.35	3.97	0.38	11.27	0.62	15.58	0.50	13.42
	V17	BPT 5204	1.48	2.07	2.49	0.59	28.50	0.42	16.87	0.51	22.68
	V18	Local check	2.78	3.53	4.29	0.76	21.40	0.76	17.66	0.76	19.53

Table. 4.1. (s): Cntd....

Group	Group	Entry No	50	100	Difference -50	(%) Reduction
IM (TP)	V1	IET 30608	4.58	5.69	1.11	19.46
	V2	IET 30603	4.64	5.83	1.20	20.51
	V3	IET 30604	4.55	5.77	1.22	21.12
	V4	IET 30605	4.56	5.78	1.22	21.06
	V5	IET 30819	4.05	5.26	1.21	23.07
	V6	IET 30613	4.48	5.73	1.24	21.73
	V7	IET 32047 (NIL)	3.72	5.05	1.33	26.31
	V8	NC- NDR 359	4.11	5.11	1.00	19.59
	V9	PR121 (N)	4.02	5.15	1.13	21.99
	V10	CR Dhan 300 (E & NE)	4.04	5.23	1.19	22.75
	V11	Karma Mahsuri (C)	4.06	5.07	1.01	19.88
	V12	Akshaydhan (W)	4.10	5.23	1.13	21.57
	V13	Jaya (S)	3.56	3.85	0.29	7.53
	V14	HRI 174	4.17	5.29	1.12	21.13
	V15	WGL 14(RP	3.84	5.07	1.23	24.26
	V16	Hybrid Check	4.42	4.62	0.20	4.33
	V17	Local check	4.64	5.70	1.06	18.58

Group	Group	Entry No	50	100	Difference -50	(%) Reduction
AL&ISTVT	V1	IET 31055	2.34	2.71	0.37	13.49
	V2	IET 31053	2.49	2.82	0.33	11.72
	V3	IET 31050	2.23	2.49	0.26	10.26
	V4	IET 31048	2.38	2.60	0.22	8.46
	V5	IET 31080	2.31	2.55	0.24	9.41
	V6	IET 31051	2.60	2.92	0.32	10.81
	V7	IET 31045	2.78	3.01	0.23	7.49
	V8	IET 31044	2.50	2.80	0.31	10.89
	V9	IET 32053	2.29	2.49	0.20	7.85
	V10	IET 32052	2.59	2.88	0.29	9.91
	V11	IET 32055	2.40	2.65	0.26	9.62
	V12	IET 32056	2.35	2.50	0.16	6.20
	V13	CSR-36	2.93	3.21	0.29	8.88
	V14	CSR-10	2.45	2.64	0.19	7.02
	V15	FL 478	2.20	2.58	0.38	14.73
	V16	CSR-23	2.43	2.69	0.27	9.85
	V17	Pusa-44	2.46	2.70	0.24	8.89
	V18	Local check	3.44	3.59	0.15	4.18

Group	Group	Entry No	50	100	Difference -50	(%) Reduction
Aerobic	V1	IET 30919	5.39	5.90	0.51	8.60
	V2	CR Dhan 201(NC)	4.57	4.93	0.36	7.27
	V3	CR Dhan 202 (N, E, NE & C)	3.89	4.69	0.80	17.06
	V4	AAUDR-1 (W)	3.20	3.84	0.63	16.51
	V5	MAS 946-1 (S)	4.47	5.30	0.84	15.75
	V6	DRR Dhan 54	4.79	5.40	0.61	11.30
	V7	DRRH 4	5.25	5.89	0.64	10.91
	V8	Local check	5.36	5.85	0.49	8.33

Table. 4.1. (s): Cntd....

Group	Group	Entry No	50	100	Difference -50	(%) Reduction
MS	V1	IET 30957	5.10	6.03	0.93	15.47
	V2	IET 30961	5.21	6.26	1.05	16.83
	V3	IET 31001	4.95	5.82	0.88	15.05
	V4	IET 29019	5.08	6.16	1.08	17.59
	V5	IET 32072 (GEL)	3.96	4.78	0.82	17.21
	V6	WGL 14 (NC 1)	4.70	5.66	0.96	16.92
	V7	BPT 5204 (NC 2)	2.94	3.27	0.33	10.09
	V8	Improved Samba Mahsuri (N, E & C)	4.01	4.95	0.94	19.03
	V9	Ketekejoha (NE)	3.36	4.28	1.02	23.88
	V10	Karjat-6 (W)	3.75	4.77	1.02	21.40
	V11	Local Check	4.74	5.45	0.71	12.96

Group	Group	Entry No	50	100	Difference -50	(%) Reduction
NIL	V1	IET 32055	3.66	4.51	0.85	18.75
	V2	IET 32059	3.02	3.77	0.74	19.73
	V3	IET 32060	3.42	4.15	0.73	17.60
	V4	IET 32063	3.24	3.86	0.61	15.91
	V5	IET 32056	3.45	4.11	0.67	16.23
	V6	IET 32062	3.42	4.21	0.79	18.86
	V7	IET 32054	3.87	4.70	0.84	17.78
	V8	IET 32061	3.39	4.09	0.70	17.11
	V9	IET 32058	3.28	3.97	0.68	17.26
	V10	IET 32051	3.96	4.72	0.75	15.97
	V11	IET 32074	4.02	4.85	0.83	17.08
	V12	IET 32064	3.64	4.39	0.74	16.97
	V13	IET 32065	3.53	4.20	0.67	15.93
	V14	IET 32052	3.74	4.40	0.66	14.95
	V15	IET 32053	3.60	4.11	0.51	12.42
	V16	Local check	4.37	5.13	0.76	14.75

Group	Group	Entry No	50	100	Difference -50	(%) Reduction
BT	V1	1914	3.75	4.62	0.87	18.90
	V2	1915	3.57	4.79	1.22	25.42
	V3	1916	3.64	5.00	1.36	27.13
	V4	1917	3.81	4.66	0.85	18.30
	V5	1918	3.53	4.56	1.02	22.45
	V6	1919	3.81	4.65	0.84	18.03
	V7	1920	3.54	4.33	0.79	18.26
	V8	1921	3.91	4.74	0.83	17.42
	V9	1922	3.29	4.57	1.29	28.12
	V10	1923	3.34	4.00	0.66	16.55
	V11	1924	3.56	4.56	1.00	21.93
	V12	1925	3.85	4.79	0.95	19.73
	V13	1926	3.05	3.99	0.94	23.64
	V14	1927	3.51	4.46	0.95	21.24
	V15	Local check	3.68	4.59	0.91	19.85

Group	Group	Entry No	50	100	Difference -50	(%) Reduction
SDW	V1	IET 29031	4.07	4.90	0.83	16.98
	V2	IET 29026	4.08	4.86	0.78	16.10
	V3	IET 31258	3.81	4.76	0.95	19.96
	V4	NC: CR Dhan 506	4.09	5.02	0.93	18.61
	V5	Local check	4.20	5.09	0.89	17.51

Table. 4.1. (s): Cntd....

Group	Gro up	Entry No	0% RDP	50% RDP	100% RDP	0-50% differe nce	Reduct ion %	50- 100% differe nce	Reduct ion %	Mean Grain Yield differe nce	Mean Reduct ion %
AVT 2 LPT	V1	IET 31106	3.76	4.26	4.50	0.50	11.84	0.24	5.37	0.37	8.61
	V2	IET 31110	4.44	4.08	4.79	-0.35	-8.66	0.71	14.79	0.18	3.06
	V3	IET 31097	4.36	4.14	4.58	-0.22	-5.31	0.44	9.60	0.11	2.15
	V4	IET 31102	3.98	4.39	4.25	0.41	9.29	-0.14	-3.27	0.13	3.01
	V5	IET 31105	4.52	4.64	4.64	0.12	2.49	0.00	0.10	0.06	1.29
	V6	IET 28070	4.49	4.56	4.93	0.07	1.49	0.37	7.41	0.22	4.45
	V7	IET 31103	4.43	4.87	4.83	0.44	9.05	-0.05	-0.95	0.20	4.05
	V8	IET 31098	4.40	5.24	5.14	0.84	16.12	-0.10	-1.91	0.37	7.10
	V9	IET 31108	3.95	4.13	4.35	0.18	4.34	0.21	4.92	0.20	4.63
	V10	IET 29560	4.20	4.36	4.29	0.16	3.59	-0.07	-1.67	0.04	0.96
	V11	IET 31115	3.39	3.61	3.44	0.23	6.31	-0.17	-4.97	0.03	0.67
	V12	IET 31096	4.27	4.68	4.68	0.40	8.61	0.00	-0.02	0.20	4.30
	V13	Rasi	2.84	3.45	3.49	0.61	17.66	0.03	0.98	0.32	9.32
	V14	Improved Samba Mahsuri	3.84	3.83	4.04	-0.01	-0.33	0.21	5.23	0.10	2.45
	V15	BPT 5204	2.94	2.97	3.12	0.03	1.01	0.16	4.97	0.09	2.99
	V16	Local check	3.46	3.71	4.07	0.24	6.52	0.36	8.86	0.30	7.69

Group	Gro up	Entry No	0% RDP	50% RDP	100% RDP	0-50% differe nce	Reduct ion %	50- 100% differe nce	Reduct ion %	Mean Grain Yield differe nce	Mean Reduct ion %
AVT 2 LNT	V1	IET 31134	3.31	4.40	4.93	1.09	24.84	0.53	10.78	0.81	17.81
	V2	IET 29579	2.70	3.51	4.13	0.80	22.92	0.62	15.08	0.71	19.00
	V3	IET 31135	3.66	4.54	5.23	0.88	19.35	0.69	13.11	0.78	16.23
	V4	IET 31120	3.62	4.13	4.70	0.51	12.40	0.56	11.97	0.54	12.19
	V5	IET 31119	3.37	3.96	4.52	0.59	14.91	0.56	12.49	0.58	13.70
	V6	IET 31118	2.65	3.57	4.13	0.93	25.97	0.55	13.39	0.74	19.68
	V7	IET 31131	2.97	3.64	4.14	0.67	18.53	0.50	11.97	0.59	15.25
	V8	IET 30269	3.43	4.00	4.49	0.57	14.28	0.50	11.07	0.53	12.68
	V9	IET 31128	3.34	4.10	4.70	0.76	18.61	0.60	12.74	0.68	15.67
	V10	IET 31124	3.49	4.63	5.18	1.14	24.56	0.55	10.59	0.84	17.58
	V11	IET 31117	3.25	3.62	4.05	0.36	9.99	0.44	10.74	0.40	10.36
	V12	IET 29581	3.12	4.03	4.25	0.91	22.52	0.22	5.06	0.56	13.79
	V13	IET 31004	3.37	4.68	5.63	1.31	27.91	0.95	16.96	1.13	22.44
	V14	Swarna	3.15	4.07	4.55	0.92	22.58	0.48	10.49	0.70	16.53
	V15	Rasi	2.39	2.97	3.32	0.58	19.39	0.35	10.65	0.47	15.02
	V16	Improved Samba Mahsuri	2.97	3.35	3.97	0.38	11.27	0.62	15.58	0.50	13.42
	V17	BPT 5204	1.48	2.07	2.49	0.59	28.50	0.42	16.87	0.51	22.68
	V18	Local check	2.78	3.53	4.29	0.76	21.40	0.76	17.66	0.76	19.53

RESOURCE CONSERVATION TECHNOLOGIES



4.2 RESOURCE CONSERVATION TECHNOLOGIES TRIALS (RCTS)

4.2.1. Water management for enhancing water use efficiency and productivity of mechanical transplanted rice (Kharif)

Increasing water scarcity is becoming real threat to rice cultivation. Hence water-saving technology needs to be developed which not only economically beneficial but also maintains soil health. Any approach that would lessen the amount of water use without compromising the rice yield would certainly be a welcome strategy. Introduction of mechanical transplanting and wet direct seeding are the alternative practices to solve water crisis, and as a methodology for increasing the productivity of irrigated rice. AWD is also called 'intermittent irrigation' or 'controlled irrigation' which can reduce the water requirement by 30 % in irrigated rice system. To evaluate the suitable and promising irrigation management practices in different crop establishment methods a trial was conducted at 6 locations (**Aduthurai, Chiplima, Gangavathi, Khudwani, Ludhiana and Mandya**). Split plot design was adopted with 3 main plots of crop establishment methods {M₁: Mechanical Transplanting method on puddled soil (crop management methods same as for puddled transplanted rice), M₂: Direct wet seeding on puddled soil (Use of Drum seeder/ dibbling of sprouted seed at 25 x 25 cm) fb crop management practices as per direct wet seeded rice, M₃: Manual transplanting} and 3 subplots of irrigation management {I₁: Flooding throughout crop growth (3 + / - 2 cm), I₂: Saturation maintenance up to PI and (3 + / - 2 cm) after PI and I₃: Alternate wetting and drying (irrigation at 5 -7 days interval with 5 cm/ha of water (5 cm irrigation at 3 DADPW) up to PI and (3 + / - 2 cm) after PI} and replicated three times. The results were summarized and presented in **Table 4.2.1** and the salient findings are as followed.

At **Aduthurai**, interaction of crop establishment methods and irrigation management on grain yield was found to be non-significant. Among establishment methods, direct wet seeding on puddled soil resulted in the highest grain yield (6.55 t/ha) and among irrigation managements, alternate wetting and drying resulted in the highest grain yield (6.78 t/ha). Among establishment methods, the highest water input was recorded in mechanical transplanting (1255 mm/ha). However, it was interesting to note that the water input was similar under all irrigation management practices (1120 mm/ha). Among establishment methods, the highest cost of cultivation was recorded under mechanical transplanting method (Rs. 51003/-) followed by direct wet seeding (Rs. 50580/-). However, among irrigation management practices, the cost of cultivation was the lowest under irrigation at saturation (Rs. 48383/-). At **Chiplima**, interaction of crop establishment methods and irrigation management on grain yield was found to be non-significant. Similarly, both crop establishment methods were found to be non-significant with respect to grain yield. Among irrigation managements, alternate wetting and drying resulted in the highest grain yield (4.2 t/ha). At **Gangavathi**, interaction of crop establishment methods and irrigation management on grain yield was found to be non-significant. Similarly, irrigation managements were found to be non-significant with respect to grain yield. Among crop establishment methods, direct wet seeding on puddled soil resulted in the highest grain yield (6.06 t/ha). Direct wet

seeding on puddled soil incurred less expenditure of Rs. 51397/- compared to Rs. 63084/- under mechanical/manual transplanting. In clay loam soils of **Khudwani**, interaction, main plots and sub plot effects were found to be non-significant with respect to grain yield. The experimental mean grain yield was 6.44 t/ha. Among irrigation management, the lowest water input was recorded in alternate wetting and drying (1228 mm/ha) with the lowest cost of cultivation (Rs. 62980/-). In sandy loam soils of **Ludhiana**, Interaction, main plots and sub plots effects on grain yield was non-significant. Among crop establishment methods, the grain yield was ranged from 7.83 t/ha to 7.87 t/ha. Similarly, among irrigation managements, the grain yield was ranged from 7.80 t/ha to 7.93 t/ha. The experimental mean cost of cultivation was (Rs. 56268/-). In red sandy loam soils of **Mandya**, interaction effect of crop establishment methods and irrigation management, main plots and sub plot effects were found to be non-significant with respect to grain yield. Direct wet seeding plots received less water (1552 mm/ha) compared to mechanical/transplanting method (1683 mm). The cost of cultivation was the lowest in alternate wetting and drying (Rs. 64865/-) than flooding (Rs. 67642/-).

Overall, across the 6 locations, among crop establishment methods, the highest mean grain yield was recorded under wet direct seeding (6.13 t/ha). Similarly, among irrigation management practices, alternate wetting and drying method recorded the highest mean grain yield of 5.99 t/ha across all locations.

Table 4.2.1: Evaluation of Water management for enhancing Water use efficiency and productivity of mechanical transplanted rice, Kharif-2024.

Treatment			ADUTHURAI										CHILPILMA				
Main Plot- Irrigation management practices	Crop establishment methods		Grain yield (t/ha)	Rank	Straw yield (t/ha)	Panicle/m ² (No.)	Test wt (g)	No of grains/panicle	Total water input (mm)	Water productivity (kg/ha-mm)	Cost of cultivation (Rs/ha)	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant height (cm)	Tillers/m ² (No.)	Panicle/m ² (No.)
M1 - Mechanical/ Manual Transplanting	I1		5.25	6	7.70	214	23.2	149	1255	4.18	50300	3.83	4	4.37	103	267	256
	I2		5.89	5	8.70	224	23.47	162	1255	4.69	48850	3.60	6	4.73	100	277	267
	I3		6.39	3	9.50	244	23.67	180	1255	5.09	53860	4.17	2	5.53	107	292	272
M2 - Direct wet seeding on puddled soil	I1		6.04	4	8.35	233	23.27	146	985	6.13	49840	3.90	3	5.10	105	282	262
	I2		6.45	2	8.96	244	23.3	159	985	6.55	48400	3.73	5	4.97	104	266	258
	I3		7.17	1	9.94	266	23.67	164	985	7.28	53500	4.23	1	5.80	104	294	276
Method of Methods																	
M1			5.84	2	8.63	228	23.44	164	1255	4.65	51003	3.87	2	4.88	103	279	265
M2			6.55	1	9.08	248	23.41	156	985	6.65	50580	3.95	1	5.29	104	281	265
C.D. (0.05)			0.26		NS	10.18	NS	2.08	-	-	-	NS		NS	NS	NS	NS
C.V. (%)			2.06		2.82	2.11	1.38	0.64	-	-	-	9.12		10.04	5.16	5.33	5.36
Mean of Irrigation																	
I1			5.65	3	8.03	224	23.23	147	1120	5.04	49830	3.86	2	4.74	104	274	259
I2			6.17	2	8.83	234	23.38	161	1120	5.51	48383	3.66	3	4.85	102	272	263
I3			6.78	1	9.72	255	23.67	172	1120	6.05	53400	4.2	1	5.66	106	293	274
CD (0.05)			0.23		0.35	5.61	0.28	2.35	-	-	-	0.34		0.42	8.31	NS	NS
C.V. (%)			2.82		2.94	1.77	0.9	1.1	-	-	-	6.51		6.23	6.01	8.39	8.28
Interaction																	
I and M			NS		NS	NS	NS	3.33	-	-	-	NS		NS	NS	NS	NS
M and I			NS		NS	NS	NS	3.18	-	-	-	NS		NS	NS	NS	NS
Experimental Mean			6.2		8.86	238	23.43	160	1120	5.54	50538	3.91		5.08	104	280	265
Soil type			Clay soil									-					
pH			7.32									-					
EC			-									-					
Variety			-									-					
RDF NPK kg/ha			150:50:50:25									MTU 1156		(115-120 Days)			
Available NPK kg/ha			265:40:450									-					
I1- Flooding throughout crop growth (3 +/- 2cm) after 15 days																	
I2- Irrigation at Saturation (No flooding)																	
I3- Alternate wetting and drying																	

Table 4.2.1: Contd.

Treatment		GANGAVATHI								
Main Plot- Irrigation management practices	Crop establishment methods	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant height (cm)	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	No of grains/ panicle	Cost of cultivation (Rs/ha)
M1 - Mechanical/ Manual Transplanting	I1	2.66	6	5.00	88.00	145	3.15	1.53	184	65417
	I2	2.68	5	5.83	95.33	153	3.55	1.55	206	62417
	I3	3.32	4	6.25	98.67	167	3.62	1.57	211	61417
M2 - Direct wet seeding on puddled soil	I1	5.72	3	7.92	87.67	270	4.19	1.52	241	53730
	I2	6.18	2	7.92	93.33	270	4.34	1.54	252	50730
	I3	6.29	1	9.17	94.33	287	5.36	1.55	303	49730
Method of Methods										
	M1	2.89	2	5.69	94.00	155	3.44	1.55	200	63084
	M2	6.06	1	8.34	91.78	276	4.63	1.54	265	51397
C.D. (0.05)		1.04		1.58	NS	25.53	0.64	NS	20.90	-
C.V. (%)		11.41		11.11	5.97	5.84	7.82	1.86	4.43	-
Mean of Irrigation										
	I1	4.19	3	6.46	87.84	208	3.67	1.52	212	59574
	I2	4.43	2	6.88	94.33	212	3.94	1.54	229	56574
	I3	4.80	1	7.71	96.50	227	4.49	1.56	257	55574
CD (0.05)		NS		NS	7.61	NS	0.60	NS	NS	-
C.V. (%)		8.91		17.57	6.15	18.00	11.17	1.90	12.79	-
Interaction										
	I and M	NS		NS	NS	NS	NS	NS	NS	NS
	M and I	NS		NS	NS	NS	NS	NS	NS	NS
Experimental Mean		4.47		7.01	92.89	215	4.04	1.54	233	57240
Soil type		-								
pH		-								
EC		-								
Variety		Gangavathi Sona (135 Days)								
RDF NPK kg/ha		-								
Available NPK kg/ha		-								

Table 4.2.1: Contd.

Treatment		KHUDWANI											
Main Plot- Irrigation management practices	Crop establishment methods	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant height (cm)	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days to 50% flowering	No of grains /panicle	Total water input (mm)	Water productivity (kg/ha-mm)	Cost of cultivation (Rs/ha)
M1 - Mechanical/ Manual Transplanting	I1	5.81	6	6.68	128.6	428	2.31	29.5	99	80	1617	3.59	61950
	I2	6.47	4	7.30	131.8	508	2.42	29.4	98	98	1256	5.15	63890
	I3	6.27	5	7.22	131.2	472	2.39	29.0	99	87	1255	5.00	62320
M2 - Direct wet seeding on puddled soil	I1	6.49	3	7.37	132.7	491	2.36	28.9	95	85	1540	4.21	64580
	I2	6.86	1	7.79	133.7	560	2.39	29.4	95	96	1232	5.57	65820
	I3	6.72	2	7.65	132.3	536	2.34	29.2	93	92	1202	5.59	63640
Method of Methods													
M1		6.18	2	7.07	130.5	469	2.37	29.3	99	88	1376	4.49	62720
M2		6.69	1	7.60	132.9	529	2.36	29.2	94	91	1325	5.05	64680
C.D. (0.05)		NS		NS	NS	NS	NS	NS	1.26	2.99	NS	-	-
C.V. (%)		6.85		6.33	2.9	10.73	4.49	3.69	0.65	1.64	6.0	-	-
Mean of Irrigation													
I1		6.15	3	7.02	130.6	459	2.34	29.2	97	83	1579	3.90	63265
I2		6.66	1	7.54	132.8	534	2.40	29.4	97	97	1244	5.35	64855
I3		6.50	2	7.44	131.7	504	2.36	29.1	96	89	1228	5.29	62980
CD (0.05)		NS		NS	NS	NS	NS	NS	0.63	9.65	56	-	-
C.V. (%)		6.82		7.55	1.8	14.04	8.73	2.94	0.49	8.08	3.1	-	-
Interaction													
I and M		NS		NS	NS	NS	NS	NS	1.22	NS	NS	-	-
M and I		NS		NS	NS	NS	NS	NS	0.89	NS	NS	-	-
Experimental Mean		6.44		7.34	131.7	499	2.37	29.2	96	90	1350	4.85	63700
Soil type		Clay loam											
pH		6.50											
EC		0.45											
Variety		-											
RDF NPK kg/ha		283:18:248											
Available NPK kg/ha													

I1- Flooding throughout crop growth (3 +/- 2cm) after 15 days

I2- Irrigation at Saturation (No flooding)

I3- Alternate wetting and drying

Table 4.2.1: Contd.

Treatment			LUDHIANA										
Main Plot- Irrigation management practices	Crop establishment methods	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant height (cm)	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% flowering	No of grains/panicle	Total water input (mm)	Water productivity (kg/ha-mm)	Cost of cultivation (Rs/ha)
M1 - Mechanical/ Manual Transplanting	I1	7.80	4	10.33	106.0	279	4.70	22.8	95	166	1659	4.70	57350
	I2	7.87	2	9.87	102.0	284	4.71	22.9	94	170	1702	4.62	56700
	I3	7.83	3	9.87	101.3	277	4.88	22.9	94	183	1829	4.28	56050
M2 - Direct Dry seeding on puddled soil	I1	7.80	4	9.80	102.3	357	3.68	21.8	87	147	1471	5.30	56485
	I2	7.77	6	9.63	98.7	362	3.72	22.8	85	151	1511	5.14	55835
	I3	8.03	1	9.57	98.7	355	3.83	22.9	84	159	1593	5.04	55185
Method of Methods													
	M1	7.83	2	10.02	103.1	280	4.76	22.8	95	173	1730	4.53	56700
	M2	7.87	1	9.67	99.9	358	3.74	22.5	85	153	1525	5.16	55835
C.D. (0.05) C.V. (%) Mean of Irrigation		NS		NS	NS	41	0.14	NS	1	NS	-	-	-
		2.75		7.71	3.1	6.35	1.59	2.6	1	7	-	-	-
	I1	7.80	3	10.06	104.2	318	4.19	22.3	91	157	1565	6.43	56918
	I2	7.82	2	9.75	100.3	323	4.22	22.8	90	161	1607	6.07	56268
	I3	7.93	1	9.72	100.0	316	4.36	22.9	89	171	1711	5.68	55618
CD (0.05) C.V. (%) Interaction		NS		NS	2.5	NS	NS	NS	1	10	-	-	-
		3.98		6.77	1.9	5.21	2.99	2.1	1	5	-	-	-
	I and M	NS		NS	NS	NS	NS	NS	NS	NS	-	-	-
	M and I	NS		NS	NS	NS	NS	NS	NS	NS	-	-	-
Experimental Mean		7.85		9.85	101.5	319	4.25	22.7	90	163	1628	6.06	56268
Soil type		Sandy loam											
pH		7.80											
EC		0.28											
Variety		-											
RDF NPK kg/ha		-											
Available NPK kg/ha		268:27:185											

I1- Flooding throughout crop growth (3 +/- 2cm) after 15 days

I2- Irrigation at Saturation (No flooding)

I3- Alternate wetting and drying

Table 4.2.1: Contd.

Treatment		MANDYA										
Main Plot- Irrigation management practices	Crop establishment methods	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% flowering	No of grains/panicle	Total water input (mm)	Water productivity (kg/ha-mm)	Cost of cultivation (Rs/ha)
M1 - Mechanical/ Manual Transplanting	I1	5.98	1	8.53	343	3.88	12.63	79	326	2022	2.96	70516
	I2	5.74	4	8.32	352	3.72	12.53	79	291	1637	3.51	68635
	I3	5.80	2	8.30	381	3.89	12.64	80	315	1389	4.18	67555
M2 - Direct wet seeding on puddled soil	I1	5.50	6	8.62	356	3.21	12.89	74	206	1918	2.87	64768
	I2	5.77	3	8.23	370	3.32	12.55	74	256	1480	3.90	63091
	I3	5.63	5	8.66	385	3.19	12.82	75	234	1257	4.48	62175
Method of Methods												
C.D. (0.05) C.V. (%) Mean of Irrigation	M1	5.84	1	8.38	359	3.83	12.60	79	310	1683	3.47	68902
	M2	5.63	2	8.50	370	3.24	12.75	74	232	1552	3.63	63344
		NS		NS	NS	0.46	NS	0.83	43.84	55.58	-	-
C.D. (0.05) C.V. (%) Interaction	I1	5.74	2	8.58	350	3.54	12.76	77	266	1970	2.91	67642
	I2	5.76	1	8.28	361	3.52	12.54	77	274	1559	3.70	65863
	I3	5.72	3	8.48	383	3.54	12.73	77	275	1323	4.32	64865
C.D. (0.05) C.V. (%) I and M M and I Experimental Mean		NS		NS	NS	NS	NS	0.44	NS	43.86	-	-
		4.90		5.89	5.92	9.57	2.56	0.43	9.79	2.04	-	-
		NS		NS	NS	NS	NS	NS	NS	NS	-	-
Soil type pH EC Variety RDF NPK kg/ha Available NPK kg/ha		NS		NS	NS	NS	NS	NS	NS	NS	-	-
		5.74		8.44	365	3.54	12.68	77	271	1617	3.64	66123
		Red sandy loam										
		7.96										
		0.35										
		RNR 15048 (125 Days)										
		100:50:50:20										
		294:85:248										

Table 4.2.1: Contd.

Treatment		Over all Mean Grain yield	Rank	Mean of Cost of cultivation	Rank	Water productivity (kg/ha-mm)	Rank
Main Plot- Irrigation management practices	Crop establishment methods						
M1 - Mechanical/ Manual Transplanting	I1	5.22	6	61107	1	3.86	6
	I2	5.38	5	60098	3	4.49	5
	I3	5.63	4	60240	2	4.64	3
M2 - Direct wet seeding on puddled soil	I1	5.91	3	57881	4	4.63	4
	I2	6.13	2	56775	6	5.29	2
	I3	6.35	1	56846	5	5.60	1
Method of Methods							
M1		5.41	2	60482	1	4.29	2
M2		6.13	1	57167	2	5.12	1
C.D. (0.05)							
C.V. (%)							
Mean of Irrigation							
I1		5.57	3	59446	1	4.57	3
I2		5.75	2	58388	3	5.16	2
I3		5.99	1	58487	2	5.34	1
CD (0.05)							
C.V. (%)							
Interaction							
<i>I and M</i>							
<i>M and I</i>							
Experimental Mean		5.77					
Soil type							
pH							
EC							
Variety							
RDF NPK kg/ha							
Available NPK kg/ha							

4.2.2a. Identification of suitable sowing method of dry DSR for higher productivity in different zones

Imminent water crisis, labour scarcity and climate change threaten the sustainability and profitability of traditional transplanted rice. Direct-seeded rice (DSR) technology has been proposed to reduce water requirement, save labour demand, mitigate greenhouse gas emission and improve environmental sustainability. It involves three principal methods viz., dry seeding, wet seeding, and water seeding, among which dry DSR is gaining momentum due to relatively high grain yield, less water consumption, reduced labour intensity, facilitating to mechanization during crop establishment, and less greenhouse gases emission. The major challenges confronting the development of dry DSR in India are poor crop establishment, weed infestation, lodging susceptibility, yield decline under continuous cropping, and variety breeding; and the strategies which may help in mitigating the constraints to dry DSR. Hence the present trial is constituted to enhance the productivity of the wet DSR with the following objectives 1) To identify suitable and cost-effective agronomic management practices to enhance the productivity of dry DSR and 2) To maximize the resource use efficiency. The trial was conducted at 13 locations (**Chatha, Gangavathi, Jagdalpur, Khudwani, Ludhiana, Mandya, Nagina, Nawagam, Pantnagar, Pusa, Raipur, Rewa and Vadgaon**). The trial was laid out in RBD with 7 treatments and replicated thrice. Treatments are S₁: Broadcasting of seeds and S₂: Mechanized line sowing of seeds (Dribbler, Happy seeder or any Drum seeder, spacing as per the equipment specifications), S₃: Raised bed sowing, S₄: Semi-dry system (sowing in dry soil and wet after one month of sowing) and S₅: Any improved system in that particular location, S₆: Location specific high yielding DSR method and S₇: Farmers' practice of the dry DSR method of the region. The results were summarized and presented in **Table 4.2.2a** and the salient findings are as followed.

Treatment effect on grain yield was found to be significant at all locations. In sandy clay loam soils of **Chatha**, 4 treatments (S₁ to S₄) were imposed. Basmati 370 variety resulted the highest grain yield under semi-dry system (3.21 t/ha). The lowest total weed dry matter at 45, 75 and 105 DAS were recorded in raised bed sowing. Similarly, the highest gross return was found under semi-dry system (Rs. 1,35,141/- per hectare). In black soils of **Gangavathi**, 4 treatments (S₁ to S₄) were taken up. Among these 4 treatments raised bed sowing found to be the best in terms of grain yield (5.10 t/ha). Weed biomass at active tillering and panicle initiation stage were found to be lowest in raised bed sowing method. The lowest cost of cultivation was recorded in semi dry system (Rs. 47180/- per hectare) and the highest gross return was obtained from raised bed sowing plots (Rs. 117300/- per hectare). At **Jagdalpur**, improved system of that particular region (pre-emergence herbicide + 2 manual weedings) resulted in the highest grain yield (5.31 t/ha) followed by raised bed sowing of dry DSR (4.70 t/ha). The experimental lowest cost of cultivation was recorded in farmers' practice (Rs. 46,420/-). The highest gross return (Rs. 122015/-) was obtained from the improved system of that particular region. At **Khudwani**, location specific high yielding dry DSR method resulted in the highest grain yield (6.80 t/ha) followed by the improved

system of that particular region (6.70 t/ha). The cost of cultivation was the lowest in broadcasting of seed method (Rs. 59983/-), however, the highest gross return was obtained under location specific high yielding dry DSR method (Rs. 193292/-). In sandy clay loam soils of **Ludhiana**, location specific Tar wattar system resulted in the highest grain yield (4.77 t/ha) followed by improved system of that particular region (mechanized line sowing) (4.53 t/ha). The experimental mean grain yield was 4.39 t/ha. In red sandy loam soils of **Mandya**, raised bed sowing resulted in the highest grain yield (5.05 t/ha). At **Nagina**, Pusa Basmati 1509 resulted the highest grain yield (4.76 t/ha) under line sowing of seeds at 20cm. Weed population at active tillering and panicle initiation stage were also lowest under line sowing of seeds at 20cm. In clay loam soils of **Nawagam**, the highest grain yield was recorded under location specific high yielding dry DSR method (aerobic rice with single seed of 25 cm row and 25 cm plant to plant spacing) (4.93 t/ha) followed by semi dry system (4.34 t/ha). The cost of cultivation and gross return recorded under this treatment were Rs. 37754/- and Rs. 136309/-, respectively. In silt loam soils of **Pantnagar**, Location specific high yielding dry DSR method resulted the highest grain yield (5.42 t/ha) followed by mechanized line sowing (5.12 t/ha). Weed population at AT and PI stages were the lowest under mechanized line sowing. The highest gross return was obtained under location specific high yielding dry DSR method (Rs. 110559/-). In sandy loam soil of **Pusa**, mechanized line sowing resulted the highest grain yield (4.71 t/ha) followed by improved system of that particular region (4.38 t/ha). The highest gross return (Rs. 115512/-) was also obtained under mechanized line sowing. In vertisols of **Raipur**, raised bed sowing resulted in the highest grain yield (4.97 t/ha), however, at par with location specific high yielding dry DSR method (4.90 t/ha). In **Rewa**, the experimental mean grain yield was very low (2.64 t/ha). Farmers practice of dry DSR method resulted the highest grain yield (3.47 t/ha). In **Vadgaon**, raised bed sowing resulted in the highest grain yield (6.02 t/ha) followed by location specific high yielding dry DSR system (5.89 t/ha).

Across the 13 locations location specific high yielding dry DSR system was found to be the best among all dry DSR establishment methods with mean grain yield of 4.91 t/ha.

Table 4.2.2a: Development of suitable sowing method of Dry DSR for higher productivity in different zones , Kharif-2024.

Methods of crop establishment	CHATHA											
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant population no/m ²		Plant height (cm)	Tillers/m ² (No.)	Panicle/m ² (No.)	Grains/panicle (No.)	Panicle wt (g)	Test wt (g)	Days for 50% flowering
				At 10 DAS	At 20 DAS							
S1	2.68	3	5.63	75	112	108.00	223	202	54	1.35	20.50	109
S2	3.14	2	6.59	88	121	138.33	238	210	63	1.44	21.27	105
S3	2.67	4	5.60	68	97	103.33	220	186	56	1.34	20.57	108
S4	3.21	1	6.74	94	126	147.67	268	221	65	1.52	21.50	103
S5	-	-	-	-	-	-	-	-	-	-	-	-
S6	-	-	-	-	-	-	-	-	-	-	-	-
S7	-	-	-	-	-	-	-	-	-	-	-	-
Expt. Mean	2.93		6.14	81	114	124.33	237	205	60	1.41	20.96	106
C.D. (0.05)	0.06		0.12	2.38	9.55	5.61	9.52	5.4	6.07	0.04	0.15	1.66
C.V. (%)	0.96		0.94	1.46	4.19	2.26	2.01	1.32	5.1	1.37	0.35	0.78
res(t)	**		**	**	**	**	**	**	*	**	**	**
Soil type	Sandy clay loam											
pH	8.03											
EC	0.21											
Variety & Duration	Basmati 370, 140-150 days											
Applied NPK kg/ha	30:20:10											
Available NPK kg/ha	245.15:1434:146.31											

S1: Broadcasting of seeds

S2: line sowing of seeds (20cm spacing)

S3: Raised bed sowing

S4- Semi-Dry system (Sowing in dry soil and Wet after one month of sowing)

S5- Any improved system in that particular location

S6- Location specific high yielding Dry DSR method

S7- Farmers practice of the Dry DSR method of the region

Table 4.2.2a: Contd.

Methods of crop establishment	CHATHA Cntd.								Gross returns Rs/ha
	Dry mater accumulation (g/m2)			Weed population (no/m ²)		Weed biomass (g/m ²)			
	45 DAS	75 DAS	105 DAS	At Active tillering	At panicle initiation	AI stage	PI stage		
S1	138.47	337.00	645.00	13.33(3.72)	62.00(7.91)	5.73	79.67	112828	
S2	166.07	346.07	678.33	9.33(3.13)	46.33(6.84)	4.38	57.00	132054	
S3	128.97	327.33	633.67	9.33(3.13)	50.00(7.11)	4.99	57.67	112267	
S4	170.17	383.67	709.00	12.67(3.63)	39.67(6.33)	5.49	47.33	135141	
S5	-	-	-	-	-	-	-	-	
S6	-	-	-	-	-	-	-	-	
S7	-	-	-	-	-	-	-	-	
Expt. Mean	150.92	348.52	666.50	3.4025	7.0475	5.15	60.42	123072	
C.D. (0.05)	9.04	10.33	8.97	0.2	0.27	0.2	7.62	2358.29	
C.V. (%)	3	1.48	0.67	2.92	1.93	1.9	6.31	0.96	
res(t)	**	**	**	**	**	**	**	**	
Soil type									
pH									
EC									
Variety & Duration									
Applied NPK kg/ha									
Available NPK kg/ha									

*Figures in the parenthesis are transformed values

Table 4.2.2a: Contd.

Methods of crop establishment	GANGAVATHI									
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant population no/m ²		Plant height (cm)	Panicle/m ² (No.)	Grains/panicle (No.)	Panicle wt (g)	Test wt (g)
				At 10 DAS	At 20 DAS					
S1	3.83	4	6.25	672	633	103.00	318	175	2.80	1.54
S2	4.38	2	7.08	509	502	106.67	373	224	3.48	1.57
S3	5.10	1	8.33	470	469	109.00	438	267	4.02	1.60
S4	4.09	3	5.83	535	522	105.67	368	193	3.07	1.56
S5	-		-	-	-	-	-	-	-	-
S6	-		-	-	-	-	-	-	-	-
S7	-		-	-	-	-	-	-	-	-
Expt. Mean	4.35		6.87	547	531	106.09	374	215	3.34	1.57
C.D. (0.05)	0.53		2.22	173.33	257.76	5.42	102.32	36.59	0.63	0.1
C.V. (%)	6.05		16.17	15.87	24.28	2.56	13.68	8.52	9.51	3.3
res(t)	**		NS	NS	NS	NS	NS	**	*	NS
Soil type	Black soil									
pH	8									
EC	0.21									
Variety & Duration	Gangavathi sona, 135 days									
Applied NPK kg/ha	-									
Available NPK kg/ha	-									

S1: Broadcasting of seeds

S2: line sowing of seeds (20cm spacing)

S3: Raised bed sowing

S4- Semi-Dry system (Sowing in dry soil and Wet after one month of sowing)

S5- Any improved system in that particular location

S6- Location specific high yielding Dry DSR method

S7- Farmers practice of the Dry DSR method of the region

Table 4.2.2a: Contd.

Methods of crop establishment	GANGAVATHI Contd.					
	Weed population (no/m ²)		Weed biomass (g/m ²)		Cost of cultivation Rs/ha	Gross returns Rs/ha
	At Active tillering	At panicle initiation	AI stage	PI stage		
S1	77.78(8.78)	5.56(1.85)	88.24	43.06	47780	87994
S2	44.44(6.49)	0.93(1.08)	46.02	12.22	47580	100779
S3	36.94(6.07)	0.85(1.06)	19.07	11.39	49380	117300
S4	57.41(7.31)	0.93(1.08)	56.76	12.50	47180	94013
S5	-	-	-	-	-	-
S6	-	-	-	-	-	-
S7	-	-	-	-	-	-
Expt. Mean	7.1625	1.2675	52.52	19.79	47980	100022
C.D. (0.05)	3.94	1.95	58.66	35.8	0	12099.5
C.V. (%)	27.52	76.83	55.9	90.54	0	6.05
res(t)	NS	NS	NS	NS	NS	**
Soil type						
pH						
EC						
Variety & Duration						
Applied NPK kg/ha						
Available NPK kg/ha						

*Figures in the parenthesis are transformed values

Table 4.2.2a: Contd.

JAGDALPUR													
Methods of crop establishment	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant population no/m ²		Plant height (cm)	Tillers/m ² (No.)	Panicle/m ² (No.)	Grains/panicle (No.)	Panicle length (cm)	Panicle wt (g)	Test wt (g)	Days for 50% flowering
				At 10 DAS	At 20 DAS								
S1	2.67	7	3.68	100	113	98.13	133	130	122	20.73	3.60	24.37	75
S2	4.36	3	5.44	56	63	101.27	230	224	130	25.18	4.03	25.32	76
S3	4.70	2	5.98	58	62	93.96	263	259	137	27.77	4.52	25.10	78
S4	4.22	4	5.37	57	60	93.63	210	205	131	24.22	4.13	25.21	76
S5	5.31	1	6.67	53	59	98.73	195	191	125	27.92	4.23	24.91	77
S6	4.01	5	5.59	61	66	93.05	187	182	135	27.93	4.37	25.08	76
S7	3.41		4.59	106	111	90.93	133	129	106	20.35	3.35	24.88	75
Expt. Mean	4.10		5.33	70	76	95.67	193	189	126	24.87	4.03	24.98	76
C.D. (0.05)	0.4		0.6	5.11	8	7.91	51.93	49.75	18.76	2.12	0.79	0.84	0.87
C.V. (%)	5.44		6.34	4.09	5.9	4.65	15.13	14.82	8.34	4.78	11.01	1.89	0.64
res(t)	**		*	**	**	NS		**			**	**	**
Soil type	-												
pH	-												
EC	-												
Variety & Duration	-												
Applied NPK kg/ha	-												
Available NPK kg/ha	-												

S1: Broadcasting of seeds

S2: line sowing of seeds (20cm spacing)

S3: Raised bed sowing

S4- Semi-Dry system (Sowing in dry soil and Wet after one month of sowing)

S5- Any improved system in that particular location

S6- Location specific high yielding Dry DSR method

S7- Farmers practice of the Dry DSR method of the region

Table 4.2.2a: Contd.

Methods of crop establishment	JAGDALPUR Contd.											
	Dry matter accumulation (g/m ²)			Total nutrients uptake (kg/ha)			Soil available nutrients (kg/ha) initial			Soil available nutrients (kg/ha) at harvest		
	45 DAS	75 DAS	at 105 DAS	N	P	K	N	P	K	N	P	K
	Cost of cultivation Rs/ha	Gross returns Rs/ha										
S1	214.24	476.08	634.78	46.73	26.35	57.12	216.00	18.33	340.00	225.33	21.00	384.67
S2	330.82	735.16	980.21	75.57	43.03	92.35	217.67	17.00	333.00	234.33	18.33	380.00
S3	360.27	800.61	1067.48	84.90	52.09	105.80	214.33	19.00	343.33	226.00	19.00	370.00
S4	323.71	719.36	959.15	72.37	40.43	89.07	220.67	18.33	343.33	224.33	19.00	363.67
S5	404.21	898.26	1197.67	94.12	59.30	120.83	218.67	17.33	352.67	225.33	16.00	349.67
S6	323.86	719.69	959.59	72.78	42.06	89.70	223.33	18.00	333.00	229.33	18.67	384.33
S7	270.02	600.04	800.05	59.70	33.26	71.31	218.33	17.00	338.00	223.33	18.00	374.67
Expt. Mean	318.16	707.03	942.70	72.31	42.36	89.45	218.43	17.86	340.48	226.85	18.57	372.43
C.D. (0.05)	32.63	72.52	96.69	7.98	3.81	9.9	6.94	4.23	13.2	5.93	2.87	9.6
C.V. (%)	5.77	5.77	5.77	6.21	5.05	6.22	1.79	13.3	2.18	1.47	8.7	1.45
res(t)	**	**	**	**	**	**	**	**	*	NS	**	**
Soil type												
pH												
EC												
Variety & Duration												
Applied NPK kg/ha												
Available NPK kg/ha												

Table 4.2.2a: Contd.

KHUDWANI															
Methods of crop establishment	Grain yield (t/ha)	Rank	Plant population no/m ²		Plant height (cm)	Tillers/m ² (No.)	Panicle/m ² (No.)	Grains/panicle (No.)	Panicle length (cm)	Panicle wt (g)	Test wt (g)	Days for 50% flowering	Dry matter accumulation (g/m ²)		
			At 10 DAS	At 20 DAS									45 DAS	75 DAS	at 105 DAS
S1	5.63	6	73	95	95.63	696.67	317	69	19.99	2.09	26.64	109	311.33	857.00	1238.00
S2	6.15	5	41	47	111.27	403.33	297	79	22.12	2.50	28.87	112	382.00	923.67	1332.00
S3	6.65	3	63	72	113.13	504	350	76	21.75	2.45	29.17	112	425.00	992.00	1366.67
S4	6.40	4	59	71	111.07	425.67	363	87	22.53	2.80	28.23	112	400.33	955.33	1347.33
S5	6.70	2	61	71	110.13	505.67	342	90	23.35	2.78	28.37	112	444.00	1007.00	1410.67
S6	6.80	1	63	70	115.30	611	328	89	23.28	2.87	28.27	111	462.00	1053.00	1427.00
S7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Expt. Mean	6.39	60	60	71	109.42	524.39	333	82	22.17	2.58	28.26	111	404.11	964.67	1353.61
C.D. (0.05)	0.75	10.92	10.92	6.53	2.84	140.68	23.58	27.36	1.85	0.78	0.76	1.08	44.58	72.95	59.74
C.V. (%)	6.42	10	10	5.05	1.43	14.75	3.9	18.44	4.59	16.55	1.47	0.54	6.06	4.16	2.43
res(f)	*	**	**	**	**	**	**	NS	*	NS	**	**	**	**	**
Soil type	-														
pH	6.7														
EC	0.46														
Variety & Duration	-														
Applied NPK kg/ha	120:60:30														
Available NPK kg/ha	-														

- S1: Broadcasting of seeds
S2: line sowing of seeds (20cm spacing)
S3: Raised bed sowing
S4- Semi-Dry system (Sowing in dry soil and Wet after one month of sowing)
S5- Any improved system in that particular location
S6- Location specific high yielding Dry DSR method
S7- Farmers practice of the Dry DSR method of the region

Table 4.2.2a: Contd.

Methods of crop establishment	KHU DWANI Contd.									
	Dry mater accumulation (g/m2)			Weed population (no/m ²)			Weed biomass (g/m ²)		Total nutrients uptake (kg/ha)	
	75 DAS		at 105 DAS	At active tillering	At panicle initiation	At active tillering	At panicle initiation	N	P	K
	45 DAS	75 DAS	at 105 DAS	At active tillering	At panicle initiation	At active tillering	At panicle initiation	N	P	K
S1	311.33	857.00	1238.00	3.33(1.93)	2.67(1.77)	1.42	2.28	99.05	18.76	95.39
S2	382.00	923.67	1332.00	2.67(1.76)	2.33(1.68)	1.13	1.90	108.70	20.19	106.13
S3	425.00	992.00	1366.67	2.67(1.77)	1.67(1.46)	1.14	1.18	112.40	20.80	109.97
S4	400.33	955.33	1347.33	2.67(1.77)	2.00(1.56)	1.14	1.45	110.09	20.40	106.19
S5	444.00	1007.00	1410.67	3.00(1.86)	2.67(1.77)	1.30	2.37	117.09	21.17	112.46
S6	462.00	1053.00	1427.00	3.67(2.04)	2.33(1.68)	1.57	1.87	114.19	21.61	110.96
S7	-	-	-	-	-	-	-	-	-	-
Expt. Mean	404.11	964.67	1353.61	1.855	1.653333333	1.28	1.84	110.25	20.49	106.85
C.D. (0.05)	44.58	72.95	59.74	0.49	0.41	0.84	1.61	13.82	3.44	15.43
C.V. (%)	6.06	4.16	2.43	14.52	13.67	35.83	48.03	6.89	9.23	7.94
res(t)	**	**	**	NS	NS	NS	NS	NS	NS	NS
Soil type										
pH										
EC										
Variety & Duration										
Applied NPK kg/ha										
Available NPK kg/ha										

*Figures in the parenthesis are transformed values

Table 4.2.2a: Contd.

Methods of crop establishment	KHU DWANI Contd.							
	Soil available nutrients (kg/ha) initial			Soil available nutrients (kg/ha) at harvest			Cost of cultivation Rs/ha	Gross returns Rs/ha
	N	P	K	N	P	K		
S1	279.30	17.84	265.30	282.10	19.20	266.31	59983	162125
S2	279.30	17.84	265.30	277.19	19.93	269.86	63084	178215
S3	279.30	17.84	265.30	271.65	20.37	266.50	64139	189935
S4	279.30	17.84	265.30	275.01	19.63	273.16	63722	182995
S5	279.30	17.84	265.30	270.75	19.23	272.42	65018	192262
S6	279.30	17.84	265.30	274.60	19.77	268.52	64354	193292
S7	-	-	-	-	-	-	-	-
Expt. Mean	279.30	17.84	265.30	275.22	19.69	269.46	63383	183137
C.D. (0.05)	0	0	0	17.95	3.99	13.96	4500.27	22989.78
C.V. (%)	0	0	0	3.58	11.14	2.85	3.9	6.9
res(t)	NS	NS	NS	NS	NS	NS	NS	NS
Soil type								
pH								
EC								
Variety & Duration								
Applied NPK kg/ha								
Available NPK kg/ha								

Table 4.2.2a: Contd.

Methods of crop establishment	LUDHIANA												
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant population no/m ² AT 20DAS	Plant height (cm)	Tillers/m ² (No.)	Filled grains / panicle (No.)	Unfilled grains / panicle (No.)	Panicle wt (g)	Test wt (g)	Days for 50% flowering	Dry matter accumulation (g/m2) AT 105DAS	Weed population (no/m ²) at AI
S1	4.50	3	7.75	42	100.00	322	64	10	1.92	27.37	85	1041.00	3.00(1.81)
S2	4.33	5	8.33	58	98.67	312	57	12	1.64	27.07	84	1075.33	2.67(1.74)
S3	4.50	3	7.05	42	98.67	355	63	7	1.98	27.40	84	963.67	2.33(1.6)
S4	-		-	-	-	-	-	-	-	-	-	-	1.67(1.46)
S5	4.53	2	8.11	43	98.73	352	66	9	1.94	27.40	84	1068.00	2.67(1.76)
S6	4.77	1	7.69	41	99.07	367	65	8	1.97	27.50	86	1074.00	3.33(1.93)
S7	3.71		7.92	39	98.00	325	60	10	1.88	27.43	84	1055.67	-
Expt. Mean	4.39		7.81	44	98.86	339	63	9	1.89	27.36	84	1046.28	1.716666667
C.D. (0.05)	0.3		0.81	7.76	2.46	14.25	11.35	3.82	0.2	0.45	2.89	77.67	0.78
C.V. (%)	3.78		5.71	9.62	1.37	2.31	9.97	22.91	5.84	0.89	1.89	4.08	24.89
res(t)	**		NS	**	NS	**	NS	NS	*	NS	NS	NS	NS
Soil type	Sandy loam												
pH	7.8												
EC	0.21												
Variety & Duration	Pusa basmati 1509,115 days												
Applied NPK kg/ha	60;30;30												
Available NPK kg/ha	195;24;5;185												

*Figures in the parenthesis are transformed values

S1: Broadcasting of seeds - (25 kg/ha)

S2: line sowing of seeds (20cm spacing) - (50 kg/ha)

S3: Raised bed sowing

S4 -

S5- Any improved system in that particular location (Mechanized line sowing of seeds)

S6- Location specific high yielding Dry DSR method - (Tar wattar system/ Soil mulch DSR (Local technology)

S7- Farmers practice of the Dry DSR method of the region - (0.675 m wide bed)

Table 4.2.2a: Contd.

Methods of crop establishment	MANDYA											
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant population no/m ² At 10 DAS	Plant height (cm)	Tillers/m ² (No.)	Panicle/m ² (No.)	Grains/panicle (No.)	Panicle length (cm)	Panicle wt (g)	Test wt (g)	Days for 50% flowering
S1	3.92	7	8.93	64	96.87	391	377	193	23.41	4.18	24.74	88
S2	4.79	4	7.17	45	99.49	344	324	202	25.22	5.61	27.15	88
S3	5.05	1	8.33	45	103.05	351	335	192	24.89	4.86	26.49	90
S4	4.82	3	7.75	47	98.15	300	289	183	24.73	5.15	27.02	88
S5	4.23	6	6.97	21	98.71	374	329	228	25.78	4.88	25.86	90
S6	4.92	2	8.43	45	95.65	312	297	194	24.59	4.99	25.14	88
S7	4.66	5	7.86	42	100.49	322	310	181	24.89	5.07	27.59	88
Expt. Mean	4.63		7.92	44	98.92	342	323	196	24.79	4.96	26.28	89
C.D. (0.05)	0.57		0.89	5.42	3.75	37.63	32.32	40.29	1.52	1.18	3.09	1.86
C.V. (%)	6.91		6.34	6.89	2.13	6.19	5.63	11.54	3.44	13.39	6.61	1.18
res(t)	*		**	**	*	**	**	NS	NS	NS	NS	*
Soil type	Red Sandy Loam											
pH	7.55											
EC	-											
Variety & Duration	KMP 175,115-120 days											
Applied NPK kg/ha	100:50:50:20											
Available NPK kg/ha	298.2:87.34:43.63											

S1: Broadcasting of seeds

S2: line sowing of seeds (20cm spacing)

S3: Raised bed sowing

S4- Semi-Dry system (Sowing in dry soil and Wet after one month of sowing)

S5- Any improved system in that particular location (Aerobic rice with single seed of 25 cm row and 25 cm pant to plant spacing)

S6- Location specific high yielding Dry DSR method (Seed drill sowing)

S7- Farmers practice of the Dry DSR method of the region (Manual line sowing with 25 cm row)

Table 4.2.2a: Contd.

Methods of crop establishment	NAGINA													
	Grain yield (t/ha)	Rank	Plant height (cm)	Tillers/m ² (No.)	Panicle/m ² (No.)	Grains/panicle (No.)	Panicle length (cm)	Panicle wt (g)	Test wt (g)	Days for 50% flowering	Weed population (no/m ²)		Weed biomass (g/m ²)	
											At active tillering	At panicle initiation	At active tillering	At panicle initiation
S1	4.04	4	99.00	290	287	150	14.32	3.99	25.49	99	10.30(3.28)	10.26(3.26)	6.37	4.92
S2	4.76	1	102.33	326	319	187	17.13	4.06	25.52	101	5.19(2.38)	5.42(2.43)	3.11	3.48
S3	4.39	3	100.67	308	298	176	15.60	4.06	25.54	101	5.35(2.41)	6.39(2.62)	2.93	4.10
S4	4.50	2	99.33	299	288	172	15.43	3.97	24.99	102	9.49(2.63)	6.38(2.61)	3.60	4.17
S5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Expt. Mean	4.42		100.33	306	298	171	15.62	4.02	25.39	101	2.675	2.73	4.00	4.17
C.D. (0.05)	0.31		0.94	12.91	33.46	11.45	0.82	0.03	0.51	2.28	0.58	0.6	1.02	1.55
C.V. (%)	3.47		0.47	2.12	5.62	3.34	2.64	0.39	1	1.13	10.82	10.94	12.72	18.62
res(f)	**		**	**	NS	**	**	**	NS	NS	*	NS	**	NS
Soil type	-													
pH	7.70													
EC	0.18													
Variety & Duration	Pusa Basmati 1509													
Applied NPK kg/ha	120:60:40													
Available NPK kg/ha	21:18.33:209													

S1: Broadcasting of seeds

S2: line sowing of seeds (20cm spacing)

S3: Raised bed sowing

S4- Semi-Dry system (Sowing in dry soil and Wet after one month of sowing)

S5- Any improved system in that particular location (Aerobic rice with single seed of 25 cm row and 25 cm pant to plant spacing)

S6- Location specific high yielding Dry DSR method (Seed drill sowing)

S7- Farmers practice of the Dry DSR method of the region (Manual line sowing with 25 cm row)

*Figures in the parenthesis are transformed values

Table 4.2.2a: Contd.

Methods of crop establishment	NAWAGAM												
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant population no/m ²		Plant height (cm)	Tillers/m ² (No.)	Panicle/m ² (No.)	Grains/panicle (No.)	Panicle length (cm)	Panicle wt (g)	Test wt (g)	Days for 50% flowering
				At 10 DAS	At 20 DAS								
S1	3.97	6	5.08	38	65	106.07	204	164	246	21.40	4.07	18.03	74
S2	4.17	5	5.05	32	57	112.47	189	139	254	24.33	4.14	17.90	74
S3	4.24	4	5.49	32	64	112.87	204	158	265	25.13	4.51	19.43	76
S4	4.34	2	5.49	31	56	120.13	211	164	262	24.60	4.28	19.90	75
S5	4.31	3	5.34	31	54	109.00	211	166	277	24.40	4.45	19.80	73
S6	4.93	1	5.99	38	67	120.67	223	174	281	25.27	4.74	19.97	75
S7	3.96	7	4.90	39	64	106.93	214	167	256	23.93	2.91	18.53	75
Expt. Mean	4.27		5.33	34	61	112.59	208	162	263	24.15	4.16	19.08	75
C.D. (0.05)	0.58		0.65	7.09	10.27	8.34	31.02	18.57	37.7	2.06	0.75	1.75	1.99
C.V. (%)	7.62		6.87	11.55	9.48	4.16	8.38	6.45	8.06	4.79	10.12	5.16	1.5
res(t)	*		*	NS	NS	*	NS	*	NS	*	**	NS	NS
Soil type	Caly loam												
pH	7.57												
EC	0.88												
Variety & Duration	Mahisagar 120 days												
Applied NPK kg/ha	100:25:0:25												
Available NPK kg/ha	203:85:204												

S1 - Broadcasting of seeds

S2 - Mechanized line sowing of seeds (Dibbler, Happy seeder or any Drum seeder: Spacing as per the equipment specifications)

S3 - Raised bed sowing (1 m raised bed and 4 rows of 20 cm spacing) (Details to be included)

S4 - Semi-Dry system (Sowing in dry soil and Wet/flooding after one month of sowing)

S5 - Any improved system like Tar Vattar method of DSR may be followed wherever feasible

S6 - Location specific high yielding Dry DSR method

S7 - Farmers practice of the Dry DSR method of the region

Table 4.2.2a: Contd.

Methods of crop establishment	NAWAGAM Cntd.								
	Weed population (no/m ²)		Weed biomass (g/m ²)		Soil available nutrients (kg/ha)			Cost of cultivation Rs/ha	Gross returns Rs/ha
	At active tillering	At panicle initiation	At active tillering	At panicle initiation	N	P	K		
S1	58.00(7.35)	101.67(9.97)	16.67	35.92	228.67	34.33	236.67	37788	110516
S2	79.33(8.84)	92.33(9.42)	33.14	34.43	228.00	35.67	234.33	37378	115285
S3	73.67(8.61)	81.33(8.99)	17.16	26.06	223.00	34.67	230.00	38893	118140
S4	52.67(7.02)	96.00(9.78)	17.18	41.61	230.33	33.33	230.00	38142	120534
S5	56.33(7.52)	99.00(9.93)	16.88	32.57	220.33	37.00	233.33	38022	119298
S6	50.33(6.95)	94.00(9.62)	20.08	31.90	221.33	33.67	228.33	37754	136309
S7	51.67(7.18)	101.00(9.96)	27.37	30.67	220.33	32.33	228.00	38847	109788
Expt. Mean	7.638571429	9.667142857	21.21	33.31	224.57	34.43	231.52	38118	118553
C.D. (0.05)	3.04	2.75	17.75	24.96	24.1	8.47	19.58	113.39	15685.03
C.V. (%)	22.36	16.01	47.03	42.12	6.03	13.82	4.75	0.17	7.44
res(t)	NS	NS	NS	NS	NS	NS	NS	**	*
Soil type									
pH									
EC									
Variety & Duration									
Applied NPK kg/ha									
Available NPK kg/ha									

*Figures in the parenthesis are transformed values

Table 4.2.2a: Contd.

Methods of crop establishment	PANTNAGAR											
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant population no/m ²		Plant height (cm)	Tillers/m ² (No.)	Panicle/m ² (No.)	Panicle length (cm)	Panicle wt (g)	Test wt (g)	Days for 50% flowering
				At 10 DAS	At 20 DAS							
S1	4.70	3	5.07	78	112	133.27	388	269	28.52	2.14	26.09	91
S2	5.12	2	5.40	98	133	127.67	337	272	25.85	2.22	26.18	90
S3	4.66	5	5.40	79	117	127.93	355	269	26.67	2.18	26.63	91
S4	4.57	6	5.30	87	113	127.30	339	263	25.77	2.14	25.58	91
S5	4.67	4	5.49	91	116	133.33	343	267	26.90	2.12	25.94	93
S6	5.42	1	5.64	113	145	129.00	379	269	26.93	2.32	25.89	89
S7	-	-	-	-	-	-	-	-	-	-	-	-
Expt. Mean	4.86		5.38	91	122	129.75	357	268	26.77	2.19	26.05	91
C.D. (0.05)	0.3		0.43	7.18	8.84	12.14	24.24	14.06	1.45	0.17	0.38	2.46
C.V. (%)	3.41		4.36	4.34	3.97	5.14	3.73	2.88	2.98	4.39	0.8	1.48
res(t)	**		NS	**	**	NS	**	NS	*	NS	**	NS
Soil type	Silt Loam											
pH	7.3											
EC	1.2											
Variety & Duration	PD -24 135 days											
Applied NPK kg/ha	120:60:40											
Available NPK kg/ha	222.3:38.5:212.3											

S1: Broadcasting of seeds

S2: Mechanized line sowing of seeds (Dribbler, Happy seeder or any Drum Seeder: Spacing as per the equipment specifications)

S3: Raised bed sowing

S4- Semi-Dry system (Sowing in dry soil and Wet after one month of sowing)

S5- Any improved system in that particular location

S6- Location specific high yielding Dry DSR method

Table 4.2.2a: Contd.

Methods of crop establishment	PANTNAGAR Cntd.									
	Dry mater accumulation (g/m2)			Weed population (no/m ²)		Weed biomass (g/m ²)		Total nutrients uptake (kg/ha)		
	45 DAS	75 DAS	at 105 DAS	At active tillering	At panicle initiation	At active tillering	At panicle initiation	N	P	K
S1	127.00	223.33	302.33	10.67(3.24)	14.67(3.88)	11.92	36.65	80.99	16.70	77.80
S2	101.87	180.67	247.67	7.67(2.81)	13.33(3.71)	9.60	35.77	77.06	14.49	76.92
S3	103.67	189.00	240.67	14.67(3.84)	20.67(4.6)	15.49	35.79	67.14	13.21	66.14
S4	91.33	171.00	258.67	13.33(3.66)	26.00(5.15)	14.67	38.94	82.48	15.45	84.14
S5	88.33	179.00	238.00	14.00(3.79)	20.33(4.56)	15.65	28.53	84.23	16.03	84.36
S6	108.00	212.67	306.70	12.67(3.49)	22.00(4.74)	15.24	37.23	98.39	19.23	94.52
S7	-	-	-	-	-	-	-	-	-	-
Expt. Mean	103.37	192.61	265.67	3.471666667	4.44	13.76	35.49	81.72	15.85	80.65
C.D. (0.05)	6.27	7.3	10.78	1.4	0.44	9.74	6.26	22.58	4.11	24.92
C.V. (%)	3.34	2.08	2.23	22.17	5.45	38.9	9.7	15.19	14.25	16.99
res(t)	**	**	**	NS	**	NS	NS	NS	NS	NS
Soil type										
pH										
EC										
Variety & Duration										
Applied NPK kg/ha										
Available NPK kg/ha										

*Figures in the parenthesis are transformed values

Table 4.2.2a: Contd.

Methods of crop establishment	PANTNAGAR Cntd.							
	Soil available nutrients (kg/ha) Initial			Soil available nutrients (kg/ha) at harvest			Cost of cultivation Rs/ha	Gross returns Rs/ha
	N	P	K	N	P	K		
S1	175.67	21.29	180.20	180.20	29.50	207.50	42745	95747
S2	180.67	21.86	187.30	187.30	30.90	207.30	41409	101693
S3	178.33	21.62	185.33	185.33	28.67	200.30	45156	94975
S4	180.00	21.87	183.53	183.53	25.30	198.00	41709	93288
S5	181.00	21.57	185.57	185.57	29.27	199.70	41409	94224
S6	183.00	22.26	188.07	188.07	32.53	192.00	41559	110559
S7	-	-	-	-	-	-	-	-
Expt. Mean	179.78	21.75	185.00	185.00	29.36	200.80	42331.16667	98414.22333
C.D. (0.05)	3.62	0.75	2.27	2.27	2.49	3.05	0	7085.25
C.V. (%)	1.11	1.89	0.67	0.67	4.67	0.84	0	3.96
res(t)	*	NS	**	**	**	**	NS	**
Soil type								
pH								
EC								
Variety & Duration								
Applied NPK kg/ha								
Available NPK kg/ha								

Table 4.2.2a: Contd.

Methods of crop establishment	PUSA											
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant population no/m ²		Plant height (cm)	Tillers/m ² (No.)	Panicle/m ² (No.)	Grains/panicle (No.)	Panicle wt (g)	Test wt (g)	Days for 50% flowering
				At 10 DAS	At 20 DAS							
S1	3.20	7	4.26	42	47	100.00	228	221	94	2.49	21.42	83
S2	4.71	1	6.24	35	50	112.33	287	282	115	2.61	21.45	82
S3	4.25	5	5.63	37	49	109.67	272	266	103	2.61	21.28	81
S4	4.33	4	5.74	39	48	111.00	259	253	107	2.31	21.38	83
S5	4.38	2	5.81	40	51	111.33	273	268	108	2.44	21.05	82
S6	4.36	3	5.79	38	49	108.67	268	262	109	2.40	21.18	84
S7	3.55	6	4.70	44	46	103.33	242	236	99	2.42	21.15	81
Expt. Mean	4.11		5.45	39	48	108.05	261	256	105	2.47	21.27	82
C.D. (0.05)	0.63		0.85	4.99	4.1	7.9	33	32.15	7.09	0.25	0.55	2.07
C.V. (%)	8.65		8.74	7.14	4.76	4.11	7.1	7.07	3.79	5.61	1.45	1.41
res(t)	**		**	*	NS	*	*	*	**	NS	NS	NS
Soil type	Sandy loam											
pH	8.33											
EC	0.52											
Variety & Duration	Rajendra Neelam		110-115 days									
Applied NPK kg/ha	120:60:40											
Available NPK kg/ha	-											

S1: Broadcasting of seeds

S2: Mechanized line sowing of seeds by Drum Seeder: Spacing as per the equipment specifications)

S3: Raised bed

sowing

S4- Semi-Dry system (Sowing in dry soil and Wet after one month of sowing)

S5- Any improved system in that particular location (Tar-vattar method)

S6- Location specific high yielding Dry DSR method - (Brown manuring)

S7- Farmers practice of the Dry DSR method of the region

Table 4.2.2a: Contd.

PUSA Cntd.															
Methods of crop establishment	Dry matter accumulation (g/m2)			Weed population (no/m ²)		Weed biomass (g/m ²)		Soil available nutrients (kg/ha) Initial			Soil available nutrients (kg/ha) at harvest			Cost of cultivation Rs/ha	Gross returns Rs/ha
	45 DAS	75 DAS	105 DAS	At active tillering	At panicle initiation	At active tillering	At panicle initiation	N	P	K	N	P	K		
S1	211.00	498.00	797.67	22.00(4.72)	25.00(5.03)	5.14	24.09	213.67	11.33	112.33	212.67	11.20	111.00	55380	78427
S2	229.33	594.33	892.67	11.00(3.36)	12.00(3.53)	2.77	9.86	210.67	11.20	109.33	210.00	11.17	108.00	57772	115512
S3	219.67	547.33	839.00	12.33(3.55)	14.00(3.77)	3.80	15.79	210.00	11.17	110.00	209.00	11.07	109.00	59800	104306
S4	218.67	548.67	840.00	14.33(3.76)	14.67(3.82)	3.42	14.82	209.33	11.13	109.67	208.33	11.07	108.67	57460	106274
S5	223.33	560.33	857.33	13.00(3.65)	13.00(3.64)	3.23	13.36	208.00	10.87	112.33	206.67	10.77	110.67	57460	107344
S6	220.00	546.67	845.33	8.00(2.89)	9.33(3.13)	2.27	7.26	211.67	11.27	112.00	210.00	11.20	109.67	57720	107020
S7	213.33	507.00	809.67	18.67(4.32)	22.33(4.74)	5.05	24.36	212.33	11.37	112.33	209.67	11.27	110.67	55380	87139
Expt. Mean	219.33	543.19	840.24	3.75	3.951428571	3.67	15.65	210.81	11.19	111.14	209.48	11.11	109.67	57282	100860
C.D. (0.05)	25.87	50.27	67.79	1.17	1.04	1.13	6.37	6.3	0.47	5.95	6.3	0.46	6.15	0	15518.07
C.V. (%)	6.63	5.2	4.54	17.6	14.83	17.31	22.87	1.68	2.38	3.01	1.69	2.33	3.15	0	8.65
res(t)	NS	*	NS	NS	*	**	**	NS	NS	NS	NS	NS	NS	NS	**
Soil type															
pH															
EC															
Variety & Duration															
Applied NPK kg/ha															
Available NPK kg/ha															

Table 4.2.2a: Contd.

RAIPUR										
Methods of crop establishment	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant height (cm)	Tillers/m ² (No.)	Panicle/m ² (No.)	Grains/panicle (No.)	Panicle length (cm)	Panicle wt (g)	Test wt (g)
S1	3.44	7	4.61	117.05	225	193	130	21.98	4.12	29.57
S2	4.68	5	6.10	120.95	290	254	159	22.35	4.78	32.60
S3	4.97	1	6.41	124.88	315	283	167	23.12	5.09	33.37
S4	4.19	6	5.60	118.14	271	233	145	22.29	4.58	31.27
S5	4.71	4	6.14	120.91	295	260	159	22.51	4.43	32.57
S6	4.90	2	6.27	123.73	313	282	164	22.98	4.97	33.30
S7	4.72	3	6.24	121.77	302	275	158	22.52	4.84	32.97
Expt. Mean	4.52		5.91	121.06	287	255	155	22.54	4.69	32.24
C.D. (0.05)	0.83		1.07	7.65	52.83	52.87	22.31	1.65	0.97	2.33
C.V. (%)	10.38		10.15	3.55	10.34	11.68	8.11	4.11	11.65	4.06
res(t)	*		*	NS	*	*	*	NS	NS	*
Soil type	Vertisols									
pH	7.2									
EC	-									
Variety & Duration	IGKVR1, 125 days									
Applied NPK kg/ha	176:8:18:9:356:4									
Available NPK kg/ha	272:19:370									

S1: Broadcasting of seeds

S2: Mechanized line sowing of seeds by Drum Seeder: Spacing as per the equipment specifications)

S3: Raised bed sowing

S4- Semi-Dry system (Sowing in dry soil and Wet after one month of sowing)

S5- Any improved system in that particular location

S6- Location specific high yielding Dry DSR method

S7- Farmers practice of the Dry DSR method of the region

Table 4.2.2a: Contd.

REWA															
Methods of crop establishment	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant population no/m ²		Plant height (cm)	Tillers/m ² (No.)	Panicle/m ² (No.)	Grains/panicle (No.)	Panicle length (cm)	Panicle wt (g)	Test wt (g)	Days for 50% flowering	Dry matter accumulation (g/m ²) AT 105DAS	Weed population (no/m ²) at PI
				At 10 DAS	At 20 DAS										
S1	2.80	3	9.29	125	124	106.33	10	6	136	27.00	2.00	21.00	84	19.25	32.33(5.72)
S2	2.76	4	9.14	59	61	102.67	9	5	107	26.67	2.39	24.67	87	20.34	22.67(4.79)
S3	2.63	5	8.96	49	49	97.33	7	7	154	28.67	2.83	20.00	83	28.43	17.33(4.19)
S4	1.65	7	8.02	152	150	98.33	8	5	172	26.67	3.17	25.00	82	22.02	17.00(4.17)
S5	2.09	6	9.33	40	42	96.00	8	6	125	26.67	3.01	24.67	84	24.88	19.33(4.43)
S6	3.10		9.10	79	79	106.67	9	5	149	25.33	3.58	24.67	83	26.23	24.00(4.94)
S7	3.47	1	9.21	50	51	104.33	12	5	149	25.33	3.21	23.67	82	18.15	25.00(5.04)
Expt. Mean	2.64		9.01	79	79	101.67	9	6	142	26.62	2.88	23.38	84	22.76	4.754285714
C.D. (0.05)	0.97		0.86	60.72	56.1	9.42	2.91	2.75	91.29	1.9	1.98	10.26	3.38	12.1	0.72
C.V. (%)	20.61		5.37	43.02	39.77	5.21	18.14	27.74	36.23	4	38.57	24.66	2.27	29.89	8.53
res(t)	*		NS	*	**	NS	NS	NS	NS	*	NS	NS	NS	NS	**
Soil type	-														
pH	-														
EC	-														
Variety & Duration	-														
Applied NPK kg/ha	-														
Available NPK kg/ha	-														

*Figures in the parenthesis are transformed values

Table 4.2.2a: Contd.

Methods of crop establishment	VADGAON												
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant population no/m ²		Plant height (cm)	Tillers/m ² (No.)	Panicle/m ² (No.)	Grains/panicle (No.)	Panicle length (cm)	Panicle wt (g)	Test wt (g)	Days for 50% flowering
				At 10 DAS	At 20 DAS								
S1	3.60	7	3.85	39	70	83.47	158	157	158	16.41	3.53	19.80	98
S2	5.84	3	6.34	43	77	94.53	257	254	257	26.63	5.72	23.33	97
S3	6.02	1	6.54	44	80	97.47	265	262	265	27.41	5.90	24.07	97
S4	5.49	5	5.92	40	73	88.93	242	239	242	25.01	5.38	21.93	97
S5	5.60	4	6.06	41	74	90.70	246	244	246	25.53	5.49	22.43	96
S6	5.89	2	6.37	43	78	95.43	259	257	259	26.84	5.77	23.57	96
S7	4.24	6	4.55	37	67	85.63	187	185	187	19.33	4.15	21.20	98
Expt. Mean	5.24		5.66	41	74	90.88	231	228	231	23.88	5.13	22.33	97
C.D. (0.05)	0.22		0.24	1.75	3.37	3.91	9.61	9.52	9.61	1	0.22	0.95	1.76
C.V. (%)	2.34		2.35	2.39	2.56	2.42	2.34	2.34	2.34	2.35	2.37	2.39	1.02
res(t)	**		**	**	**	**	**	**	**	**	**	**	NS
Soil type	-												
pH	7.76												
EC	0.15												
Variety & Duration	Phule Samruddhi, 125-130 days												
Applied NPK kg/ha	100:50:50												
Available NPK kg/ha	-												

S1: Broadcasting of seeds - (Seed rate = 50kg/ha)
S2: Mechanized line sowing of seeds by Drum Seeder: Spacing as per the equipment specifications) - (Seed rate = 25kg/ha, Spacing -23 cm)
S3: Raised bed sowing - (1 m raised bed and 4 rows of 20cm spacing , Seed rate = 25kg/ha)
S4- Semi-Dry system (Sowing in dry soil and Wet after one month of sowing) - (Sowing at 22.5cm distance, Seed rate = 50kg/ha)
S5- Any improved system in that particular location -(Sowing at 30cm distance, Seed rate = 50kg/ha)
S6- Location specific high yielding Dry DSR method - (Dibbling at 20 x 20 cm , Seed rate = 25kg/ha)
S7- Farmers practice of the Dry DSR method of the region - (Broadcasting of seed, Seed rate = 75kg/ha)

Table 4.2.2a: Contd.

Methods of crop establishment	VADAGAON Cntd.											Over all Mean	Rank
	Dry mater accumulation (g/m2)			Weed population (no/m ²)		Weed biomass (g/m ²)		Soil available nutrients (kg/ha) at harvest					
								N	P	K			
	45 DAS	75 DAS	105 DAS	At active tillering	At panicle initiation	At active tillering	At panicle initiation						
S1	177.53	408.33	559.23	7.92(2.9)	16.63(4.13)	7.70	16.20	191.33	14.17	257.63	3.77	7	
S2	287.97	662.33	907.07	3.35(1.95)	7.04(2.73)	3.27	6.83	254.33	16.97	283.77	4.55	4	
S3	296.90	682.83	935.17	5.32(2.41)	11.18(3.41)	5.20	10.83	262.77	17.53	290.23	4.60	3	
S4	270.90	623.10	853.40	4.38(2.21)	9.20(3.11)	4.23	8.87	247.53	15.10	267.93	4.32	5	
S5	276.30	635.60	870.47	4.55(2.25)	9.55(3.17)	4.43	9.27	249.83	15.97	278.73	4.65	2	
S6	290.70	668.63	915.73	3.68(2.03)	7.73(2.85)	3.60	7.53	255.97	16.33	277.10	4.91	1	
S7	209.50	481.80	659.90	7.15(2.76)	15.02(3.94)	6.97	14.63	197.90	14.67	265.27	3.97	6	
Expt. Mean	258.54	594.66	814.42	2.358571429	3.334285714	5.06	10.59	237.09	15.82	274.38	4.37		
C.D. (0.05)	9.69	22.27	30.53	0.35	0.52	1.56	3.27	15.52	1.04	17.74			
C.V. (%)	2.11	2.1	2.11	8.23	8.71	17.36	17.36	3.68	3.71	3.63			
res(t)	**	**	**	**	**	**	**	**	**	*			
Soil type													
pH													
EC													
Variety & Duration													
Applied NPK kg/ha													
Available NPK kg/ha													

*Figures in the parenthesis are transformed values

4.2.2b. Identification of suitable varieties for dry DSR system

One of the major challenges confronting the development of dry DSR in India is poor choice of suitable varieties and variety breeding. Hence the present trial is constituted to enhance the productivity of the dry DSR with the following objectives 1) To identify the suitable and promising rice cultivars in dry direct seeded rice and 2) To assess the various agronomic parameters for suitability of rice cultivars in dry direct seeded rice establishment methods. The trial was conducted at 8 locations (**Dhangain, Gangavathi, Kota, Mandya, Nawagam, Pusa, Rajendranagar and Ranchi**). The trial was laid out in RBD with 13 treatments and replicated thrice. Treatments are T₁: DRR Dhan 44 (early) T₂: Sahbhagidhan (very early) T₃: DRR Dhan 60 T₄: DRR Dhan 42 (Mid early) T₅: Vandana (rainfed upland), T₆: Anjali T₇: Varalu (Upland Wesern zone) T₈: IRRI 1 T₉: IRRI 2 T₁₀: IRRI 3 T₁₁: LC 1 T₁₂: LC 2 T₁₃: LC 3. The trial was initiated in 2023-24 kharif. The results were summarized and presented in **Table 4.2.2b** and the salient findings are as followed.

Location	Grain yield (t/ha) of varieties		
	1 st rank	2 nd rank	3 rd rank
Dhangain	LC 1 (5.30)	LC 2 (4.75)	LC 3 (3.49)
Gangavathi	DRR Dhan 44 (4.63)	LC 3 (4.13)	LC 2 (4.07)
Kota	DRR Dhan 44 (4.81)	DRR Dhan 42 (4.71)	IRRI 1 (4.63)
Mandya	LC 2 (5.60)	LC 3 (5.57)	Sahbhagidhan (5.11)
Nawagam	LC 3 (4.88)	DRR Dhan 44 (4.78)	LC 1 (4.63)
Pusa	LC 1 (4.40)	Sahbhagidhan (4.27)	LC 3 (4.22)
Rajendranagar	DRR Dhan 44 (4.29)	Sahbhagidhan (4.07)	LC 3 (4.01)
Ranchi	DRR Dhan 44 (4.84)	DRR Dhan 42 (4.58)	LC 3 (4.34)

DRR Dhan 44 mean grain yield across the 8 locations was the highest with 4.40 t/ha

Table 4.2.2b: Evaluation of varieties for their suitability and enhancement of the productivity in dry direct seeded rice (un-puddle soil) , Kharif-2024.

DHANGAIN							
Cultivars	Grain yield (t/ha)	Rank	Grain yield (kg/plot)	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% flowering
1. DRR Dhan 44 (early)	3.20	6	3.46	265	2.93	20.80	84
2.Sabhagidhan (very early)	3.30	5	3.56	266	2.97	24.13	78
3. DRR Dhan 60	3.40	4	3.68	269	3.09	18.47	93
4. DRR Dhan 42 (Mid early)	3.14	7	3.40	259	2.86	23.73	79
5. Vandana (rainfed upland)	-		-	-	-	-	-
6. Anjali	-		-	-	-	-	-
7. Varalu (Upland-western zone)	-		-	-	-	-	-
8. IRR1 1	-		-	-	-	-	-
9.IRR1 2	-		-	-	-	-	-
10. IRR1 3	-		-	-	-	-	-
11.LC 1	5.30	1	5.72	292	4.46	23.00	89
12. LC 2	4.75	2	5.13	280	3.56	17.87	93
13. LC 3	3.49	3	3.77	275	3.25	20.87	84
Expt. Mean	3.80		4.10	272	3.30	21.27	86
C.D. (0.05)	0.52		0.57	27.3	0.67	0.75	0.84
C.V. (%)	7.77		7.77	5.64	11.32	1.97	0.55
res(t)	**		**	NS	**	**	**
Soil type	Clay loam						
pH	6.56						
EC	0.65						
Applied NPK kg/ha	120:60:40						
Available NPK kg/ha	347.5:48.3:262.2						

V11.LC 1 - Arize 6555 (120-125 days)
V12. LC 2 - Sabour Vijay (125-130 days)
V13. LC 3 - R. Bhagwati (115 - 120 days)

Table 4.2.2b: Contd.

Cultivars	GANGAVATHI													
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Grain yield (kg/plot)	Straw yield (kg/plot)	Germination (%)	Plant population no/m2			Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% flowering	Cost of cultivation Rs/ha
							20 DAS	Harvest						
1. DRR Dhan 44 (early)	4.63	1	5.27	3.36	3.83	100	237	234	520.33	3.80	2.41	84	51330	
2.Sabhagidhan (very early)	2.32	7	3.20	1.69	2.67	100	259	256	228.67	2.26	2.28	82	51330	
3. DRR Dhan 60	3.25	5	4.12	2.36	3.00	100	222	219	299	2.60	1.52	99	51330	
4. DRR Dhan 42 (Mid early)	3.19	6	4.81	2.32	3.17	100	194	191	329.67	3.16	2.16	82	51330	
5. Vandana (rainfed upland)	-		-	-	-	-	-	-	-	-	-	-	-	
6. Anjali	-		-	-	-	-	-	-	-	-	-	-	-	
7. Varalu (Upland-western zone)	-		-	-	-	-	-	-	-	-	-	-	-	
8. IRR1 1	-		-	-	-	-	-	-	-	-	-	-	-	
9.IRR1 2	-		-	-	-	-	-	-	-	-	-	-	-	
10. IRR1 3	-		-	-	-	-	-	-	-	-	-	-	-	
11.LC 1	3.48	4	5.03	2.53	3.67	100	335	332	358.67	2.52	1.78	89	51330	
12. LC 2	4.07	3	5.17	2.97	3.33	100	202	202	318.67	2.99	1.77	84	51330	
13. LC 3	4.13	2	4.81	3.01	3.33	100	205	205	304.67	3.26	2.94	84	51330	
Expt. Mean	3.58		4.63	2.61	3.29	100	236	234	337.0971429	2.94	2.12	86	51330	
C.D. (0.05)	0.87		1.18	0.64	1.31	0	85.53	84.39	194.33	0.86	0.75	0	0	
C.V. (%)	13.63		14.27	13.71	22.42	0	20.33	20.25	32.4	16.37	19.82	0	0	
res(t)	**		*	**	NS	NS	*	*	NS	*	*	NS	NS	
Soil type	Blacksoil													
pH	8													
EC	-													
Applied NPK kg/ha	150:75:75													
Available NPK kg/ha	-													

Table 4.2.2b: Contd.

Cultivars	KOTA											
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Grain yield (kg/plot)	Straw yield (kg/plot)	Plant population no/m2		Tillers/m ² (No.)	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% flowering
						20 DAS	Harvest					
1. DRR Dhan 44 (early)	4.81	1	7.08	4.85	7.13	49	42	299	272	3.00	22.93	80
2.Sabthagidhan (very early)	3.64	8	5.90	3.67	5.95	45	40	212	187	3.18	22.37	75
3. DRR Dhan 60	4.35	5	7.86	4.38	7.92	49	41	253	226	3.07	14.97	86
4. DRR Dhan 42 (Mid early)	4.71	2	7.90	4.75	7.97	52	44	269	248	3.84	25.82	79
5. Vandana (rainfed upland)	1.36	10	3.27	1.37	3.30	49	42	239	211	2.61	24.55	64
6. Anjali	1.95	9	3.97	1.97	4.00	46	41	254	229	2.12	26.23	61
7. Varalu (Upland-western zone)	3.69	7	6.93	3.72	6.98	52	45	259	232	3.87	20.86	83
8. IRR1 1	4.63	3	6.91	4.67	6.97	49	43	304	266	3.33	25.56	79
9.IRR1 2	4.26	6	6.32	4.30	6.37	51	45	271	241	3.57	22.94	81
10. IRR1 3	4.37	4	7.95	4.40	8.02	48	42	277	251	3.49	24.68	76
11.LC 1	-	-	-	-	-	-	-	-	-	-	-	-
12. LC 2	-	-	-	-	-	-	-	-	-	-	-	-
13. LC 3	-	-	-	-	-	-	-	-	-	-	-	-
Expt. Mean	3.78		6.41	3.81	6.46	49	43	264	236	3.21	23.09	77
C.D. (0.05)	0.46		0.66	0.46	0.66	4.77	3.7	24.63	22.17	0.41	1.19	0.92
C.V. (%)	7.08		5.97	7.1	5.97	5.68	5.07	5.44	5.47	7.5	3.01	0.7
res(t)	**		**	**	**	NS	NS	**	**	**	**	**
Soil type	Clay											
pH	7.49											
EC	0.52											
Applied NPK kg/ha	120:60:40											
Available NPK kg/ha	214.6:30.1:369.4											

Table 4.2.2b: Contd.

Cultivars	MANDYA										
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Grain yield (kg/plot)	Straw yield (kg/plot)	Germination (%)	Plant population no/m2 (20DAS)	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% flowering
1. DRR Dhan 44 (early)	4.54	6	9.21	8.37	16.99	94	42	370	4.01	28.08	83
2.Sabhadghan (very early)	5.11	3	6.06	9.43	11.18	95	43	413	2.95	27.16	74
3. DRR Dhan 60	4.76	4	6.81	8.77	12.56	96	43	413	2.39	18.22	86
4. DRR Dhan 42 (Mid early)	4.57	5	8.98	8.42	16.56	96	43	401	3.09	32.36	80
5. Vandana (rainfed upland)	-		-	-	-	-	-	-	-	-	-
6. Anjali	-		-	-	-	-	-	-	-	-	-
7. Varalu (Upland-western zone)	-		-	-	-	-	-	-	-	-	-
8. IRR1 1	-		-	-	-	-	-	-	-	-	-
9.IRR1 2	-		-	-	-	-	-	-	-	-	-
10. IRR1 3	-		-	-	-	-	-	-	-	-	-
11.LC 1	4.45	7	5.82	8.22	10.73	95	42	449	2.69	24.55	79
12. LC 2	5.60	1	8.61	10.33	15.88	96	43	378	4.21	25.15	78
13. LC 3	5.57	2	8.02	10.28	14.79	93	42	477	2.81	28.85	82
Expt. Mean	4.94		7.64	9.12	14.10	95	43	414	3.16	26.34	80
C.D. (0.05)	1.07		1.67	1.97	3.09	3.14	1.54	64.41	1.02	4.12	1.76
C.V. (%)	12.15		12.31	12.16	12.32	1.86	2.04	8.74	18.14	8.79	1.23
res(f)	NS		**	NS	**	NS	NS	*	*	**	**
Soil type	Red sandy loam										
pH	7.95										
EC	0.34										
Applied NPK kg/ha	100:50:50										
Available NPK kg/ha	274.20:67.40:271.30										

V11.LC 1 - Rasi (120-125 days)
V12. LC 2 - KMP 175 (115-120 days)
V13. LC 3 - MAS 26 (110-120 days))

Table 4.2.2b: Contd.

Cultivars	NAWAGAM											
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Grain yield (kg/plot)	Straw yield (kg/plot)	Germination (%)	Plant population no/m ² (20DAS)	Tillers/m ² (No.)	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% flowering
1. DRR Dhan 44 (early)	4.78	2	5.25	3.59	3.94	78	47	186	165	5.12	22.70	84
2.Sabhadghan (very early)	4.11	8	4.80	3.08	3.60	71	39	196	173	3.78	23.33	78
3. DRR Dhan 60	4.53	6	5.11	3.40	3.83	80	47	189	166	3.83	24.87	86
4. DRR Dhan 42 (Mid early)	4.56	5	5.14	3.42	3.85	74	42	205	180	3.89	22.57	82
5. Vandana (rainfed upland)	3.28	11	4.01	2.46	3.01	67	37	201	180	2.39	24.70	65
6. Anjali	3.16	12	3.74	2.37	2.81	74	41	159	140	3.53	27.77	71
7. Varalu (Upland-western zone)	3.46	10	4.35	2.59	3.26	74	40	172	152	4.26	18.77	97
8. IRR1 1	4.15	7	4.97	3.11	3.72	73	43	169	149	3.13	25.30	110
9.IRR1 2	4.61	4	5.21	3.46	3.90	77	40	155	139	4.43	20.83	103
10. IRR1 3	3.48	9	4.20	2.61	3.15	68	45	145	127	3.95	24.53	103
11.LC 1	4.63	3	5.28	3.48	3.96	71	41	130	116	4.89	17.83	101
12. LC 2	4.88	1	5.59	3.66	4.19	75	49	194	172	5.69	32.37	87
13. LC 3	-		-	-	-	-	-	-	-	-	-	-
Expt. Mean C.D. (0.05) C.V. (%) res(t)	4.14		4.80	3.10	3.60	73	43	175	155	4.07	23.80	89
	0.56		0.82	0.42	0.61	7.59	9.02	32.44	24.69	0.67	1.4	2.11
	8.03		10.05	8.01	10.07	6.11	12.53	10.94	9.41	9.72	3.48	1.4
	**		**	NS	NS	**	**	**	**	**	**	**
Soil type	Clay loam											
pH	8.01											
EC	0.52											
Applied NPK kg/ha	100:25:00:25											
Available NPK kg/ha	235:20:36.50:239.50											

V11. LC 1 - Mahisagar (115-120 days)
V12. LC 2 - GAR 201 (115-120 days)
V13. LC 3 -

Table 4.2.2b: Contd.

Cultivars	NAWAGAM Contd.				
	Weed population (no/m ²)		Weed biomass (g/m ²)		Cost of cultivation Rs/ha
	At active tillering	At panicle initiation	At active tillering	At panicle initiation	
1. DRR Dhan 44 (early)	96.67(9.59)	198.67(13.98)	28.75	56.19	39697
2.Sabhagidhan (very early)	66.00(7.83)	78.33(8.8)	19.64	24.14	39700
3. DRR Dhan 60	51.00(6.77)	48.67(6.94)	16.99	12.94	39710
4. DRR Dhan 42 (Mid early)	80.67(8.92)	159.00(12.45)	26.53	45.01	39730
5. Vandana (rainfed upland)	36.67(5.9)	117.67(10.72)	11.00	32.39	39697
6. Anjali	55.00(6.93)	83.33(9.11)	19.81	23.09	39710
7. Varalu (Upland-western zone)	84.00(9.13)	152.00(12.33)	27.67	41.76	39730
8. IRR1 1	29.33(5.42)	64.00(7.95)	9.51	17.05	39697
9.IRR1 2	37.00(5.97)	59.33(7.57)	10.84	21.34	39730
10. IRR1 3	65.00(7.86)	153.33(12.3)	22.26	38.71	39730
11.LC 1	61.33(7.35)	142.33(11.54)	18.40	39.87	39730
12. LC 2	74.33(8.58)	110.67(9.91)	22.30	37.30	39750
13. LC 3	-	-	-	-	-
Expt. Mean	7.520833333	10.3	19.48	32.48	39718
C.D. (0.05)	4	4.02	20.72	27.84	66.22
C.V. (%)	31.41	23.06	62.82	50.61	0.1
res(t)	NS	*	NS	NS	NS
Soil type					
pH					
EC					
Applied NPK kg/ha					
Available NPK kg/ha					

*Figures in the parenthesis are transformed values.

Table 4.2.2b: Contd.

Cultivars	PUSA												
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Germination (%)	Plant population no/m2		Tillers/m ² (No.)	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% flowering	Water input mm/ha	Cost of cultivation Rs/ha
					20 DAS	Harvest							
1. DRR Dhan 44 (early)	4.07	6	5.22	86	54	49	260	255	2.52	21.70	79	200	57772
2.Sabhagidhan (very early)	4.27	2	5.55	88	53	51	278	274	2.49	21.27	76	200	57772
3. DRR Dhan 60	3.94	7	5.22	85	53	50	257	252	2.55	22.27	87	200	57772
4. DRR Dhan 42 (Mid early)	4.09	5	5.31	85	51	49	238	233	2.43	21.20	83	200	57772
5. Vandana (rainfed upland)	-	-	-	-	-	-	-	-	-	-	-	-	-
6. Anjali	-	-	-	-	-	-	-	-	-	-	-	-	-
7. Varalu (Upland-western zone)	-	-	-	-	-	-	-	-	-	-	-	-	-
8. IRR1 1	-	-	-	-	-	-	-	-	-	-	-	-	-
9.IRR1 2	-	-	-	-	-	-	-	-	-	-	-	-	-
10. IRR1 3	-	-	-	-	-	-	-	-	-	-	-	-	-
11.LC 1	4.40	1	5.69	92	53	51	280	275	2.65	22.13	78	200	57772
12. LC 2	4.14	4	5.36	90	52	50	267	262	2.52	21.20	75	200	57772
13. LC 3	4.22	3	5.46	92	52	50	270	265	2.54	20.77	75	200	57772
Expt. Mean	4.16		5.40	88	53	50	264	260	2.53	21.51	79	200	57772
C.D. (0.05)	0.25		0.37	2.87	3.13	3.38	21.24	21.11	0.1	0.53	4.09	0	0
C.V. (%)	3.4		3.82	1.83	3.35	3.8	4.52	4.57	2.19	1.39	2.92	0	0
res(f)	*		NS	**	NS	NS	*	*	*	**	**	NS	NS
Soil type	Clay loam												
pH	8.01												
EC	0.52												
Applied NPK kg/ha	100:25:00:25												
Available NPK kg/ha	235:20:36.50:239.50												

Table 4.2.2b: Contd.

ARI-RAJENDRANAGAR							
Cultivars	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Tillers/m ² (No.)	Panicle/m ² (No.)	Panicle wt (g)	Days for 50% flowering
1. DRR Dhan 44 (early)	4.29	1	5.70	516	475	4.02	113
2.Sabhadghan (very early)	4.07	2	4.90	515	472	3.13	94
3. DRR Dhan 60	2.69	9	3.17	375	349	2.49	86
4. DRR Dhan 42 (Mid early)	3.33	6	4.52	476	437	3.07	110
5. Vandana (rainfed upland)	1.98	12	3.44	323	292	2.59	88
6. Anjali	2.71	8	3.83	397	364	2.81	107
7. Varalu (Upland-western zone)	3.65	5	5.11	447	429	3.44	95
8. IRR1 1	2.55	11	3.60	371	343	3.31	93
9.IRR1 2	2.58	10	3.70	349	322	4.43	101
10. IRR1 3	-		-	-	-	-	-
11.LC 1	3.81	4	5.11	475	435	3.41	97
12. LC 2	3.05	7	4.14	420	387	3.78	91
13. LC 3	4.01	3	5.50	497	454	4.21	94
Expt. Mean	3.23		4.39	430	397	3.39	97
C.D. (0.05)	0.53		0.58	96.27	89.47	0.48	1.39
C.V. (%)	9.78		7.8	13.22	13.32	8.35	0.84
res(t)	**		**	**	**	**	**
Soil type	Clay						
pH	-						
EC	-						
Applied NPK kg/ha	120:60:40						
Available NPK kg/ha	-						

V11. LC 1 - RNR 15048 (120 days)
V12. LC 2 - RNR 29325 (120-125 days)
V13. LC 3 RNR 28361 (130-135 days)

Table 4.2.2b: Contd.

Cultivars	RANCHI								Test wt (g)
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Tillers/m2 (No.)			Panicle/m ² (No.)	Grains/panicle (No)	
				30 DAS	60 DAS	Harvest			
1. DRR Dhan 44 (early)	4.84	1	7.03	142	282	273	265	112	25.16
2.Sabhadighan (very early)	4.05	4	6.78	124	245	229	220	96	24.57
3. DRR Dhan 60	-		-	-	-	-	-	-	-
4. DRR Dhan 42 (Mid early)	4.58	2	7.42	133	265	256	250	99	24.72
5. Vandana (rainfed upland)	-		-	-	-	-	-	-	-
6. Anjali	-		-	-	-	-	-	-	-
7. Varalu (Upland-western zone)	-		-	-	-	-	-	-	-
8. IRR1 1	-		-	-	-	-	-	-	-
9.IRR1 2	-		-	-	-	-	-	-	-
10. IRR1 3	-		-	-	-	-	-	-	-
11.LC 1	3.77	6	6.03	116	230	215	206	78	24.10
12. LC 2	4.04	5	5.97	124	244	228	222	93	24.56
13. LC 3	4.34	3	6.11	129	258	244	238	99	24.62
Expt. Mean	4.27		6.56	128	254	241	234	96	24.62
C.D. (0.05)	0.85		1.29	18.26	35.68	39.71	34.59	15.11	2.23
C.V. (%)	10.96		10.85	7.83	7.72	9.06	8.14	8.66	4.97
res(t)	NS		NS	NS	NS	NS	*	*	NS
Soil type	-								
pH	5.8								
EC	-								
Applied NPK kg/ha	80:40:30								
Available NPK kg/ha	-								

Table 4.2.2b: Contd.

Cultivars	RANCHI Contd.					Over all Mean	Rank
	Weed population (no/m ²)		Weed biomass (g/m ²)				
	At active tillering	At panicle initiation	At active tillering	At panicle initiation			
	At active tillering	At panicle initiation	At active tillering	At panicle initiation			
1. DRR Dhan 44 (early)	25.25(5.07)	28.07(5.64)	21.75	65.25	4.40	1	
2.Sabthagidhan (very early)	45.23(6.76)	56.49(7.86)	41.44	105.75	3.86	7	
3. DRR Dhan 60	-	-	-	-	3.85	8	
4. DRR Dhan 42 (Mid early)	35.23(5.98)	49.19(6.76)	29.23	88.23	4.02	5	
5. Vandana (rainfed upland)	-	-	-	-	2.21	13	
6. Anjali	-	-	-	-	2.61	12	
7. Varalu (Upland-western zone)	-	-	-	-	3.60	11	
8. IRR1 1	-	-	-	-	3.78	10	
9.IRR1 2	-	-	-	-	3.82	9	
10. IRR1 3	-	-	-	-	3.93	6	
11.LC 1	51.21(7.19)	72.07(8.3)	45.36	140.27	4.26	4	
12. LC 2	50.34(7.13)	54.02(7.66)	44.23	135.75	4.36	2	
13. LC 3	41.75(6.5)	49.08(7.27)	36.27	109.75	4.29	3	
Expt. Mean	6.438333333	7.248333333	36.38	107.50			
C.D. (0.05)	0.46	0.51	5.61	17.01			
C.V. (%)	3.9	3.88	8.47	8.7			
res(f)	**	**	**	**			
Soil type							
pH							
EC							
Applied NPK kg/ha							
Available NPK kg/ha							

*Figures in the parenthesis are transformed values.

4.2.2c. Seed priming in Dry DSR for proper establishment and productivity

In dry direct seeding, good crop establishment is constrained by subsurface soil drying associated with high temperature. Besides, poor germination under aerobic soil condition results in sparse and patchy stands, which encourages weed growth and reduces the competitive ability of rice against weeds. Since seedling vigour is an agronomical trait that predicts the possibility of seed germination, seedling growth, and climate tolerance, there are a few agronomic interventions that can promote seedling vigour as well, which include seed invigoration/priming, a simple, yet effective technique. Seed priming is one of the most important developments to help rapid, uniform germination and emergence of seeds and to increase seed tolerance to adverse environmental conditions. Invigoration /Priming of seeds has shown to have positive effects on the emergence, yield, and quality of dry direct-seeded rice. With this back ground, the trial is initiated to evaluate different seed invigorators in crop establishment, growth and yield of dry DSR and to identify the suitable, cost effective and promising seed invigoration in dry DSR.

The trial was conducted at six locations viz., **Chatha, Coimbatore, ICAR-IIRR, Jagdalpur, Ludhiana and Mandya**. The trial included six priming treatments and control viz., hydro-priming, hardening, priming with NaCl1%, seed treatment with CPB-1 (Chitinolytic bacterium), seed treatment with *Trichoderma asperellum*, seed treatment with *Bacillus* and control in replicated Randomized Block Design. Though the data on critical parameters of crop growth from all the test locations is necessary to assess the performance of different priming treatments and derive meaningful conclusion, only two locations (ICAR-IIRR) have reported seedling vigor index, leaf area index at 7,14,21,28 and 35 Days After Sowing and four locations (**Chatha, Coimbatore, Ludhiana and Mandya**) data is not reported. At two locations (**ICAR-IIRR and Mandya**), no germination was reported with seed treatment with *Bacillus subtilis*. The mean grain yield varied from 2.98 t/ha at Jagdalpur to 5.99 t/ha at Ludhiana with variety DRRDhan48. **ICAR-IIRR and Jagdalpur** have reported Seedling Vigor Index and the results showed that, Seedling Vigor Index was significantly superior with seed hardening and seed treatment with Chitinolytic Bacterium at 14 and 21 DAS.

At **Jagdalpur and Mandya**, there was no significant difference among the treatments and control. At **Chatha**, hydro-priming was significantly superior over all other priming treatments. At **Coimbatore**, seed treatment with CPB-1 (Chitinolytic bacterium) was significantly superior over other priming treatments and untreated control was significantly inferior. At **ICAR-IIRR**, hydropriming, hardening, priming with NaCl 1%, seed treatment with *Trichoderma asperellum* recorded significantly higher grain yields, comparable to each other statistically; and superior over seed treatment with CPB-1 (Chitinolytic bacterium) and control. At **Ludhiana**, hardening and priming with NaCl 1% were significantly superior over other priming treatments and were comparable to each other. The straw yield followed similar trend as that of grain yield. The yield attributes supported in realization of yields in the respective priming treatments. (Table 4.2.2c). The seedling vigor index was significantly influenced by Priming treatments and higher except with seed treatment of CPB1 at 21 DAS

and hardening at 28 DAS. Leaf Area Index was significantly higher with priming. At **Jagdalpur**, seed priming treatments were significant in improving seedling vigor index at all stages of observations, except hydropriming and priming with Na Cl. Based on the results of two seasons field experiment, it was concluded that, seed priming of any kind is simple technique to improve germination, seedling vigor, crop growth, yield attributes and grain yield in Dry DSR.

Table 4.2.2c: Yield parameters and grain yield of Seed priming in Dry DSR for proper establishment and productivity Kharif-2024.

Treatment details	Grain yield t/ha				
	Chatha	Coimbatore	ICAR-IIRR	Jagdulpur	Ludhiana
T1 - Hydropriming	7.03	4.87	5.65	2.94	5.94
T2 - Hardening	5.06	4.96	5.46	2.83	6.55
T3 - Priming with NaCl 1%	5.27	4.92	5.66	3.14	6.34
T4 - Seed treatment with CPB-1 (Chitinolytic bacterium)	5.62	5.08	5.12	3.25	5.77
T5 - Seed treatment with Trichoderma asperellum	4.53	4.72	5.99	2.75	5.71
T6 - Seed treatment with Bacillus subtilis	4.15	4.84	-	3.25	5.85
T7 - Control	5.99	4.24	4.95	2.73	5.74
Exp. mean	5.38	4.80	5.47	2.98	5.99
CD(0.05)	0.15	0.11	0.54	0.71	0.40
CV	1.57	1.26	6.58	13.33	3.74
res(t)	**	**	*	NS	**
Applied N:P:K:Zn Kg/ha	120:60:40 kg/ha	150:50:50 kg/ha	120:60:40	120:60:30	150:30:30-4
Avail N:P:K (kg/ha)	245.15: 14.34:146.31 kg/ha	247:23:426 kg/ha			212:22.8:165kg/ha
Soil type	Sandy clay loam	Clay loam	Clay	Loamy clay	Sandy loam
pH	8.03	8.1	7.2	5.8	7.7
EC (dsm-1)	0.21		0.52		
Organic carbon	0.57	0.47	0.48	0.48	0.45

*T6 - Seed treatment with Bacillus subtilis was not germinated in Mandya & ICAR-IIRR Locations

261.4:65.20:270.30

Red sandy loam

7.93

0.34

1.16

Table 4.2.2c: Contd.

Treatment details	Straw yield t/ha					
	Chatha	Coimbatore	ICAR-IIRR	Jagdalpur	Ludhiana	Mandya
T1 - Hydropriming	8.79	6.42	7.13	9.60	7.75	7.06
T2 - Hardening	6.32	6.50	7.08	9.54	8.32	7.16
T3 - Priming with NaCl 1%	6.59	6.43	7.22	9.16	8.11	7.73
T4 - Seed treatment with CPB-1 (Chitinolytic bacterium)	7.03	6.65	6.96	9.65	7.69	6.24
T5 - Seed treatment with Trichoderma asperellum	5.67	6.22	7.27	9.12	7.31	7.12
T6 - Seed treatment with Bacillus subtilis	5.19	6.40	-	8.70	7.85	-
T7 - Control	7.49	6.78	6.39	9.42	7.42	6.18
Exp. mean	6.73	6.48	7.01	9.31	7.78	6.91
CD(0.05)	0.19	0.12	0.40	2.21	0.45	1.46
CV	1.57	1.07	3.79	13.34	3.28	11.64
res(t)	**	**	**	NS	**	NS
Applied N:P:K:Zn Kg/ha						
Avail N:P:K (kg/ha)						
Soil type						
pH						
EC (dsm-1)						
Organic carbon						

Table 4.2.2c: Contd.

Treatment details	No of Panicles/m ²						Panicle Weight(g)					
	Chatha	Coimbatore	ICAR-IIRR	Jagdulpur	Ludhiana	Mandya	Chatha	Coimbatore	ICAR-IIRR	Jagdulpur	Ludhiana	Mandya
T1	381	302	436	287	382	402	2.24	2.36	2.40	3.47	2.72	2.26
T2	308	318	416	303	427	397	2.13	2.59	2.21	3.27	2.86	2.15
T3	313	312	452	304	432	415	2.17	2.48	2.44	3.53	2.87	2.28
T4	323	332	388	308	387	391	2.20	2.75	2.19	4.07	2.71	2.38
T5	292	288	468	323	352	350	2.06	2.20	2.50	3.47	2.69	2.35
T6	278	301	-	328	390	-	2.03	2.32	-	3.20	2.71	-
T7	339	256	360	332	380	386	2.21	2.09	2.04	2.80	2.72	2.09
Exp. mean	319	301	420	312	393	390	2.15	2.40	2.30	3.40	2.76	2.25
CD(0.05)	6	13	52	86	27	79	0.02	0.10	0.30	0.61	0.31	0.43
CV	1	2	8	16	4	11	0.44	2.37	8.72	10.05	6.26	10.53
res(t)	**	**	**	NS	**	NS	**	**	*	*	NS	NS

- Treatments:
- T1 - Hydropriming
 - T2 - Hardening
 - T3 - Priming with NaCl 1%
 - T4 - Seed treatment with CPB-1 (Chitinolytic bacterium)
 - T5 - Seed treatment with Trichoderma asperellum
 - T6 - Seed treatment with Bacillus subtilis
 - T7 - Control

Table 4.2.2c: Contd.

Treatment details	Test Weight(g)							Filled grain %		
	Chatha	Coimbatore	ICAR-IIRR	Jagdulpur	Ludhiana	Mandya		ICAR-IIRR	Ludhiana	Mandya
T1	24.63	22.13	17.16	16.00	25.27	15.94		92.56	92.63	88.35
T2	23.43	22.90	17.07	16.00	25.27	14.86		92.20	93.51	85.02
T3	24.13	22.47	17.43	15.33	25.40	15.73		93.81	93.63	82.49
T4	24.33	23.07	17.03	15.67	25.27	15.28		92.11	91.81	85.67
T5	23.17	22.10	17.57	16.00	25.37	17.83		94.66	93.23	82.57
T6	23.03	23.10	-	16.00	25.33	-		-	92.44	-
T7	24.37	21.90	16.50	15.33	25.30	15.62		91.53	92.69	87.41
Exp. mean	23.87	22.52	17.13	15.76	25.31	15.88		92.81	92.85	85.25
CD(0.05)	0.11	0.39	0.81	1.09	0.92	1.45		1.53	1.77	6.53
CV	0.25	0.97	3.14	3.87	2.04	5.04		1.1	1.07	4.21
res(t)	**	**	NS	NS	NS	*		**	NS	NS

- Treatments:
- T1 - Hydropriming
 - T2 - Hardening
 - T3 - Priming with NaCl 1%
 - T4 - Seed treatment with CPB-1 (Chitinolytic bacterium)
 - T5 - Seed treatment with Trichoderma asperellum
 - T6 - Seed treatment with Bacillus subtilis
 - T7 - Control

Table 4.2.2c: Contd.

Treatment details	Plant height(cm) at harvest				
	Chattha	Coimbatore	ICAR-IIRR	Jagdalpur	Mandya
T1	88.14	89.50	98.06	96.47	62.97
T2	72.58	92.20	97.30	100.78	58.41
T3	77.33	90.30	98.17	99.13	59.59
T4	84.00	95.00	97.74	103.44	60.27
T5	75.67	87.73	99.06	102.39	58.71
T6	73.00	89.30	-	98.58	-
T7	77.73	85.80	94.47	96.84	60.44
Exp. mean	78.35	89.98	97.47	99.66	60.06
CD(0.05)	4.77	2.62	2.35	3.76	5.82
CV	3.42	1.64	1.60	2.12	5.33
res(t)	**	**	*	*	NS

Table 4.2.2c: Contd.

Leaf Area Index					Seedling Vigor Index								
Treatment details	ICAR-IIRR			Jagdalpur	ICAR-IIRR				Jagdalpur				
	Seedling stage	Max.tillering stage	50 % flowering stage	Max.tillering stage	14 DAS	21 DAS	28 DAS	35 DAS	7 DAS	14 DAS	21 DAS	28 DAS	35 DAS
T1	0.89	1.87	3.57	2.53	454.10	665.42	2753.82	3663.26	609.90	1195.93	1791.83	2389.11	2986.39
T2	0.85	1.76	3.21	2.11	436.18	632.57	2617.38	3609.01	636.85	1265.00	1884.23	2512.31	3140.39
T3	0.93	1.91	3.74	2.32	460.69	691.56	3069.10	3867.22	571.00	1143.89	1654.26	2205.68	2757.10
T4	0.78	1.27	2.82	2.37	407.85	586.39	2697.64	3463.61	663.92	1304.57	1930.01	2573.34	3216.68
T5	1.05	2.06	3.83	2.11	485.08	714.56	3218.38	3944.45	663.44	1311.22	1949.42	2599.23	3249.03
T6	-	-	-	2.10	-	-	-	-	639.55	1248.71	1873.14	2497.51	3121.89
T7	0.75	1.08	2.61	1.90	392.75	537.60	2490.32	3340.95	617.15	1188.55	1800.67	2400.90	3001.12
Exp. mean	0.87	1.66	3.30	2.21	439.44	638.02	2807.77	3648.08	628.83	1236.84	1840.51	2454.01	3067.51
CD(0.05)	0.15	0.51	0.59	0.72	78.96	114.05	427.10	418.42	43.35	54.08	104.65	139.53	174.41
CV	11.67	20.54	11.91	18.31	11.92	11.86	10.09	7.61	3.87	2.46	3.20	3.20	3.20
res(t)	*	**	**	NS	NS	*	*	NS	**	**	**	**	**

Treatments:

- T1 - Hydropriming
- T2 - Hardening
- T3 - Priming with NaCl 1%
- T4 - Seed treatment with CPB-1 (Chitinolytic bacterium)
- T5 - Seed treatment with Trichoderma asperellum
- T6 - Seed treatment with Bacillus subtilis
- T7 - Control

Table 4.2.2c: Contd.

Treatment details	Dry matter production g/m ²				Root:Shoot ratio			
	ICAR-IIRR				ICAR-IIRR			
	Seedling stage	Max.tillering stage	50 % flowering stage		14 DAS	21 DAS	28 DAS	35 DAS
T1	36.27	1208.33	2039.9		0.89	0.51	0.35	0.53
T2	36.02	1194.98	1993.46		0.78	0.48	0.34	0.51
T3	38.75	1282.89	2202.43		0.89	0.54	0.35	0.54
T4	35.54	1157.63	1893.01		0.69	0.47	0.33	0.49
T5	40.7	1346.61	2402.98		0.90	0.55	0.36	0.57
T6	-	-	-		-	-	-	-
T7	33.82	1137.31	1818.61		0.62	0.45	0.25	0.45
Exp. mean	36.85	1221.29	2058.4		0.79	0.50	0.33	0.51
CD(0.05)	3.87	108	241.17		0.16	0.20	0.06	0.15
CV	6.96	5.87	7.78		13.39	26.10	13.01	19.21
res(t)	*	**	**		**	NS	*	NS

Treatments:

- T1 - Hydropriming
- T2 - Hardening
- T3 - Priming with NaCl 1%
- T4 - Seed treatment with CPB-1 (Chitinolytic bacterium)
- T5 - Seed treatment with Trichoderma asperellum
- T6 - Seed treatment with Bacillus subtilis
- T7 - Control

4.2.3a. Identification of suitable sowing method of wet DSR for higher productivity in different zones

Direct wet seeding offers the advantage of faster and easier planting, reduced labour and less drudgery, 7-10 days earlier crop maturity, more efficient water use and higher tolerance to water deficit, less methane emission, and often higher profit in areas with assured water supply. This method of seeding in the past has received relatively less attention than transplanting. Sowing of sprouted rice seed or wet-seeded rice in puddled soil though becoming increasingly important as a method of crop establishment under lowland rice is beset with weed problems, particularly grassy weeds besides other management practices. Weeds emerge at about the same time that the rice seeds germinate, and therefore the yield losses caused by weeds will become greater with the trend towards wet seeding. Effective weed control is one of the key issues and major requirements to ensure a successful wet-seeded rice crop. Furthermore, varieties must be improved for early seeding vigour, weed competitiveness, submergence tolerance to survive untimely rainfall during stand establishment and drought tolerance to survive dry conditions during germination and later growth stages, and for lodging resistance at maturity. Hence the present trial is constituted to enhance the productivity of the wet DSR with the following objectives 1) To identify suitable and cost-effective agronomic management practices to enhance the productivity of wet-DSR) To maximize the resource use efficiency. The trial was conducted at 16 locations (**Chatha, Chiplima, Coimbatore, Karjat, Mandya, Moncompu, Navasari, Nawagam, Pattambi, Puducherry, Pusa, Rewa, Vadagaon, Varanasi, Aduthurai and Maruteru**). The trial was conducted in RBD and replicated thrice. The treatments were S₁: Broadcasting of seeds and S₂: Manual line sowing, S₃: Mechanized line sowing of seeds (Dribbler, Happy seeder of any Drum seeder, spacing as per the equipment specifications) S₄: Raised bed sowing, S₅: Any improved system in that particular location and S₆: Location specific high yielding wet DSR method, and S₇: Farmers' practice of the wet DSR method of the region. The results were summarized and presented in **Table 4.2.3a** and the salient findings are as followed.

In sandy clay loam soils of **Chatha**, manual line sowing resulted in the highest grain yield (3.19 t/ha) followed by mechanized line sowing (3.16 t/ha). The lowest weed population at active tillering (3.13 no./m²) and panicle initiation (6.12 no./m²) stages also observed under manual line sowing. Similar trend of results were also reflected in weed biomass at both stages of crop. At **Chiplima**, mechanized line sowing of seeds resulted the highest grain yield (5.00 t/ha), at par with transplanted rice (4.80 t/ha). The lowest weed population at active tillering (3.43 no./m²) and panicle initiation (2.3 no./m²) stages observed under transplanted rice. In clay loam soils of **Coimbatore**, Paddy + Dhaincha drum seeder treatment resulted in the highest grain yield (5.86 t/ha), however, at par with mechanized line sowing by drum seeder (5.79 t/ha). The lowest weed population at active tillering (3.31 no./m²) and panicle initiation (3.00 no./m²) stages also observed in plots treated with Paddy + Dhaincha drum seeder. At active tillering stage, weed biomass also recorded the lowest (4.20 g/m²) under same treatment. At **Karjat**, raised bed sowing method resulted in the highest grain yield (4.85 t/ha), however, at par with mechanized line sowing (4.72 t/ha). In red sandy loam soils of **Mandya**, raised bed sowing resulted the highest grain yield (5.68 t/ha), however, at par

with mechanized line sowing (5.66 t/ha). In clay loam soils of **Moncompu**, manual line sowing of seeds resulted in the highest grain yield (6.15 t/ha), however, at par with improved system of that particular location (drum seeding with higher seed rate @ 62.5 kg/ha and spacing of 20 x 5 cm) (5.96 t/ha). Weed population and biomass did not show any clear trend with respect to grain yield. The highest gross return (Rs. 182952/-) was recorded in manual line sowing method. In clay soils of **Navasari**, all methods of establishment raised bed sowing (3.34 t/ha) found to be superior with respect to grain yield. However, at par with transplanted rice (3.33 t/ha). The highest gross return was recorded in raised bed sowing (Rs. 86196/-). At **Nawagam**, location specific high yielding wet DSR method resulted in the highest grain yield (4.25 t/ha), at par with broadcasting of seeds (4.20 t/ha). The cost of cultivation under location specific high yielding wet DSR method was the lowest (Rs. 42897/-). The highest gross return was Rs. 118487/- under same treatment. In **Pattambi**, the mean experimental grain yield was very low (1.64 t/ha). The highest grain yield was recorded under broadcasting of seeds (2.33 t/ha). The lowest cost of cultivation and gross return were Rs. 66900/- and Rs. 100033/-, respectively under same treatment. At **Puducherry**, only 3 treatments (S_1 to S_3) were laid out. Mechanized line sowing resulted the highest grain yield (5.73 t/ha). The lowest cost of cultivation and gross return were Rs. 65961/- and Rs. 172368/-, respectively under the same treatment. At **Pusa**, manual line sowing resulted in the highest grain yield (4.84 t/ha) followed by Tar vattar (4.50 t/ha). The highest gross returns under manual line sowing was Rs. 1,18,789/-.

At **Rewa**, broadcasting of seeds resulted in the highest grain yield (3.28 t/ha) followed by location specific high yielding wet DSR method (2.69 t/ha). At **Vadagaon**, raised bed sowing resulted in the highest grain yield (6.26 t/ha), however at par with location specific high yielding wet DSR method (6.15 t/ha). In clay soils of **Varanasi**, raised bed sowing resulted in the highest grain yield (5.17 t/ha) followed by improved system of that particular location (4.45 t/ha).

Across 14 locations mechanized line sowing resulted in the highest grain yield (4.24 t/ha).

The same trial was conducted in different lay out and treatments at **Aduthurai** and **Maruteru**. Details is given in the table.

4.2.3a (R). Identification of suitable sowing method of wet DSR for higher productivity in different zones

In *rabi* season, at **Pattambi** and **Puducherry**, at **Pattambi** the mean experimental grain yield was very low (2.08 t/ha). The highest grain yield was recorded under broadcasting of seeds (3.00 t/ha). The lowest cost of cultivation and gross return were Rs. 66900/- and Rs. 118480/-, respectively under same treatment. Three methods of crop establishment viz; Broadcasting of seeds, Manual sowing and Mechanised line sowing at **Puducherry** significantly varied for grain yield. Maximum grain yield was recorded with Mechanised line sowing method (5.88t/ha) and similar trend was observed with B:C Ratio (2.34).

Table 4.2.3a: Identification of suitable sowing method of Wet DSR for higher productivity in different zones (Puddle soil), kharif 2024.

Methods of crop establishment	CHATHA											
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant population no/m ²		Plant height (cm)	Tillers/m ² (No.)	Panicle/m ² (No.)	Grains/ panicle (No.)	Panicle wt (g)	Test wt (g)	Days for 50% flowering
				At 15 DAS	At 30 DAS							
S1	2.75	3	5.95	81	131	110.33	223	200	56	1.34	20.57	109
S2	3.19	1	6.96	101	145	148.67	268	220	66	1.52	21.50	103
S3	3.16	2	6.69	94	140	139.33	237	208	63	1.44	21.27	105
S4	2.68	4	5.89	74	116	103.67	215	185	52	1.32	20.33	109
S5	-		-	-	-	-	-	-	*	-	-	-
S6	-		-	-	-	-	-	-	*	-	-	-
S7	-		-	-	-	-	-	-	*	-	-	-
Expt. Mean	2.945		6.3725	88	133	125.5	236	203	59	1.405	20.9175	106
C.D. (0.05)	0.02		0.07	2.6	7.62	8.83	3.21	5.7	4.66	0.03	0.07	1.53
C.V. (%)	0.36		0.56	1.49	2.87	3.52	0.68	1.4	3.93	1.11	0.18	0.72
res(f)	**		**	**	**	**	**	**	**	**	**	**
Soil type	Sandy clay loam											
pH	-											
EC	-											
OC	0.57											
Variety	Basmati, 140-150 days											
Applied NPK kg/ha	30:20:10											
Available NPK kg/ha	245.15:14.34:146.31											

S1: Broadcasting of seeds

S2: Manual line sowing

S3: Mechanized line sowing of seeds (Dribbler, Happy seeder or any Drum Seeder: Spacing as per the equipment specifications)

S4: Raised bed sowing

Table 4.2.3a: Contd.

Methods of crop establishment	CHATHA Contd.							
	Dry mater accumulation (g/m2)			Weed population (no/m ²)		Weed biomass (g/m ²)		
	45 DAS	75 DAS	105das	At Active tillering	At PI	AI stage	PI stage	
S1	137.33	341.33	539.67	13.67(3.76)	60.33(7.8)	5.77	78.37	
S2	175.00	374.67	579.00	9.33(3.13)	37(6.12)	5.31	41.93	
S3	168.67	360.00	567.00	(10.33(3.29)	43.33(6.62)	5.53	54.33	
S4	133.33	326.33	537.00	10.67(3.34)	48.66(7.01)	5.54	57.30	
S5	-	-	-	-	-	-	-	
S6	-	-	-	-	-	-	-	
S7	-	-	-	-	-	-	-	
Expt. Mean	153.5825	350.5825	555.6675	3.38	6.8875	5.5375	57.9825	
C.D. (0.05)	7.9	5.61	7.2	0.33	0.37	0.27	7.5	
C.V. (%)	2.57	0.8	0.65	4.9	2.67	2.42	6.48	
res(t)	**	**	**	*	**	*	**	
Soil type								
pH								
EC								
OC								
Variety & Duration								
Applied NPK kg/ha								
Available NPK kg/ha								

*Figures in the parenthesis are transformed values

Table 4.2.3a: Contd.

Methods of crop establishment	CHIPLIMA												
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant population no/m ²		Plant height (cm)	Tillers/m ² (No.)	Panicle/m ² (No.)	Grains/panicle (No.)	Panicle length (cm)	Panicle wt (g)	Test wt (g)	Days for 50% flowering
				At 30 DAS									
S1	4.50	4	5.10	112		86.87	230.67	214	168	24.70	3.90	24.30	82
S2	4.57	3	4.57	52		91.83	239	216	187	25.30	4.00	24.47	85
S3	5.00	1	4.87	72		94.30	287	264	192	26.40	4.43	24.87	83
S4	3.87	5	4.23	45		86.23	217	194	158	23.77	3.33	23.73	86
S5	3.43	7	4.03	40		90.23	229.33	207	135	24.87	3.83	24.50	89
S6	4.80	2	5.07	67		88.40	256.67	238	167	24.63	3.57	24.30	92
S7	3.73	6	4.23	90		88.70	240	197	114	25.17	3.03	23.23	86
Expt. Mean	4.27		4.59	68		89.51	242.81	219	160	24.98	3.73	24.20	86
C.D. (0.05)	0.65		0.73	14.41		4.98	26.86	20.04	19.59	1.03	0.43	2.99	6.45
C.V. (%)	8.5		9	11.84		3.13	6.22	5.15	6.87	2.31	6.55	6.95	4.22
res(t)	**		*	**		*	**	**	**	**	**	NS	NS
Soil type	-												
pH	5.4												
EC	0.1												
OC	0.17%												
Variety & Duration	MTU-1156 (115-120 Days)												
Applied NPK kg/ha	80:40:40												
Available NPK kg/ha	-												

- S1: Broadcasting of seeds - (Sprouted seeds)
- S2: Manual line sowing - (row spacing 20 cm)
- S3: Mechanized line sowing of seeds - (using drum seeder, 24 hr. soaked seed)
- S4: Raised bed sowing - (1mt. Raised bed to ht. 15 cm, 4 row, 20cm spacing)
- S5- Any improved system in that particular location - (Drum seeding with dryseed)
- S6- Location specific high yielding Wet DSR method - (Transplanted rice)
- S7- Farmers practice of the Wet DSR method of the region - (Broadcasting with dry seeds)

Table 4.2.3a: Contd.

CHIPLIMA Contd.							
Methods of crop establishment	Dry mater accumulation (g/m2)			Weed population (no/m ²)		Weed biomass (g/m ²)	
	45 DAS	75 DAS	105 DAS	At Active tillering	At panicle initiation	At stage	PI stage
S1	27.60	79.50	176.37	26.00(5.13)	13.00(3.67)	49.83	24.40
S2	30.30	86.07	181.73	23.67(4.91)	11.67(3.48)	46.43	23.03
S3	30.37	87.03	183.33	19.00(4.4)	12.33(3.57)	35.37	22.40
S4	29.83	77.73	168.40	48.33(6.98)	22.67(4.81)	78.93	42.80
S5	29.10	76.70	173.97	28.00(5.33)	23.33(4.88)	59.03	45.57
S6	29.57	78.40	178.67	11.33(3.43)	5.00(2.3)	22.93	8.87
S7	27.13	76.73	173.10	39.33(6.29)	21.67(4.7)	62.80	42.77
Expt. Mean	29.13	80.31	176.51	5.21	3.915714286	50.76	29.98
C.D. (0.05)	2.01	5.25	9.6	0.67	0.59	13.5	7.58
C.V. (%)	3.87	3.67	3.06	7.27	8.51	14.95	14.21
res(t)	*	**	NS	**	**	**	**
Soil type							
pH							
EC							
OC							
Variety & Duration							
Applied NPK kg/ha							
Available NPK kg/ha							

*Figures in the parenthesis are transformed values

Table 4.2.3a: Contd.

COIMBATORE														
Methods of crop establishment	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant population no/m ² at 15DAS	Plant height (cm)	Tillers/m ² (No.)	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% flowering	Dry mater accumulation (g/m ²) 105 DAS	Weed population (no/m ²)		Weed biomass (g/m ²) AT stage
												At Active tillering	At panicle initiation	
S1	4.40	5	5.88	52	86.30	304	271	2.05	15.33	76	849.8	30.20(5.54)	14.50(3.87)	6.13
S2	5.41	3	6.90	68	89.93	372	337	2.67	15.27	76	884.2	23.27(4.88)	12.93(3.66)	5.43
S3	5.79	2	7.41	65	93.07	377	347	2.64	15.33	77	891.8	17.23(4.21)	9.47(3.16)	5.07
S4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S5	5.86	-	7.68	56	95.50	388	361	3.15	15.37	77	975.37	10.47(3.31)	8.50(3)	4.20
S6	5.16	4	6.51	58	88.87	353	323	2.47	15.30	77	855.9	15.40(3.99)	11.27(3.43)	5.20
S7	4.19	6	5.69	50	84.60	287	260	1.98	15.33	77	823.47	37.80(6.18)	21.43(4.68)	6.87
Expt. Mean	5.14		6.68	58	89.71	347	316	2.49	15.32	77	880.09	4.685	3.633333333	5.48
C.D. (0.05)	0.14		0.13	5.82	1.69	10.1	11.23	0.35	0.11	0	41.38	0.43	0.18	0.42
C.V. (%)	1.5		1.04	5.48	1.04	1.6	1.95	7.81	0.41	0	2.58	5.06	2.67	4.22
res(f)	**		**	**	**	**	**	**	NS	NS	**	**	**	**
Soil type	Clay loam													
pH	8.3													
EC	-													
OC	-													
Variety & Duration	CO 54, 110 days													
Applied NPK kg/ha	150:50:50													
Available NPK kg/ha	245:26:478													

*Figures in the parenthesis are transformed values

S1: Broadcasting of seeds

S2: Manual line sowing

S3: Mechanized line sowing of seeds - (Paddy drum seeder)

S4: Raised bed sowing - (1mt. Raised bed to ht. 15 cm, 4 row, 20cm spacing)

S5- Any improved system in that particular location - (Paddy + Daincha drum seeder)

S6- Location specific high yielding Wet DSR method - (Direct planting system)

S7- Farmers practice of the Wet DSR method of the region

Table 4.2.3a: Contd.

KARJAT															
Methods of crop establishment	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant height (cm)	Tillers/m ² (No.)	Grains/panicle (No.)	Panicle/m ² (No.)	Panicle length (cm)	Panicle wt (g)	Test wt (g)	Days for 50% flowering	Weed population (no/m ²)		Weed biomass (g/m ²)	
												At Active tillering	At panicle initiation	AT stage	PI stage
S1	3.52	6	4.93	95.10	171	276	127	22.41	2.22	25.78	86	64.67(8.07)	22.22(4.77)	33.82	23.42
S2	3.87	4	5.23	98.47	133	316	131	23.24	2.31	23.90	85	75.00(8.69)	15.11(3.94)	33.15	11.60
S3	4.72	2	5.90	102.37	202	333	158	24.26	2.45	24.54	85	56.67(7.56)	20.56(4.58)	17.91	17.59
S4	4.85		6.31	103.37	197	363	207	25.07	3.94	26.87	85	53.00(7.31)	18.67(4.38)	27.93	14.19
S5	4.11	-	5.48	97.60	122	333	132	22.54	2.31	26.24	84	63.67(8.01)	19.22(4.44)	31.65	17.40
S6	3.78	5	5.07	101.30	135	328	142	23.85	2.35	25.53	85	67.00(8.22)	15.67(4.02)	24.51	10.53
S7	2.35	7	3.48	91.13	93	297	112	21.83	1.88	24.84	85	77.67(8.84)	21.33(4.67)	29.04	19.84
Expt. Mean	3.89		5.20	98.48	150	321	144	23.31	2.49	25.39	85	8.1	4.4	28.29	16.37
C.D. (0.05)	1.01		1.41	4.12	5.33	25.76	19.97	0.65	0.3	1.02	1.25	0.14	0.42	0.85	0.85
C.V. (%)	14.68		15.25	2.35	1.99	4.51	7.79	1.56	6.66	2.25	0.83	0.94	5.3	1.68	2.91
res(f)	**		*	**	**	**	**	**	**	**	NS	**	**	**	**
Soil type	-														
pH	-														
EC	-														
OC	-														
Variety & Duration	-														
Applied NPK kg/ha	-														
Available NPK kg/ha	-														

S1: Broadcasting of seeds - (50 kg ha-1)
S2: Manual line sowing -(22.5 cm)
S3: Mechanized line sowing of seeds - (with Drum Seeder (22.5 x 5 cm) local Make (4 Rows))
S4: Raised bed sowing - (1 m Width and 20 cm Row Spacing)
S5- Any improved system in that particular location - (20 cm Row Spacing (8 Rows))
S6- Location specific high yielding Wet DSR method - (Dibling (20 cm X 20 cm))
S7- Farmers practice of the Wet DSR method of the region - (Broadcasting of seeds @75 kg ha-1)

*Figures in the parenthesis are transformed values

Table 4.2.3a: Contd.

Methods of crop establishment	MANDYA												
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant		Plant height (cm)	Tillers/m ² (No.)	Panicle/m ² (No.)	Grains/panicle (No.)	Panicle length (cm)	Panicle wt (g)	Test wt (g)	Days for 50% flowering
				population no/m ²	At 15 DAS								
S1	4.77	5	8.64	69		88.06	420	405	138	25.11	3.26	26.93	93
S2	4.92	4	8.22	57		89.63	321	309	138	25.65	3.27	26.89	95
S3	5.66	2	8.51	57		88.75	353	343	129	25.92	3.32	27.32	93
S4	5.68	1	9.08	44		87.42	400	377	139	26.71	3.40	26.82	92
S5	5.17	3	7.98	46		92.75	346	333	159	25.90	3.28	29.08	94
S6	4.54	6	8.10	51		86.86	415	387	117	25.30	3.24	25.86	93
S7	4.18	7	7.81	45		89.01	344	326	110	24.53	2.46	25.74	95
Expt. Mean	4.99		8.33	53		88.93	371	354	133	25.59	3.18	26.95	94
C.D. (0.05)	0.55		1.09	6.94		6.74	59.26	56.16	31.63	1.47	0.52	3.02	2.18
C.V. (%)	6.2		7.33	7.4		4.26	8.97	8.91	13.39	3.23	9.21	6.3	1.3
res(t)	**		NS	**		NS	*	*	NS	NS	*	NS	NS
Soil type	Red sandy loam												
pH	7.51												
EC	0.25												
OC	1.02												
Variety & Duration	KMP 220, 125-130 days												
Applied NPK kg/ha	100:50:50												
Available NPK kg/ha	263.20:69.50: 275.80												

S1: Broadcasting of seeds (Sprouted seed)

S2: Manual line sowing (Dry seed)

S3: Mechanized line sowing of seeds (Drum Seeder)

S4: Raised bed sowing

S5- Any improved system in that particular location (Drum seeding with water soaked seed)

S6- Location specific high yielding Wet DSR method (Broad casting of water soaked seed)

S7- Farmers practice of the Wet DSR method of the region (Broadcasting of dry seed)

Table 4.2.3a: Contd.

MONUCOMPU														
Methods of crop establishment	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant population no/m ²		Plant height (cm)	Tillers/m ² (No.)	Panicle/m ² (No.)	Grains/panicle (No.)	Panicle length (cm)	Panicle wt (g)	Test wt (g)	Days for 50% flowering	
				At 15 DAS	At 30 DAS									
S1	5.90	3	7.82	297	287	110.93	409	408	115	23.08	3.35	25.67	85	
S2	6.15	1	7.60	70	57	110.60	373	392	126	23.39	3.57	26.03	88	
S3	5.76	4	7.12	58	49	110.13	369	377	135	23.67	3.93	26.53	85	
S4	4.88	6	6.03	241	231	102.27	365	391	123	23.01	3.53	26.07	88	
S5	5.96	2	8.08	73	60	109.00	395	391	112	23.39	3.25	26.83	85	
S6	4.86	7	6.60	16	16	112.27	136	147	156	23.72	4.44	25.00	78	
S7	5.64	5	7.31	328	315	107.53	411	397	108	22.74	3.10	25.43	85	
Expt. Mean	5.59		7.22	155	145	108.96	351	358	125	23.29	3.60	25.94	85	
C.D. (0.05)	0.7		1.49	22.91	22	5.88	75.72	35.5	29.39	1.7	0.83	1.1	0	
C.V. (%)	6.99		11.6	8.33	8.53	3.03	12.12	5.58	13.22	4.11	12.94	2.37	0	
res(t)	**		NS	**	**	*	**	**	NS	NS	NS	*	NS	
Soil type	-													
pH	5.5													
EC	0.55													
OC	1.8													
Variety & Duration	MO 16 (Uma), 130 Days													
Applied NPK kg/ha	90:45:45 NPK kg/ha													
Available NPK kg/ha	180:18:150													

S1: Broadcasting of seeds

S2: Manual line sowing of seeds (20-25 cm row spacing sown in solid row)

S3: Mechanized line sowing of seeds (with Drum Seeder@ 45 kg/ha of seed rate with 20x10 cm spacing)

S4:Any improved system in that particular location - Raised bed sowing

S5:Any improved system in that particular location - Drum seeding with higher seed rate @ 62.5 kg/ha ie., 20x5 cm spacing

S6: SRI

S7- Famers wet DSR - broadcasting with high seed rate @ 125 kg/ha

Table 4.2.3a: Contd.

Methods of crop establishment	MONUCOMPU Contd.													
	Dry mater accumulation (g/m2)		Weed population (no/m ²)		Weed biomass (g/m ²)		Soil available nutrients (kg/ha) initial			Soil available nutrients (kg/ha) at harvest			Cost of cultivation Rs/ha	Gross returns Rs/ha
	45 DAS	75 DAS	At Active tillering	At panicle Initiation	AI stage	PI stage	N	P	K	N	P	K		
S1	1124.27	2148.53	16.00(4.05)	16.67(4.14)	14.33	20.16	0.12	5.58	59.87	0.21	3.53	29.87	65370	176049
S2	454.56	923.49	30.33(5.49)	33.33(5.75)	14.34	20.17	0.09	7.75	71.07	0.18	5.70	41.07	65370	182952
S3	239.09	462.27	30.67(5.58)	32.67(5.75)	21.95	25.45	0.11	6.19	67.33	0.20	4.14	37.33	65370	171396
S4	1000.84	1864.80	35.33(5.97)	38.00(6.18)	13.39	18.89	0.07	8.61	86.00	0.17	4.75	56.00	66030	144965
S5	351.20	792.00	19.33(4.42)	23.33(4.81)	10.94	16.44	0.15	3.68	71.07	0.21	1.63	41.07	64610	177896
S6	157.76	302.40	18.00(4.3)	22.67(4.81)	26.67	31.17	0.13	7.03	78.53	0.20	3.94	48.53	74510	145139
S7	1188.73	2045.33	12.00(3.49)	14.33(3.8)	6.70	7.94	0.12	4.73	74.80	0.19	4.00	44.80	66420	168014
Expt. Mean	645.21	1219.83	4.7571429	5.0342857	15.47	20.03	0.11	6.22	72.67	0.19	3.96	42.67	66811	166630
C.D. (0.05)	139.24	244.92	1.1	1.24	7.48	6.54	0.04	2.51	31.7	0.06	4.03	31.7	0	20693.53
C.V. (%)	12.13	11.29	13.03	13.84	27.19	18.37	18.14	22.68	24.52	16.53	57.28	41.77	0	6.98
res(f)	**	**	**	**	**	**	**	*	NS	NS	NS	NS	NS	**
Soil type														
pH														
EC														
OC														
Variety & Duration														
Applied NPK kg/ha														
Available NPK kg/ha														

*Figures in the parenthesis are transformed values

Table 4.2.3a: Contd.

Methods of crop establishment	NAVASARI													
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant population no/m ²			Plant height (cm)	Tillers/m ² (No.)	Panicle/m ² (No.)	Grains/panicle (No.)	Panicle length (cm)	Panicle wt (g)	Test wt (g)	Days for 50% flowering
				At 15 DAS	At 30 DAS	At 30 DAS								
S1	2.90	7	3.93	97	102	96.90	333	303	226	20.57	4.30	26.43	90	
S2	3.16	3	4.31	101	106	106.23	348	326	246	22.73	3.59	26.63	91	
S3	3.14	4	4.65	111	113	117.83	355	337	256	21.83	4.21	28.77	90	
S4	3.34	1	4.84	97	98	107.47	323	301	223	22.57	4.62	28.67	90	
S5	2.97	5	4.56	93	99	106.10	353	333	255	22.00	3.04	26.90	92	
S6	3.33	2	4.78	99	106	113.00	335	318	257	22.00	3.42	28.63	90	
S7	2.96	6	4.47	103	108	111.07	341	320	249	22.00	3.32	25.37	91	
Expt. Mean	3.11		4.51	100	105	108.37	341	320	245	21.96	3.79	27.34	91	
C.D. (0.05)	0.48		0.64	16.65	19.5	11.62	46.32	45.93	34.79	2.4	0.56	3.37	1.92	
C.V. (%)	8.7		8.01	9.34	10.47	6.03	7.63	8.08	8	6.15	8.34	6.92	1.19	
res(t)	NS		NS	NS	NS	*	NS	NS	NS	NS	**	NS	NS	
Soil type	Clayey													
pH	7.88													
EC	0.53													
OC	0.54													
Variety & Duration	GNR-3, 125 days													
Applied NPK kg/ha	100:30:0													
Available NPK kg/ha	-													

S1: Broadcasting of seeds

S2: Manual line sowing

S3: Mechanized line sowing of seeds (Dribbler, Happy seeder or any Drum Seeder: Spacing as per the equipment specification)NS

S4: Raised bed sowing

S5- Aerobic rice system (Any improved system in that particular location)

S6- Transplanted rice (Location specific high yielding method)

S7- Farmers practice of the Wet DSR method of the region

Table 4.2.3a: Contd.

Methods of crop establishment	NAVASARI Contd.									
	Dry mater accumulation (g/m2)			Weed population (no/m ²)		Weed biomass (g/m ²)		Soil available nutrients (kg/ha) initial		
	45 DAS	75 DAS	105 DAS	At Active tillering	At panicle initiation	AI stage	PI stage	N	P	K
S1	396.94	815.41	891.92	14.00(3.81)	42.67(6.57)	25.22	65.03	47.59	14.62	61.80
S2	416.24	848.41	891.39	12.33(3.58)	40.67(6.41)	25.34	63.13	56.07	15.39	70.67
S3	425.12	865.07	918.23	12.33(3.58)	38.67(6.25)	27.04	55.23	54.19	15.16	76.16
S4	394.49	778.27	842.35	13.67(3.76)	39.67(6.33)	26.10	60.13	62.41	16.68	78.04
S5	400.00	811.14	876.52	12.00(3.53)	36.00(6.04)	25.44	52.36	55.88	16.25	74.89
S6	415.25	844.74	930.23	9.33(3.13)	32.00(5.7)	20.85	49.38	58.81	17.16	78.00
S7	412.33	864.40	923.16	13.33(3.72)	39.33(6.3)	26.65	60.82	56.52	16.30	72.26
Expt. Mean	408.62	832.49	896.26	3.587142857	6.228571429	25.23	58.01	55.92	15.94	73.12
C.D. (0.05)	59.46	116.77	117.12	0.26	0.5	3.59	8	7.59	1.86	12.6
C.V. (%)	8.18	7.88	7.35	4.04	4.48	8	7.76	7.63	6.56	9.68
res(t)	NS	NS	NS	**	*	*	**	*	NS	NS
Soil type										
pH										
EC										
OC										
Variety & Duration										
Applied NPK kg/ha										
Available NPK kg/ha										

*Figures in the parenthesis are transformed values

Table 4.2.3a: Contd.

Methods of crop establishment	NAVASARI Contd.									
	Total nutrient uptake (kg/ha)				Soil available nutrients (kg/ha) at harvest				Cost of cultivation Rs/ha	Gross returns Rs/ha
	N	P	K		N	P	K			
S1	251.93	38.67	659.07		249.97	35.27	651.53		73053	73576
S2	252.23	34.60	646.10		247.57	32.83	652.60		73053	80383
S3	257.87	40.03	667.27		255.30	37.70	655.43		73768	81544
S4	250.07	39.40	648.20		253.47	35.37	642.67		73900	86196
S5	262.27	32.60	689.80		259.70	29.97	667.00		73053	77846
S6	259.73	32.53	560.00		259.73	30.10	657.23		72173	85797
S7	248.77	37.73	665.47		250.43	35.30	666.83		73053	77194
Expt. Mean	254.70	36.51	647.99		253.74	33.79	656.18		73150	80362
C.D. (0.05)	37.64	6.46	128.04		36.23	5.17	94.71		0	10229.92
C.V. (%)	8.31	9.94	11.11		8.03	8.6	8.11		0	7.16
res(t)	NS	NS	NS		NS	*	NS		NS	NS
Soil type										
pH										
EC										
OC										
Variety & Duration										
Applied NPK kg/ha										
Available NPK kg/ha										

Table 4.2.3a: Contd.

Methods of crop establishment	NAWAGAM												
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant population no/m ²		Plant height (cm)	Tillers/m ² (No.)	Panicle/m ² (No.)	Grains/panicle (No.)	Panicle length (cm)	Panicle wt (g)	Test wt (g)	Days for 50% flowering
				At 15 DAS	At 30 DAS								
S1	4.20	2	5.25	42	70	99.00	183	142	233	21.97	3.80	17.77	79
S2	3.80	6	4.34	48	79	118.33	169	153	261	25.07	4.62	18.13	79
S3	4.19	3	5.42	51	84	120.67	133	119	277	25.40	4.17	19.70	79
S4	3.83	5	4.57	54	84	121.67	173	155	267	26.20	3.99	18.30	78
S5	4.00	4	5.00	52	79	121.00	166	149	278	24.10	4.15	18.50	77
S6	4.25	1	5.47	47	80	118.33	175	167	282	26.73	4.84	19.03	78
S7	3.69	7	4.78	47	75	109.33	173	156	249	24.60	3.89	19.03	77
Expt. Mean	3.99		4.98	49	79	115.48	167	149	264	24.87	4.21	18.64	78
C.D. (0.05)	0.36		0.6	12.46	18.95	10.62	28.16	21.93	24.08	2.68	0.65	2.43	2.07
C.V. (%)	5.09		6.76	14.38	13.56	5.17	9.46	8.28	5.13	6.06	8.66	7.33	1.49
res(t)	*		**	NS	NS	**	*	*	**	*	*	NS	NS
Soil type	-												
pH	8.01												
EC	0.52												
OC	0.41												
Variety & Duration	Mahisagar, 115-120 days												
Applied NPK kg/ha	100:25:0												
Available NPK kg/ha	253.20:36.50:239.50												

S1: Broadcasting of seeds

S2: Manual line sowing

S3: Mechanized line sowing of seeds (Dribbler, Happy seeder or any Drum Seeder: Spacing as per the equipment specificationNS)

S4: Raised bed sowing

S5- Any improved system in that particular location

S6- Location specific high yielding Wet DSR method

S7- Farmers practice of the Wet DSR method of the region

Table 4.2.3a: Contd.

Methods of crop establishment	NAWAGAM Contd.									
	Weed population (no/m ²)			Weed biomass (g/m ²)			Soil available nutrients (kg/ha) at harvest			Gross returns Rs/ha
	At Active tillering		At panicle initiation	At stage	PI stage		N	P	K	
S1	67.67(8.17)	108.33(10.4)		19.35	30.82		231.00	37.33	232.67	116643
S2	68.67(8.12)	92.33(9.4)		21.83	26.29		226.67	34.67	228.00	104280
S3	67.67(8.01)	104.67(10.22)		23.55	30.30		232.67	34.33	234.67	116675
S4	68.33(8.26)	94.33(9.64)		21.82	26.09		232.33	35.33	232.33	105570
S5	55.00(7.35)	116.00(10.76)		12.85	33.22		228.00	39.33	236.00	110906
S6	58.00(7.48)	115.67(10.71)		20.16	32.92		233.33	34.33	237.00	118487
S7	81.33(9.04)	129.33(11.23)		28.41	35.77		229.00	31.33	227.33	102867
Expt. Mean	8.061428571	10.33714286		21.14	30.77		230.43	35.24	232.57	110775
C.D. (0.05)	3.22	3.3		16.98	18.43		29.61	8.72	13.93	10154.81
C.V. (%)	22.48	17.96		45.15	33.67		7.22	13.91	3.37	5.15
res(f)	NS	NS		NS	NS		NS	NS	NS	*
Soil type										**
pH										
EC										
OC										
Variety & Duration										
Applied NPK kg/ha										
Available NPK kg/ha										

*Figures in the parenthesis are transformed values

Table 4.2.3a: Contd.

PATTAMBI (Kharif)													
Methods of crop establishment	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant population no/m ²		Plant height (cm)	Tillers/m ² (No.)	Panicle/m ² (No.)	Grains/panicle (No.)	Panicle length (cm)	Panicle wt (g)	Test wt (g)	Days for 50% flowering
				At 15 DAS	At 30 DAS								
S1	2.33	1	11.57	188	177	93.67	444	408	152	19.87	9.17	19.50	88
S2	1.33	5	8.70	35	30	82.33	227	213	145	18.83	8.50	19.70	88
S3	1.27	6	7.70	32	30	81.33	181	168	152	19.00	8.73	20.00	87
S4	1.47	3	10.07	34	29	81.33	239	232	149	19.13	9.17	18.80	88
S5	2.03	2	12.10	69	40	106.67	313	303	150	20.67	9.50	20.80	88
S6	1.43	4	10.83	-	37	80.33	248	240	150	20.40	8.67	20.07	90
S7	-	-	-	-	-	-	-	-	-	-	-	-	-
Expt. Mean	1.64		10.16	71	57	87.61	275	261	150	19.65	8.96	19.81	88
C.D. (0.05)	0.32		1.04	25.66	23.45	8.16	65.52	61.23	6.42	2.39	1.67	3.55	5.78
C.V. (%)	10.64		5.63	19.07	22.59	5.12	13.07	12.92	2.36	6.69	10.24	9.85	3.61
res(f)	**		**	**	**	**	**	**	NS	NS	NS	NS	NS
Soil type	-												
pH	-												
EC	-												
Variety & Duration	Aiswarya, 120-125 days												
Applied NPK kg/ha	90:45:45												
Available NPK kg/ha	-												

S1: Broadcasting of seeds

S2: Manual line sowing

S3: Mechanized line sowing of seeds (Drum seeder)

S4: Raised bed sowing

S5- Any improved system in that particular location - (Drum seeder all holes open)

S6- Location specific high yielding Wet DSR method - (Transplanting)

Table 4.2.3a: Contd.

Methods of crop establishment	PATTAMBI (Kharif) Contd.									
	Dry mater accumulation (g/m2)			Weed population (no/m ²)		Weed bio mass (g/m ²)			Cost of cultivation Rs/ha	Gross returns Rs/ha
	45 DAS	75 DAS	105 DAS	At Active tillering	At panicle initiation	AT stage	PI stage			
S1	258.20	409.87	870.33	80.00(8.96)	89.33(9.47)	30.47	119.80	66900	100033	
S2	248.07	348.20	772.00	43.00(6.59)	49.67(7.08)	15.93	68.00	68200	63433	
S3	195.97	332.83	643.63	54.33(7.39)	51.00(7.13)	22.93	61.93	67850	58567	
S4	250.63	334.20	738.60	45.00(6.74)	37.00(6.04)	22.93	45.13	69150	71267	
S5	263.23	303.27	835.17	44.33(6.68)	45.33(6.74)	21.17	53.70	67200	93233	
S6	220.57	283.83	631.30	38.30(6.22)	29.67(5.24)	19.07	24.50	69250	72633	
S7	-	-	-	-	-	-	-	-	-	
Expt. Mean	239.45	335.37	748.51	7.096666667	6.95	22.08	62.18	68092	76528	
C.D. (0.05)	42.24	65.56	56.49	0.58	2.2	4.63	18.21	0	10698.45	
C.V. (%)	9.7	10.75	4.15	4.46	17.39	11.51	16.1	0	7.68	
res(t)	*	*	**	**	*	**	**	NS	**	
Soil type										
pH										
EC										
Variety & Duration										
Applied NPK kg/ha										
Available NPK kg/ha										

*Figures in the parenthesis are transformed values

Table 4.2.3a: Contd.

Methods of crop establishment	PUDUCHERRY													
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant height (cm)	Tillers/m2 (No.)			Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Cost of cultivation Rs/ha	Gross returns Rs/ha	Net returns Rs/ha	B:C Ratio
					At Max. Tillering	At Panicle Initiation								
S1	4.73	3	7.65	112.00	284	302	270	3.34	18.24	68900	155431	86847	2.27	
S2	5.18	2	8.40	114.67	308	335	300	3.58	18.50	70116	165247	95087	2.36	
S3	5.73	1	9.31	117.33	321	360	322	3.73	18.69	65961	172368	105150	2.57	
S4	-		-	-	-	-	-	-	-	-	-	-	-	
S5	-		-	-	-	-	-	-	-	-	-	-	-	
S6	-		-	-	-	-	-	-	-	-	-	-	-	
S7	-		-	-	-	-	-	-	-	-	-	-	-	
Expt. Mean	5.21		8.45	114.67	304	332	297	3.55	18.48	68326	164349	95695	2.40	
C.D. (0.05)	0.2		0.32	6.86	9.78	17.51	3.46	0.14	0.68	0	5019.57	3589.38	0.09	
C.V. (%)	1.66		1.68	2.64	1.42	2.32	0.51	1.78	1.61	0	1.35	1.65	1.72	
res(t)	**		**	NS	**	**	**	**	NS	NS	**	**	**	
Soil type	Clay loam													
pH	6.43													
EC	0.12													
OC	-													
Variety & Duration	ADT 54, 135 days													
Applied NPK kg/ha	120:40:40													
Available NPK kg/ha	145.6:11.53:123													

- S1: Broadcasting of seeds
- S2: Manual line sowing
- S3: Mechanized line sowing of seeds
- S4: Raised bed sowing
- S5- Any improved system in that particular location
- S6- Location specific high yielding Wet DSR method -

Table 4.2.3a: Contd.

Methods of crop establishment	PUSA											
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant population no/m ²		Plant height (cm)	Tillers/m ² (No.)	Panicle/m ² (No.)	Grains/panicle (No.)	Panicle wt (g)	Test wt (g)	Days for 50% flowering
				At 15 DAS	At 30 DAS							
S1	3.31	7	4.42	44	49	104.33	234	225	103	2.49	21.46	81
S2	4.84	1	6.42	37	52	116.33	293	287	123	2.62	21.50	81
S3	4.37	5	5.80	39	51	114.33	277	270	112	2.62	21.32	80
S4	4.46	4	5.91	41	50	115.00	265	258	116	2.32	21.42	82
S5	4.50	2	5.99	42	53	115.67	279	273	116	2.45	21.08	80
S6	4.49	3	5.97	40	51	112.67	274	267	118	2.41	21.22	83
S7	3.68	6	4.87	46	48	107.67	247	239	107	2.43	21.19	80
Expt. Mean	4.24		5.63	41	50	112.29	267	260	114	2.48	21.31	81
C.D. (0.05)	0.64		0.85	4.99	4.1	8.38	34.43	32.77	6.64	0.25	0.55	2
C.V. (%)	8.45		8.54	6.79	4.57	4.2	7.25	7.09	3.28	5.69	1.45	1.39
res(t)	**		**	*	NS	NS	*	*	**	NS	NS	NS
Soil type	Sandy loam											
pH	8.33											
EC	-											
OC	0.4											
Variety & Duration	Rajendra Nilam; 110-115 days											
Applied NPK kg/ha	120:60:40											
Available NPK kg/ha	-											

S1: Broadcasting of seeds

S2: Manual line sowing

S3: Mechanized line sowing of seeds (Dribbler, Happy seeder or any Drum Seeder: Spacing as per the equipment specifications)

S4: Raised bed sowing

S5- Any improved system (Tar-vattar)

S6- Location specific high yielding Wet DSR method (Brown manuring)

S7- Farmers practice of the Wet DSR method of the region

Table 4.2.3a: Contd.

Methods of crop establishment	PUSA Contd.							
	Dry matter accumulation (g/m ²)			Weed population (no/m ²)		Weed biomass (g/m ²)		
	45 DAS	75 DAS	105 DAS	At Active tillering	At panicle initiation	AI stage	PI stage	
S1	226.33	523.33	823.00	16.00(4.03)	20.00(4.51)	4.30	22.90	
S2	246.33	621.33	919.67	5.00(2.23)	7.00(2.72)	1.93	8.67	
S3	233.67	571.33	863.00	6.33(2.51)	9.00(3.01)	2.96	14.60	
S4	232.67	572.67	864.00	8.33(2.73)	9.67(3.04)	2.58	13.63	
S5	238.67	585.67	882.67	7.00(2.69)	8.00(2.86)	2.39	12.17	
S6	235.33	572.33	871.00	2.33(1.6)	4.33(2.18)	1.43	6.07	
S7	228.00	531.33	834.00	12.67(3.53)	17.33(4.17)	4.21	23.17	
Expt. Mean	234.43	568.28	865.33	2.76	3.212857143	2.83	14.46	
C.D. (0.05)	25.71	50.19	68.01	1.6	1.29	1.13	6.37	
C.V. (%)	6.16	4.96	4.42	32.63	22.54	22.45	24.75	
res(f)	NS	*	NS	NS	*	**	**	
Soil type								
pH								
EC								
OC								
Variety & Duration								
Applied NPK kg/ha								
Available NPK kg/ha								

*Figures in the parenthesis are transformed values

Table 4.2.3a: Contd.

Methods of crop establishment	PUSA Contd.								Gross returns Rs/ha
	Soil available nutrients (kg/ha) initial			Soil available nutrients (kg/ha) at harvest			Cost of cultivation Rs/ha		
	N	P	K	N	P	K			
S1	215.00	11.73	114.33	215.00	11.97	116.33	55380	81293	
S2	212.33	11.37	111.67	213.67	11.60	114.00	59540	118789	
S3	212.33	11.43	113.67	214.00	11.60	115.67	56420	107260	
S4	211.67	11.53	113.00	211.33	11.77	114.67	59800	109383	
S5	212.00	11.33	112.33	213.33	11.77	113.67	56420	110462	
S6	214.67	11.50	113.67	215.33	11.73	116.33	56680	110135	
S7	214.00	11.60	114.33	214.33	11.87	116.33	55380	90167	
Expt. Mean	213.14	11.50	113.29	213.86	11.76	115.29	57089	103927	
C.D. (0.05)	6.09	0.43	5.24	6.7	0.42	5.04	0	15626.41	
C.V. (%)	1.61	2.12	2.6	1.76	2.01	2.46	0	8.45	
res(f)	NS	NS	NS	NS	NS	NS	NS	**	
Soil type									
pH									
EC									
OC									
Variety & Duration									
Applied NPK kg/ha									
Available NPK kg/ha									

Table 4.2.3a: Contd.

REWA															
Methods of crop establishment	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant population no/m ²		Plant height (cm)	Tillers/m ² (No.)	Panicle/m ² (No.)	Grains/panicle (No.)	Panicle length (cm)	Panicle wt (g)	Test wt (g)	Days for 50% flowering	Dry mater accumulation (g/m2) 105 DAS	Weed population (no/m ²) At panicle initiation
				At 15 DAS	At 30 DAS										
S1	3.28	1	9.94	48	48	105.40	8	6	113	19.10	2.35	22.33	74	23.68	19.00(4.41)
S2	2.22	6	8.86	34	35	106.23	8	7	128	25.77	2.88	25.33	77	27.73	23.33(4.88)
S3	2.51	3	8.94	36	34	108.07	7	6	160	24.93	2.53	22.00	73	30.33	24.00(4.94)
S4	2.33	4	9.08	33	36	103.53	8	8	210	25.00	2.26	21.67	78	37.48	21.33(4.67)
S5	1.92	7	8.44	31	32	107.47	10	9	204	25.87	3.95	22.67	77	49.19	19.00(4.41)
S6	2.69	2	9.53	36	35	108.03	8	7	150	22.83	3.11	24.00	76	29.89	28.33(5.36)
S7	2.30	-	9.91	50	50	105.13	7	6	147	24.93	3.20	25.00	74	29.68	20.00(4.52)
Expt. Mean	2.46		9.24	38	39	106.27	8	7	159	24.06	2.90	23.29	76	32.57	4.69285714
C.D. (0.05)	0.96		0.93	5.15	3.13	14.09	2.25	1.99	66.52	5.34	1.89	5.75	3.07	10.06	0.38
C.V. (%)	22		5.64	7.57	4.54	7.45	15.92	16.05	23.54	12.47	36.62	13.87	2.29	17.36	4.51
res(t)	NS		*	**	**	NS	NS	*	NS	NS	NS	NS	*	**	**
Soil type	-														
pH	-														
EC	-														
Variety & Duration	-														
Applied NPK kg/ha	-														
Available NPK kg/ha	-														

S1: Broadcasting of seeds
S2: Manual line sowing
S3: Mechanized line sowing of seeds (Dribbler, Happy seeder or any Drum Seeder: Spacing as per the equipment specifications)
S4: Raised bed sowing
S5- Any improved system in that particular location
S6- Location specific high yielding Wet DSR method

*Figures in the parenthesis are transformed values

Table 4.2.3a: Contd.

Methods of crop establishment	VADAGAON												
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant population no/m ²		Plant height (cm)	Tillers/m ² (No.)	Panicle/m ² (No.)	Grains/panicle (No.)	Panicle length (cm)	Panicle wt (g)	Test wt (g)	Days for 50% flowering
				At 15 DAS	At 30 DAS								
S1	3.75	7	3.98	41	73	87.37	169	168	154	17.23	3.68	20.25	98
S2	5.74	5	6.14	42	76	88.93	258	256	235	23.53	5.62	22.95	96
S3	6.07	3	6.56	45	80	94.07	273	271	249	24.87	5.95	23.67	97
S4	6.26	1	6.76	46	83	96.97	282	280	257	25.67	6.13	24.40	96
S5	5.82	4	6.29	43	77	90.23	262	260	239	23.90	5.71	22.71	97
S6	6.15	2	6.61	45	81	95.27	277	275	252	25.20	6.03	23.97	97
S7	4.41	6	4.70	39	70	88.27	199	197	181	20.30	4.33	19.86	98
Expt. Mean	5.46		5.86	43	77	91.59	246	244	224	22.96	5.35	22.54	97
C.D. (0.05)	0.22		0.24	1.86	3.25	3.98	10.04	10.01	9.14	0.97	0.22	0.94	0.94
C.V. (%)	2.27		2.31	2.44	2.37	2.45	2.3	2.31	2.3	2.37	2.26	2.34	0.54
res(f)	**		**	**	**	**	**	**	**	**	**	**	**
Soil type													
pH	7.73												
EC	0.13												
OC	0.51												
Variety & Duration	Phule Samruddhi-125 to 130 days												
Applied NPK kg/ha	100:50:50												
Available NPK kg/ha													

S1: Broadcasting of seeds - (Seed rate = 50kg/ha)
S2: Manual line sowing - (Sowing at 20cm, Seed rate = 50kg/ha)
S3: Mechanized line sowing of seeds - (Seed rate = 25kg/ha, Spacing -23 cm)
S4: Raised bed sowing - (1 m raised bed and 4 rows of 20cm spacing , Seed rate = 25kg/ha)
S5- Any improved system in that particular location - (Sowing at 30cm distance, Seed rate = 50kg/ha)
S6- Location specific high yielding Wet DSR method - (Dibbling at 20 x 20 cm , Seed rate = 25kg/ha)
S7- Farmers practice of the Wet DSR method of the region - (Broadcasting of seed, Seed rate = 75kg/ha)

Table 4.2.3a: Contd.

Methods of crop establishment	VADAGAON Contd.										
	Dry mater accumulation (g/m2)			Weed population (no/m ²)			Weed biomass (g/m ²)		Soil available nutrients (kg/ha) Harvest		
	45 DAS	75 DAS	105 DAS	At Active tillering	At panicle initiation		AI stage	PI stage	N	P	K
S1	201.03	455.37	563.67	6.02(2.55)	15.05(3.93)		5.97	14.60	178.87	13.13	226.03
S2	307.60	696.70	862.43	4.76(2.29)	11.90(3.52)		4.71	11.53	245.63	16.23	254.67
S3	325.33	736.99	912.27	3.78(2.06)	9.45(3.14)		3.75	9.20	231.43	14.00	235.10
S4	335.47	759.83	940.50	2.66(1.77)	6.65(2.66)		2.64	6.47	234.47	15.70	252.23
S5	312.23	707.22	875.43	4.20(2.17)	10.50(3.31)		4.16	10.20	233.57	14.77	247.87
S6	329.53	746.38	923.93	3.22(1.92)	8.05(2.91)		3.20	7.83	239.73	15.13	246.40
S7	236.57	535.69	663.20	5.46(2.44)	13.65(3.75)		5.41	13.23	185.10	13.57	232.77
Expt. Mean	292.54	662.60	820.20	2.171428571	3.317142857		4.26	10.44	221.26	14.65	242.15
C.D. (0.05)	12.61	30.91	36.03	0.17	0.28		0.84	2.07	8.53	0.52	5.72
C.V. (%)	2.42	2.62	2.47	4.49	4.8		11.03	11.17	2.17	2	1.33
res(t)	**	**	**	**	**		**	**	**	**	**
Soil type											
pH											
EC											
OC											
Variety & Duration											
Applied NPK kg/ha											
Available NPK kg/ha											

*Figures in the parenthesis are transformed values

Table 4.2.3a: Contd.

Methods of crop establishment	VARANASI											Over all Mean	Rank
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Tillers/m ² (No.)	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Weed population (no/m ²)		Weed biomass (g/m ²)			
								At Active tillering	At panicle initiation	At stage	At stage		
S1	3.21	6	9.39	243	243	1.30	24.92	96.67(9.85)	35.33(5.95)	29.72	17.88	3.77	6
S2	3.79	5	10.11	284	284	1.45	28.42	84.33(9.18)	50.67(7.1)	47.70	23.04	3.99	3
S3	4.27	3	10.44	284	284	1.67	22.64	51.00(7.14)	111.67(10.55)	24.22	51.24	4.24	1
S4	5.17	-	11.18	310	310	1.82	26.15	23.67(4.87)	55.67(7.32)	14.75	22.58	3.95	4
S5	4.45	2	10.52	301	301	1.68	27.20	35.00(5.92)	25.00(4.98)	22.37	14.46	4.01	2
S6	3.88	4	9.64	284	284	1.55	20.61	76.67(8.64)	43.00(6.58)	30.08	21.11	3.91	5
S7	3.13	-	9.38	237	237	1.43	16.15	157.00(12.54)	66.00(8.13)	49.03	46.81	3.66	7
Expt. Mean	3.99		10.09	277	277	1.56	23.73	8.305714286	7.23	31.12	28.16	3.93	
C.D. (0.05)	0.53		0.7	34.8	34.8	0.14	2.39	1.64	1.5	30.69	20.64		
C.V. (%)	7.52		3.88	7.05	7.05	5.09	5.65	11.1	11.64	55.42	41.19		
res(t)	**		**	**	**	**	**	**	**	NS	*		
Soil type	Clay												
pH	-												
EC	-												
Variety & Duration	WGL 962, 125 Days duration												
Applied NPK kg/ha	120:60:40: 50												
Available NPK kg/ha	105:41:333												

*Figures in the parenthesis are transformed values

S1: Broadcasting of seeds

S2: Manual line sowing

S3: Mechanized line sowing of seeds (Dribbler, Happy seeder or any Drum Seeder: Spacing as per the equipment specifications)

S4: Raised bed sowing

S5- Any improved system in that particular location - (Drum seeding in unpuddled condition)

S6- Location specific high yielding Wet DSR method

S7- Farmers practice of the Wet DSR method of the region - (Broadcasting of sprouted seeds)

Table 4.2.3a: Contd.

Methods of crop establishment	Sub plot	ADUTHURAI												
		Grain yield (t/ha)	Rank	Tillers/m ² (No.)	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Weed population (no/m ²)			Weed biomass (g/m ²)			Cost of cultivation (Rs/ha)
								Grasses	Sedges	BLW	Grasses	Sedges	BLW	
S1	W1	5.10	16	204	192	4.11	23.03	8.75(3.04)	7.75(2.86)	4.50(2.23)	1.80	1.32	1.32	48100
	W2	5.13	15	223	211	4.16	23.58	11.75(3.49)	6.75(2.68)	5.25(2.39)	2.11	1.58	1.31	43520
	W3	5.48	12	241	225	4.24	23.65	13.75(3.75)	10.00(3.24)	5.25(2.39)	2.26	1.49	1.13	45634
	W4	5.55	9	262	248	4.34	23.60	8.00(2.9)	4.00(2.09)	5.00(2.31)	2.31	1.53	1.39	44502
S2	W1	5.38	14	229	214	4.15	23.35	10.25(3.27)	7.00(2.74)	4.50(2.22)	2.14	1.39	1.27	49044
	W2	5.60	5	248	231	4.24	23.53	11.00(3.38)	6.50(2.62)	4.25(2.15)	3.02	1.48	1.33	45532
	W3	5.90	3	255	238	4.35	23.73	11.00(3.39)	7.00(2.71)	4.75(2.27)	3.30	1.47	1.31	47606
	W4	6.08	2	260	247	4.42	23.73	9.00(3.08)	5.25(2.38)	4.75(2.28)	2.90	1.81	1.28	46402
S3	W1	5.50	11	210	199	4.16	23.05	8.50(2.99)	6.00(2.54)	3.00(1.83)	2.01	1.48	1.34	50158
	W2	5.58	8	230	218	4.24	23.33	8.50(2.98)	5.75(2.47)	6.00(2.52)	2.73	1.60	1.24	47655
	W3	5.40	13	244	228	4.36	23.53	11.75(3.49)	8.00(2.9)	4.75(2.27)	3.33	1.54	1.38	50053
	W4	5.60	5	251	235	4.45	23.58	12.00(3.53)	6.50(2.63)	4.75(2.25)	2.22	1.46	1.21	48815
S4	W1	5.55	9	218	206	4.21	23.35	8.50(8.5)	4.00(2.1)	3.50(1.98)	2.23	1.42	1.27	48904
	W2	5.83	4	239	218	4.35	23.58	11.25(3.42)	4.75(2.25)	3.25(1.92)	2.20	1.53	1.18	46757
	W3	5.60	5	242	221	4.44	23.40	11.25(3.42)	6.50(2.62)	5.00(2.32)	2.86	1.43	1.39	48733
	W4	6.18	1	251	236	4.49	23.58	7.75(2.84)	4.25(2.13)	3.75(2.03)	2.38	1.24	1.13	47602
Mean of Methods														
	S1	5.32	4	233	219	4.21	23.46	3.3	2.72	2.33	2.12	1.48	1.29	45439
	S2	5.74	2	248	232	4.29	23.58	3.28	2.61	2.23	2.84	1.54	1.30	47146
	S3	5.52	3	234	220	4.30	23.37	3.25	2.64	2.22	2.57	1.52	1.29	49170
	S4	5.79	1	237	220	4.37	23.48	3.17	2.28	2.06	2.42	1.40	1.24	47999
C.D. (0.05)		0.17		3.81	4.49	0.01	NS	NS	0.29	NS	0.08	NS	NS	0
C.V. (%)		3.75		2	2.52	0.38	0.79	5.78	14.13	17.36	4.22	9.52	5.04	0

*Figures in the parenthesis are transformed values

S₁: Broadcasting of seeds
S₂: Drum Seeding
S₃ – Semi Dry System
S₄ – Direct planting system

W₁ – Manual weeding
W₂ – Pre + Post emergence herbicide
W₃ – Pre emergence herbicide + Manual weeding
W₄ – Pre + early Post emergence & Post emergence herbicide two times 20 and 45 DAS
4.320

Table 4.2.3a: Contd.

Methods of crop establishment		Sub plot	ADUTHURAI											
Grain yield (t/ha)	Rank		Tillers/m ² (No.)	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Weed population (no/m ²)			Weed biomass (g/m ²)			Cost of cultivation (Rs/ha)	
							Grasses	Sedges	BLW	Grasses	Sedges	BLW		
Mean of Varieties	W1	5.38	4	215	202	4.16	23.20	3.07	2.56	2.06	2.04	1.40	1.30	49052
	W2	5.54	3	235	220	4.25	23.50	3.32	2.5	2.24	2.52	1.55	1.26	45866
	W3	5.60	2	246	228	4.35	23.58	3.51	2.87	2.31	2.94	1.48	1.30	48007
	W4	5.85	1	256	241	4.42	23.62	3.09	2.31	2.22	2.45	1.51	1.25	46830
CD (0.05)		0.16		3.46	2.77	0.01	0.08	0.21	0.23	NS	0.05	NS	NS	0
C.V. (%)		4.11		2.03	1.74	0.31	0.49	9.08	12.43	13.02	3	10.2	5.71	0
Interaction														
M and S		0.31		6.65	5.85	0.02	0.18	0.42	NS	NS	0.11	0.21	0.1	0
S and M		0.33		6.92	5.54	0.02	0.17	0.38	NS	NS	0.11	0.22	0.1	0
Experimental Mean		5.59		238	223	4.29	23.48	3.25	2.56	2.21	2.49	1.49	1.28	47439
Soil type		Clay												
pH		-												
EC		-												
Variety & Duration		-												
Applied NPK kg/ha		150:50:50												
Available NPK kg/ha		278:48:545												

Table 4.2.3a: Contd.

Methods of crop establishment	Sub plot	MARUTERU												
		Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant population no/m ² at 15 DAS	Plant height (cm)	Tillers/m ² (No.)	Panicle/m ² (No.)	Panicle length (cm)	Days to 50% flowering	Weed population (no/m ²)		Weed biomass (g/m ²)	Gross returns (Rs/ha)
											At active tillering	At panicle initiation		
S1	W1	2.97	11	5.23	204	106.47	198	213	22.47	118	10.00(2.83)	2.67(1.64)	2.33	80233
	W2	2.37	12	7.50	248.67	100.40	242	175	24.31	116	15.67(3.5)	2.67(1.64)	7.30	66433
	W3	5.57	4	7.30	276.67	99.80	212	219	24.97	118	8.00(2.52)	1.33(1.29)	1.63	140033
	W4	6.24	1	7.00	256.33	112.20	244	219	25.40	116	1.33(1.18)	0.00(0.71)	0.67	155597
S2	W1	5.73	3	7.17	49	116.20	209	236	25.37	121	13.00(2.93)	2.33(1.39)	15.25	143867
	W2	4.30	9	6.70	49.67	108.33	223	235	24.67	122	5.67(2.2)	3.67(1.72)	2.21	110900
	W3	5.37	6	5.33	54.33	110.20	214	209	24.57	124	26.00(4.89)	11.33(3.28)	6.45	135433
	W4	4.20	10	6.03	37.33	119.67	212	240	23.93	127	5.33(1.83)	1.00(1.1)	4.10	108600
S3	W1	4.37	8	6.33	33.67	113.47	204	224	25.23	104	7.33(2.38)	6.67(2.33)	6.26	112433
	W2	4.63	7	7.53	31	114.07	243	197	25.07	103	1.67(1.26)	1.00(1.1)	1.27	118567
	W3	6.07	2	7.53	33.67	118.13	237	228	25.20	105	1.67(1.26)	0.00(0.71)	1.32	151533
	W4	5.43	5	7.03	31.67	111.20	243	230	24.10	105	3.00(1.68)	0.33(0.88)	1.52	136967
Mean of Methods														
	S1	4.29	3	6.76	246.42	104.72	224	207	24.29	117	2.51	1.32	2.98	110574
	S2	4.90	2	6.31	47.58	113.60	215	230	24.64	124	2.96	1.87	7.00	124700
	S3	5.12	1	7.10	32.5	114.22	232	220	24.90	104	1.64	1.26	2.59	129875
C.D. (0.05)		NS		NS	47.24	NS	NS	NS	NS	1.36	NS	NS	NS	NS
C.V. (%)		16.62		11.32	38.29	18.06	18.26	17.44	7.82	1.04	63.33	76.47	222.3	14.98

S1: Broadcasting of seeds

S2: Manual line sowing

S3: S3: Mechanized line sowing of seeds (Dribbler, Happy seeder or any Drum Seeder: Spacing as per the equipment

specifications)

Table 4.2.3a: Contd.

		MARUTERU												
Methods of crop establishment	Sub plot	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant population no/m2 at 15 DAS	Plant height (cm)	Tillers/m ² (No.)	Panicle/m ² (No.)	Panicle length (cm)	Days to 50% flowering	Weed population (no/m ²)		Weed biomass (g/m ²)	Gross returns (Rs/ha)
											At active tillering	At panicle initiation		
Mean of Varieties	W1	4.36	3	6.24	95.56	112.05	204	224	24.36	115	2.71	1.79	7.95	112178
	W2	3.77	4	7.24	109.78	107.60	236	202	24.68	114	2.32	1.49	3.59	98633
	W3	5.67	1	6.72	121.56	109.38	221	219	24.91	116	2.89	1.76	3.13	142333
	W4	5.29	2	6.69	108.44	114.36	233	230	24.48	116	1.56	0.9	2.10	133721
CD (0.05) C.V. (%) Interaction		0.57		NS	32.84	NS	NS	11.86	NS	NS	NS	NS	NS	13050.09
		12.01		12.4	30.47	7.71	14.79	5.47	4.04	3	76.07	58.41	193.43	10.83
	M and S	1.1		1.41	NS	NS	NS	36.44	2.22	NS	NS	NS	NS	25299.12
	S and M	0.98		1.43	NS	NS	NS	20.55	1.71	NS	NS	NS	NS	22603.43
Experimental Mean		4.77		6.72	108.83	110.84	223	219	24.61	115	2.37	1.48	4.19	121716
	Soil type	Alluvial clay												
	pH	-												
	EC	-												
Variety & Duration	OC	0.95												
	Variety & Duration	-												
	Applied NPK kg/ha	-												
	Available NPK kg/ha	-												

Table 4.2.3a: Contd.

Methods of crop establishment	PATTAMBI (Rabi)												
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant population no/m ²		Plant height (cm)	Tillers/m ² (No.)	Panicle/m ² (No.)	Grains/panicle (No.)	Panicle length (cm)	Panicle wt (g)	Test wt (g)	Days for 50% flowering
				At 15 DAS	At 30 DAS								
S1	3.00	1	11.50	181	195	86.33	383	358	152	19.83	8.63	22.37	86
S2	1.63	5	9.23	35	33	97.00	305	288	145	19.47	8.10	20.07	86
S3	1.90	4	7.80	48	37	98.00	249	238	154	20.33	8.43	20.43	88
S4	2.50	2	11.80	43	38	106.33	369	343	159	19.73	8.80	20.43	87
S5	1.93	3	8.10	99	94	105.00	242	226	153	20.20	8.20	20.97	87
S6	1.50	6	8.90		36	86.67	216	209	144	20.83	7.63	20.33	85
S7	-		-	-	-	-	-	-	-	-	-	-	-
Expt. Mean	2.08		9.56	81	72	96.56	294	277	151	20.07	8.30	20.77	87
C.D. (0.05)	0.57		0.76	33.71	45.06	7.67	36.08	39.17	18.29	2.67	1.44	3.86	5.62
C.V. (%)	15.22		4.39	22.06	34.3	4.37	6.74	7.77	6.65	7.31	9.52	10.21	3.57
res(f)	**		**	**	**	**	**	**	NS	NS	NS	NS	NS
Soil type	-												
pH	-												
EC	-												
Variety & Duration	Aiswarya, 120-125 days												
Applied NPK kg/ha	90:45:45												
Available NPK kg/ha	-												

S1: Broadcasting of seeds

S2: Manual line sowing

S3: Mechanized line sowing of seeds (Drum seeder)

S4: Raised bed sowing

S5- Any improved system in that particular location - (Drum seeder all holes open)

S6- Location specific high yielding Wet DSR method - (Transplanting)

Table 4.2.3a: Contd.

Methods of crop establishment	PATTAMBI (Rabi) Contd..									
	Dry mater accumulation (g/m2)			Weed population (no/m ²)		Weed bio mass (g/m ²)		Cost of cultivation Rs/ha	Gross returns Rs/ha	
	45 DAS	75 DAS	105 DAS	At Active tillering	At panicle initiation	AT stage	PI stage			
S1	264.00	348.90	868.03	66.00(8.14)	96.00(9.82)	26.00	124.30	66900	118480	
S2	278.00	395.33	907.37	29.00(5.42)	56.33(7.54)	11.47	72.50	68200	73433	
S3	191.33	362.57	675.67	40.33(6.36)	57.67(7.59)	18.47	66.43	67850	76650	
S4	246.00	350.33	823.20	31.00(5.61)	43.67(6.59)	18.47	49.63	69150	105410	
S5	240.47	299.17	801.27	30.33(5.52)	52.00(7.21)	16.70	58.20	67200	78433	
S6	215.93	279.73	658.90	24.30(4.98)	36.33(5.87)	14.60	29.00	69250	68700	
S7	-	-	-	-	-	-	-	-	-	
Expt. Mean	239.29	339.34	789.07	6.005	7.436666667	17.62	66.68	68092	86851	
C.D. (0.05)	84.69	62.73	110.87	0.67	2.02	4.63	18.21	0	15091.39	
C.V. (%)	19.45	10.16	7.72	6.16	14.9	14.43	15.01	0	9.55	
res(t)	NS	*	**	**	*	**	**	NS	**	
Soil type										
pH										
EC										
Variety & Duration										
Applied NPK kg/ha										
Available NPK kg/ha										

*Figures in the parenthesis are transformed values

Table 4.2.3a: Contd.

Methods of crop establishment	PUDUCHERRY (Rabi)											Cost of cultivation (rs/ha)	B:C Ratio
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant height (cm)	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Weed population (no/m ²)		Weed biomass (g/m ²)			
								At Active tillering	At panicle initiation	At stage	At stage		
S1	5.29	3	8.36	108.00	281	2.83	13.64	160.92(11.66)	141.47(10.89)	100.91	89.30	61075	2.24
S2	5.53	2	8.53	110.26	295	2.96	13.91	135.45(11.00)	118.21(9.97)	85.50	74.13	63825	2.24
S3	5.88	1	9.02	111.49	316	3.04	14.12	120.6	99	75.62	62.49	62950	2.34
S4	-		-	-	-	-	-	-	-	-	-	-	-
S5	-		-	-	-	-	-	-	-	-	-	-	-
S6	-		-	-	-	-	-	-	-	-	-	-	-
S7	-		-	-	-	-	-	-	-	-	-	-	-
Expt. Mean	5.57		8.64	109.92	297	2.94	13.89	11.79	10.93	87.35	75.31		2.28
C.D. (0.05)	0.15		0.36	4.57	1.17	0.02	0.12	0.18	0.23	3.01	2.68		0.04
C.V. (%)	1.91		2.86	2.87	0.27	0.36	0.62	1.06	1.45	2.37	2.45		1.07
res(f)	**		NS	NS	**	**	**	**	**	**	**		*
Soil type	Clay loam												
pH	6.74												
EC	0.13												
Variety & Duration	ADT-56 (116 Days)												
Applied NPK kg/ha	120:40:40												
Available NPK kg/ha	146:25:105												

S1: Broadcasting of seeds

S2: Manual line sowing

S3: Mechanized line sowing of seeds (Drum seeder)

4.2.3b. Identification of suitable varieties for wet DSR system

One of the major challenges confronting the development of wet DSR in India is poor choice of suitable varieties and variety breeding. Hence the present trial is constituted to enhance the productivity of the wet DSR with the following objectives 1) To identify the suitable and promising rice cultivars in dry direct seeded rice and 2) To assess the various agronomic parameters for suitability of rice cultivars in wet direct seeded rice establishment methods. The trial was conducted at 8 locations (**Bankura, Dhangain, Gangavathi, IIRR, Kota, Mandya, Nawagam, Pusa, Raipur and Warangal**). The trial was laid out in RBD with 13 treatments and replicated thrice. Treatments are T₁: DRR Dhan 44 (early) T₂: Sahbhagidhan (very early) T₃: DRR Dhan 60 T₄: DRR Dhan 42 (Mid early) T₅: Vandana (rainfed upland), T₆: Anjali T₇: Varalu (Upland Wesern zone) T₈: IRR1 1 T₉: IRR1 2 T₁₀: IRR1 3 T₁₁: LC 1 T₁₂: LC 2 T₁₃: LC 3. However, at Bankura suggested varieties were not tested as per the technical programme 2024-25. The trial was initiated in 2023-24 *kharif*. The results were summarized and presented in **Table 4.2.3b** and the salient findings are as followed.

Location	Grain yield (t/ha) of varieties		
	1 st rank	2 nd rank	3 rd rank
Bankura	LC 1 (6.84)	LC 2 (6.36)	LC 3 (5.28)
Dhangain	DRR Dhan 42 (6.37)	LC 1 (5.79)	DRR Dhan 44 (5.66)
Gangavathi	LC 2 (4.07)	DRR Dhan 44 (4.81)	LC 3 (3.83)
IIRR	Sahbhagidhan (6.31)	DRR Dhan 44 (6.23)	DRR Dhan 42 (6.06)
Kota	Varalu (5.40)	DRR Dhan 44 (5.32)	IRRI 1 (5.17)
Mandya	LC 3 (7.03)	LC 2 (6.99)	DRR Dhan 60 (6.94)
Nawagam	LC 3 (4.73)	DRR Dhan 42 (4.69)	DRR Dhan 44 (4.50)
Pusa	LC 1 (4.58)	Sahbhagidhan (4.44)	LC 3 (4.37)
Raipur	DRR Dhan 44 (4.03)	LC 1 (3.86)	LC 2 (3.84)
Warangal	Sahbhagidhan (7.42)	Varalu (7.32)	DRR Dhan 60 (7.16)

Table 4.2.3b: Evaluation of varieties for their suitability and enhancement of the productivity in wet direct seeded rice (un-puddle soil) , Kharif-2024.

Cultivars	BANKURA													
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Grain yield (kg/plot)	Straw yield (kg/plot)	Germination (%)	Plant population no/m2 (21 DAS)	Tillers/m ² (No.)	Panicle/m ² (No.)	Test wt (g)	Days for 50% flowering	Dry mateer accumulation (g/m ²)		
												45 DAS	75 DAS	105 DAS
1. DRR Dhan 44 (early)	-		-	-	-	-	-	-	-	-	-	-	-	-
2.Sabhagidhan (very early)	-		-	-	-	-	-	-	-	-	-	-	-	-
3. DRR Dhan 60	-		-	-	-	-	-	-	-	-	-	-	-	-
4. DRR Dhan 42 (Mid early)	-		-	-	-	-	-	-	-	-	-	-	-	-
5. Vandana (rainfed upland)	-		-	-	-	-	-	-	-	-	-	-	-	-
6. Anjali	-		-	-	-	-	-	-	-	-	-	-	-	-
7. Varalu (Upland-western zone)	-		-	-	-	-	-	-	-	-	-	-	-	-
8. IRRI 1	-		-	-	-	-	-	-	-	-	-	-	-	-
9.IRRI 2	-		-	-	-	-	-	-	-	-	-	-	-	-
10. IRRI 3	-		-	-	-	-	-	-	-	-	-	-	-	-
11.LC 1	6.84	1	10.10	9.85	14.53	97	90	384	348	23.50	106	30.75	619.06	1059.42
12. LC 2	6.36	2	9.44	9.15	13.58	95	86	368	336	23.25	105	27.80	595.06	1048.92
13. LC 3	5.28	3	8.53	7.60	12.28	86	81	351	315	20.18	109	24.13	552.58	896.83
Expt. Mean	6.16		9.36	8.87	13.46	93	86	368	333	22.31	107	27.56	588.90	1001.72
C.D. (0.05)	0.35		0.55	0.51	0.81	2.38	5.07	5.83	9.25	0.27	1.98	0.93	7.76	19.79
C.V. (%)	3.32		3.42	3.34	3.49	1.49	3.42	0.92	1.6	0.7	1.07	1.96	0.76	1.14
res(f)	**		**	**	**	**	*	**	**	**	**	**	**	**
Soil type	Red & Lateritic (Sandy Loam)													
pH	7.6													
EC	0.58													
Applied NPK kg/ha	120:60:40													
Available NPK kg/ha	218:30:398													

V11 LC 1 - Dhiren(142 Days)
V12 LC 2 - Dhruaba(143 Days)
V13 LC 3 - MTU 7029 (145 Days)

Table 4.2.3b: Contd.

Cultivars	DHANGAIN						
	Grain yield (t/ha)	Rank	Grain yield (kg/plot)	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% flowering
1. DRR Dhan 44 (early)	5.66	3	5.20	315	4.11	21.67	82
2.Sabhadidhan (very early)	4.44	6	4.07	290	2.98	23.67	76
3. DRR Dhan 60	4.84	4	4.44	298	3.87	18.27	92
4. DRR Dhan 42 (Mid early)	6.37	1	5.85	364	4.37	23.67	76
5. Vandana (rainfed upland)	-		-	-	-	-	-
6. Anjali	-		-	-	-	-	-
7. Varalu (Upland-western zone)	-		-	-	-	-	-
8. IRR1 1	-		-	-	-	-	-
9.IRR1 2	-		-	-	-	-	-
10. IRR1 3	-		-	-	-	-	-
11.LC 1	5.79	2	5.32	339	4.31	22.40	87
12. LC 2	4.72	5	4.33	296	3.37	18.33	91
13. LC 3	4.25	7	3.90	288	2.93	22.67	82
Expt. Mean	5.15		4.73	313	3.71	21.53	83
C.D. (0.05)	0.9		0.82	35.6	0.89	0.89	1.1
C.V. (%)	9.77		9.77	6.4	13.49	2.31	0.74
res(t)	**		**	**	*	**	**
Soil type	Clay loam						
pH	6.56						
EC	0.65						
Applied NPK kg/ha	120:60:40						
Available NPK kg/ha	347.5:48.3:262.2						

V11 LC 1 - Arize 6555 (120-125 Days)
V12 LC 2 - Sabour Vijay (125-130 Days)
V13 LC 3 - R. Bhagwati (115-120 Days)

Table 4.2.3b: Contd.

Cultivars	GANGAVATHI										
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Grain yield (kg/plot)	Straw yield (kg/plot)	Germination (%)	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% flowering	Cost of cultivation Rs/ha
1. DRR Dhan 44 (early)	3.89	2	4.81	2.83	3.50	100	270	3.33	2.45	73	55880
2.Sabhagidhan (very early)	2.57	6	3.21	1.87	2.33	100	288	2.53	2.33	66	55880
3. DRR Dhan 60	1.59	7	3.20	1.16	2.33	100	257	1.53	1.42	84	55880
4. DRR Dhan 42 (Mid early)	2.63	5	3.44	1.91	2.50	100	229	3.17	2.57	73	55880
5. Vandana (rainfed upland)	-		-	-	-	-	-	-	-	-	-
6. Anjali	-		-	-	-	-	-	-	-	-	-
7. Varalu (Upland-western zone)	-		-	-	-	-	-	-	-	-	-
8. IRR1 1	-		-	-	-	-	-	-	-	-	-
9.IRR1 2	-		-	-	-	-	-	-	-	-	-
10. IRR1 3	-		-	-	-	-	-	-	-	-	-
11.LC 1	3.51	4	3.66	2.56	2.67	100	356	2.13	1.30	71	55880
12. LC 2	4.07	1	3.66	2.96	2.67	100	355	3.09	1.74	68	55880
13. LC 3	3.83	3	4.58	2.79	3.33	100	408	2.07	2.44	73	55880
Expt. Mean	3.16		3.79	2.30	2.76	100	309	2.55	2.04	73	55880
C.D. (0.05)	0.63		1.35	0.46	0.98	0	78.81	0.7	0.1	0.39	0
C.V. (%)	11.28		19.98	11.26	20.02	0	14.34	15.36	2.75	0.3	0
res(f)	**		NS	**	NS	NS	**	**	**	**	NS
Soil type	Black soil										
pH	8										
EC	-										
Applied NPK kg/ha	150:75:75										
Available NPK kg/ha	-										

V11.LC 1 - RNR 15048 (120 days)

V12. LC 2 - GNV 1089 (115-120 days)

V13. LC 3 - MTU 1010 (125 - 130 days)

Table 4.2.3b: Contd.

Cultivars	ICAR-IIRR						
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Tillers/m ² (No.)	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)
1. DRR Dhan 44 (early)	6.23	2	12.88	359	331	2.92	24.00
2.Sabhagidhan (very early)	6.31	1	15.23	285	259	2.70	21.33
3. DRR Dhan 60	4.29	5	9.74	427	384	2.84	21.83
4. DRR Dhan 42 (Mid early)	6.06	3	13.86	395	370	3.05	25.17
5. Vandana (rainfed upland)	-		-	-	-	-	-
6. Anjali	-		-	-	-	-	-
7. Varalu (Upland-western zone)	-		-	-	-	-	-
8. IRR1 1	-		-	-	-	-	-
9.IRR1 2	-		-	-	-	-	-
10. IRR1 3	-		-	-	-	-	-
11.LC 1	4.37	4	10.51	423	377	3.11	21.50
12. LC 2	3.55	6	8.86	321	327	2.36	20.70
13. LC 3	-		-	-	-	-	-
Expt. Mean	5.14		11.85	368	341	2.83	22.42
C.D. (0.05)	1.42		3.95	125.6	117.49	0.24	2.3
C.V. (%)	15.15		18.34	18.75	18.93	4.65	5.65
res(f)	**		*	NS	NS	**	**
Soil type	Clay loam						
pH	7.7						
EC	-						
Applied NPK kg/ha	120:60:40						
Available NPK kg/ha	-						

V11.LC 1 - DRR Dhan 53 (130-135 days)

V12. LC 2 - RP Bio 226 (135-140 days)

V13. LC 3 -

Table 4.2.3b: Contd.

KOTA											
Cultivars	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Grain yield (kg/plot)	Straw yield (kg/plot)	Plant population no/m2 (21DAS)	Tillers/m² (No.)	Panicle/m² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% flowering
1. DRR Dhan 44 (early)	5.32	2	6.69	6.63	8.35	42	304	280	4.37	24.41	72
2.Sabhagidhan (very early)	4.61	7	6.09	5.75	7.60	36	307	272	4.16	23.94	74
3. DRR Dhan 60	4.85	5	7.62	6.06	9.52	39	329	301	3.65	17.32	84
4. DRR Dhan 42 (Mid early)	4.61	7	7.62	5.75	9.52	42	299	282	3.38	25.02	74
5. Vandana (rainfed upland)	2.05	12	5.12	2.57	6.38	39	285	232	2.20	24.95	56
6. Anjali	2.48	11	5.42	3.10	6.77	41	291	247	2.63	22.91	57
7. Varalu (Upland-western zone)	5.40	1	6.81	6.74	8.50	38	301	272	4.68	20.92	76
8. IRR1 1	5.17	3	7.10	6.45	8.87	39	329	290	3.67	26.03	77
9.IRR1 2	4.79	6	6.12	5.97	7.63	37	286	258	4.71	25.18	73
10. IRR1 3	4.21	9	7.13	5.25	8.90	40	303	272	3.85	24.85	72
11.LC 1	4.92	4	7.82	6.13	9.77	42	299	282	4.00	25.02	74
12. LC 2	4.19	10	6.44	5.22	8.03	39	296	266	3.79	22.15	73
13. LC 3	-	-	-	-	-	-	-	-	-	-	-
Expt. Mean	4.38		6.67	5.47	8.32	40	302	271	3.76	23.56	72
C.D. (0.05)	0.47		0.55	0.58	0.69	4.66	21.85	19.25	0.44	1.03	0.69
C.V. (%)	6.28		4.86	6.29	4.86	6.97	4.27	4.19	6.99	2.57	0.56
res(f)	**		**	**	**	NS	**	**	**	**	**
Soil type	Clay										
pH	7.55										
EC	0.56										
Applied NPK kg/ha	120:60:40										
Available NPK kg/ha	210.34:25.6:350.2										

V11.LC 1 - CR Dhan 201 (120-125 days)

V12. LC 2 - CR Dhan 202 (120-125 days)

V13. LC 3 -

Table 4.2.3b: Contd.

Cultivars	MANDYA										
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Grain yield (kg/plot)	Straw yield (kg/plot)	Germination (%)	Plant population no/m2 (21DAS)	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% flowering
1. DRR Dhan 44 (early)	6.58	5	9.89	9.92	14.91	96	59	387	4.50	25.83	61
2.Sabhagidhan (very early)	5.29	7	6.23	7.98	9.39	98	61	378	3.49	26.88	58
3. DRR Dhan 60	6.94	3	9.58	10.47	14.45	94	58	410	3.07	16.76	71
4. DRR Dhan 42 (Mid early)	6.91	4	9.93	10.42	14.98	95	58	356	3.97	30.24	62
5. Vandana (rainfed upland)	-		-	-	-	-	-	-	-	-	-
6. Anjali	-		-	-	-	-	-	-	-	-	-
7. Varalu (Upland-western zone)	-		-	-	-	-	-	-	-	-	-
8. IRR1 1	-		-	-	-	-	-	-	-	-	-
9.IRR1 2	-		-	-	-	-	-	-	-	-	-
10. IRR1 3	-		-	-	-	-	-	-	-	-	-
11.LC 1	6.18	6	9.89	9.31	14.92	96	59	343	3.91	23.96	56
12. LC 2	6.99	2	8.68	10.54	13.09	96	58	404	2.43	28.07	64
13. LC 3	7.03	1	9.98	10.60	15.05	97	60	421	3.32	25.94	70
Expt. Mean	6.56		9.17	9.89	13.83	96	59	386	3.53	25.38	63
C.D. (0.05)	0.76		2.19	1.14	3.3	2.84	2.56	68.5	0.63	2.58	2.67
C.V. (%)	6.5		13.43	6.49	13.43	1.66	2.44	9.99	10	5.72	2.38
res(f)	**		*	**	*	NS	NS	NS	**	**	**
Soil type	Red sandy loam										
pH	7.97										
EC	0.38										
Applied NPK kg/ha	100:50:50										
Available NPK kg/ha	263.20:69.50:275.80										

Table 4.2.3b: Contd.

Cultivars	NAWAGAM											
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Grain yield (kg/plot)	Straw yield (kg/plot)	Germination (%)	Plant population no/m ² (21 DAS)	Tillers/m ² (No.)	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% flowering
1. DRR Dhan 44 (early)	4.50	3	4.98	3.38	3.73	64	44	188	164	4.21	21.43	81
2.Sabhagidhan (very early)	4.42	5	5.45	3.32	4.08	70	41	196	172	3.68	22.77	79
3. DRR Dhan 60	2.83	6	4.48	2.12	3.37	59	32	127	118	3.21	24.01	86
4. DRR Dhan 42 (Mid early)	4.69	2	5.52	3.52	4.14	67	45	196	175	3.37	23.17	82
5. Vandana (rainfed upland)	-		-	-	-	-	-	-	-	-	-	-
6. Anjali	-		-	-	-	-	-	-	-	-	-	-
7. Varalu (Upland-western zone)	-		-	-	-	-	-	-	-	-	-	-
8. IRR1 1	-		-	-	-	-	-	-	-	-	-	-
9.IRR1 2	-		-	-	-	-	-	-	-	-	-	-
10. IRR1 3	-		-	-	-	-	-	-	-	-	-	-
11.LC 1	-		-	-	-	-	-	-	-	-	-	-
12. LC 2	4.44	4	5.39	3.33	4.04	70	51	199	174	4.19	17.87	93
13. LC 3	4.73	1	5.54	3.54	4.16	74	50	195	177	5.69	31.50	86
Expt. Mean	4.27		5.23	3.20	3.92	67	44	183	163	4.06	23.46	85
C.D. (0.05)	0.53		0.7	0.39	0.52	367	8.61	37.2	25.96	0.67	2.09	2.36
C.V. (%)	6.77		7.34	6.78	7.34	2.99	10.83	11.15	8.73	9.01	4.89	1.54
res(f)	**		*	**	*	**	**	*	**	**	**	**
Soil type	Clay loam											
pH	8.01											
EC	0.52											
Applied NPK kg/ha	100:25:00:25											
Available NPK kg/ha	235.20:36.50:239.50											

V11.LC 1 -
V12. LC 2 - Mahisagar (115-120 days)
V13. LC 3 - GAR 201 (115-120 days)

Table 4.2.3b: Contd.

Cultivars	NAWAGAM Contd.				
	Weed population (no/m ²)		Weed biomass (g/m ²)		Cost of cultivation Rs/ha
	At active tillering	At panicle initiation	At active tillering	At panicle initiation	
1. DRR Dhan 44 (early)	85.00(8.63)	176.00(13.27)	22.24	51.60	39697
2.Sabhagidhan (very early)	62.33(7.73)	159.67(12.5)	16.76	46.27	39700
3. DRR Dhan 60	71.33(8.34)	130.33(11.21)	22.35	35.47	39710
4. DRR Dhan 42 (Mid early)	64.67(7.9)	148.67(11.94)	21.31	43.63	39730
5. Vandana (rainfed upland)	-	-	-	-	-
6. Anjali	-	-	-	-	-
7. Varalu (Upland-western zone)	-	-	-	-	-
8. IRR1 1	-	-	-	-	-
9.IRR1 2	-	-	-	-	-
10. IRR1 3	-	-	-	-	-
11.LC 1	-	-	-	-	-
12. LC 2	80.67(8.95)	160.00(12.52)	23.06	46.93	39730
13. LC 3	81.33(9)	155.67(12.36)	23.63	45.07	39750
Expt. Mean	8.425	12.3	21.56	44.83	39719
C.D. (0.05)	4.11	4.35	20.97	29.97	74.39
C.V. (%)	26.8	19.45	53.46	36.75	0.1
res(t)	NS	NS	NS	NS	NS
Soil type					
pH					
EC					
Applied NPK kg/ha					
Available NPK kg/ha					

*Figures in the parenthesis are transformed values

Table 4.2.3b: Contd.

Cultivars	PUSA								
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Germination (%)	Plant population no/m2 (21 DAS)	Tillers/m ² (No.)	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)
1. DRR Dhan 44 (early)	4.22	6	5.41	87.67	57	264	259	2.54	21.83
2.Sabhagidhan (very early)	4.44	2	5.77	89.33	57	285	281	2.52	21.60
3. DRR Dhan 60	4.06	7	5.38	86.33	55	260	255	2.55	22.43
4. DRR Dhan 42 (Mid early)	4.25	5	5.52	86.67	54	243	238	2.45	21.43
5. Vandana (rainfed upland)	-		-	-	-	-	-	-	-
6. Anjali	-		-	-	-	-	-	-	-
7. Varalu (Upland-western zone)	-		-	-	-	-	-	-	-
8. IRR1 1	-		-	-	-	-	-	-	-
9.IRR1 2	-		-	-	-	-	-	-	-
10. IRR1 3	-		-	-	-	-	-	-	-
11.LC 1	4.58	1	5.93	93.33	58	286	281	2.67	22.33
12. LC 2	4.29	4	5.54	91	56	272	267	2.54	21.63
13. LC 3	4.37	3	5.66	93	55	276	271	2.57	21.03
Expt. Mean	4.32		5.60	89.61857143	56	270	265	2.55	21.75
C.D. (0.05)	0.26		0.38	3.19	3.13	21.24	21.11	0.1	0.61
C.V. (%)	3.39		3.83	2	3.14	4.43	4.48	2.21	1.57
res(f)	*		NS	**	NS	**	**	*	**
Soil type	Sand loam								
pH	8.39								
EC	-								
Applied NPK kg/ha	120:60:40								
Available NPK kg/ha	-								

V11.LC 1 - Rajendra Nilam (105-115 days)
V12. LC 2 - Rajendra Bhagwati (105-115 days)
V13. LC 3 - Rajendra Saraswati (105-115 days)

Table 4.2.3b: Contd.

Cultivars	PUSA Contd.					
	Days for 50% flowering	Dry matter accumulation (g/m ²)			Water input mm/ha	Cost of cultivation Rs/ha
		45 DAS	75 DAS	105 DAS		
1. DRR Dhan 44 (early)	80	209.67	555.67	863.00	250	59540
2.Sabhagidhan (very early)	77	226.33	588.67	882.67	250	59540
3. DRR Dhan 60	88	218.33	472.67	805.33	250	59540
4. DRR Dhan 42 (Mid early)	84	221.33	495.67	814.33	250	59540
5. Vandana (rainfed upland)	-	-	-	-	-	-
6. Anjali	-	-	-	-	-	-
7. Varalu (Upland-western zone)	-	-	-	-	-	-
8. IRR1 1	-	-	-	-	-	-
9.IRR1 2	-	-	-	-	-	-
10. IRR1 3	-	-	-	-	-	-
11.LC 1	79	229.67	594.33	892.67	250	59540
12. LC 2	76	220.00	540.67	840.33	250	59540
13. LC 3	76	221.33	544.33	854.67	250	59540
Expt. Mean	80	220.95	541.72	850.43	250	59540
C.D. (0.05)	4.09	17.09	35.97	46	0	0
C.V. (%)	2.88	4.35	3.73	3.04	0	0
res(t)	**	NS	**	*	NS	NS
Soil type						
pH						
EC						
Applied NPK kg/ha						
Available NPK kg/ha						

Table 4.2.3b: Contd.

Cultivars	RAIPUR									
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Grain yield (kg/plot)	Straw yield (kg/plot)	Tillers/m ² (No.)	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% flowering
1. DRR Dhan 44 (early)	4.03	1	7.28	5.52	9.96	299	228	3.60	27.13	77
2.Sabhadidhan (very early)	3.28	5	6.62	4.49	9.06	220	162	3.39	23.00	74
3. DRR Dhan 60	3.48	4	6.68	4.77	9.14	277	224	2.43	15.30	84
4. DRR Dhan 42 (Mid early)	3.08	6	5.51	4.22	7.53	260	206	2.52	24.37	77
5. Vandana (rainfed upland)	-		-	-	-	-	-	-	-	-
6. Anjali	2.63		5.25	3.60	7.18	236	178	2.99	26.20	73
7. Varalu (Upland-western zone)	-		-	-	-	-	-	-	-	-
8. IRR1 1	-		-	-	-	-	-	-	-	-
9.IRR1 2	-		-	-	-	-	-	-	-	-
10. IRR1 3	-		-	-	-	-	-	-	-	-
11.LC 1	3.86	2	7.10	5.28	9.71	267	210	4.30	24.30	80
12. LC 2	3.84	3	7.06	5.25	9.66	273	219	3.12	21.87	75
13. LC 3	-		-	-	-	-	-	-	-	-
Expt. Mean	3.46		6.50	4.73	8.89	262	204	3.19	23.17	77
C.D. (0.05)	0.63		1.29	0.87	1.77	45.61	34.11	0.81	0.84	0.53
C.V. (%)	10.25		11.16	10.27	11.17	9.8	9.41	14.33	2.04	0.38
res(f)	**		*	**	*	*	**	**	**	**
Soil type	Vertisols									
pH	7.1									
EC	-									
Applied NPK kg/ha	100:60:40									
Available NPK kg/ha	180.3:20.8:329.4									

V11.LC 1 - Bastar Dhan-1 (110 days)
V12. LC 2 - Danteshwarii (105 days)
V13. LC 3 -

Table 4.2.3b: Contd.

Cultivars	WARANGAL							
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Grain yield (kg/plot)	Straw yield (kg/plot)	Germination (%)	Plant population no/m2	
							21 DAS	Harvest
1. DRR Dhan 44 (early)	6.60	7	7.20	10.77	11.73	82	33	33
2.Sabthagidhan (very early)	7.42	1	6.34	12.10	10.33	84	33	33
3. DRR Dhan 60	7.16	3	7.06	11.67	11.50	88	35	35
4. DRR Dhan 42 (Mid early)	6.83	5	6.48	11.13	10.57	85	33	33
5. Vandana (rainfed upland)	-		-	-	-	-	-	-
6. Anjali	-		-	-	-	-	-	-
7. Varalu (Upland-western zone)	7.32	2	6.69	11.93	10.90	81	34	34
8. IRR1 1	-		-	-	-	-	-	-
9.IRR1 2	-		-	-	-	-	-	-
10. IRR1 3	-		-	-	-	-	-	-
11.LC 1	6.67	6	7.08	10.87	11.53	91	34	34
12. LC 2	7.14	4	7.36	11.63	12.00	84	33	33
13. LC 3	6.56	8	6.67	10.70	10.87	83	32	32
Expt. Mean	6.96		6.86	11.35	11.18	85	33	33
C.D. (0.05)	1.16		1.05	1.89	1.71	9.88	2.57	2.57
C.V. (%)	9.53		8.76	9.52	8.74	6.65	4.38	4.38
res(f)	NS		NS	NS	NS	NS	NS	NS
Soil type	Black							
pH	-							
EC	-							
Applied NPK kg/ha	120:60:40:50							
Available NPK kg/ha	-							

Table 4.2.3b: Contd.

Cultivars	WARANGAL Contd.					Over all Mean	Rank
	Tillers/m ² (No.)	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days for 50% flowering		
1. DRR Dhan 44 (early)	306	306	4.43	22.90	72	5.23	2
2.Sabhagidhan (very early)	314	314	2.77	22.90	68	4.75	9
3. DRR Dhan 60	298	298	2.33	15.80	90	4.45	10
4. DRR Dhan 42 (Mid early)	299	299	2.87	25.83	73	5.05	6
5. Vandana (rainfed upland)	-	-	-	-	-	2.05	13
6. Anjali	-	-	-	-	-	2.56	12
7. Varalu (Upland-western zone)	307	307	3.50	20.37	78	6.36	1
8. IRRI 1	-	-	-	-	-	5.17	4
9. IRRI 2	-	-	-	-	-	4.79	8
10. IRRI 3	-	-	-	-	-	4.21	11
11. LC 1	183	183	6.10	31.93	83	5.19	3
12. LC 2	307	307	3.63	23.57	72	4.96	7
13. LC 3	288	288	3.23	13.00	82	5.15	5
Expt. Mean	288	288	3.61	22.04	77	4.96	
C.D. (0.05)	28.73	28.73	0.61	1.47	1.27		
C.V. (%)	5.7	5.7	9.59	3.8	0.94		
res(f)	**	**	**	**	**		
Soil type							
pH							
EC							
Applied NPK kg/ha							
Available NPK kg/ha							

RICE BASED CROP DIVERSIFICATION SYSTEM TRIALS



4.3 RICE BASED CROP DIVERSIFICATION SYSTEM TRIALS (RBCDTs)

4.3.1. Conservation Agriculture/ System based management practices in rice and rice-based cropping systems (crop diversification) for higher profitability

Conservation agriculture is the farming system that can prevent losses of arable land while regenerating degraded lands. It is the production of crops with the aim of reducing excessive mixing of the soil and maintain crop residues on the soil surface to minimize damage to the environment. **The three principles** of CA are: minimum tillage and soil disturbance, permanent soil cover with crop residues as live mulches and crop rotation and intercropping.

Among the various cropping systems being practiced in India, Rice-based cropping systems is considered to be the most important because of its large area coverage and contribution to overall food grain production. Transplanting is the most dominant and traditional method of establishment in irrigated lowland rice. However, due to the non-availability of irrigation water, shortage of labour during the peak period of transplanting and escalating labour costs makes the transplanting technique more expensive which invariably leads to delay in transplanting and resulting in a reduction of yield. Crop residue especially Rice-Staw containing about 1-2% of 'K' a good source of nutrient especially for intensively cropped soils. Residue incorporation is known to help *Rabi* crops in rice-based cropping systems. To address this problem, alternate methods of crop establishment need to be evolved to substitute manual transplanting methods under various Agro-ecologies. Hence, this trial was initiated to evaluate systems of rice crop establishment under different residue management during 2017 and continued in *Kharif* 2024, to realize the production potential of alternate systems of crop establishment under different residue retention.

The trial was laid out in split-plot design during *Kharif* 2024 at four locations continued at **Ghaghrahat, Karjat, Vadagaon** and **Titabar** to assess the effect of different crop establishment methods under various residue/straw management practices. Main plot treatments comprised of three different crop establishment methods (M₁: Transplanting, M₂: Wet seeding (line sowing under puddled conditions) and M₃: Aerobic rice – Dry rice cultivation). The subplot treatments comprised of two different tillage practices (S₁Conventional tillage, S₂: Minimum tillage) to be superimposed for *Rabi* crops during rabi season. The results are summarized and presented in Table 4.4.1 and the salient findings are summarized below.

Wet season 2024

Crop establishment methods influenced the grain yield significantly at all locations. At **Karjat**, results revealed that M₁: Transplanting of rice recorded significantly higher yield attributes and grain yield (4.85 t/ha) as compared to other crop establishment methods (4.48 to 4.76 t/ha). Similarly, the grain yields were higher at **Vadagaon** (5.70 t/ha) and **Titabar** (4.50 t/ha) and **Ghaghrahat** (3.48t/ha) during *Kharif* 2024. The results are in accordance to earlier two *Kharif* seasons these locations. The transplanting method showed superiority in

minimizing the weed population and weed dry biomass at 30 and 60 DAS over wet seeding at most of the locations and recorded better yields. Among the tillage management practices, conventional tillage practice gave better yields of 5.69 t/ha over minimum tillage (5.40 t/ha) at **Vadagoan**, with significant reduction in weed population and weed dry matter. Similar trend of the higher grain yield with conventional tillage (4.31 t/ha) was found over minimum tillage at **Titabar** also.

The system productivity analysis (Kharif and rabi- 2023-24) indicated the superiority of transplanting at **Karjat** (7.30 t/ha) and **Vadagaon** (7.77 t/ha). The tillage system S-1 conventional tillage found promising at **Karjat** with higher yield (7.56 t/ha).

The REY of the system productivity indicated superiority of the conventional tillage system with transplanting at both **Karjat** and **Vadagaon** with higher rice equivalent system (7.30 and 7.77 t/ha) which needs to be promoted in large scale.

Table 4.3.1: Summary of data on grain yield and ancillary characters of conservation Agriculture/system based management practices in rice and rice based cropping systems to utilise the resources and enhancing the profitability and productivity, Kharif 2024.

Main Methods	GHAGHRGHAT					KARJAT								Over all mean	Rank		
	Grain Yield (t/ha)	Straw Yield (t/ha)	Panicle/m2 (No.)	Panicle weight (g)	Test weight (g)	Grain Yield (t/ha)	Panicle/m2 (No.)	Panicle weight (g)	Test weight (g)	Days 50% flowering	Weed population at 30 DAS (No/m2)	Weed population at 60 DAS (No/m2)	Weed Dry wt at 30 DAS (g/m2)			Weed Dry wt at 60 DAS (g/m2)	Cost of cultivation (Rs/ha)
M1- Transplanting	3.48	3.66	207.0	3.30	24.11	4.85	302	3.92	27.4	93	4.20	2.46	4.08	7.13	102482	4.17	1
M2- Wet seeding (Line sowing under puddle condition)	3.04	3.13	205.7	3.32	23.22	4.76	347	4.50	27.6	90	4.76	3.05	4.26	8.62	91741	3.90	2
M3- Aerobic rice - - Dry rice cultivation	2.81	2.89	168.3	2.93	22.27	4.48	236	3.69	28.7	92	4.91	3.09	4.63	10.80	91841	3.65	3
Exp. mean	3.11	3.23	193.7	3.19	23.20	4.69	295	4.04	27.9	91	4.62	2.87	4.32	8.85	95355	3.90	
CD(0.05)	0.34	0.31	24.83	0.20	0.23	0.08	NS	NS	NS	0.39	NS	NS	NS	1.13			
CV	7.59	6.57	8.84	4.41	0.67	1.15	5.17	1.71	1.55	0.29	4.20	6.55	4.08	8.78			
Variety	NDR 2065					-											
Soil type	-					-											
pH	7.4					-											
RDF N:P:K (kg/ha)	120:60:40					100:50:50											
Aval. NPK of soil (kg/ha)	200:24:234					-											

Table 4.3.1: Contd.

VADAGAON Kharif 2024													
Main plot	Sub plots	Grain Yield (t/ha) Kh 2023	Grain Yield (t/ha) Kh 2024	Rank	Straw yield (t/ha)	Panicle/m2 (No.)	Panicle weight (g)	Test weight (g)	Days for 50% flowering	Weed population at 30 DAS (No/m2)	Weed population at 60 DAS (No/m2)	Weed Dry wt at 30 DAS (g/m2)	Weed Dry wt at 60 DAS (g/m2)
M1- Transplanting	S1	5.67	5.80	1	6.19	251	3.94	22.92	97	6.48(2.63)	7.89(2.89)	9.07	11.05
	S2	5.48	5.61	3	5.98	242	3.81	22.15	97	8.10(2.91)	9.86(3.21)	11.34	16.17
M2- Wet seeding	S1	5.54	5.67	2	6.06	245	3.86	22.41	97	8.96(3.07)	11.40(3.44)	12.99	16.52
	S2	5.23	5.35	5	5.71	231	3.64	21.12	97	11.20(3.42)	14.24(3.83)	16.69	21.22
M3- Aerobic rice	S1	5.46	5.58	4	5.96	241	3.80	22.05	97	10.26(3.27)	12.82(3.65)	15.28	19.11
	S2	5.11	5.23	6	5.59	226	3.56	20.67	97	12.82(3.64)	16.03(4.06)	19.10	23.88
Mean of main plots													
M1		5.57	5.70	1	6.09	246	3.88	22.53	97	7.29(2.77)	8.88(3.05)	10.20	13.61
M2		5.39	5.51	2	5.88	238	3.75	21.76	97	10.08(3.25)	12.82(3.64)	14.84	18.87
M3		5.29	5.41	3	5.77	234	3.68	21.36	97	11.54(3.46)	14.43(3.85)	17.19	21.49
C.D.(0.05)		0.06	0.06		0.06	2.52	0.04	0.23	NS	0.17	0.12	1.45	1.00
C.V.(%)		1.01	1.01		1.01	1.03	1.01	1.01	1.06	5.22	3.44	10.03	5.44
Mean of Sub plots													
S1-Conventional tillage		5.56	5.69	1	6.07	246	3.87	22.46	97	8.56(2.99)	10.70(3.33)	12.45	15.56
S2-Minimum tillage		5.27	5.40	2	5.76	233	3.67	21.31	97	10.71(3.32)	13.38(3.70)	15.71	20.43
C.D.(0.05)		0.06	0.06		0.07	2.71	0.04	0.25	NS	0.03	0.03	0.50	1.88
C.V.(%)		0.99	0.99		0.99	0.98	0.99	0.99	1.21	0.79	0.64	3.09	9.03
Interaction													
N at same V		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
V at same N		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Expt. Mean		5.42	5.54		5.91	239	3.77	21.89	97	3.16	3.51	14.08	17.99
Variety		Phule Samruddhi 125 days											
Soil type		-											
pH		7.6											
RDF N:P:K (kg/ha)		100:50:50											
Aval. N:P:K of soil (kg/ha)		200:18:247											

Table 4.3.1(R): Contd.

		TITABAR Rabi 2023-24											
Main plot	Sub plots	Grain Yield (t/ha) Kh 2023	Grain Yield (t/ha) Rabi 2023-24	Rank	Straw yield (t/ha)	Panicle/m2 (No.)	Panicle weight (g)	Test weight (g)	Days for 50% flowering	Weed population at 30 DAS (No/m2)	Weed population at 60 DAS (No/m2)	Weed Dry wt at 30 DAS (g/m2)	Weed Dry wt at 60 DAS (g/m2)
M1- Transplanting	S1	4.40	4.70	1	9.33	239.33	4.20	24.70	104	16.67(4.11)	27.67(5.30)	7.67	13.13
	S2	4.10	4.43	2	7.00	241.33	3.30	25.07	103	20.33(4.55)	33.67(5.84)	9.33	14.40
M2- Wet seeding	S1	4.17	4.43	2	9.50	268.67	3.70	25.20	102	21.00(4.59)	30.00(5.51)	9.57	15.20
	S2	4.00	4.03	4	8.73	259.67	3.23	24.47	103	21.00(4.62)	34.67(5.93)	8.90	16.07
M3- Aerobic rice	S1	3.37	3.80	5	8.40	286.33	3.23	24.53	104	19.00(4.38)	29.67(5.46)	8.63	13.53
	S2	3.10	3.63	6	7.17	253.00	3.20	24.17	103	13.00(3.64)	29.00(5.42)	6.27	14.77
Mean of main plots													
C.D.(0.05) C.V.(%)	M1	4.25	4.57	1	8.17	240.33	3.75	24.88	104	18.50(4.33)	30.67(5.57)	8.50	13.77
	M2	4.08	4.23	2	9.12	264.17	3.47	24.83	102	21.00(4.60)	32.33(5.72)	9.23	15.63
	M3	3.23	3.72	3	7.78	269.67	3.22	24.35	104	16.00(4.01)	29.33(5.44)	7.45	14.15
Mean of Sub plots	C.D.(0.05)	0.30	0.37		NS	12.31	NS	NS	NS	NS	NS	NS	NS
	C.V.(%)	7.47	8.66		21.83	4.65	14.10	2.32	0.67	11.74	6.38	13.87	14.66
S1-Conventional tillage S2-Minimum tillage	1	3.98	4.31	1	9.08	264.78	3.71	24.81	103	18.89(4.36)	29.11(5.43)	8.62	13.96
	2	3.73	4.03	2	7.63	251.33	3.24	24.57	103	18.11(4.27)	32.44(5.73)	8.17	15.08
C.D.(0.05) C.V.(%)	C.D.(0.05)	0.14	NS		1.17	13.37	0.44	NS	NS	NS	NS	NS	NS
	C.V.(%)	3.12	5.84		12.13	4.49	11.05	3.72	0.91	15.81	8.06	32.89	16.44
Interaction	N at same V	NS	NS		NS	NS	NS	NS	NS	NS	NS	NS	NS
	V at same N	NS	NS		NS	NS	NS	NS	NS	NS	NS	NS	NS
	Expt. Mean	3.86	4.17		8.36	258	3.48	24.69	103	4.32	5.58	8.39	14.52
Variety Soil type pH	Variety												
	Soil type												
	pH	-											
RDF N:P:K (kg/ha) Aval N:P:K of soil (kg/ha)	RDF N:P:K (kg/ha)	60:20:40											
	Aval N:P:K of soil (kg/ha)	-											

Table 4.4.1(R): Conservation Agriculture/System based management practices in rice and rice-based cropping systems (crop diversification) for higher profitability (Interdisciplinary with Entomology and Pathology) Rabi 2022-23.

Crop Establishment Methods	Sub plots	Sub-Sub plot	KARJAT															
			Kharif 2022 Rice	Grain Yield (t/ha) Rb 22-23 Systems	Kh 2023 Rice	Grain Yield (t/ha) Rb 23-24 Systems	Straw Yield (t/ha)	Days to 50% flowering	Test weight (g)	Weed population at 30DAS (no/m2)	Weed population at 60DAS (no/m2)	Weed dry weight at 30DAS (g/m2)	Weed dry weight at 60 DAS (no/m2)	Cost of cultivation (Rs./ ha)	REY (Rb 2022-23	REY (K + R)	REY (Rb 2023-24)	REY (K + R)
M1: Transplanting	S1- Conventional tillage	C1	4.68	4.08	4.85	3.81	4.27	63.00	185.0	13.24	16.09	4.71	4.00	50009	3.93	8.61	3.26	8.11
		C2		1.07		1.05	1.59	45.00	2.1	14.30	17.48	3.10	4.44	34569	2.99	7.67	2.62	7.47
		C3		2.57		2.49	2.01	52.33	29.7	7.97	11.93	3.11	4.06	47299	2.81	7.49	2.43	7.28
		C4		1.35		1.10	0.85	58.00	145.6	12.63	13.82	2.92	3.45	40651	3.54	8.22	2.56	7.41
	S2-Minimum tillage	C1		3.13		2.86	3.13	61.00	183.9	30.87	14.43	7.68	4.74	46309	3.01	7.69	2.45	7.30
		C2		0.95		0.92	1.38	45.33	1.8	23.67	16.90	5.53	5.33	33869	2.67	7.35	2.31	7.16
		C3		1.78		1.62	1.25	53.00	28.3	16.31	23.09	10.17	19.67	42999	1.95	6.63	1.58	6.43
		C4		1.12		1.02	0.76	56.67	144.7	18.00	15.74	7.24	11.36	36351	2.95	7.63	2.37	7.22
M2: Wet seeding (Line sowing under puddle condition)	S1- Conventional tillage	C1	4.34	3.99	4.76	3.72	4.17	64.67	184.9	23.56	13.71	8.02	6.12	50009	3.85	8.19	3.19	7.95
		C2		1.04		1.01	1.53	45.67	2.1	17.96	13.06	3.68	4.09	34569	2.93	7.27	2.51	7.27
		C3		2.55		2.46	1.98	52.33	29.2	17.45	18.81	10.90	12.51	47299	2.79	7.13	2.40	7.16
		C4		1.25		1.08	0.84	58.67	144.8	14.78	9.41	10.92	2.12	40651	3.28	7.62	2.53	7.29
	S2-Minimum tillage	C1		3.00		2.73	2.99	62.33	183.8	37.18	20.36	8.55	11.93	46309	2.90	7.24	2.34	7.10
		C2		0.93		0.87	1.30	43.33	1.8	25.06	21.63	4.63	6.29	33869	2.61	6.95	2.18	6.94
		C3		1.67		1.54	1.19	52.00	28.1	19.71	24.82	16.43	15.77	42999	1.83	6.17	1.50	6.26
		C4		1.11		1.00	0.75	57.67	144.5	22.51	19.30	7.45	10.11	36351	2.92	7.26	2.33	7.09
M3: Aerobic rice - Dry rice cultivation	S1- Conventional tillage	C1	3.98	3.97	4.48	3.70	4.15	63.00	184.5	25.06	16.13	6.92	7.29	50009	3.83	7.81	3.17	7.65
		C2		0.97		0.99	1.50	45.00	2.0	19.82	19.62	3.95	8.78	34569	2.73	6.71	2.47	6.95
		C3		2.50		2.45	1.97	51.67	29.0	23.26	19.82	7.77	6.38	47299	2.74	6.72	2.38	6.86
		C4		1.20		1.07	0.82	56.00	144.5	27.52	15.03	5.10	10.17	40651	3.14	7.12	2.49	6.97
	S2-Minimum tillage	C1		2.98		2.71	2.97	63.00	183.6	29.84	22.76	13.12	11.75	46309	2.87	6.85	2.32	6.80
		C2		0.92		0.86	1.27	43.00	1.8	19.62	27.59	7.55	16.73	33869	2.59	6.57	2.14	6.62
		C3		1.59		1.53	1.18	51.33	27.7	25.44	26.66	20.32	13.13	42999	1.74	5.72	1.49	5.97
		C4		1.02		0.98	0.74	58.00	144.3	18.77	19.66	8.28	12.16	36351	2.68	6.66	2.29	6.77

Table 4.4.1(R): Contd.

Crop Establishment Methods	Sub plots	Sub-Sub plot	KARJAT														
			Kharif 2022 Rice	Grain Yield (t/ha) Rb 22-23 Systems	Kh 2023 Rice	Grain Yield (t/ha) Rb 23-24 Systems	Straw Yield (t/ha)	Days to 50% flowering	Test weight (g)	Weed population at 30DAS (no/m2)	Weed population at 60DAS (no/m2)	Weed dry weight at 30DAS (g/m2)	Weed dry weight at 60 DAS (no/m2)	Cost of cultivation (Rs./ha)	REY (K + R)	REY (Rb 2023-24)	REY (K + R)
Mean of methods			4.68	2.00	4.85	1.86	1.90	54.3	90.1	17.12	16.18	5.56	7.13	41507	2.98	7.66	7.30
	M1		4.34	1.94	4.76	1.80	1.84	54.6	89.9	22.28	17.64	8.82	8.62	41507	2.89	7.23	7.13
	M2		3.98	1.89	4.48	1.79	1.83	53.9	89.7	23.67	20.91	9.13	10.80	41507	2.79	6.77	6.83
	M3																
C.D. SE(m) Mean of sub plot			NS	NS	N/A	N/A	N/A	0.5	N/A	4.21	3.26	2.70	1.75				
	S1-Conventional tillage		0.05	0.05	0.04	0.04	0.04	0.1	0.3	1.08	0.84	0.69	0.45				
	S2-Minimum tillage		2.21	2.08	2.08	2.08	2.14	54.6	90.3	18.13	15.41	5.92	6.12	43132	3.21	7.55	7.37
			1.68	1.55	1.55	1.55	1.58	53.9	89.5	23.92	21.08	9.75	11.58	39882	2.56	6.89	6.81
C.D. SE(m) Mean of sub sub plot			0.16	0.16	0.20	0.20	0.22	0.6	0.7	3.52	2.19	1.85	2.81				
	S1-Maize		0.05	0.05	0.06	0.06	0.06	0.2	0.2	1.02	0.64	0.54	0.81				
	S2-Mustard		3.53	3.26	3.26	3.26	3.61	62.8	184.3	26.62	17.25	8.17	7.64	48159	3.40	7.73	7.49
	S3-Wheat		0.98	0.95	0.95	0.95	1.43	44.6	1.9	20.07	19.38	4.74	7.61	34219	2.75	7.09	7.07
C.D. SE(m) Interaction			2.11	2.02	2.02	2.02	1.60	52.1	28.7	18.35	20.85	11.45	11.92	45149	2.31	6.64	6.66
	S4-Chickpea		1.17	1.04	1.04	1.04	0.79	57.5	144.7	19.04	15.49	6.99	8.23	38501	3.09	7.42	7.13
	S5-Interaction		0.17	0.16	0.16	0.16	0.17	0.8	1.4	5.70	3.42	3.60	3.34				
	S6-Interaction A X B		0.06	0.06	0.06	0.06	0.06	0.3	0.5	1.99	1.19	1.25	1.17				
Interaction A X B			NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS				
	Interaction A X C		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS				
	Interaction A X B X C		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS				
			NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS				

Table 4.4.1(R): Contd.

Crop Establishment Methods	Sub plots	Sub-Sub plot	VADAGAON							Over all mean	Rank
			Kharif 2022	Grain Yield (t/ha) Rabi 22-23 Systems	REY	REY (K + R)	Kharif 2023	Grain Yield (t/ha) Rabi 22-23 Systems	REY	REY (K + R)	
M1: Transplanting	S1- Conventional tillage	C1	5.54	1.03	2.85	8.39	5.67	1.05	2.57	8.24	1
		C2		0.97	2.76	8.30		0.99	2.72	8.39	19
		C3		0.62	1.73	7.27		0.63	1.57	7.24	7
		C4		1.74	1.91	7.45		1.77	1.72	7.39	11
	S2-Minimum tillage	C1	5.33	1.09	2.99	8.32	5.48	1.11	2.70	8.18	4
		C2		1.03	2.91	8.24		1.04	2.86	8.34	20
		C3		0.65	1.83	7.16		0.66	1.65	7.13	16
		C4		1.83	2.01	7.34		1.86	1.81	7.29	10
M2: Wet seeding (Line sowing under puddle condition)	S1- Conventional tillage	C1	5.38	0.96	2.65	8.03	5.54	0.98	2.39	7.93	2
		C2		0.91	2.57	7.95		0.92	2.53	8.07	21
		C3		0.57	1.61	6.99		0.58	1.46	7.00	8
		C4		1.62	1.77	7.15		1.64	1.60	7.14	13
	S2-Minimum tillage	C1	5.07	1.01	2.79	7.86	5.23	1.03	2.51	7.74	5
		C2		0.95	2.70	7.77		0.97	2.66	7.89	23
		C3		0.60	1.70	6.77		0.61	1.53	6.76	17
		C4		1.70	1.87	6.94		1.73	1.68	6.91	12
M3: Aerobic rice - Dry rice cultivation	S1- Conventional tillage	C1	5.27	0.91	2.50	7.77	5.46	0.92	2.26	7.72	3
		C2		0.86	2.43	7.70		0.87	2.39	7.85	22
		C3		0.54	1.53	6.80		0.55	1.38	6.84	9
		C4		1.53	1.68	6.95		1.55	1.51	6.97	14
	S2-Minimum tillage	C1	4.98	0.96	2.64	7.62	5.11	0.97	2.38	7.49	6
		C2		0.90	2.56	7.54		0.92	2.52	7.63	24
		C3		0.57	1.61	6.59		0.58	1.45	6.56	18
		C4		1.61	1.77	6.75		1.63	1.59	6.70	15

Table 4.4.1(R): Contd.

Crop Establishment Methods	Sub plots	Sub-Sub plot	VADAGAON								Over all mean	Rank
			Kharif 2022	Grain Yield (t/ha) Rabi 22-23	REY	REY (K + R)	Kharif 2022	Grain Yield (t/ha) Rabi 22-23	REY	REY (K + R)		
Mean of methods M1 M2 M3 C.D. SE(m) Mean of sub plot S1-Conventional tillage S2-Minimum tillage C.D. SE(m) Mean of sub ub plot C1-Gram C2-Lentil C3-Mustard C4-Wheat C.D. SE(m) Interaction Interaction A X B Interaction A X C Interaction A X B X C			5.44 5.23 5.13	1.12 1.04 0.99	2.37 2.21 2.09	7.81 7.43 7.21	5.57 5.39 5.29	1.14 1.06 1.00	2.20 2.04 1.93	7.77 7.43 7.22	1.50 1.43 1.39	1 2 3
				0.008 0.002				0.009 0.002				
			5.40 5.13	1.02 1.08	2.17 2.28	7.56 7.41	5.56 5.27	1.04 1.09	2.01 2.11	7.56 7.39	1.56 1.32	1 2
				0.002 0.001				0.003 0.001				
				0.99 0.94 0.59 1.67	2.73 2.65 1.67 1.83	8.00 7.92 6.93 7.09		1.01 0.95 0.60 1.70	2.47 2.61 1.51 1.65	7.88 8.03 6.92 7.07	2.13 0.95 1.31 1.37	1 4 3 2
				0.05 0.02				0.04 0.02				
				NS NS NS				NS NS NS				
Gram MSP												
Lentil MSP												
Mustard MSP												
Wheat MSP												
Paddy MSP												

4.3.2 Assessing the performance and yielding ability of Sorghum hybrids in Rice fallows

In rice-fallows, sorghum cultivation was found to be high yield potential with labour and inputs intensive cropping system. It is found that use of high inputs Viz., pesticides, weedicides, fertilizers, labourers, and skillful management of all the innovative practices including irrigations, were resulted into the high yield. It is implied that the farmers were highly profit oriented and obtained high returns from the sorghum cultivation. Their profit margin could be further increased by mechanization and introducing standard package of practices. Keeping the yield benefits in view, the farmers innovative knowledge should be validated on their fields to develop standardize location-specific production technologies so that the productivity and soil health will sustain in long run. These innovative farmers would be able to educate and transfer the viable technologies more effectively among the other sorghum growers in rice-fallows as change agent. Further very efficient genotypes had been developed which are very much suitable for rice fallows. There is need to test these cultivars in rice fallows of different locations to gain the benefit of the Rice sorghum cropping system.

A trial was laid out with four replications during *Kharif* 2024 at **Jagdarpur, Karjat** and **Mandya** to assess the effect of different crop establishment methods (T₁: Transplanting and T₂: Wet Direct Seeding (line sowing under puddled conditions) in *Kharif* 2023 and in *Rabi* 2023-24, promising Sorghum hybrids CSH 30, CSH 41 and CSH 48 in *Rabi* 2023-24. The results are summarized after statistical analysis and presented in Table 4.3.2.

In *Kharif* season 2023, among the crop establishment methods at **Karaikal** and **Jagdarpur**, transplanting system was superior over others and at Mandya, wet DSR system was superior. In *Rabi* season 2023-24, at **Karaikal** and **Jagdarpur**, the previous season dry DSR system was superior over wet DSR and transplanted system in recording higher Sorghum grain yields. The yield attributes and straw yield supported the trend in performance of establishment methods. Among the Sorghum hybrids evaluated in Rice-Sorghum system, CSH 30 at **Jagdarpur**, CSH 48 at **Karaikal** were promising with significantly higher yield, whereas at **Mandya**, no significant difference among test hybrids was reported. The rice equivalent yield (REY) was higher with Dry DSR followed by wet DSR and lowest with transplanted system.

The Dry DSR system was found promising for rice-sorghum system and sorghum hybrids CSH 30, CSH 41 and CSH 48 shown comparable performance.

Table- 4.3.2: Assessing the performance and yielding ability of kharif sorghum hybrids in Rice-Sorghum sequence cropping system, Kharif-2024.

Treatments	JAGDALPUR							
	Grain Yield (t/ha)	Straw Yield (t/ha)	Panicle No./m ²	Panicle length(cm)	Panicle wt (g)	Test wt (g)	filled grains/ panicle	Days for 50% flowering
T1	5.90	7.71	215	25.4	2.92	28.8	143	101
T2	5.58	6.95	219	25.6	2.76	28.4	137	100
T3	5.42	6.77	221	26.4	2.88	28.6	140	100
Expt. Mean	5.63	7.14	218	25.8	2.85	28.6	140	100
CD(0.05)	0.65	1.64	31.97	1.1	0.25	1.36	5.92	1.54
CV(%)	7.85	15.76	10.04	2.92	6.04	3.26	2.91	1.05
	NS	NS	NS	NS	NS	NS	NS	NS
Variety	-							
Soil type	-							
pH	8.26							
Available NPK kg/ha	-							
Fertilizer applied kgl/ha	120:60:40							

T1: Transplanting

T2: Wet DSR

T3: Dry DSR

Table 4.3.2(R): Assessing the performance and yielding ability of kharif sorghum hybrids in Rice-Sorghum sequence cropping system, Rabi 2023-24.

Main plot: Fertilizer treatments	Sub plot: Cultivars	Rice Grain Yield (t/ha)Kh - 2023	JAGDALPUR (Sorghum Yield data of Rabi 2023-24)										
			Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant height (cm)	Panicle No./m ²	Panicle length (cm)	Panicle wt (g)	Test wt (g)	No of grains/panicle	Days to 50% flowering	REY
M1: Transplanting	V1	5.32	2.88	6	5.67	177	20	28.57	40.80	21.37	1716	71	4.20
	V2	5.32	2.51	9	5.04	160	22	29.24	41.20	20.09	1929	74	3.66
	V3	5.32	2.96	5	5.70	148	20	30.66	42.12	20.03	1644	73	4.31
	V4	-	-	-	-	-	-	-	-	-	-	-	-
	V5	-	-	-	-	-	-	-	-	-	-	-	-
M2: Wet DSR	V1	4.93	3.42	3	6.59	169	22	28.66	39.60	20.73	2014	71	4.98
	V2	4.93	2.68	8	5.14	156	23	29.43	40.60	20.13	2000	74	3.90
	V3	4.93	3.19	4	6.34	144	22	30.17	39.00	19.93	1516	73	4.65
	V4	-	-	-	-	-	-	-	-	-	-	-	-
	V5	-	-	-	-	-	-	-	-	-	-	-	-
M2: Dry DSR	V1	5.26	3.50	1	6.64	187	23	28.28	39.40	21.83	1858	71	5.10
	V2	5.26	2.81	7	5.50	178	24	29.36	39.20	20.34	2083	74	4.09
	V3	5.26	3.49	2	6.59	167	23	30.44	40.40	20.26	1562	73	5.08
	V4	-	-	-	-	-	-	-	-	-	-	-	-
	V5	-	-	-	-	-	-	-	-	-	-	-	-
Mean of Factor-1													
M1 M2 M3		5.32	2.78	3	5.47	162	21	29.49	41.37	20.50	1763	73	4.05
		4.93	3.10	2	6.02	156	22	29.42	39.73	20.26	1843	72	4.52
		5.26	3.27	1	6.24	177	23	29.36	39.67	20.81	1834	73	4.76
CD(0.05)			0.28		0.58	3.84	2	NS	NS	NS	NS	NS	
CV(%)			10.73		11.59	2.76	8	7.16	7.32	4.08	13.92	1.99	

Table 4.3.2(R): Contd.

Main plot: Fertilizer treatments	Sub plot: Cultivars	Rice Grain Yield (t/ha)Kh - 2023	JAGDALPUR (Sorghum Yield data of Rabi 2023-24)										
			Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant height (cm)	Panicle No./m ²	Panicle length (cm)	Panicle wt (g)	Test wt (g)	No of grains/panicle	Days to 50% flowering	REY
Mean of Factor-2	V1	5.17	3.27	1	6.30	177	22	28.50	39.93	21.31	1863	71	4.76
	V2	5.17	2.67	3	5.23	165	23	29.34	40.33	20.19	2004	74	3.89
	V3	5.17	3.21	2	6.21	153	22	30.42	40.51	20.08	1574	73	4.68
	V4	-	-	-	-	-	-	-	-	-	-	-	-
	V5	-	-	-	-	-	-	-	-	-	-	-	-
CD(0.05) CV(%) Interaction M and T T and M Experimental Mean			0.27 11.66		0.57 12.74	3.52 2.82	NS 10	1.33 5.98	NS 8.80	NS 7.93	177 12.92	1 2.21	
			NS		NS	NS	NS	NS	NS	NS	NS	NS	
			NS		NS	NS	NS	NS	NS	NS	NS	NS	
			3.05		5.91	165	22	29.42	40.26	20.52	1814	73	4.44

REY : Rice Equivalent Yield

Paddy MSP for Rb 2023-24 - Rs.2183/q
Sorghum MSP for Rb 2023-24 - Rs.3180/q
V1 CSH 30
V2 CSH 41
V3 CSH 48
V4 -
V5 -

Table 4.3.2(R): Contd.

Main plot: Fertilizer treatments	Sub plot: Cultivars	Rice Grain Yield (t/ha)Kh - 2023	KARIAKAL (Sorghum Yield data of Rabi 2023-24)									
			Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant height (cm)	Panicle No./m ²	Panicle length (cm)	Panicle wt (g)	Testwt (g)	Days to 50% flowering	REY
M1: Transplanting	V1	5.59	1.43	14	4.05	137	22	18.86	45.67	19.91	65	2.08
	V2	5.59	1.34	15	4.86	142	23	18.86	44.00	22.80	61	1.95
	V3	5.59	1.51	11	4.58	139	20	23.89	52.33	17.90	60	2.20
	V4	5.59	1.55	10	5.13	143	19	24.51	53.00	21.89	66	2.26
	V5	5.59	1.76	5	5.61	163	27	24.60	51.67	26.61	67	2.56
M2: Wet DSR	V1	4.91	1.44	13	4.27	132	20	22.92	43.33	20.10	64	2.10
	V2	4.91	1.65	8	5.56	130	19	22.23	45.33	21.68	64	2.40
	V3	4.91	1.48	12	5.70	150	21	24.10	51.17	22.46	62	2.16
	V4	4.91	1.65	8	5.46	151	21	24.27	46.50	23.78	65	2.40
	V5	4.91	1.76	5	5.56	152	22	25.45	55.67	24.61	65	2.56
M2: Dry DSR	V1	4.68	1.81	4	5.48	136	23	23.16	52.50	20.01	64	2.64
	V2	4.68	1.73	7	5.64	153	25	24.42	45.33	24.39	65	2.52
	V3	4.68	1.82	3	6.22	152	25	25.80	56.62	21.71	62	2.65
	V4	4.68	1.83	2	6.02	149	24	23.57	56.67	24.34	64	2.67
	V5	4.68	1.87	1	5.67	159	26	25.84	58.83	26.24	62	2.72
Mean of Factor-1												
	M1	5.59	1.52	3	4.85	145	22	22.14	49.33	21.82	64	2.21
	M2	4.91	1.60	2	5.31	143	21	23.79	48.40	22.53	64	2.33
	M3	4.68	1.81	1	5.81	150	24	24.56	53.99	23.34	64	2.64
CD(0.05)			0.08		0.46	2.20	1.09	1.08	1.89	NS	NS	
CV(%)			7.86		13.20	2.33	7.48	7.11	5.76	7.76	3.74	

Table 4.3.2(R): Contd.

Main plot: Fertilizer treatments	Sub plot: Cultivars	Rice Grain Yield (t/ha)Kh - 2023	KARIAKAL (Sorghum Yield data of Rabi 2023-24)									
			Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant height (cm)	Panicle No./m ²	Panicle length (cm)	Panicle wt (g)	Test wt (g)	Days to 50% flowering	REY
Mean of Factor-2	V1	5.06	1.56	5	4.60	135	22	21.65	47.17	20.01	65	2.27
	V2	5.06	1.57	4	5.35	141	22	21.84	44.89	22.95	64	2.29
	V3	5.06	1.60	3	5.50	147	22	24.60	53.37	20.69	61	2.33
	V4	5.06	1.68	2	5.54	147	21	24.12	52.06	23.34	65	2.45
	V5	5.06	1.79	1	5.61	158	25	25.30	55.39	25.82	65	2.61
	CD(0.05)		0.11		0.69	7.28	2.01	2.04	3.84	1.98	NS	
	CV(%)		6.68		13.28	5.13	9.19	8.91	7.79	9.04	5.79	
	Interaction											
	M and T		NS		NS	NS	NS	NS	NS	NS	NS	
	T and M		NS		NS	NS	NS	NS	NS	NS	NS	
Experimental Mean			1.64		5.32	146	22	23.50	50.57	22.56	64	6.47

REY : Rice Equivalent Yield

Paddy MSP for Rb 2023-24 - Rs.2183/q
Sorghum MSP for Rb 2023-24 - Rs.3180/q
V1 CSH 30
V2 CSH 41
V3 CSH 48
V4 CO 32
V5 PAC 501

Table 4.3.2(R): Contd.

Main plot: Fertilizer treatments	Sub plot: Cultivars	Rice Grain Yield (t/ha)Kh - 2023	MANDYA (Sorghum Yield data of Rabi 2023-24)								
			Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant height (cm)	Panicle length (cm)	Panicle wt (g)	Test wt (g)	No of grains/panicle	REY
M1: Transplanting	V1	5.74	5.04	6	7.74	153	27.34	41.13	32.17	985	7.34
	V2	5.74	5.94	4	9.34	146	29.43	48.69	32.80	1136	8.65
	V3	5.74	7.07	3	11.30	143	29.42	54.84	31.40	1407	10.30
	V4	-	-	-	-	-	-	-	-	-	-
	V5	-	-	-	-	-	-	-	-	-	-
M2: Wet DSR	V1	5.89	7.30	1	11.34	152	30.96	57.01	32.83	1404	10.63
	V2	5.89	5.77	5	9.62	152	27.81	44.39	33.73	1064	8.41
	V3	5.89	7.13	2	11.50	141	30.74	59.46	33.23	1393	10.39
	V4	-	-	-	-	-	-	-	-	-	-
	V5	-	-	-	-	-	-	-	-	-	-
M2: Dry DSR	V1	-	-	-	-	-	-	-	-	-	-
	V2	-	-	-	-	-	-	-	-	-	-
	V3	-	-	-	-	-	-	-	-	-	-
	V4	-	-	-	-	-	-	-	-	-	-
	V5	-	-	-	-	-	-	-	-	-	-
Mean of Factor-1											
M1		5.74	6.02	2	9.46	147	28.73	48.22	32.12	1176	8.77
M2		5.89	6.74	1	10.82	148	29.84	53.62	33.26	1287	9.82
M3		-	-	-	-	-	-	-	-	-	-
CD(0.05)			NS		NS	NS	NS	NS	NS	NS	
CV(%)			14.42		16.69	7.20	5.03	19.08	4.78	21.42	

Table 4.3.2(R): Contd.

Main plot: Fertilizer treatments	Sub plot: Cultivars	Rice Grain Yield (t/ha)Kh - 2023	MANDYA (Sorghum Yield data of Rabi 2023-24)								
			Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant height (cm)	Panicle length (cm)	Panicle wt (g)	Test wt (g)	No of grains/panicle	REY
Mean of Factor-2	V1	5.82	6.17	2	9.54	152	29.15	49.07	32.50	1194	8.99
	V2	5.82	5.85	3	9.48	149	28.62	46.54	33.27	1100	8.52
	V3	5.82	7.10	1	11.40	142	30.08	57.15	32.31	1400	10.34
	V4	-	-	-	-	-	-	-	-	-	-
	V5	-	-	-	-	-	-	-	-	-	-
	CD(0.05)		NS		1.49	6.28	NS	NS	NS	NS	
	CV(%)		13.45		11.05	3.19	5.86	14.79	7.62	17.36	
	Interaction										
	M and T		NS		NS	NS	NS	NS	NS	NS	
	T and M		NS		NS	NS	NS	NS	NS	NS	
Experimental Mean			6.38		10.14	148	29.28	50.92	32.69	1231	9.29

REY : Rice Equivalent Yield

Paddy MSP for Rb 2023-24 - Rs.2183/q
Sorghum MSP for Rb 2023-24 - Rs.3180/q
V1 CSH 30
V2 CSH 41
V3 CSH 48
V4 -
V5 -

Table 4.3.2(R): Contd.

Main plot: Fertilizer treatments	Sub plot: Cultivars	Rice Grain Yield (t/ha)Kh - 2023	PUDUCHERRY (Sorghum Yield data of Rabi 2023-24)								Mean REY (4 Locations)	Rank
			Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant height (cm)	Panicle no/m2	Panicle length (cm)	Panicle wt (g)	Test wt (g)	REY	
M1: Transplanting	V1	5.54	2.53	5	6.95	180.99	23.19	27.45	52.55	21.11	3.68	6
	V2	5.54	2.72	3	7.46	181.17	26.35	29.94	55.60	23.71	3.96	5
	V3	5.54	2.92	1	8.02	176.81	29.50	32.41	61.88	22.42	4.25	3
	V4	-	-	-	-	-	-	-	-	-	-	15
	V5	-	-	-	-	-	-	-	-	-	-	12
M2: Wet DSR	V1	5.09	2.48	6	6.83	170.00	20.11	25.06	47.38	20.88	3.62	2
	V2	5.09	2.66	4	7.32	170.85	23.45	27.23	51.42	23.37	3.88	4
	V3	5.09	2.90	2	7.97	162.80	27.98	31.66	60.22	21.56	4.22	1
	V4	-	-	-	-	-	-	-	-	-	-	14
	V5	-	-	-	-	-	-	-	-	-	-	12
M2: Dry DSR	V1	-	-	-	-	-	-	-	-	-	-	7
	V2	-	-	-	-	-	-	-	-	-	-	9
	V3	-	-	-	-	-	-	-	-	-	-	7
	V4	-	-	-	-	-	-	-	-	-	-	11
	V5	-	-	-	-	-	-	-	-	-	-	10
Mean of Factor-1	M1	5.54	2.72	1	7.48	179.66	26.35	29.93	56.68	22.41	3.96	2
	M2	5.09	2.68	2	7.37	167.88	23.85	27.98	53.01	21.94	3.91	1
	M3	-	-	-	-	-	-	-	-	-	-	3
	CD(0.05)		NS		NS	1.25	2.48	1.37	1.09	0.08	-	
	CV(%)		1.51		1.51	0.35	4.87	2.34	0.98	0.17	-	

Table 4.3.2(R): Contd.

Main plot: Fertilizer treatments	Sub plot: Cultivars	Rice Grain Yield (t/ha)Kh - 2023	PUDUCHERRY (Sorghum Yield data of Rabi 2023-24)								Mean REY (4 Locations)	Rank	
			Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant height (cm)	Panicle no/m ²	Panicle length (cm)	Panicle wt (g)	Test wt (g)			REY
Mean of Factor-2	V1	5.32	2.50	3	6.89	175.49	21.65	26.25	49.96	21.00	3.65	4.92	2
	V2	5.32	2.69	2	7.39	176.01	24.90	28.58	53.51	23.54	3.92	4.65	3
	V3	5.32	2.91	1	7.99	169.81	28.74	32.04	61.05	21.99	4.23	5.40	1
	V4	-	-	-	-	-	-	-	-	-	-	2.45	5
	V5	-	-	-	-	-	-	-	-	-	-	2.61	4
CD(0.05) CV(%) Interaction M and T T and M Experimental Mean			0.06		0.15	NS	1.35	0.97	0.89	0.63			
			1.56		1.56	2.71	4.04	2.52	1.22	2.12			
			NS		NS	NS	NS	NS	NS	NS			
			NS		NS	NS	NS	NS	NS	NS			
			6.38		7.42	173.77	25.10	28.96	54.84	22.17	9.29		

REY : Rice Equivalent Yield

Paddy MSP for Rb 2023-24 - Rs.2183/q
Sorghum MSP for Rb 2023-24 - Rs.3180/q
V1 CSH 30
V2 CSH 41
V3 CSH 48
V4 -
V5 -

4.3.3. Long term trial on weed dynamics in rice under different establishment methods

Weeds are endemic in crops and a constant problem in crop production because of their dynamic nature. Despite modern control practices aimed at weed elimination, weeds continue to be a ubiquitous and recurrent threat for crop production due to its ability to shift in response to management practices and environmental conditions. Further, continuous use of selective herbicides in rice over the long term period may cause a shift in weed flora, from annuals to perennials, which are difficult to control. The Long term trial was initiated with the objective of assessing the weed dynamics in different establishment methods, and was conducted in *kharif* season 2024 at 16 locations viz., **Aduthurai, Chatha, Chinsurah, Chiplima, Gangavathi, Ghaghraghat, Jagdalpur, Malan, Moncompu, Nagina, Nawagam, Pantnagar, Pattambi, ARI-Rajendranagar, Titabar and Varanasi**, *rabi* season 2023-24 at 2 locations viz., **Karaikal and Pattambi** in replicated split plot design. The treatments consisted of three main plots M1 – Mechanised planting or hand transplanting, M2 – Puddled direct seeding, M3 – Unpuddled dry direct seeding and three sub plots S1 – Weedy check, S2 – Mechanical weeding using weeder and S3 – Chemical weed control *(pre and post-emergence Herbicide application as per the recommendation of respective University). The individual Genus and Species wise, group wise, total weed population, weed dry biomass at two critical crop growth stages of active tillering and panicle initiation; crop dry-matter production, yield attributes, grain and straw yield recorded by the test locations after statistical analysis are summarised and presented in **Tables 4.3.3.**

Weed Flora of different Test Locations:

Table: The location wise weeds at critical crop growth stages in rice systems

Centre	Groups	Active Tillering Stage	Panicle Initiation Stage
		Species	Species
Aduthurai	Grasses	<i>Echinochloa colona</i> , <i>Cynodon dactylon</i> , <i>Leptochloa chinensis</i> , <i>Echinochloa crusgalli</i> , <i>Panicum repens</i>	-
Chatha		<i>Echinochloa</i> Spp, <i>Dactylactenium aegyptium</i> , <i>Cynodon dactylon</i> , <i>Eleusine indica</i>	<i>Echinochloa</i> Spp, <i>Dactylactenium aegyptium</i> , <i>Cynodon dactylon</i> , <i>Eleusine indica</i>
Chiplima		<i>Echinochloa crusgalli</i>	-
Chinsurah		<i>Cynodon dactylon</i> , <i>Echinochloa colona</i> , <i>Echinochloa crusgalli</i> ,	<i>Echinochloa colona</i> , <i>Leptochloa chinensis</i> , <i>Echinochloa crusgalli</i> , <i>Dactylactenium aegyptium</i> , <i>Eleusine indica</i>
Jagdalpur		<i>Echinochloa</i> Spp, <i>Cynodon dactylon</i> , <i>Ischaemum rugosum</i> <i>Paspalum Dilatatum</i>	<i>Echinochloa</i> Spp, <i>Cynodon dactylon</i> , <i>Paspalum Dilatatum</i> , <i>Ischaemum rugosum</i>
Gangavathi		<i>Echinochloa crusgalli</i> , <i>Oryza. sativa f.sp. spontanea</i> , <i>Digiteria longifolia</i>	<i>Echinochloa crusgalli</i> , <i>Oryza. sativa f.sp. spontanea</i> , <i>Digiteria longifolia</i>
Karaikal		<i>Echinochloa colona</i>	<i>Echinochloa colona</i> , <i>Leptochloa chinensis</i>
Malan		<i>Echinochloa colona</i> , <i>Echinochloa crusgalli</i> , <i>Panicum repens</i>	<i>Echinochloa colona</i> , <i>Echinochloa crusgalli</i> , <i>Panicum repens</i>

Moncompu		<i>Isahcne miliacea, Echinochloa stagnina, Oryza. sativa f.sp. spontanea</i>	<i>Isahcne miliacea, Echinochloa stagnina</i>
Nawagam		<i>Echinochloa colona, Cynodon dactylon, Digitaria sanguinalis, Chloris barbata, Echinochloa crusgalli</i>	<i>Echinochloa colona, Cynodon dactylon, Chloris barbata, Echinochloa crusgalli, Digitaria sanguinalis</i>
Pantnagar		<i>Echinochloa colona</i>	<i>Echinochloa colona, Eleusine indica</i>
Pattambi		<i>Isahcne miliacea, Oplismenus burmannii</i>	<i>Isahcne miliacea, Oplismenus burmannii</i>
Titabar		<i>Echinochloa crusgalli, Leersia hexandra</i>	<i>Echinochloa crusgalli, Leersia hexandra</i>
Varanasi		<i>Cynodon dactylon, Echinochloa crusgalli</i>	<i>Cynodon dactylon, Echinochloa colona, Echinochloa crusgalli</i>
Aduthurai	Sedges	<i>Cyperus rotundus, Cyperus difformis, Fimbristylis miliacea</i>	-
Chatha		<i>Cyperus spp</i>	<i>Cyperus spp</i>
Chiplima		<i>Cyperus esculentus, Fimbristylis teragona, Fimbristylis miliacea</i>	-
Chinsurah		<i>Cyperus difformis, Cyperus iria, Cyperus rotundus, Fimbristylis miliacea</i>	<i>Cyperus difformis, Cyperus iria, Cyperus rotundus, Fimbristylis miliacea</i>
Jagdapur		<i>Cyperus rotundus, Cyperus iria, Cyperus difformis</i>	<i>Cyperus rotundus, Cyperus iria, Cyperus difformis</i>
Gangavathi		<i>Cyperus rotundus, Cyperus difformis</i>	<i>Cyperus rotundus</i>
Karaikal		<i>Cyperus rotundus</i>	<i>Cyperus rotundus</i>
Malan		<i>Cyperus rotundus, Cyperus difformis, Cyperus iria</i>	<i>Cyperus rotundus, Cyperus difformis, Cyperus iria</i>
Moncompu		<i>Cyperus difformis</i>	<i>Cyperus difformis,</i>
Nawagam		<i>Cyperus iria, Cyperus esculentus, Cyperus rotundus</i>	<i>Cyperus iria, Cyperus esculentus, Cyperus rotundus</i>
Pantnagar		<i>Cyperus iria, Cyperus difformis</i>	<i>Cyperus iria, Cyperus difformis</i>
Pattambi		<i>Cyperus rotundus, Fimbristylis miliacea</i>	<i>Cyperus rotundus, Fimbristylis miliacea</i>
Titabar		<i>Cyperus iria</i>	<i>Cyperus iria</i>
Varanasi		<i>Cyperus rotundus, Cyperus difformis</i>	<i>Cyperus rotundus, Cyperus difformis</i>
Aduthurai	BLW	<i>Eclipta alba, Ammania baccifera, Euphorbia prostrata, Marsilea quadrifolia, Bergia capensis</i>	-
Chatha		<i>Physalis minima, Solanum nigrum,</i>	<i>Physalis minima, Solanum nigrum</i>
Chiplima		<i>Ludwigia parviflora, Marsilea quadrifolia, Monochoria vaginalis, Sphenoclea zeylanica</i>	-
Chinsurah		<i>Eclipta alba, Alternanthera sessilis, physalis minima, Trianthema portulacastrum</i>	<i>Eclipta alba, Alternanthera sessilis, physalis minima, Ludwigia octovalvis, Monochoria vaginalis, Sphenoclea zeylanica, Trianthema portulacastrum</i>

Jagdarpur	<i>Ludwigia parviflora</i> , <i>Ageratum conyzoides</i>	<i>Ludwigia parviflora</i> , <i>Ageratum conyzoides</i>
Gangavathi	<i>Cyanotis cristata</i>	<i>Cyanotis cristata</i>
Karaikal	<i>Hydrolea zeylanica</i> , <i>Bergia ammoides</i>	<i>Hydrolea zeylanica</i> , <i>Bergia ammoides</i>
Malan	<i>Monochoria vaginalis</i> , <i>Alternanthera</i> spp, <i>Eclipta alba</i>	<i>Monochoria vaginalis</i> , <i>Alternanthera</i> spp, <i>Eclipta alba</i>
Moncompu	<i>Monochoria vaginalis</i> , <i>Ludwigia hyssopifolia</i>	<i>Monochoria vaginalis</i> , <i>Ludwigia hyssopifolia</i>
Nawagam	<i>Mollugo verticillate</i> , <i>Ipomoea aquatic</i> , <i>Eclipta prostrata</i> , <i>Solanum retroflexum</i>	<i>Mollugo verticillate</i> , <i>Ipomoea aquatic</i> , <i>Eclipta prostrata</i> , <i>Solanum retroflexum</i>
Pantnagar	<i>Alternanthera sessilis</i> , <i>Commelina diffusa</i>	<i>Alternanthera sessilis</i> , <i>Commelina diffusa</i>
Pattambi	<i>Monochoria vaginalis</i> , <i>Marsilea quadrifolia</i> , <i>Sphenoclea zeylanica</i>	<i>Monochoria vaginalis</i> , <i>Marsilea quadrifolia</i> , <i>Sphenoclea zeylanica</i>
Titabar	<i>Alternanthera</i> spp	<i>Alternanthera</i> spp
Varanasi	<i>Phyllanthus niruri</i> , <i>Parthenium hysterophorus</i> , <i>Euphorbia hirta</i>	<i>Phyllanthus niruri</i> , <i>Solanum nigrum</i> , <i>Eclipta prostrata</i>

Weed Population (No./m²)

The Genus and Species wise weed population was reported by 12 locations viz., **Aduthurai, Chatha, Chiplima, Gangavathi, Jagdarpur, Malan, Moncompu, Nawagam, Pantnagar, Pattambi Titabar and Varanasi** (Table 4.3.3). The puddled direct seeding system recorded higher weed population (individual, group wise and total) compared to Mechanical transplanting; and un-puddled direct seeding system recorded higher weed population (individual species wise, group wise and total) compared to puddled DSR system. The weed population was significantly low with chemical weed control treatments. Mechanical weeding using weeder recorded significantly lower population than weedy check. Weed population showed progressive increase from active tillering stage to panicle initiation stage. The data on relative dominance of group wise weeds at active tillering stage and panicle initiation stage was worked out based on weed population.

At Active Tillering stage, the common and prevalent group wise weed population was in the order of Grasses > Sedges > Broad Leaf Weeds (BLW) at four locations (**ARI-Rajendranagar, Nagina, Pantnagar, Pattambi**); whereas Grasses > BLW > Sedges at five locations (**Aduthurai, Chinsurah, Jagdarpur, Malan, Moncompu**); Sedges > Grasses > BLW at three locations (**Chatha, Gangavathi and Varanasi**); BLW > Sedges > Grasses at **Chiplima**; Sedges > BLW > Grasses at **Nawagam**, indicating the increase in BLW and Sedge groups population and shift within the Grass group. At Panicle Initiation stage, dominance of Grasses > Sedges > Broad Leaf Weeds (BLW) at seven locations (**Chatha, Jagdarpur, Pantnagar, Pattambi, ARI-Rajendranagar, Titabar, Varanasi**); Grasses > BLW > Sedges at **Malan, Moncompu and Nawagam**; Sedges > Grasses > BLW at **Gangavathi**;

Sedges>BLW> Grasses at **Chinsurah**; were reported indicating the dominance of grasses followed by Sedges even at later growth stage of the crop against dominance of BLW.

The data on total weed population was reported by all the locations at Active Tillering stage and 13 locations at Panicle Initiation stage except **Aduthurai, Chiplima and Nagina**. The total weed population ($<10/m^2$), was low at Active Tillering stage in eleven locations viz., **Chatha, Chiplima, Gangavathi, Ghaghraghat, Jagdalpur, Malan, Nagina, Pantnagar, Pattambi, ARI-Rajendranagar** and **Titabar**; medium ($10-20/m^2$) at Active Tillering in three locations (**Aduthurai, Moncompu** and **Varanasi**) and at panicle initiation at two locations (**Moncompu** and **Pattambi**); high ($>20/m^2$) at Active Tillering stage in two locations (**Chinsurah** and **Nawagam**); one location (**Nawagam**) at Panicle Initiation stage.

The data on grass group population at Active Tillering stage was reported by all locations except **Ghaghraghat**. The grasses were $<10/m^2$ at all locations, except **Moncompu, Karaikal** and **Nawagam** (with high number $>10/m^2$). At Panicle Initiation stage, 12 locations reported the data viz., **Chatha, Chinsurah, Gangavathi, Jagdalpur, Malan, Moncompu, Nawagam, Pantnagar, Pattambi, ARI-Rajendranagar, Titabar** and **Varanasi**. The test locations recorded lower grass group population except **Moncompu** and **Nawagam**. The data on sedge group population was reported by all locations at Active Tillering stage and except **Aduthurai Chiplima, Nagina** at panicle initiation stage. **Ghaghraghat** has reported no sedge group. **Nawagam** has recorded high number ($>10/m^2$) at both Active Tillering and Panicle Initiation stages. The data on BLW group was reported by all locations at Active Tillering and except **Aduthurai, Chiplima, Nagina** at Panicle Initiation stages. **Ghaghraghat** has reported no BLW group. **Nawagam** has recorded highest number ($>10/m^2$) at both Active Tillering and Panicle Initiation stages.

The individual grass weeds and species wise (15) population at active tillering was reported by 12 locations viz., **Aduthurai, Chatha, Chiplima, Gangavathi, Jagdalpur, Malan, Moncompu, Nawagam, Pantnagar, Pattambi, Titabar** and **Varanasi** in kharif season and two locations (**Karaikal** and **Pattambi**) in rabi season; at panicle initiation by 10 locations viz., **Chatha, Gangavathi, Jagdalpur, Malan, Moncompu, Nawagam, Pantnagar, Pattambi, Titabar** and **Varanasi** in kharif season and two locations (**Karaikal** and **Pattambi**) in rabi season. Both *Echinochloa colona* and *Echinochloa crusgalli* were major grasses at four locations (**Aduthurai, Malan, Nawagam, Karaikal**) and individually at seven and six locations each. *Cynodon dactylon* was reported at five locations and *Panicum spp.* At three locations, *Isachne miliaceae*, *Digitaria sanguinalis*, and weedy rice were reported by two locations each. *Leptochloa chinensis*, *Leersia hexandra*, *Chloris barbata*, *Dactylactenium aegyptium*, *Paspalum dilatatum*, *Isachne miliaceae*, *Eleusine indica*, *Echinochloa stagnina* were of minor occurrence in one location each. The results showed dominance and increasing occurrence of *Echinochloa colona* over *Echinochloa crusgalli* followed by *Cynodon dactylon*. At panicle initiation, similar trend was observed in the reported locations. The individual and species wise sedge weed population (6) were reported by 12 locations viz., **Aduthurai, Chatha, Chiplima, Gangavathi, Jagdalpur, Malan, Moncompu, Nawagam, Pantnagar, Pattambi, Titabar** and **Varanasi** in kharif

season and **two locations (Karaikkal and Pattambi)** in rabi season; at panicle initiation by 10 locations viz., **Chatha, Gangavathi, Jagdalpur, Malan, Moncompu, Nawagam, Pantnagar, Pattambi, Titabar and Varanasi** in kharif season and **two locations (Karaikal and Pattambi)** in *rabi* season. In both the stages, *Cyperus rotundus* was major sedge followed by *Cyperus difformis* and *Cyperus iria*. *Cyperus esculentus* and *Fimbristylis spp.* were reported as minor weeds by one location each. The individual Broad Leaf Weeds (19) were reported by 12 loations viz., **Aduthurai, Chatha, Chiplima, Gangavathi, Jagdalpur, Malan, Moncompu, Nawagam, Pantnagar, Pattambi, Titabar and Varanasi** in kharif season and **two locations (Karaikkal and Pattambi)** in *rabi* season; at panicle initiation by 10 locations viz., **Chatha, Gangavathi, Jagdalpur, Malan, Moncompu, Nawagam, Pantnagar, Pattambi, Titabar and Varanasi** in kharif season and **two locations (Karaikal and Pattambi)** in *rabi* season. In active tillering stage, *Monochoria vaginalis* was reported as major Broad Leaf Weed at four locations and *Eclipta spp.*, *Ludwigia parviflora*, *Marsilea quadrifolia*, *Alternanthera spp.* at three locations each. Other weeds are *Mollugo verticillata*, *Ipomea aquatic*, *Solanum retroflexum*, *Commelina benghalensis*, *Ammania baccifera*, *Bergia capensis*, *Physalis minima*, *Cyanotis auxillaris* were of minor occurance and reported by one location each. The results showed the diversity in number and occurance at different locations with *Monochoria vaginalis*, *Eclipta spp.*, *Ludwigia parviflora*, *Marsilea quadrifolia*, *Alternanthera spp.* as major weeds.

Weed Biomass (dry) (gm/m²)

Individual weed wise biomass and total weed biomass was reported at two critical stages by **Gangavathi, Moncompu, Malan, Pattambi, Nawagam and Pantnagar**. At active tillering stage, total weed biomass at all the nine test locations was highest in unpuddled DSR followed by puddled DSR while transplanting recorded significantly low. Among the weed management treatments, chemical weed control has resulted in significantly low total weed biomass and statistically superior over mechanical weeding using weeder, which in turn is superior over weedy check. **Chinsurah, Ghaghraghat, Karaikal** have reported group wise weed biomass. The total mean weed biomass at active tillering ranged from 3.12g/m² to 37.89m². The results indicated relatively low intensity of weed pressure in **Chinsurah, Ghaghraghat, Karaikal, Malan, Pantnagar, Pattambi**. The mean total weed biomass was medium at **Moncompu** with 91.96g/m². The mean total weed biomass was high at **Gangavathi** with 158.07 g/m² and **Nawagam** with 222.32 g/m² indicating high weed pressure. At panicle initiation stage, the mean total weed biomass was low with 4.67 g/m² at **Chinsurah** to 45.63g/m² at **Pantnagar**; medium at **Malan** with 55.32 g/m²; high at **Moncompu** (116.28g/m²) and **Nawagam** (328.74 g/m²) and followed similar trend of active tillering stage.

The group wise weed biomass at critical stages of active tillering and panicle initiation was reported by eight locations viz., **Chinsurah, Gangavathi, Malan, Moncompu, Nawagam, Pantnagar, Pattambi, Titabar**. At both active tillering and panicle initiation stages, the order of dominance was Grasses >Sedges > BLW at **Gangavathi, Karaikal, Malan and Pantnagar, Pattambi**; Grasses >BLW >Sedges at **Monocompu**; and BLW

>Grasses > Sedges at **Nawagam**. The order of dominance at active tillering was different from panicle initiation stage at **Chinsurah, Pattambi, Titabar** with BLW > Grasses >Sedges; Grasses > Sedges –BLW at **Chinsurah**; Grasses >sedges > BLW, Grasses >BLW > Sedges at **Pattambi** and **Titabar** respectively.

The grass weed Biomass has increased from active tillering to panicle initiation stage at eight locations. At active tillering stage, the grass weed biomass ranged from 1.83g/m² at **Chinsurah** to 108.64 g/m² at **Gangavathi**. At panicle initiation stage, the weed biomass was 2.17g/m² at **Chinsurah** to 202.90 g/m² at **Gangavathi**. The Sedge weed biomass has increased from active tillering to panicle initiation stage at five locations viz., **Chinsurah, Malan, Nawagam, Pattambi** and **Titabar** and decreased at three locations viz., **Gangavathi, Moncompu** and **Pantnagar**. The sedge weed biomass at active tillering ranged from 1.23 g/m² at **Chinsurah** to 64.97 g/m² at **Nawagam**; 1.25 g/m² at **Chinsurah** to 82.66g/m² at **Nawagam**. The BLW biomass has increased from active tillering to panicle initiation stage at six locations viz., **Gangavathi, Malan, Nawagam, Moncompu, Pattambi** and **Titabar** and decreased at two locations viz., **Chinsurah** and **Pantnagar**. The biomass at active tillering stage ranged from 1.92 g/m² in **Chinsurah** to 82.43 g/m² in **Nawagam**; 1.25g/m² at panicle initiation stage in **Chinsurah** to 125.77 g/m² at **Nawagam**.

The individual grasses species wise biomass was reported by eight locations viz., **Gangavathi, Malan, Karaikal** (Rabi season) **Moncompu, Nawagam, Pantnagar, Pattambi** (rabi & kharif) and **Titabar** at both active tillering and panicle initiation stages. At active tillering stage, *Echinochloa colona* was dominant at three locations viz., **Malan, Nawagam** and **Pantnagar** ranging from 9.7 g/m² to 18.69 g/m² ; *Echinochloa crusgalli* 6.08 g/m² at **Malan** to 18.00 g/ m² at **Nawagam** ; *Isachnae miliaceae* 4.98 g/ m² at **Pattambi** to 29.00 g/m² at **Moncompu** ; *Cynodon dactylon* 19.15 g/m² and *Chloris barbata* 19.09 g/m² at **Nawagam**; weedy rice 1.09 g/m² at **Moncompu** to 83.29 g/ m² at **Gangavathi** ; *Ehinochloa Stagnina* / *Panicum Stagnina*/ *Oplismenus burmannii* was reported by **Malan**(3.12 g/m²) **Moncompu** to 4.60g/ m² and **Pattambi** (10.77 g/m²) ; *Leersia hexandra* 3.61 g/m² at **Titabar**. At panicle initiation stage, the grass weed biomass ranged from 4.09 g/m² (*Leersia hexandra*) at **Titabar** to 187.26g/m² (weedy rice) at **Gangavathi**. *Echinochloa colona* and *Echinochloa crusgalli* were reported by four locations each, but *Echinochloa colona* was dominant and varied from 10.42 g/m² at **Pantnagar** to 34.05 g/m² at **Nawagam**. *Ehinochloa Stagnina*/ *Panicum Stagnina* was reported at **Malan** and **Moncompu**. *Isachnae miliaceae* was reported as major grass by two locations **Moncompu** and **Pattambi**. Weedy rice was dominant at **Gangavathi** 187.26 g/m² and **Pattambi** (Kharif & Rabi) seasons. *Chloris barbata* and *Cynodon dactylon* were reported by only location (**Nawagam**; *Digitaria longifolia* by **Gangavathi**, *Eleusine indica* by **Pantnagar**, *Leptochloa chinensis* by **Karaikal** in rabi season, *Leersia hexandra* by **Titabar**.

The individual species wise sedge weed biomass at active tillering and panicle initiation stages was reported by seven locations in Kharif season 2024 viz., **Gangavathi, Malan, Moncompu, Nawagam, Pantnagar, Pattambi, Titabar**; in Rabi season 2023-24 by two locations **Karaikal** and **Pattambi**. The mean weed biomass varied from 0.73 g/m²

(*Cyperus rotundus*) at **Pattambi** to 40.72 g/m² *Cyperus rotundus* at **Gangavathi**. *Cyperus difformis*, *Cyperus rotundus* and *Cyperus iria* were reported by 4 locations each. The biomass of *Cyperus rotundus* and *Cyperus iria* have increased compared to common species of *Cyperus difformis*. *Fimbristylis miliacea* was reported by one location (**Pattambi**) only in both Kharif and Rabi seasons. Similar trend was observed at Panicle initiation stage also with biomass ranging from 2.66 g/m² at **Pattambi** to 41.97 g/m² at **Gangavathi**. The biomass of individual sedge weed or species have increased, at all reported locations from active tillering to panicle initiation stages.

The individual and species wise BLW biomass at active tillering and panicle initiation stages was reported by seven locations in Kharif seasons 2024 viz., **Gangavathi, Malan, Moncompu, Nawagam, Pantnagar, Pattambi, Titabar**; in Rabi season 2023-24 by two locations **Karaikal and Pattambi**. All the reported locations showed higher and increased weed biomass from active tillering to panicle initiation stage. At panicle initiation stage, the minimum BLW biomass was 0.88 g/m² by *Monochoria vaginalis* and 40.07 g/m² by *Ipomoea aquatica* at **Nawagam**. At active tillering stage, the minimum BLW biomass of 0.28 g/m² by *Monochoria vaginalis* at **Pattambi** and 22.39 g/m² by *Solanum retroflexa*. *Monochoria vaginalis*, *Alternanthera* species was reported by four locations, *Eclipta spp.* and *Sphenoclea zeylanica* by two locations and others at one location each were reported. The indicated increasing BLW biomass from active tillering to panicle initiation stage and *Monochoria vaginalis*, *Alternanthera spp.* were dominant followed by *Eclipta spp.* and *Sphenoclea zeylanica*.

Weed Control Efficiency

Weed control efficiency of different treatments was reported by six locations viz., **Gangavathi, Malan, Moncompu, Nawagam, Pantnagar** and **Pattambi**, at both active tillering, panicle initiation stages. Under all methods of establishment, Chemical weed control has recorded higher weed control efficiency at **Pantnagar** and **Pattambi**. Among methods of establishment, Wet DSR is superior at **Gangavathi, Malan** and **Pantnagar**; dry DSR at **Moncompu** and **Nawagam**; Transplanting at **Pattambi**. **Moncompu** and **Malan**, Unpuddled Dry DSR system recorded highest efficiency.

Weed Index

Weed Index was reported by three locations viz., **Moncompu, Pantnagar** and **Pattambi**. The un puddled DSR system with weedy check has shown higher weed index and transplanted system with chemical weed control recorded lowest weed Index.

Grain yield (t/ha.) and Yield attributes

The grain yield data was reported by 16 locations viz., **Aduthurai, Chatha, Chinsurah, Chiplima, Gangavathi, Ghaghraghat, Jagdalpur, Malan, Moncompu, Nagina, Nawagam, Pantnagar, Pattambi, ARI-Rajendranagar, Titabar** and **Varanasi** in kharif 2024 and two locations (**Karaikal** and **Pattambi**) in rabi season 2023-24. The statistical

analysis revealed that, the mean grain yield was ranging from 2.32 t/ha at **Moncompu** to 5.43 t/ha at **Aduthurai** in kharif 2024 and 2.66t/ha at **Pattambi** to 4.62t/ha. The systems of establishment had no significant difference at seven locations viz., **Chiplima, Jagdalpur, Malan, Nawagam, Pattambi, Titabar** and **Varanasi**. At all the test locations, weedy check recorded significantly low grain yield of 1.24 t/ha at **Chatha** to 4.54t/ha at **Nawagam**. At 10 locations viz., **Chiplima, Chinsurah, Gangavathi, Jagdalpur, Malan, Moncompu, Nagina, Pantnagar, ARI Rajendranagar** and **Varanasi**, the chemical weed control was significantly superior and recorded highest grain yield ranging from 2.88t/ha at **Ghaghraghat** to 6.18t/ha at **Aduthurai; Pattambi** in rabi season. At five locations viz., **Adhuthurai, Ghaghraghat, Nawagam, Pattambi, Titabar** in *kharif* season and **Karaikal** in *rabi* season, mechanical weeding using weeder and chemical weed control using pre and post emergence herbicides were statistically comparable in managing weeds efficiently. Straw yield data was reported by 15 locations viz., **Adhuthurai, Chatha, Chiplima, Chinsurah, Gangavathi, Ghaghraghat, Jagdalpur, Malan, Moncompu, Nawagam, Pantnagar, Pattambi, ARI Rajendranagar, Titabar** and **Varanasi** in kharif season and two locations viz., **Karaikal** and **Pattambi** in rabi season. Straw yield has followed similar trend of grain yield by different establishment methods and weed management options. The yield attributes of number of panicles/m² ranged from 137/m² at **Jagdalpur** to 386 m² at **Gangavathi**; panicle weight varied from 1.69g at Chatha to 4.35g at **Adhuthurai**. The test weight was reported by all locations except **ARI-Rajendranagar** and ranged from 15.34g at **Gangavathi** to 30.14g at **Pantnagar**.

Crop Dry Matter Production (gm/m²)

Crop Dry Matter Production g/m² at two critical crop growth stages of Active Tillering was reported by 10 locations viz., **Chatha, Chilplima, Jagdalpur, Malan, Moncompu, Pantnagar, Pattambi, ARI-Rajendranagar, Titabar** and **Varanasi**, varying from 60.54 g/m² at **Malan** to 736.48 g/m² at **Titabar**. At panicle initiation stage, nine locations viz., **Chatha, Chiplima, Jagdalpur, Malan, Moncompu, Pantnagar, Pattambi, Titabar** and **Varanasi** reported and varied from 94.67 g/m² at **Jagdalpur** to 1060.72 g/m² at **Moncompu**. The establishment methods had significant influence on crop biomass at six locations viz., **Chatha, Malan, Pantnagar, Pattambi, ARI-Rajendranagar** and **Varanasi** in kharif season and one location (**Pattambi**) in rabi season. The weed management treatments had significant influence on crop biomass at active tillering at eight locations viz., **Chatha, Chiplima, Jagdalpur, Malan, Pantnagar, ARI-Rajendranagar, Titabar** and **Varanasi**; and at Panicle Initiation stage in seven locations in kharif season viz., **Chatha, Jagdalpur, Malan, Pantnagar, ARI_Rajendranagar, Titabar** and **Varanasi**, and two locations viz., **Karaikal** and **Pattambi**. At active tillering stage, weedy check has resulted in significantly low crop biomass of 51.14 g/m² at **Malan** to 627.11 g/m² at **Titabar**; while at Panicle Initiation stage, 73.89 g/m² at **Jagdalpur** to 847.33 g/m² at **Titabar** indicating the high weed pressure influence at **Malan, Jagdalpur** and low weed pressure influence at **Titabar**.

Economics

The Economics of the field trial was reported by seven locations viz., **Aduthurai, Gangavathi, Jagdalpur, Moncompu, Nawagam, Pantnagar** and **Pattambi**. The results revealed that, the cost of cultivation was low in unpuddled direct sown rice under unweeded check at **Aduthurai, Gangavathi, Jagdalpur, Momcompu, Pantnagar**, and high with transplanting/ mechanical transplanting at **Aduthurai, Gangavathi, Moncompu, Nawagam, Pantnagar**. The puddled DSR system was costliest at **Jagdalpur** and **Pattambi**. At **Nawagam** only the puddled DSR system was the cheapest system. The Benefit-Cost Ratio was reported by seven locations viz., **Aduthurai, Gangavathi Jagdalpur, Karaikal, Nawagam, Pantnagar Pattambi**. Among the establishment methods, significant influence was reported at three locations viz., **Aduthurai, Jagdalpur** and **Pantnagar**. At **Aduthurai, Gangavathi**, Puddled DSR system was superior to unpuddled DSR system and unpuddled DSR system at **Jagdalpur** and **Pantnagar**. At all the locations, transplanted system has recorded significantly low B:C Ratio except **Karaikal**. At **Aduthurai, Nawagam, Pantnagar** both puddled and unpuddled DSR systems were comparable, while unpuddled DSR system was superior at **Gangavathi** and **Jagdalpur**.

In summary, the 5th year study was conducted at 16 locations viz., **Aduthurai, Chatha, Chiplima, Chinsurah, Gangavathi, Ghaghraghat, Jagdalpur, Malan, Moncompu, Nagina, Nawagam, Pantnagar, Pattambi, ARI-Rajendranagar, Titabar and Varanasi in Kharif** season 2024, and at **Karaikal, Pattambi in Rabi** season 2023-24 in split plot design. The individual Genus and Species wise, group wise, total weed population, weed dry biomass at two critical crop growth stages of active tillering and panicle initiation, were reported by 12 locations showed that at all the test locations, the un puddled direct sown rice system recorded higher weed population and weed biomass compared to puddled DSR system, mechanical transplanting. The weed dry biomass was significantly low with chemical weed control treatments followed by mechanical weeding using weeder. The individual weed analysis revealed that.

The 5th year results are clearly showing the shift was noticed in species within the weed groups. In all establishment methods, among the grasses (15 individual species), *Echinochloa colona* and *Cynodon dactylon* were reported dominant rather than regular *Echinochloa crusgalli* and *Leptochloa chinensis* was reported as difficult to control weed; among sedges (6 individual species), *Cyperus rotundus* has increased than regular *Cyperus difformis*. Among BLW *Monochoria vaginalis*, *Eclipta spp.*, *Ludwigia parviflora*, *Marsilea quadrifolia*, *Alternanthera spp.* as major weeds.

The mean grain yield ranged from 2.32 t/ha at **Moncompu** to 5.43 t/ha at **Aduthurai**. The puddled and un puddled DSR systems were comparable to mechanical transplanting/ transplanting under chemical weed control at seven locations viz., **Chiplima, Jagdalpur, Malan, Nawagam, Pattambi, Titabar and Varanasi**. The results of the crop dry matter production, yield attributes and straw yield showed that Puddled DSR and unpuddled DSR were comparable. Economics of the trial revealed low cost of cultivation in unpuddled direct

sown rice under weedy check and high with transplanting/ mechanical transplanting with chemical weed control. The Benefit-Cost Ratio in Puddled DSR system was superior to unpuddled DSR system and lowest in transplanted system. Based on the long-term trial of five years, the puddled or un puddled DSR systems are comparable to transplanting system in terms of crop growth, yield and superior in terms of Benefit-Cost Ratio, though individual weed shift in number, species, biomass are higher in DSR systems which are manageable with mechanical and or chemical control methods.

Trial 4.3.3: Summary on Species wise weed population no. /m² of Long term trial on Weed Dynamics in rice under different establishment methods, Kharif 2024.

		Aduthurai							
		Active tillering stage							
		Grasses					Sedges		
Main plot	Sub plot treatments	<i>Echinochloa colona</i>	<i>Echinochloa crusgalli</i>	<i>Leptochloa chinensis</i>	<i>Panicum repens</i>	<i>Cynodon dactylon</i>	<i>Cyperus rotundus</i>	<i>Cyperus difformis</i>	<i>Fimbristylis miliacea</i>
M1	S1	40.33(6.39)	18.00(4.30)	21.00(4.64)	11.00(3.39)	5.67(2.47)	11.00(3.39)	4.33(2.20)	3.67(2.04)
	S2	7.67(2.85)	3.33(1.93)	5.33(2.41)	4.33(2.20)	2.33(1.68)	3.67(2.04)	2.67(1.77)	0.00(0.71)
	S3	4.67(2.27)	4.67(2.27)	4.33(2.20)	3.67(2.04)	2.00(1.56)	2.67(1.77)	1.67(1.46)	1.33(1.34)
M2	S1	44.33(6.69)	23.67(4.91)	31.67(5.67)	14.67(3.89)	12.00(3.53)	11.67(3.48)	6.67(2.68)	4.00(2.12)
	S2	6.67(2.67)	20.67(4.60)	7.67(2.85)	5.67(2.47)	4.33(2.20)	7.33(2.79)	3.33(1.95)	0.00(0.71)
	S3	10.33(3.28)	6.33(2.60)	6.33(2.60)	4.00(2.11)	2.67(1.77)	3.67(2.04)	1.33(1.34)	1.33(1.34)
M3	S1	52.00(7.24)	28.67(5.40)	34.33(5.90)	22.00(4.74)	15.00(3.92)	14.00(3.80)	9.00(3.07)	7.67(2.86)
	S2	14.33(3.85)	10.67(3.34)	11.00(3.39)	7.67(2.84)	5.33(2.41)	7.00(2.73)	6.33(2.61)	1.33(1.34)
	S3	11.00(3.39)	7.00(2.72)	7.33(2.78)	6.00(2.54)	15.67(4.02)	5.67(2.48)	3.00(1.86)	1.00(1.22)
Mean of Factor-1									
	M1	17.56(3.84)	8.67(2.83)	10.22(3.08)	6.33(2.54)	3.33(1.90)	5.78(2.40)	2.89(1.81)	1.67(1.36)
	M2	20.44(4.21)	16.89(4.04)	15.22(3.71)	8.11(2.82)	6.33(2.50)	7.56(2.77)	3.78(1.99)	1.78(1.39)
	M3	25.78(4.83)	15.44(3.82)	17.56(4.02)	11.89(3.38)	12.00(3.45)	8.89(3.00)	6.11(2.51)	3.33(1.81)
	CD(0.05)	0.04	0.15	0.23	0.15	0.16	0.09	0.15	0.1
	CV%	0.98	5.06	7.58	6.02	7.18	3.8	8.79	7.63
	Mean of Factor-2								
	S1	45.56(6.78)	23.44(4.87)	29.00(5.40)	15.89(4.00)	10.89(3.31)	12.22(3.56)	6.67(2.65)	5.11(2.34)
	S2	9.56(3.12)	11.56(3.29)	8.00(2.88)	5.89(2.50)	4.00(2.10)	6.00(2.52)	4.11(2.11)	0.44(0.92)
	S3	8.67(2.98)	6.00(2.53)	6.00(2.53)	4.56(2.23)	6.78(2.45)	4.00(2.10)	2.00(1.55)	1.22(1.30)
	CD(0.05)	0.2	0.2	0.19	0.24	0.24	0.26	0.21	0.14
	CV%	4.58	5.47	5.13	7.87	8.92	9.13	9.92	9.24
	Interaction								
	M and T	NS	0.35	NS	NS	0.42	NS	NS	0.25
	T and M	NS	0.29	NS	NS	0.35	NS	NS	0.21
	Experimental Mean	4.29	3.56	3.6	2.91	2.62	2.72	2.11	1.52

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Aduthurai					
		Active tillering stage					
		BLW					
		<i>Eclipta alba</i>	<i>Euphorbia prostrata</i>	<i>Ammania baccifera</i>	<i>Marselia quadrifolia</i>	<i>Bergia capensis</i>	<i>Total</i>
M1	S1	38.00(6.20)	24.33(4.98)	10.67(3.34)	5.67(2.48)	2.67(1.77)	196.33(14.03)
	S2	4.33(2.19)	3.00(1.87)	3.33(1.95)	2.67(1.76)	0.00(0.71)	42.67(6.57)
	S3	6.67(2.68)	4.33(2.19)	2.00(1.58)	1.33(1.34)	0.67(1.05)	40.00(6.36)
M2	S1	42.67(6.57)	24.33(4.98)	11.67(3.48)	5.67(2.48)	5.33(2.41)	238.33(15.45)
	S2	5.67(2.48)	3.00(1.87)	3.67(2.04)	3.33(1.94)	2.33(1.68)	73.67(8.60)
	S3	4.67(2.27)	2.33(1.68)	2.67(1.77)	1.67(1.44)	1.33(1.34)	48.67(7.01)
M3	S1	45.67(6.79)	30.33(5.55)	17.33(4.22)	11.67(3.49)	7.67(2.85)	295.33(17.19)
	S2	9.67(3.19)	4.67(2.27)	5.33(2.41)	4.67(2.27)	4.00(2.12)	92.00(9.61)
	S3	0.00(0.71)	3.67(2.04)	3.67(2.04)	0.00(0.71)	2.00(1.58)	75.67(8.72)
Mean of Factor-1							
	M1	16.33(3.69)	10.56(3.01)	5.33(2.29)	3.22(1.86)	1.11(1.18)	93.00(8.99)
	M2	17.67(3.77)	9.89(2.84)	6.00(2.43)	3.56(1.95)	3.00(1.81)	120.22(10.35)
	M3	18.44(3.56)	12.89(3.29)	8.78(2.89)	5.44(2.16)	4.56(2.19)	154.33(11.84)
	CD(0.05)	0.07	0.12	0.05	NS	0.11	0.19
	CV%	2.4	4.52	2.13	13.75	7.52	2.23
Mean of Factor-2							
	S1	42.11(6.52)	26.33(5.17)	13.22(3.68)	7.67(2.82)	5.22(2.34)	243.33(15.56)
	S2	6.56(2.62)	3.56(2.00)	4.11(2.14)	3.56(1.99)	2.11(1.50)	69.44(8.26)
	S3	3.78(1.88)	3.44(1.97)	2.78(1.80)	1.00(1.16)	1.33(1.33)	54.78(7.36)
	CD(0.05)	0.21	0.16	0.17	0.22	0.18	0.22
	CV%	5.52	5.08	6.41	10.76	10.33	2.09
Interaction							
	M and T	0.36	NS	NS	0.38	NS	NS
	T and M	0.3	NS	NS	0.34	NS	NS
Experimental Mean		3.67	3.05	2.54	1.99	1.72	10.39

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot		Sub plot treatments		Chatha						
				Active tillering stage						
				Grasses			Sedges		BLW	
				<i>Echinochloa spp</i>	<i>Dactyloctenium aegyptium</i>	<i>Cynodon dactylon</i>	<i>Elusine indica</i>	<i>Cyperus spp</i>	<i>Solanum nigrum</i>	<i>Physalis minima</i>
										<i>Total</i>
M1		S1	22.33(4.78)	13.67(3.76)	12.00(3.53)	1.00(1.17)	35.33(5.99)	0.67(1.05)	1.00(1.22)	86.00(9.30)
		S2	3.67(2.04)	2.67(1.77)	2.00(1.58)	0.67(1.05)	1.33(1.34)	1.00(1.17)	0.67(1.05)	12.00(3.53)
		S3	2.67(1.77)	2.00(1.58)	1.33(1.34)	0.33(0.88)	29.33(5.46)	0.33(0.88)	0.33(0.88)	36.33(6.06)
M2		S1	24.67(5.01)	14.33(3.85)	12.33(3.57)	2.00(1.56)	46.00(6.82)	1.33(1.34)	1.33(1.34)	102.00(10.12)
		S2	3.33(1.95)	2.67(1.77)	2.00(1.58)	0.67(1.05)	2.33(1.68)	1.33(1.34)	1.33(1.34)	13.67(3.76)
		S3	3.67(2.04)	1.67(1.46)	1.67(1.46)	0.67(1.05)	35.00(5.96)	0.33(0.88)	0.67(1.05)	43.67(6.65)
M3		S1	25.33(5.08)	16.33(4.10)	14.00(3.81)	2.00(1.58)	45.33(6.77)	1.67(1.46)	2.33(1.68)	107.00(10.37)
		S2	2.67(1.77)	2.67(1.77)	2.33(1.68)	0.67(1.05)	1.33(1.34)	1.67(1.46)	2.00(1.58)	13.33(3.72)
		S3	2.33(1.68)	2.33(1.68)	1.67(1.46)	1.67(1.46)	40.33(6.39)	2.00(1.58)	1.00(1.22)	51.33(7.20)
Mean of Factor-1		M1	9.56(2.86)	6.11(2.37)	5.11(2.15)	0.67(1.03)	22.00(4.26)	0.67(1.03)	0.67(1.05)	44.78(6.30)
		M2	10.56(3.00)	6.22(2.36)	5.33(2.21)	1.11(1.22)	27.78(4.82)	1.00(1.19)	1.11(1.25)	53.11(6.84)
		M3	10.11(2.84)	7.11(2.52)	6.00(2.32)	1.44(1.37)	29.00(4.83)	1.78(1.50)	1.78(1.49)	57.22(7.09)
		CD(0.05)	0.08	NS	NS	NS	0.03	0.12	0.09	0.2
		CV%	3.18	8.49	6.8	26.67	0.79	11.27	8.65	3.61
Mean of Factor-2		S1	24.11(4.96)	14.78(3.90)	12.78(3.64)	1.67(1.44)	42.22(6.52)	1.22(1.29)	1.56(1.42)	98.33(9.93)
		S2	3.22(1.92)	2.67(1.77)	2.11(1.61)	0.67(1.05)	1.67(1.45)	1.33(1.33)	1.33(1.33)	13.00(3.67)
		S3	2.89(1.83)	2.00(1.57)	1.56(1.42)	0.89(1.13)	34.89(5.93)	0.89(1.11)	0.67(1.05)	43.78(6.64)
		CD(0.05)	0.2	0.13	0.17	0.22	0.2	NS	0.25	0.18
		CV%	6.84	5.36	7.59	17.86	4.2	22.96	19.04	2.54
Interaction		M and T	NS	NS	NS	NS	NS	NS	NS	NS
		T and M	NS	NS	NS	NS	NS	NS	NS	NS
Experimental Mean			2.9	2.42	2.22	1.21	4.64	1.24	1.26	6.75

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Chatha							
		Panicle initiation stage							
		Grasses			Sedges		BLW		
		<i>Echinochloa spp</i>	<i>Dactyloctenium aegyptium</i>	<i>Cynodon dactylon</i>	<i>Elusine indica</i>	<i>Cyperus spp</i>	<i>Solanum nigrum</i>	<i>Physalis minima</i>	<i>Total</i>
M1	S1	36.00(6.04)	30.33(5.55)	21.67(4.70)	3.00(1.86)	66.67(8.19)	3.00(1.86)	2.67(1.77)	163.33(12.80)
	S2	4.33(2.20)	6.33(2.61)	6.67(2.68)	1.33(1.34)	5.00(2.35)	1.67(1.46)	1.33(1.34)	26.67(5.21)
	S3	3.33(1.95)	6.67(2.68)	4.67(2.27)	0.67(1.05)	7.67(2.86)	0.67(1.05)	0.33(0.88)	24.00(4.95)
M2	S1	47.67(6.94)	35.33(5.99)	23.00(4.84)	7.00(2.73)	75.33(8.71)	5.33(2.41)	6.67(2.68)	200.33(14.17)
	S2	7.00(2.74)	9.00(3.08)	8.67(3.03)	1.67(1.46)	7.67(2.85)	2.00(1.58)	1.33(1.34)	37.33(6.15)
	S3	5.67(2.48)	8.33(2.97)	8.33(2.97)	1.00(1.17)	11.00(3.39)	1.33(1.34)	1.00(1.22)	36.67(6.09)
M3	S1	56.00(7.52)	37.67(6.17)	20.67(4.60)	8.00(2.91)	80.67(9.01)	6.33(2.61)	7.67(2.86)	217.00(14.75)
	S2	9.00(3.08)	9.67(3.18)	10.33(3.29)	2.33(1.68)	9.33(3.13)	1.67(1.46)	1.67(1.46)	44.00(6.67)
	S3	7.67(2.86)	7.33(2.80)	8.33(2.97)	1.33(1.34)	10.67(3.33)	1.67(1.46)	1.67(1.46)	38.67(6.26)
Mean of Factor-1									
	M1	14.56(3.40)	14.44(3.61)	11.00(3.22)	1.67(1.42)	26.44(4.47)	1.78(1.46)	1.44(1.33)	71.33(7.65)
	M2	20.11(4.05)	17.56(4.01)	13.33(3.61)	3.22(1.79)	31.33(4.98)	2.89(1.78)	3.00(1.75)	91.44(8.80)
	M3	24.22(4.48)	18.22(4.05)	13.11(3.62)	3.89(1.98)	33.56(5.16)	3.22(1.85)	3.67(1.93)	99.89(9.23)
	CD(0.05)	0.12	0.16	0.07	0.24	0.26	0.19	0.12	0.18
	CV%	3.71	4.88	2.41	16.85	6.37	13.21	8.55	2.46
Mean of Factor-2									
	S1	46.56(6.83)	34.44(5.90)	21.78(4.71)	6.00(2.50)	74.22(8.64)	4.89(2.29)	5.67(2.44)	193.56(13.91)
	S2	6.78(2.67)	8.33(2.96)	8.56(3.00)	1.78(1.49)	7.33(2.78)	1.78(1.50)	1.44(1.38)	36.00(6.01)
	S3	5.56(2.43)	7.44(2.81)	7.11(2.74)	1.00(1.19)	9.78(3.19)	1.22(1.29)	1.00(1.19)	33.11(5.77)
	CD(0.05)	0.18	0.18	0.16	0.22	0.15	0.19	0.21	0.13
	CV%	4.34	4.41	4.5	12.33	3.06	10.95	12.18	1.47
Interaction									
	M and T	NS	NS	NS	NS	NS	NS	NS	NS
	T and M	NS	NS	NS	NS	NS	NS	NS	NS
	Experimental Mean	3.98	3.89	3.48	1.73	4.87	1.69	1.67	8.56

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Chiplima								
		Active tillering stage								Total
		Grasses	Sedges			BLW				
		<i>Echinochloa crusgalli</i>	<i>Cyperus esculentus</i>	<i>Fimbristylis miliacea</i>	<i>Fimbristylis teragona</i>	<i>Ludwigia parviflora</i>	<i>Marsilea quadrifolia</i>	<i>Monochoria vaginalis</i>	<i>Sphenoclea zeylanica</i>	
M1	S1	1.33(1.29)	10.33(3.28)	4.67(2.24)	7.00(2.73)	6.00(2.49)	16.67(4.13)	5.67(2.44)	8.00(2.83)	59.67(7.74)
	S2	0.33(0.88)	2.00(1.47)	2.67(1.76)	2.33(1.68)	3.33(1.94)	6.00(2.53)	0.67(1.00)	1.67(1.39)	19.00(4.40)
	S3	1.00(1.17)	4.00(2.11)	2.33(1.68)	4.00(2.11)	2.33(1.68)	2.00(1.47)	2.00(1.56)	2.33(1.54)	20.00(4.52)
M2	S1	13.00(3.66)	11.00(3.38)	3.00(1.86)	18.67(4.37)	7.67(2.82)	13.67(3.76)	4.67(2.24)	12.00(3.53)	83.67(9.17)
	S2	1.67(1.39)	6.00(2.52)	2.67(1.72)	2.00(1.56)	4.67(2.26)	1.67(1.39)	1.00(1.17)	1.67(1.39)	21.33(4.66)
	S3	3.67(2.03)	4.67(2.26)	2.33(1.64)	2.33(1.64)	5.00(2.32)	1.67(1.39)	1.67(1.39)	2.00(1.56)	23.33(4.88)
M3	S1	16.00(4.02)	18.00(4.27)	6.33(2.59)	18.67(4.37)	7.67(2.81)	3.67(2.02)	3.33(1.94)	13.00(3.67)	86.67(9.33)
	S2	1.00(1.17)	1.67(1.39)	3.33(1.93)	3.00(1.86)	3.33(1.95)	2.33(1.54)	1.00(1.17)	2.00(1.47)	17.67(4.26)
	S3	5.67(2.41)	3.00(1.86)	3.33(1.93)	6.00(2.50)	2.67(1.77)	3.67(2.04)	2.00(1.56)	2.00(1.56)	28.33(5.37)
Mean of Factor-1		M1	0.89(1.11)	5.44(2.29)	3.22(1.89)	4.44(2.17)	3.89(2.03)	8.22(2.71)	4.00(1.92)	32.89(5.56)
		M2	6.11(2.36)	7.22(2.72)	2.67(1.74)	7.67(2.52)	5.78(2.47)	5.67(2.18)	5.22(2.16)	42.78(6.23)
		M3	7.56(2.53)	7.56(2.51)	4.33(2.15)	9.22(2.91)	4.56(2.18)	3.22(1.87)	5.67(2.23)	44.22(6.32)
	CD(0.05)	0.3	NS	NS	0.22	NS	0.14	NS	0.11	0.05
	CV%	17.71	19.54	12.52	10.42	14.91	7.51	31.38	6.09	0.9
Mean of Factor-2		S1	10.11(2.99)	13.11(3.65)	4.67(2.23)	14.78(3.83)	7.11(2.71)	11.33(3.30)	11.00(3.34)	76.67(8.75)
		S2	1.00(1.15)	3.22(1.79)	2.89(1.80)	2.44(1.70)	3.78(2.05)	3.33(1.82)	1.78(1.41)	19.33(4.44)
		S3	3.44(1.87)	3.89(2.08)	2.67(1.75)	4.11(2.09)	3.33(1.93)	2.44(1.63)	2.11(1.55)	23.89(4.92)
	CD(0.05)	0.6	0.48	0.4	0.36	0.48	0.64	0.47	0.71	0.47
	CV%	29	18.77	20.35	13.88	20.84	27.82	28.44	32.97	7.56
Interaction										
	M and T	NS	NS	NS	NS	NS	NS	NS	NS	0.81
	T and M	NS	NS	NS	NS	NS	NS	NS	NS	0.66
Experimental Mean		2	2.5	1.93	2.54	2.23	2.25	1.61	2.1	6.04

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Gangavathi							
		Active tillering stage							
		Grasses		Sedges		BLW			
		<i>Echinochloa crusgalli</i>	<i>Digitaria longifolia</i>	<i>Oryza sativa sp spontanea</i>	<i>Cyperus rotundus</i>	Cyperus difformis	Cynotitis cristata		
M1	S1	5.56(2.19)	0.00(0.71)	0.93(1.07)	116.67(9.97)	1.85(1.29)	0.00(0.71)	125.00(10.33)	
	S2	1.85(1.29)	0.00(0.71)	0.00(0.71)	10.19(2.33)	5.56(1.85)	0.00(0.71)	19.44(3.87)	
	S3	0.00(0.71)	0.00(0.71)	0.00(0.71)	4.63(1.74)	0.93(1.07)	0.00(0.71)	5.56(1.85)	
M2	S1	21.30(4.58)	0.00(0.71)	53.70(6.16)	130.56(11.44)	12.04(3.05)	0.00(0.71)	236.11(15.34)	
	S2	25.00(4.77)	0.93(1.07)	12.04(2.49)	62.96(7.40)	1.85(1.29)	0.00(0.71)	105.56(10.10)	
	S3	4.63(2.24)	1.85(1.44)	0.00(0.71)	23.15(4.85)	0.00(0.71)	0.00(0.71)	29.63(5.48)	
M3	S1	0.00(0.71)	0.00(0.71)	188.89(13.68)	27.78(5.13)	0.00(0.71)	18.52(3.66)	235.19(15.31)	
	S2	1.85(1.29)	0.00(0.71)	72.22(8.52)	57.41(7.42)	4.63(1.74)	7.41(2.44)	143.52(11.96)	
	S3	0.00(0.71)	34.26(5.54)	4.63(1.74)	66.67(7.24)	0.93(1.07)	0.00(0.71)	106.48(10.27)	
Mean of Factor-1		M1	2.47(1.40)	0.00(0.71)	0.31(0.83)	43.83(4.68)	2.78(1.41)	0.00(0.71)	50.00(5.35)
		M2	16.98(3.87)	0.93(1.07)	21.91(3.12)	72.22(7.90)	4.63(1.68)	0.00(0.71)	123.77(10.31)
		M3	0.62(0.90)	11.42(2.32)	88.58(7.98)	50.62(6.60)	1.85(1.17)	8.64(2.27)	161.73(12.51)
		CD(0.05)	0.60	0.77	1.72	NS	NS	NS	2.02
		CV%	34.82	67.57	51.75	33.66	48.59	125.23	25.68
Mean of Factor-2		S1	8.95(2.49)	0.00(0.71)	81.17(6.97)	91.67(8.85)	4.63(1.68)	6.17(1.69)	198.77(13.66)
		S2	9.57(2.45)	0.31(0.83)	28.09(3.91)	43.52(5.72)	4.01(1.63)	2.47(1.28)	89.51(8.64)
		S3	1.54(1.22)	12.04(2.56)	1.54(1.05)	31.48(4.61)	0.62(0.95)	0.00(0.71)	47.22(5.87)
		CD(0.05)	1.05	0.89	2.08	3.41	NS	NS	2.67
		CV%	49.88	63.11	50.93	51.92	83.07	68.47	27.67
Interaction									
		M and T	NS	1.53	NS	NS	NS	NS	NS
		T and M	NS	1.33	NS	NS	NS	NS	NS
Experimental Mean			2.05	1.37	3.98	6.39	1.42	1.23	9.39

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Gangavathi				
		Panicle initiation stage				
		Grasses		Sedges	BLW	
		<i>Echinochloa crusgalli</i>	<i>Digiteria longifolia</i>	<i>Oryza sativa sp spontanea</i>	<i>Cyperus rotundus</i>	Cynotis cristata
M1	S1	3.70(1.88)	0.00(0.71)	0.00(0.71)	76.85(8.66)	0.00(0.71)
	S2	8.33(2.90)	0.00(0.71)	0.93(1.07)	14.81(3.73)	0.00(0.71)
	S3	0.93(1.07)	0.00(0.71)	0.00(0.71)	4.63(1.74)	0.00(0.71)
M2	S1	3.70(1.61)	0.00(0.71)	38.89(6.27)	95.37(9.77)	1.85(1.29)
	S2	2.78(1.46)	0.00(0.71)	24.07(4.78)	57.41(7.46)	0.00(0.71)
	S3	0.00(0.71)	0.00(0.71)	12.04(3.05)	11.11(2.99)	0.00(0.71)
M3	S1	0.00(0.71)	0.00(0.71)	87.04(9.32)	15.74(3.47)	27.78(5.32)
	S2	0.00(0.71)	0.00(0.71)	37.04(5.92)	44.44(6.42)	6.48(2.36)
	S3	0.00(0.71)	11.11(2.41)	18.52(4.05)	33.33(5.59)	0.00(0.71)
Mean of Factor-1						
M1		4.32(1.95)	0.00(0.71)	0.31(0.83)	32.10(4.71)	0.00(0.71)
M2		2.16(1.26)	0.00(0.71)	25.00(4.70)	54.63(6.74)	0.62(0.90)
M3		0.00(0.71)	3.70(1.27)	47.53(6.43)	31.17(5.16)	11.42(2.80)
CD(0.05)		NS	NS	0.96	NS	0.6
CV%		64.98	109.7	28.7	30.95	48.58
Mean of Factor-2						
S1		2.47(1.40)	0.00(0.71)	41.98(5.43)	62.65(7.30)	9.88(2.44)
S2		3.70(1.69)	0.00(0.71)	20.68(3.93)	38.89(5.87)	2.16(1.26)
S3		0.31(0.83)	3.70(1.27)	10.19(2.60)	16.36(3.44)	0.00(0.71)
CD(0.05)		NS	NS	1.47	2.15	0.61
CV%		66.14	109.7	35.84	37.74	40.15
Interaction						
M and T		NS	NS	NS	3.72	1.05
T and M		NS	NS	NS	3.13	0.92
Experimental Mean		1.31	0.9	3.99	5.54	1.47

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Jagdalpur									
		Active tillering stage									
		Grasses			Sedges			BLW			Total
		<i>Echinochloa spp</i>	<i>Cynodon dactylon</i>	<i>Paspalum dilatun</i>	<i>Ischaemum rugosum</i>	<i>Cyperus rotundus</i>	<i>Cyperus iria</i>	Cyperus diformis	Ludwigia spp	Aegeratum spp	
M1	S1	5.00(2.32)	0.00(0.71)	2.67(1.64)	8.00(2.90)	1.53(1.41)	3.95(2.08)	1.63(1.40)	10.67(3.31)	0.00(0.71)	33.45(5.82)
	S2	11.43(3.41)	0.62(1.01)	0.52(0.99)	4.33(2.16)	0.73(1.08)	2.67(1.75)	3.14(1.80)	5.78(2.45)	0.00(0.71)	29.22(5.44)
	S3	10.00(3.23)	0.42(0.93)	0.88(1.13)	10.33(3.24)	0.23(0.85)	1.13(1.16)	1.50(1.32)	0.85(1.08)	0.00(0.71)	25.35(5.08)
M2	S1	9.50(3.14)	0.08(0.76)	1.02(1.20)	1.67(1.39)	2.56(1.73)	2.30(1.66)	3.66(2.01)	17.80(4.23)	0.00(0.71)	38.58(6.19)
	S2	1.37(1.33)	0.43(0.94)	0.17(0.80)	1.00(1.10)	1.54(1.40)	2.03(1.49)	2.25(1.53)	10.02(3.21)	0.00(0.71)	18.81(4.39)
	S3	3.03(1.84)	0.00(0.71)	0.53(0.95)	2.33(1.54)	0.30(0.88)	1.50(1.33)	0.93(1.11)	0.44(0.93)	0.00(0.71)	9.07(3.04)
M3	S1	16.27(4.06)	7.05(2.70)	6.20(2.53)	29.33(5.44)	4.32(2.18)	15.17(3.91)	4.53(2.21)	17.05(4.16)	13.43(3.65)	113.36(10.64)
	S2	6.12(2.53)	3.18(1.92)	3.17(1.91)	2.00(1.32)	2.35(1.68)	3.52(1.92)	1.68(1.44)	6.80(2.64)	3.20(1.91)	32.02(5.68)
	S3	6.54(2.63)	4.33(2.17)	1.20(1.30)	3.00(1.71)	1.16(1.29)	1.03(1.16)	1.72(1.46)	1.62(1.35)	0.22(0.83)	20.81(4.55)
Mean of Factor-1											
M1		8.81(2.99)	0.34(0.88)	1.36(1.25)	7.56(2.77)	0.83(1.11)	2.58(1.66)	2.09(1.51)	5.77(2.28)	0.00(0.71)	29.34(5.45)
M2		4.63(2.11)	0.17(0.80)	0.57(0.99)	1.67(1.34)	1.47(1.34)	1.94(1.49)	2.28(1.55)	9.42(2.79)	0.00(0.71)	22.16(4.54)
M3		9.64(3.07)	4.86(2.26)	3.52(1.92)	11.44(2.82)	2.61(1.72)	6.57(2.33)	2.64(1.71)	8.49(2.72)	5.62(2.13)	55.40(6.96)
CD(0.05)		0.13	0.23	NS	0.58	0.21	NS	NS	NS	0.26	0.47
CV%		5.75	21.07	43.79	30.09	18.41	42.89	28.02	25.51	26.2	9.94
Mean of Factor-2											
S1		10.26(3.17)	2.38(1.39)	3.30(1.79)	13.00(3.24)	2.81(1.78)	7.14(2.55)	3.27(1.87)	15.17(3.90)	4.48(1.69)	61.80(7.55)
S2		6.31(2.43)	1.41(1.29)	1.28(1.23)	2.44(1.52)	1.54(1.39)	2.74(1.72)	2.36(1.59)	7.53(2.77)	1.07(1.11)	26.68(5.17)
S3		6.52(2.57)	1.58(1.27)	0.87(1.13)	5.22(2.17)	0.56(1.01)	1.22(1.22)	1.38(1.30)	0.97(1.12)	0.07(0.75)	18.41(4.22)
CD(0.05)		0.6	NS	0.4	0.78	0.21	0.54	NS	0.65	0.36	0.77
CV%		21.55	26.57	28.46	32.89	14.84	28.54	34.09	24.23	29.59	13.24
Interaction											
M and T		1.04	NS	NS	1.35	NS	0.93	NS	NS	0.62	1.33
T and M		0.85	NS	NS	1.15	NS	0.86	NS	NS	0.53	1.11
Experimental Mean		2.72	1.32	1.38	2.31	1.39	1.83	1.59	2.6	1.18	5.65

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Jagdalpur									
		Panicle initiation stage					Sedges				
		Grasses			Cyperus		BLW			Total	
		<i>Echinochloa spp</i>	<i>Cynodon dactylon</i>	<i>Paspalum dilatatum</i>	<i>Ischaemum rugosum</i>	<i>Cyperus rotundus</i>	<i>Cyperus iria</i>	Cyperus diformis	Ludwigia spp	Aegeratum spp	Total
M1	S1	13.87(3.77)	0.77(1.06)	1.82(1.51)	11.63(3.45)	1.95(1.55)	5.22(2.35)	5.08(2.35)	12.03(3.51)	0.00(0.71)	52.36(7.26)
	S2	10.00(3.23)	0.08(0.76)	3.11(1.81)	5.54(2.44)	1.18(1.28)	4.17(2.13)	5.38(2.37)	4.62(2.25)	0.00(0.71)	34.09(5.88)
	S3	5.00(2.32)	0.00(0.71)	1.08(1.19)	3.67(1.83)	0.20(0.82)	1.92(1.46)	1.93(1.42)	1.17(1.19)	0.00(0.71)	14.96(3.87)
M2	S1	9.50(3.14)	0.08(0.76)	1.60(1.41)	3.75(1.98)	3.19(1.90)	3.15(1.89)	5.47(2.42)	19.97(4.48)	0.00(0.71)	46.70(6.82)
	S2	1.37(1.33)	0.43(0.94)	0.28(0.86)	2.33(1.66)	1.93(1.52)	2.18(1.52)	2.80(1.72)	8.53(2.86)	0.00(0.71)	19.86(4.50)
	S3	3.03(1.84)	0.00(0.71)	0.71(1.01)	1.07(1.20)	0.42(0.95)	1.88(1.45)	1.23(1.19)	0.87(1.06)	0.00(0.71)	9.21(3.07)
M3	S1	16.27(4.06)	8.10(2.88)	6.83(2.64)	37.32(6.11)	5.93(2.53)	19.31(4.37)	8.53(3.00)	20.60(4.57)	1.07(1.20)	123.96(11.14)
	S2	6.12(2.53)	3.83(2.08)	3.62(2.03)	3.99(2.03)	3.21(1.92)	7.33(2.77)	2.92(1.85)	9.03(3.05)	1.25(1.25)	41.30(6.46)
	S3	6.54(2.63)	4.73(2.25)	1.13(1.27)	1.50(1.33)	2.07(1.58)	1.54(1.34)	1.97(1.56)	2.90(1.74)	0.00(0.71)	22.38(4.70)
Mean of Factor-1											
M1	M1	9.62(3.10)	0.28(0.84)	2.00(1.51)	6.94(2.57)	1.11(1.22)	3.77(1.98)	4.13(2.05)	5.94(2.32)	0.00(0.71)	33.80(5.67)
	M2	4.63(2.11)	0.17(0.80)	0.86(1.09)	2.38(1.61)	1.84(1.46)	2.40(1.62)	3.17(1.78)	9.79(2.80)	0.00(0.71)	25.26(4.80)
	M3	9.64(3.07)	5.56(2.40)	3.86(1.98)	14.27(3.16)	3.74(2.01)	9.39(2.83)	4.47(2.13)	10.84(3.12)	0.77(1.05)	62.55(7.43)
CD(0.05)	CD(0.05)	0.11	0.27	NS	0.2	0.27	NS	NS	NS	0.15	0.33
	CV%	4.73	24.32	35.42	9.74	20.82	36.95	28.9	22.99	21.18	6.61
	Mean of Factor-2										
S1	S1	13.21(3.65)	2.98(1.57)	3.42(1.85)	17.57(3.85)	3.69(1.99)	9.22(2.87)	6.36(2.59)	17.53(4.19)	0.36(0.87)	74.34(8.41)
	S2	5.83(2.36)	1.45(1.26)	2.34(1.57)	3.95(2.04)	2.11(1.57)	4.56(2.14)	3.70(1.98)	7.39(2.72)	0.42(0.89)	31.75(5.61)
	S3	4.86(2.26)	1.58(1.22)	0.97(1.16)	2.08(1.45)	0.90(1.12)	1.78(1.42)	1.71(1.39)	1.64(1.33)	0.00(0.71)	15.52(3.88)
CD(0.05)	CD(0.05)	0.59	NS	0.47	0.82	0.23	0.64	0.49	0.77	NS	0.82
	CV%	20.77	24.28	30.12	32.47	14.25	29.16	23.84	27.41	30.39	13.41
Interaction	M and T	NS	NS	NS	1.41	NS	1.11	NS	NS	NS	1.42
	T and M	NS	NS	NS	1.16	NS	0.99	NS	NS	NS	1.17
	Experimental Mean	2.76	1.35	1.53	2.45	1.56	2.14	1.99	2.75	0.82	5.97

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Malan									
		Active tillering stage					Sedges				
		Grasses			Cyperus		BLW			Total	
		<i>Echinochloa colonum</i>	<i>Echinochloa crusgalli</i>	<i>Panicum spp.</i>	<i>Cyperus iria</i>	<i>Cyperus rotundus</i>	<i>Cyperus difformis</i>	<i>Alternanthera spp.</i>	<i>Eclipta alba</i>	<i>Monochoria vaginalis</i>	Total
M1	S1	15.67(4.02)	8.33(2.97)	4.33(2.18)	3.33(1.95)	2.67(1.77)	4.00(2.12)	4.33(2.19)	3.67(2.04)	5.67(2.47)	52.00(7.24)
	S2	10.00(3.24)	6.33(2.60)	3.33(1.95)	2.67(1.77)	2.33(1.68)	2.67(1.77)	1.67(1.44)	2.00(1.56)	3.33(1.95)	34.33(5.90)
	S3	6.33(2.57)	2.67(1.76)	2.00(1.56)	2.00(1.58)	1.33(1.34)	3.00(1.86)	3.00(1.86)	2.00(1.56)	2.00(1.56)	24.33(4.96)
M2	S1	16.67(4.14)	12.67(3.62)	8.00(2.91)	7.00(2.73)	8.67(3.02)	8.00(2.91)	7.00(2.73)	11.00(3.38)	9.33(3.13)	88.33(9.42)
	S2	12.67(3.62)	8.00(2.91)	2.33(1.68)	9.33(3.12)	5.00(2.34)	5.33(2.40)	5.00(2.34)	5.00(2.34)	6.33(2.61)	59.00(7.71)
	S3	5.00(2.34)	2.33(1.64)	1.67(1.46)	2.00(1.58)	2.33(1.68)	2.67(1.76)	3.33(1.93)	3.00(1.87)	2.33(1.68)	24.67(5.01)
M3	S1	17.33(4.19)	14.33(3.83)	9.00(3.08)	10.33(3.29)	11.33(3.42)	11.33(3.41)	8.67(3.02)	13.00(3.64)	12.00(3.53)	107.33(10.35)
	S2	10.00(3.20)	9.00(3.08)	6.33(2.60)	8.33(2.97)	8.67(3.02)	6.00(2.54)	6.00(2.54)	6.00(2.54)	10.00(3.23)	70.33(8.41)
	S3	8.33(2.97)	2.00(1.56)	2.33(1.68)	3.00(1.87)	3.33(1.95)	2.00(1.56)	2.00(1.58)	2.67(1.74)	2.33(1.60)	28.00(5.34)
Mean of Factor-1											
M1	M1	10.67(3.27)	5.78(2.45)	3.22(1.90)	2.67(1.77)	2.11(1.60)	3.22(1.92)	3.00(1.83)	2.56(1.72)	3.67(1.99)	36.89(6.04)
	M2	11.44(3.37)	7.67(2.73)	4.00(2.02)	6.11(2.48)	5.33(2.35)	5.33(2.36)	5.11(2.34)	6.33(2.53)	6.00(2.47)	57.33(7.38)
	M3	11.89(3.46)	8.44(2.82)	5.89(2.45)	7.22(2.71)	7.78(2.80)	6.44(2.50)	5.56(2.38)	7.22(2.64)	8.11(2.79)	68.56(8.03)
CD(0.05)	CD(0.05)	NS	NS	0.17	0.14	0.24	NS	0.21	0.24	0.16	0.48
	CV%	14.44	16.56	9.76	7.28	12.6	19.83	11.41	12.48	7.98	8.05
	Mean of Factor-2										
S1	S1	16.56(4.12)	11.78(3.47)	7.11(2.72)	6.89(2.66)	7.56(2.74)	7.78(2.81)	6.67(2.65)	9.22(3.02)	9.00(3.04)	82.56(9.01)
	S2	10.89(3.36)	7.78(2.86)	4.00(2.08)	6.78(2.62)	5.33(2.35)	4.67(2.24)	4.22(2.11)	4.33(2.15)	6.56(2.60)	54.56(7.34)
	S3	6.56(2.63)	2.33(1.65)	2.00(1.57)	2.33(1.68)	2.33(1.66)	2.56(1.73)	2.78(1.79)	2.56(1.72)	2.22(1.61)	25.67(5.10)
CD(0.05)	CD(0.05)	0.36	0.29	0.24	0.2	0.2	0.26	0.23	0.39	0.37	0.43
	CV%	10.41	10.46	10.89	8.36	8.75	11.09	10.18	16.47	14.92	5.85
Interaction	Interaction										
	M and T	NS	NS	NS	0.34	NS	NS	NS	NS	NS	0.74
	T and M	NS	NS	NS	0.29	NS	NS	NS	NS	NS	0.67
Experimental Mean		3.37	2.66	2.12	2.32	2.25	2.26	2.18	2.3	2.42	7.15

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Contd.

		Malan									
		Panicle initiation stage									
Main plot	Sub plot treatments	Grasses			Sedges			BLW			Total
		<i>Echinochloa colonum</i>	<i>Echinochloa crusgalli</i>	<i>Panicum spp.</i>	<i>Cyperus iria</i>	<i>Cyperus rotundus</i>	<i>Cyperus difformis</i>	<i>Alternanthera spp.</i>	<i>Eclipta alba</i>	Monochoria vaginalis	
M1	S1	18.00(4.30)	6.33(2.61)	4.00(2.11)	3.67(2.03)	2.00(1.56)	2.67(1.76)	5.00(2.35)	4.33(2.20)	6.33(2.60)	52.33(7.27)
	S2	12.00(3.53)	5.33(2.41)	4.00(2.11)	2.00(1.56)	1.67(1.46)	2.33(1.68)	3.33(1.95)	2.67(1.77)	4.00(2.11)	37.33(6.15)
	S3	5.67(2.48)	1.33(1.34)	1.33(1.34)	2.00(1.56)	1.00(1.22)	9.00(2.79)	1.67(1.46)	1.67(1.46)	2.33(1.68)	26.00(5.08)
M2	S1	17.00(4.18)	9.00(3.08)	6.33(2.61)	6.00(2.54)	7.33(2.77)	7.00(2.72)	8.00(2.91)	8.33(2.96)	7.67(2.86)	76.67(8.78)
	S2	11.33(3.44)	5.67(2.48)	1.67(1.46)	7.67(2.85)	4.33(2.18)	5.00(2.32)	6.33(2.58)	4.67(2.26)	5.33(2.41)	52.00(7.24)
	S3	5.67(2.48)	3.00(1.86)	1.00(1.22)	1.33(1.34)	2.00(1.58)	2.33(1.64)	2.67(1.77)	3.67(2.04)	2.67(1.77)	24.33(4.98)
M3	S1	18.00(4.29)	9.67(3.18)	7.67(2.85)	9.00(3.08)	7.33(2.78)	11.33(3.41)	9.33(3.13)	13.33(3.69)	13.33(3.71)	99.00(9.95)
	S2	11.33(3.40)	6.33(2.61)	6.00(2.55)	7.67(2.86)	8.00(2.91)	7.33(2.78)	7.33(2.79)	5.67(2.48)	7.00(2.73)	66.67(8.19)
	S3	7.00(2.73)	1.67(1.46)	1.33(1.34)	2.67(1.77)	0.00(0.71)	2.00(1.52)	0.00(0.71)	2.00(1.56)	2.67(1.74)	25.00(5.05)
Mean of Factor-1		11.89(3.44)	4.33(2.12)	3.11(1.86)	2.56(1.72)	1.56(1.42)	4.67(2.08)	3.33(1.92)	2.89(1.81)	4.22(2.13)	38.56(6.16)
CD(0.05)	M1	11.33(3.37)	5.89(2.47)	3.00(1.77)	5.00(2.25)	4.56(2.18)	4.78(2.23)	5.67(2.42)	5.56(2.42)	5.22(2.35)	51.00(7.00)
	M2	12.11(3.47)	5.89(2.42)	5.00(2.25)	6.44(2.57)	5.11(2.13)	6.89(2.57)	5.56(2.21)	7.00(2.58)	7.67(2.73)	63.56(7.73)
	M3	NS	0.14	0.22	0.32	0.23	NS	NS	0.28	0.27	0.56
CV%		14.31	7.35	13.16	17.68	14.12	34.37	13.76	14.84	13.44	9.6
Mean of Factor-2		17.67(4.26)	8.33(2.96)	6.00(2.53)	6.22(2.55)	5.56(2.37)	7.00(2.63)	7.44(2.80)	8.67(2.95)	9.11(3.06)	76.00(8.67)
CD(0.05)	S1	11.56(3.46)	5.78(2.50)	3.89(2.04)	5.78(2.42)	4.67(2.18)	4.89(2.26)	5.67(2.44)	4.33(2.17)	5.44(2.42)	52.00(7.19)
	S2	6.11(2.56)	2.00(1.55)	1.22(1.30)	2.00(1.56)	1.00(1.17)	4.44(1.99)	1.44(1.31)	2.44(1.69)	2.56(1.73)	25.11(5.03)
	S3	0.23	0.19	0.15	0.19	0.3	NS	0.21	0.29	0.19	0.43
CV%		6.64	7.73	7.47	8.43	15.12	25.26	9.37	12.5	7.83	5.98
Interaction		NS	NS	0.26	0.33	0.51	NS	0.36	NS	NS	0.74
M and T	T and M	NS	NS	0.25	0.34	0.44	NS	0.33	NS	NS	0.7
	Experimental Mean	3.43	2.34	1.96	2.18	1.91	2.29	2.18	2.27	2.4	6.96

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Monocrop					
		Active tillering stage					
		Grasses		Sedges		BLW	
		<i>Isachnae miliceae</i>	<i>Echinochloa stagnina</i>	<i>O.sativa f.sp. spontanea</i>	<i>Cyperus difformis</i>	<i>Monochoria vaginalis</i>	<i>Ludwigia hyssopifolia</i>
M1	S1	221.33(14.78)	86.67(9.14)	0.00(0.71)	2.67(1.44)	8.00(2.12)	5.33(2.18)
	S2	76.00(7.36)	34.67(5.90)	0.00(0.71)	0.00(0.71)	9.33(2.77)	0.00(0.71)
	S3	236.00(15.34)	0.00(0.71)	2.67(1.44)	0.00(0.71)	0.00(0.71)	0.00(0.71)
M2	S1	106.67(8.64)	41.33(6.44)	0.00(0.71)	2.67(1.44)	8.00(2.86)	2.67(1.44)
	S2	50.67(6.06)	40.00(6.29)	0.00(0.71)	0.00(0.71)	9.33(2.77)	4.00(1.91)
	S3	236.00(15.23)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)
M3	S1	228.00(14.91)	40.00(6.18)	0.00(0.71)	8.00(2.12)	8.00(2.56)	6.67(2.39)
	S2	92.00(8.08)	24.00(4.86)	0.00(0.71)	0.00(0.71)	6.67(2.39)	1.33(1.18)
	S3	128.00(10.80)	0.00(0.71)	1.33(1.18)	2.67(1.44)	0.00(0.71)	0.00(0.71)
Mean of Factor-1							
M1	M1	177.78(12.49)	40.44(5.25)	0.89(0.95)	0.89(0.95)	5.78(1.87)	1.78(1.20)
	M2	131.11(9.98)	27.11(4.48)	0.00(0.71)	0.89(0.95)	5.78(2.11)	2.22(1.35)
	M3	149.33(11.26)	21.33(3.92)	0.44(0.86)	3.56(1.42)	4.89(1.88)	2.67(1.42)
CD(0.05)	CD(0.05)	NS	NS	NS	NS	NS	NS
	CV%	45.99	33.46	44.32	135.17	78.32	69.55
	Mean of Factor-2						
S1	S1	185.33(12.78)	56.00(7.26)	0.00(0.71)	4.44(1.67)	8.00(2.51)	4.89(2.00)
	S2	72.89(7.17)	32.89(5.68)	0.00(0.71)	0.00(0.71)	8.44(2.64)	1.78(1.27)
	S3	200.00(13.79)	0.00(0.71)	1.33(1.11)	0.89(0.95)	0.00(0.71)	0.00(0.71)
CD(0.05)	CD(0.05)	4.61	1.12	NS	NS	1.42	0.99
	CV%	39.95	24	59.99	83.65	70.95	72.61
Interaction	Interaction						
	M and T	NS	NS	NS	NS	NS	NS
	T and M	NS	NS	NS	NS	NS	NS
Experimental Mean		11.24	4.55	0.84	1.11	1.95	1.33

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Moncompu					
		Panicle initiation stage					
		Grasses		Sedges	BLW		Total
		Isachnae miliaceae	Echinochloa stagnina		Monochoria vaginalis	Ludwigia hyssopifolia	
M1	S1	181.33(13.36)	89.33(9.42)	0.00(0.71)	0.00(0.71)	5.33(2.18)	276.000
	S2	130.67(11.41)	45.33(6.55)	0.00(0.71)	4.00(1.65)	4.00(1.65)	184.000
	S3	226.67(14.95)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	226.670
M2	S1	202.67(14.00)	52.00(7.16)	5.33(1.83)	5.33(1.83)	2.67(1.44)	268.000
	S2	125.33(11.21)	33.33(5.77)	0.00(0.71)	0.00(0.71)	0.00(0.71)	158.670
	S3	248.00(15.70)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	248.000
M3	S1	209.33(14.01)	36.00(5.97)	0.00(0.71)	0.00(0.71)	0.00(0.71)	245.330
	S2	76.00(7.22)	17.33(4.18)	0.00(0.71)	2.67(1.44)	1.33(1.18)	97.330
	S3	128.00(10.53)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	128.000
Mean of Factor-1							
M1		179.56(13.24)	44.89(5.56)	0.00(0.71)	1.33(1.02)	3.11(1.51)	228.890
M2		192.00(13.64)	28.44(4.55)	1.78(1.08)	1.78(1.08)	0.89(0.95)	224.890
M3		137.78(10.59)	17.78(3.62)	0.00(0.71)	0.89(0.95)	0.44(0.86)	156.890
CD(0.05)		NS	0.6	NS	NS	NS	NS
CV%		25.16	15.59	77.66	18.79	104.06	31.29
Mean of Factor-2							
S1		197.78(13.79)	59.11(7.52)	1.78(1.08)	1.78(1.08)	2.67(1.44)	263.110
S2		110.67(9.95)	32.00(5.50)	0.00(0.71)	2.22(1.27)	1.78(1.18)	146.670
S3		200.89(13.73)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	200.890
CD(0.05)		2.42	1.23	NS	NS	NS	69.86
CV%		18.83	26.16	77.66	92.88	70.73	33.41
Interaction							
M and T		NS	NS	NS	NS	NS	NS
T and M		NS	NS	NS	NS	NS	NS
Experimental Mean		12.49	4.58	0.83	1.02	1.11	203.56

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Nawagam								
		Active tillering stage					Sedges			
		<i>Echinochloa crusgalli</i>	<i>Echinochloa colonum</i>	<i>Cynodon dactylon</i>	<i>Chloris barbata</i>	<i>Digitaria sanguinalis</i>	<i>Cyperus rotundus</i>	<i>Cyperus iria</i>	<i>Cyperus esculentus</i>	
M1	S1	108.00(10.39)	110.00(10.40)	107.67(10.33)	105.33(10.08)	85.00(9.15)	82.00(9.05)	114.33(10.70)	104.33(10.21)	
	S2	42.33(6.44)	48.67(6.92)	39.00(6.23)	44.33(6.53)	57.67(7.60)	72.00(8.42)	71.33(8.38)	89.00(9.44)	
	S3	32.33(5.62)	35.67(6.00)	30.67(5.50)	35.33(5.91)	56.67(7.42)	55.33(7.30)	55.33(7.28)	82.67(9.09)	
M2	S1	108.00(10.38)	117.00(10.76)	115.67(10.75)	93.00(9.61)	80.33(8.86)	84.67(9.09)	77.67(8.68)	83.00(9.08)	
	S2	42.00(6.27)	59.33(7.63)	51.00(7.01)	50.00(6.92)	58.67(7.45)	40.33(6.36)	70.00(8.23)	73.67(8.58)	
	S3	33.00(5.55)	34.33(5.63)	46.00(6.69)	55.00(7.37)	67.67(8.11)	47.33(6.65)	59.33(7.35)	53.33(7.29)	
M3	S1	130.00(11.34)	95.33(9.73)	139.67(11.82)	137.67(11.71)	83.67(9.16)	82.00(9.02)	89.33(9.47)	80.67(8.96)	
	S2	58.33(7.52)	67.67(8.19)	59.00(7.50)	49.33(7.01)	87.00(9.34)	71.33(8.41)	57.00(7.51)	72.67(8.44)	
	S3	50.67(7.11)	63.33(7.88)	53.00(7.07)	67.67(8.20)	32.00(5.57)	67.33(8.22)	48.67(6.95)	53.00(7.15)	
Mean of Factor-1		M1	60.89(7.48)	64.78(7.77)	59.11(7.35)	61.67(7.51)	66.44(8.06)	69.78(8.26)	80.33(8.79)	92.00(9.58)
		M2	61.00(7.40)	70.22(8.00)	70.89(8.15)	66.00(7.97)	68.89(8.14)	57.44(7.37)	69.00(8.08)	70.00(8.32)
		M3	79.67(8.66)	75.44(8.60)	83.89(8.80)	84.89(8.97)	67.56(8.03)	73.56(8.55)	65.00(7.97)	68.78(8.18)
		CD(0.05)	NS	NS	NS	NS	NS	NS	NS	NS
		CV%	27.93	12.87	11.71	22.7	13.76	14.81	30.23	16.06
Mean of Factor-2		S1	115.33(10.70)	107.44(10.30)	121.00(10.97)	112.00(10.47)	83.00(9.06)	82.89(9.06)	93.78(9.62)	89.33(9.42)
		S2	47.56(6.74)	58.56(7.58)	49.67(6.91)	47.89(6.82)	67.78(8.13)	61.22(7.73)	66.11(8.04)	78.44(8.82)
		S3	38.67(6.10)	44.44(6.50)	43.22(6.42)	52.67(7.16)	52.11(7.03)	56.67(7.39)	54.44(7.19)	63.00(7.85)
		CD(0.05)	1.4	1.63	1.48	1.57	NS	1.27	1.14	1.21
		CV%	17.42	19.52	17.75	18.77	20.79	15.32	13.45	13.59
Interaction		M and T	NS	NS	NS	NS	NS	NS	NS	NS
		T and M	NS	NS	NS	NS	NS	NS	NS	NS
Experimental Mean			7.85	8.13	8.1	8.15	8.08	8.06	8.28	8.69

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Nawagam							
		Grasses				Panicle initiation stage			
		<i>Echinochloa crusgalli</i>	<i>Echinochloa colonum</i>	<i>Cynodon dactylon</i>	<i>Chloris barbata</i>	<i>Digitaria sanguinalis</i>	<i>Cyperus rotundus</i>	<i>Cyperus iria</i>	<i>Cyperus esculentus</i>
M1	S1	147.00(11.98)	182.67(13.14)	167.33(12.90)	220.67(14.23)	100.67(9.81)	103.33(10.15)	138.00(11.45)	115.67(10.76)
	S2	110.67(10.53)	93.67(9.59)	129.33(11.31)	99.33(9.87)	60.33(7.66)	58.33(7.45)	67.33(8.08)	70.33(8.25)
	S3	45.67(6.73)	82.00(9.04)	53.00(7.11)	52.00(7.16)	47.67(6.82)	49.00(6.86)	49.00(6.84)	38.33(6.06)
M2	S1	147.00(11.88)	205.00(13.91)	147.67(12.13)	100.00(9.79)	111.00(9.97)	100.67(9.96)	73.00(8.27)	91.00(9.52)
	S2	73.00(8.52)	109.33(10.45)	80.67(9.00)	69.00(8.24)	92.00(9.60)	53.00(7.01)	39.67(6.29)	47.33(6.82)
	S3	55.00(7.35)	41.33(6.29)	47.33(6.89)	46.67(6.71)	43.33(6.48)	46.67(6.45)	40.00(6.25)	51.67(6.68)
M3	S1	164.00(12.71)	138.33(11.37)	140.33(11.40)	76.67(8.70)	143.33(11.64)	119.33(10.66)	132.00(11.33)	104.67(10.06)
	S2	56.00(7.45)	69.33(8.13)	96.33(9.83)	54.67(7.30)	141.67(11.78)	70.00(8.24)	54.67(7.40)	116.33(10.44)
	S3	34.67(5.72)	58.33(7.50)	41.33(6.24)	28.67(5.38)	30.67(5.49)	28.00(5.29)	72.00(8.49)	37.00(5.83)
Mean of Factor-1									
Mean of Factor-2	M1	101.11(9.74)	119.44(10.59)	116.56(10.44)	124.00(10.42)	69.56(8.10)	70.22(8.15)	84.78(8.79)	74.78(8.36)
	M2	91.67(9.25)	118.56(10.22)	91.89(9.34)	71.89(8.25)	82.11(8.69)	66.78(7.81)	50.89(6.94)	63.33(7.67)
	M3	84.89(8.63)	88.67(9.00)	92.67(9.16)	53.33(7.13)	105.22(9.64)	72.44(8.06)	86.22(9.07)	86.00(8.78)
	CD(0.05)	NS	NS	NS	NS	NS	NS	NS	NS
	CV%	19.23	22.45	20.92	24.41	28.07	25.71	16.63	19.61
	S1	152.67(12.19)	175.33(12.81)	151.78(12.14)	132.44(10.91)	118.33(10.47)	107.78(10.26)	114.33(10.35)	103.78(10.11)
	S2	79.89(8.83)	90.78(9.39)	102.11(10.05)	74.33(8.47)	98.00(9.68)	60.44(7.56)	53.89(7.26)	78.00(8.50)
	S3	45.11(6.60)	60.56(7.61)	47.22(6.75)	42.44(6.41)	40.56(6.27)	41.22(6.20)	53.67(7.19)	42.33(6.19)
	CD(0.05)	2.04	3.06	2.06	2.26	2.15	1.9	2.33	2.55
	CV%	21.58	30.01	20.83	25.63	23.78	23.12	27.43	30.02
Interaction	M and T	NS	NS	NS	NS	NS	NS	NS	NS
	T and M	NS	NS	NS	NS	NS	NS	NS	NS
	Experimental Mean	9.21	9.93	9.64	8.6	8.81	8.01	8.27	8.27

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Contd.

Nawagam						
Panicle initiation stage						
BLW						
Main plot	Sub plot treatments	Mollugo verticillata	Eclipta prostrata	Ipomoea aquatica	Solanum retroflexum	Total
M1	S1	104.00(9.69)	66.00(7.98)	133.67(11.50)	88.67(9.42)	1567.67(39.58)
	S2	67.33(7.99)	72.33(8.47)	66.67(8.03)	56.33(7.34)	952.00(30.86)
	S3	31.00(5.42)	37.67(5.87)	44.67(6.66)	49.00(6.88)	579.00(24.07)
M2	S1	63.67(7.82)	80.33(8.88)	61.33(7.54)	97.33(9.55)	1278.00(35.68)
	S2	48.33(6.89)	55.33(7.30)	59.67(7.57)	79.67(8.89)	807.00(28.41)
	S3	34.00(5.81)	45.33(6.52)	38.33(5.94)	31.33(5.54)	521.00(22.79)
M3	S1	75.33(8.55)	66.67(7.78)	103.67(10.08)	132.33(11.17)	1396.67(37.37)
	S2	89.33(9.45)	56.67(7.45)	119.67(10.80)	32.00(5.66)	956.67(30.93)
	S3	57.67(7.38)	60.67(7.72)	57.00(7.23)	66.00(7.82)	572.00(23.90)
Mean of Factor-1						
M1		67.44(7.70)	58.67(7.44)	81.67(8.73)	64.67(7.88)	1032.89(31.50)
M2		48.67(6.84)	60.33(7.57)	53.11(7.02)	69.44(7.99)	868.67(28.96)
M3		74.11(8.46)	61.33(7.65)	93.44(9.37)	76.78(8.22)	975.11(30.73)
CD(0.05)		0.68	NS	NS	NS	NS
CV%		10.54	39.61	29.2	26.46	6.08
Mean of Factor-2						
S1		81.00(8.69)	71.00(8.21)	99.56(9.71)	106.11(10.05)	1414.11(37.54)
S2		68.33(8.11)	61.44(7.74)	82.00(8.80)	56.00(7.29)	905.22(30.06)
S3		40.89(6.20)	47.89(6.70)	46.67(6.61)	48.78(6.75)	557.33(23.59)
CD(0.05)		NS	NS	2.14	2.26	1.29
CV%		33.12	24.08	24.87	27.4	4.12
Interaction						
M and T		NS	NS	NS	NS	NS
T and M		NS	NS	NS	NS	NS
Experimental Mean		7.67	7.55	8.37	8.03	30.4

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot		Sub plot treatments	Pantnagar					
			Active tillering stage					
			Sedges		BLW		Total	
			Cyperus iria	Cyperus difformis	Alternanthera sessilis	Commelina diffusa		
Echinochloa colonum								
M1		S1	14.00(3.80)	13.33(3.71)	7.33(2.79)	9.33(3.12)	13.33(3.69)	57.33(7.59)
		S2	2.00(1.47)	6.00(2.53)	3.33(1.94)	2.67(1.65)	1.33(1.29)	15.33(3.94)
		S3	5.33(2.41)	0.67(1.00)	1.33(1.29)	5.33(2.39)	0.67(1.00)	13.33(3.69)
M2		S1	22.00(4.73)	16.67(4.14)	10.00(3.23)	12.00(3.50)	10.67(3.33)	71.33(8.47)
		S2	4.67(2.21)	6.67(2.65)	2.67(1.65)	2.67(1.65)	2.00(1.47)	18.67(4.36)
		S3	1.33(1.18)	6.67(2.67)	2.00(1.58)	2.00(1.47)	0.67(1.00)	12.67(3.62)
M3		S1	19.33(4.45)	16.67(4.14)	7.33(2.79)	12.00(3.50)	12.00(3.53)	67.33(8.24)
		S2	6.67(2.67)	3.33(1.94)	2.00(1.47)	6.67(2.65)	7.33(2.79)	26.00(5.15)
		S3	4.67(2.26)	0.67(1.00)	0.00(0.71)	2.67(1.76)	0.67(1.00)	11.95(3.48)
Mean of Factor-1								
M1			7.11(2.56)	6.67(2.41)	4.00(2.01)	5.78(2.39)	5.11(1.99)	28.67(5.08)
M2			9.33(2.71)	10.00(3.15)	4.89(2.15)	5.56(2.21)	4.44(1.93)	34.22(5.48)
M3			10.22(3.13)	6.89(2.36)	3.11(1.66)	7.11(2.64)	6.67(2.44)	35.10(5.62)
CD(0.05)			NS	0.26	NS	NS	NS	0.24
CV%			18.86	11.54	19.47	17.85	18.3	5.22
Mean of Factor-2								
S1			18.44(4.33)	15.56(4.00)	8.22(2.94)	11.11(3.38)	12.00(3.52)	65.33(8.10)
S2			4.44(2.12)	5.33(2.37)	2.67(1.69)	4.00(1.98)	3.56(1.85)	20.00(4.48)
S3			3.78(1.95)	2.67(1.56)	1.11(1.19)	3.33(1.87)	0.67(1.00)	12.65(3.60)
CD(0.05)			0.51	0.39	0.49	0.69	0.55	0.58
CV%			17.86	14.29	24.63	28.02	25.26	10.47
Interaction								
M and T			NS	NS	NS	NS	NS	NS
T and M			NS	NS	NS	NS	NS	NS
Experimental Mean			2.8	2.64	1.94	2.41	2.12	5.39

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Pantnagar						
		Panicle initiation stage						
		Grasses		Sedges			BLW	
		<i>Echinochloa colonum</i>	<i>Eleusine indica</i>	Cyperus iria	Cyperus difformis	Alternanthera sessilis	Commelina diffusa	Total
M1	S1	18.67(4.37)	39.33(6.29)	10.00(3.23)	6.00(2.53)	2.67(1.76)	11.33(3.42)	88.00(9.39)
	S2	1.33(1.29)	5.33(2.18)	3.33(1.94)	2.67(1.65)	1.33(1.18)	1.33(1.18)	15.33(3.79)
	S3	1.33(1.29)	2.67(1.65)	2.00(1.47)	2.67(1.65)	0.67(1.00)	1.67(1.35)	11.00(3.27)
M2	S1	25.33(5.08)	41.00(6.44)	15.33(3.97)	4.67(2.06)	12.67(3.61)	13.33(3.71)	112.33(10.62)
	S2	2.67(1.76)	8.00(2.86)	6.00(2.53)	2.00(1.47)	2.67(1.76)	8.00(2.77)	29.33(5.42)
	S3	0.67(1.00)	4.00(1.91)	1.67(1.46)	0.67(1.00)	1.33(1.18)	1.33(1.18)	9.67(3.15)
M3	S1	25.33(5.08)	53.67(7.36)	18.67(4.37)	8.67(3.00)	12.67(3.61)	13.33(3.66)	132.33(11.51)
	S2	6.67(2.67)	8.00(2.86)	4.67(2.23)	3.33(1.73)	2.67(1.65)	5.33(2.39)	30.67(5.55)
	S3	2.33(1.68)	4.00(1.91)	1.33(1.29)	2.67(1.61)	0.00(0.71)	5.33(2.12)	15.67(3.90)
Mean of Factor-1								
Mean of Factor-2	M1	7.11(2.32)	15.78(3.37)	5.11(2.21)	3.78(1.94)	1.56(1.31)	4.78(1.98)	38.11(5.49)
	M2	9.56(2.61)	17.67(3.74)	7.67(2.65)	2.44(1.51)	5.56(2.18)	7.56(2.55)	50.44(6.40)
	M3	11.44(3.14)	21.89(4.04)	8.22(2.63)	4.89(2.12)	5.11(1.99)	8.00(2.72)	59.56(6.99)
	CD(0.05)	0.2	NS	0.22	NS	0.37	NS	0.3
	CV%	9.05	20.76	10.43	27.04	24.44	20.23	5.79
	S1	23.11(4.84)	44.67(6.70)	14.67(3.86)	6.44(2.53)	9.33(3.00)	12.67(3.60)	110.89(10.51)
	S2	3.56(1.91)	7.11(2.63)	4.67(2.23)	2.67(1.62)	2.22(1.53)	4.89(2.11)	25.11(4.92)
	S3	1.44(1.32)	3.56(1.83)	1.67(1.41)	2.00(1.42)	0.67(0.96)	2.78(1.55)	12.11(3.44)
	CD(0.05)	0.44	0.88	0.53	0.69	0.6	0.98	1.05
	CV%	15.92	23	20.49	36.21	32.19	39.46	16.24
	Interaction							
	M and T	NS	NS	NS	NS	NS	NS	NS
	T and M	NS	NS	NS	NS	NS	NS	NS
Experimental Mean		2.69	3.72	2.5	1.86	1.83	2.42	6.29

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Pattambi							
		Grasses				Sedges		Active tillering stage	
		Isachne milliaceae	Opismenus burmannii	Cyperus rotundus	Fimbristylis miliaceae	Marselia quadrifolia	Monochoria vaginalis	Sphenoclea zeylanica	Total
M1	S1	12.00(3.53)	14.67(3.89)	4.00(2.11)	13.33(3.71)	17.33(4.18)	0.00(0.71)	17.67(4.25)	79.00(8.91)
	S2	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)
	S3	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)
M2	S1	26.33(5.17)	46.00(6.78)	7.33(2.79)	57.00(7.53)	14.00(3.80)	5.67(2.40)	18.67(4.30)	175.00(13.22)
	S2	11.67(3.45)	21.00(4.63)	9.33(3.09)	17.33(4.21)	0.00(0.71)	0.00(0.71)	3.00(1.81)	62.33(7.92)
	S3	11.00(3.34)	12.33(3.57)	4.33(2.09)	4.00(2.11)	0.00(0.71)	0.00(0.71)	0.00(0.71)	31.67(5.63)
M3	S1								
	S2								
	S3								
Mean of Factor-1	M1	4.00(1.65)	4.89(1.77)	1.33(1.18)	4.44(1.71)	5.78(1.87)	0.00(0.71)	5.89(1.89)	26.33(3.44)
	M2	16.33(3.99)	26.44(4.99)	7.00(2.66)	26.11(4.62)	4.67(1.74)	1.89(1.27)	7.22(2.27)	89.67(8.92)
	M3								
CD(0.05)		0.8	0.35	0.39	0.4	NS	0.21	0.13	0.8
	CV%	27.12	10.98	28.2	14.98	14.86	23.6	8.13	13.99
Mean of Factor-2	S1	21.67(4.62)	41.00(6.19)	4.22(2.08)	29.11(5.14)	14.56(3.85)	3.33(1.76)	16.67(4.10)	130.56(11.29)
	S2	12.33(3.06)	11.56(3.03)	3.56(1.71)	9.67(2.80)	0.00(0.71)	0.00(0.71)	1.00(1.08)	38.11(5.28)
	S3	10.67(2.88)	6.33(2.31)	1.44(1.17)	2.22(1.51)	0.00(0.71)	0.00(0.71)	0.00(0.71)	20.67(3.95)
CD(0.05)		0.26	0.45	0.36	0.44	0.27	0.29	0.48	0.38
	CV%	7.15	11.36	21.15	13.72	14.85	26.27	23.82	5.46
Interaction	M and T	0.45	NS	NS	0.77	NS	0.5	NS	0.66
	T and M	0.66	NS	NS	0.67	NS	0.42	NS	0.76
	Experimental Mean	3.52	3.85	1.65	3.15	1.76	1.06	1.96	6.84

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot		Sub plot treatments		Pattambi						
				Panicle initiation stage						
		Grasses		Sedges			BLW			
		Isachne milliacea	Oplismenus burmannii	Cyperus rotundus	<i>Fimbristylis milliacea</i>	Marselia quadrifolia	Monochoria vaginalis	Sphenoclea zeylanica	Total	
M1	S1	88.67(9.42)	11.67(3.46)	8.00(2.89)	22.00(4.74)	22.00(4.71)	0.00(0.71)	28.67(5.40)	181.00(13.47)	
	S2	30.33(5.54)	6.00(2.54)	4.67(2.24)	13.67(3.76)	0.00(0.71)	0.00(0.71)	0.00(0.71)	54.67(7.42)	
	S3	61.00(7.62)	2.67(1.77)	2.67(1.72)	7.33(2.79)	3.00(1.86)	0.00(0.71)	0.00(0.71)	76.67(8.60)	
M2	S1	105.00(10.27)	16.67(4.14)	8.67(3.00)	43.00(6.51)	20.33(4.56)	9.33(3.08)	25.33(5.02)	228.33(15.12)	
	S2	28.33(5.31)	7.67(2.85)	4.67(2.26)	19.33(4.39)	8.00(2.89)	0.00(0.71)	0.00(0.71)	68.00(8.23)	
	S3	102.33(10.12)	3.33(1.93)	3.67(2.02)	5.33(2.35)	0.00(0.71)	0.00(0.71)	0.00(0.71)	114.67(10.72)	
M3	S1									
	S2									
	S3									
Mean of Factor-1		M1								
		M2								
		M3								
		CD(0.05)								
		CV%								
Mean of Factor-2		S1								
		S2								
		S3								
		CD(0.05)								
		CV%								
Interaction		M and T								
		T and M								
Experimental Mean										

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Titabar										
		Active tillering stage					Panicle initiation stage					
		Grasses			Total	BLW <i>Alternanthera spp.</i>	Grasses		Sedges <i>Cyperus iria</i>	BLW <i>Alternanthera spp.</i>	Total	
		<i>Echinochloa crusgalli</i>	<i>Leersia hexandra</i>	<i>Cyperus iria</i>			<i>Echinochloa crusgalli</i>	<i>Leersia hexandra</i>				
M1	S1	19.33(4.45)	16.33(4.10)	9.00(3.06)	53.67(7.36)	9.00(3.06)	22.67(4.81)	19.00(4.39)	14.00(3.77)	13.00(3.66)	68.67(8.31)	
	S2	13.67(3.75)	14.33(3.83)	6.00(2.54)	40.67(6.41)	6.67(2.67)	17.67(4.26)	11.00(3.38)	8.33(2.94)	8.67(3.02)	45.67(6.79)	
	S3	8.33(2.96)	9.00(3.06)	6.33(2.57)	28.67(5.40)	5.00(2.32)	13.67(3.74)	10.33(3.28)	6.33(2.58)	7.67(2.83)	38.00(6.20)	
M2	S1	22.67(4.81)	20.00(4.52)	12.33(3.58)	67.33(8.23)	12.33(3.57)	24.67(5.01)	22.67(4.80)	18.33(4.33)	18.00(4.30)	83.67(9.17)	
	S2	17.67(4.26)	16.33(4.10)	9.67(3.17)	53.33(7.33)	9.67(3.18)	20.00(4.52)	19.67(4.48)	11.67(3.48)	13.00(3.66)	64.33(8.05)	
	S3	12.33(3.58)	10.67(3.29)	6.67(2.67)	36.33(6.07)	6.67(2.64)	17.00(4.18)	15.33(3.97)	8.67(3.02)	9.33(3.12)	50.33(7.12)	
M3	S1	26.00(5.13)	22.00(4.74)	18.00(4.29)	83.00(9.13)	17.00(4.18)	27.00(5.24)	22.67(4.81)	20.67(4.59)	21.00(4.63)	91.33(9.58)	
	S2	20.33(4.55)	18.33(4.34)	13.33(3.71)	64.33(8.05)	12.33(3.58)	22.00(4.74)	17.33(4.22)	19.33(4.43)	14.33(3.84)	73.00(8.57)	
	S3	14.00(3.80)	12.67(3.61)	7.33(2.77)	43.67(6.64)	9.67(3.18)	19.33(4.45)	15.00(3.90)	9.67(3.18)	9.00(3.06)	53.00(7.31)	
Mean of Factor-1		M1	13.78(3.72)	13.22(3.66)	7.11(2.73)	41.00(6.39)	6.89(2.68)	18.00(4.27)	13.44(3.68)	9.56(3.10)	9.78(3.17)	50.78(7.10)
		M2	17.56(4.22)	15.67(3.97)	9.56(3.14)	52.33(7.21)	9.56(3.13)	20.56(4.57)	19.22(4.42)	12.89(3.61)	13.44(3.69)	66.11(8.12)
		M3	20.11(4.49)	17.67(4.23)	12.89(3.59)	63.67(7.94)	13.00(3.65)	22.78(4.81)	18.33(4.31)	16.56(4.07)	14.78(3.84)	72.44(8.49)
		CD(0.05)	0.28	NS	0.3	0.25	0.14	0.18	NS	0.11	0.17	0.33
		CV%	8.14	12.37	11.21	4.17	5.33	4.82	16.22	3.59	5.65	5
Mean of Factor-2		S1	22.67(4.80)	19.44(4.45)	13.11(3.64)	68.00(8.24)	12.78(3.60)	24.78(5.02)	21.44(4.67)	17.67(4.23)	17.33(4.20)	81.22(9.02)
		S2	17.22(4.19)	16.33(4.09)	9.67(3.14)	52.78(7.26)	9.56(3.14)	19.89(4.51)	16.00(4.03)	13.11(3.62)	12.00(3.51)	61.00(7.80)
		S3	11.56(3.45)	10.78(3.32)	6.78(2.67)	36.22(6.03)	7.11(2.71)	16.67(4.12)	13.56(3.72)	8.22(2.93)	8.67(3.00)	47.11(6.88)
		CD(0.05)	0.27	0.42	0.4	0.3	0.39	0.32	0.27	0.45	0.34	0.23
		CV%	6.39	10.43	12.36	4.1	12.18	6.89	6.41	12.15	9.26	2.89
Interaction												
		M and T	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
		T and M	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Experimental Mean			4.14	3.95	3.15	7.18	3.15	4.55	4.14	3.59	3.57	7.9

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot		Sub plot treatments	Varanasi								
			Active tillering stage								
			Grasses		Sedges		BLW				
			<i>Cynodon dactylon</i>	<i>Echinochloa crusgalli</i>	<i>Cyperus difformis</i>	<i>Cyperus rotundus</i>	<i>Euphorbia hirta</i>	Phyllanthus niruri	<i>Parthenium hysterophorus</i>	Total	
M1		S1	22.33(4.72)	9.00(3.06)	2.00(1.48)	23.33(4.87)	5.00(2.33)	6.00(2.46)	5.33(2.38)	73.00(8.57)	
		S2	12.67(3.62)	2.33(1.57)	7.00(2.44)	19.00(4.41)	1.67(1.46)	4.33(2.20)	4.00(1.93)	51.00(7.15)	
		S3	19.33(4.44)	2.33(1.64)	3.00(1.84)	13.00(3.67)	2.33(1.57)	2.67(1.77)	3.00(1.86)	45.67(6.79)	
M2		S1	51.33(7.18)	5.67(2.43)	13.00(3.61)	108.33(10.02)	5.33(2.39)	12.00(3.48)	6.33(2.60)	202.00(14.03)	
		S2	41.67(6.48)	1.67(1.39)	7.33(2.76)	41.00(6.33)	2.33(1.57)	5.33(2.39)	3.67(2.02)	103.00(10.13)	
		S3	29.67(5.49)	1.67(1.46)	3.00(1.71)	42.33(6.51)	2.33(1.68)	4.00(2.06)	2.67(1.74)	85.67(9.27)	
M3		S1	49.00(7.01)	6.33(2.51)	9.67(3.17)	122.33(10.74)	6.67(2.67)	10.67(3.33)	8.00(2.91)	212.67(14.46)	
		S2	30.00(5.50)	7.33(2.68)	7.33(2.66)	60.00(7.68)	5.33(2.40)	8.67(3.01)	5.67(2.48)	124.33(11.15)	
		S3	27.00(5.20)	4.00(2.06)	3.67(2.02)	36.67(5.98)	2.67(1.77)	6.67(2.64)	4.00(2.11)	84.67(9.20)	
Mean of Factor-1			M1	18.11(4.26)	4.56(2.09)	4.00(1.92)	18.44(4.32)	3.00(1.79)	4.33(2.14)	4.11(2.06)	56.56(7.50)
			M2	40.89(6.38)	3.00(1.76)	7.78(2.69)	63.89(7.62)	3.33(1.88)	7.11(2.64)	4.22(2.12)	130.22(11.14)
			M3	35.33(5.90)	5.89(2.42)	6.89(2.62)	73.00(8.13)	4.89(2.28)	8.67(2.99)	5.89(2.50)	140.56(11.61)
			CD(0.05)	0.46	NS	NS	1.83	NS	0.23	NS	1.29
			CV%	9.89	38.23	41.95	32.6	30.35	10.7	23.13	15.31
Mean of Factor-2			S1	40.89(6.30)	7.00(2.67)	8.22(2.76)	84.67(8.55)	5.67(2.46)	9.56(3.09)	6.56(2.63)	162.56(12.35)
			S2	28.11(5.20)	3.78(1.88)	7.22(2.62)	40.00(6.14)	3.11(1.81)	6.11(2.53)	4.44(2.14)	92.78(9.48)
			S3	25.33(5.04)	2.67(1.72)	3.22(1.85)	30.67(5.39)	2.44(1.67)	4.44(2.16)	3.22(1.90)	72.00(8.42)
			CD(0.05)	0.53	0.63	NS	1.43	0.38	0.41	0.39	1.14
			CV%	9.29	29.41	34.18	20.79	18.63	15.35	16.92	10.97
Interaction											
			M and T	NS	NS	NS	NS	NS	NS	NS	NS
			T and M	NS	NS	NS	NS	NS	NS	NS	NS
Experimental Mean			5.52	2.09	2.41	6.69	1.98	2.59	2.22	2.22	10.08

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Varanasi									
		Panicle initiation stage									
		Grasses					Sedges			BLW	
		<i>Cynodon dactylon</i>	<i>Echinochloa colonum</i>	<i>Echinochloa crusgalli</i>	<i>Cyperus difformis</i>	<i>Cyperus rotundus</i>	<i>Eclipta prostrata</i>	<i>Phyllanthus niruri</i>	<i>Solanum nigrum</i>	Total	
M1	S1	59.33(7.69)	3.33(1.85)	3.33(1.85)	9.00(2.97)	33.33(5.80)	4.00(2.11)	10.00(3.23)	7.33(2.79)	129.67(11.34)	
	S2	14.67(3.88)	2.67(1.74)	2.67(1.74)	2.67(1.72)	12.00(3.53)	1.00(1.17)	4.67(2.23)	4.67(2.24)	45.67(6.79)	
	S3	14.33(3.84)	2.00(1.43)	2.00(1.43)	2.33(1.68)	14.00(3.75)	2.33(1.64)	2.33(1.64)	1.67(1.44)	41.67(6.42)	
M2	S1	75.67(8.69)	3.33(1.93)	3.33(1.93)	2.00(1.56)	31.67(5.66)	4.00(2.08)	8.33(2.96)	6.33(2.56)	136.67(11.68)	
	S2	32.00(5.69)	4.00(2.00)	4.00(2.00)	2.67(1.76)	12.00(3.52)	2.33(1.66)	3.67(2.02)	1.67(1.44)	61.33(7.82)	
	S3	17.67(4.25)	3.00(1.84)	3.00(1.84)	1.33(1.34)	15.00(3.85)	1.33(1.34)	2.00(1.56)	2.00(1.52)	44.33(6.65)	
M3	S1	52.67(7.28)	2.33(1.64)	2.33(1.64)	6.67(2.66)	32.00(5.70)	6.33(2.61)	9.00(3.06)	5.33(2.39)	119.00(10.92)	
	S2	16.00(4.03)	2.00(1.56)	2.00(1.56)	2.33(1.64)	9.00(3.06)	1.67(1.46)	5.33(2.36)	1.33(1.34)	40.67(6.38)	
	S3	15.00(3.92)	3.00(1.81)	3.00(1.81)	2.67(1.74)	8.33(2.95)	2.33(1.66)	1.67(1.44)	2.00(1.56)	38.00(6.19)	
Mean of Factor-1											
M1	M1	29.44(5.13)	2.67(1.67)	2.67(1.67)	4.67(2.12)	19.78(4.36)	2.44(1.64)	5.67(2.37)	4.56(2.16)	72.33(8.18)	
	M2	41.78(6.21)	3.44(1.92)	3.44(1.92)	2.00(1.55)	19.56(4.35)	2.56(1.69)	4.67(2.18)	3.33(1.84)	80.78(8.72)	
	M3	27.89(5.08)	2.44(1.67)	2.44(1.67)	3.89(2.01)	16.44(3.90)	3.44(1.91)	5.33(2.29)	2.89(1.76)	65.89(7.83)	
CD(0.05)	CD(0.05)	0.32	NS	NS	NS	NS	NS	NS	NS	NS	
	CV%	7.09	37.81	37.81	24.29	13.39	11.71	12.03	22.79	9.96	
	Mean of Factor-2										
S1	S1	62.56(7.89)	3.00(1.81)	3.00(1.81)	5.89(2.40)	32.33(5.72)	4.78(2.27)	9.11(3.09)	6.33(2.58)	128.44(11.31)	
	S2	20.89(4.53)	2.89(1.77)	2.89(1.77)	2.56(1.71)	11.00(3.37)	1.67(1.43)	4.56(2.20)	2.56(1.68)	49.22(6.99)	
	S3	15.67(4.00)	2.67(1.69)	2.67(1.69)	2.11(1.59)	12.44(3.52)	2.00(1.55)	2.00(1.55)	1.89(1.51)	41.33(6.42)	
CD(0.05)	CD(0.05)	0.43	NS	NS	0.46	0.41	0.4	0.33	0.38	0.47	
	CV%	7.72	31.8	31.8	23.82	9.44	22.02	13.91	19.38	5.53	
Interaction	M and T	NS	NS	NS	NS	NS	NS	NS	NS	NS	
	T and M	NS	NS	NS	NS	NS	NS	NS	NS	NS	
	Experimental Mean	5.48	1.76	1.76	1.9	4.2	1.75	2.28	1.92	8.24	

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Summary on Group wise weed population no. /m² of Long term trial on Weed Dynamics in rice under different establishment methods, Kharif 2024.

Main plot	Sub plot treatments	Aduthurai			
		Active tillering stage			Total
		Grasses	Sedges	BLW	
M1	S1	96.00(9.82)	19.00(4.41)	81.33(9.05)	196.33(14.03)
	S2	23.00(4.84)	6.33(2.61)	13.33(3.72)	42.67(6.57)
	S3	19.33(4.45)	5.67(2.48)	15.00(3.93)	40.00(6.36)
M2	S1	126.33(11.26)	22.33(4.78)	89.67(9.49)	238.33(15.45)
	S2	45.00(6.74)	10.67(3.34)	18.00(4.29)	73.67(8.60)
	S3	29.67(5.48)	6.33(2.61)	12.67(3.62)	48.67(7.01)
M3	S1	152.00(12.35)	30.67(5.57)	112.67(10.63)	295.33(17.19)
	S2	49.00(7.03)	14.67(3.89)	28.33(5.37)	92.00(9.61)
	S3	47.00(6.88)	9.67(3.18)	19.00(4.41)	75.67(8.72)
Mean of Factor-1					
M1		46.11(6.37)	10.33(3.17)	36.56(5.57)	93.00(8.99)
M2		67.00(7.83)	13.11(3.58)	40.11(5.80)	120.22(10.35)
M3		82.67(8.75)	18.33(4.21)	53.33(6.81)	154.33(11.84)
CD(0.05)		0.18	0.09	0.14	0.19
CV%		2.78	2.92	2.71	2.23
Mean of Factor-2					
S1		124.78(11.14)	24.00(4.92)	94.56(9.72)	243.33(15.56)
S2		39.00(6.20)	10.56(3.28)	19.89(4.46)	69.44(8.26)
S3		32.00(5.61)	7.22(2.76)	15.56(3.99)	54.78(7.36)
CD(0.05)		0.19	0.25	0.22	0.22
CV%		2.45	6.68	3.49	2.09
Interaction					
M and T		NS	NS	NS	NS
T and M		NS	NS	NS	NS
Experimental Mean		7.65	3.65	6.06	10.39

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control* (Herbicide

recommendation of respective

University may be followed)

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Chatha							
		Active tillering stage				Panicle initiation stage			
		Grasses	Sedges	BLW	Total	Grasses	Sedges	BLW	Total
M1	S1	48.00(6.96)	35.33(5.99)	2.67(1.76)	86.00(9.30)	88.00(9.41)	66.67(8.19)	8.67(3.03)	163.33(12.80)
	S2	8.33(2.97)	1.33(1.34)	2.33(1.64)	12.00(3.53)	17.33(4.22)	5.00(2.35)	4.33(2.20)	26.67(5.21)
	S3	6.00(2.54)	29.33(5.46)	1.00(1.17)	36.33(6.06)	14.67(3.89)	7.67(2.86)	1.67(1.46)	24.00(4.95)
M2	S1	51.33(7.20)	46.00(6.82)	4.67(2.26)	102.00(10.12)	106.00(10.32)	75.33(8.71)	19.00(4.41)	200.33(14.17)
	S2	8.00(2.91)	2.33(1.68)	3.33(1.94)	13.67(3.76)	24.67(5.02)	7.67(2.85)	5.00(2.35)	37.33(6.15)
	S3	7.00(2.74)	35.00(5.96)	1.67(1.39)	43.67(6.65)	22.33(4.78)	11.00(3.39)	3.33(1.93)	36.67(6.09)
M3	S1	55.67(7.49)	45.33(6.77)	6.00(2.54)	107.00(10.37)	114.33(10.72)	80.67(9.01)	22.00(4.74)	217.00(14.75)
	S2	7.67(2.86)	1.33(1.34)	4.33(2.19)	13.33(3.72)	29.00(5.43)	9.33(3.13)	5.67(2.47)	44.00(6.67)
	S3	6.33(2.61)	40.33(6.39)	4.67(2.27)	51.33(7.20)	23.33(4.88)	10.67(3.33)	4.67(2.27)	38.67(6.26)
Mean of Factor-1									
	M1	20.78(4.16)	22.00(4.26)	2.00(1.52)	44.78(6.30)	40.00(5.84)	26.44(4.47)	4.89(2.23)	71.33(7.65)
	M2	22.11(4.28)	27.78(4.82)	3.22(1.86)	53.11(6.84)	51.00(6.70)	31.33(4.98)	9.11(2.90)	91.44(8.80)
	M3	23.22(4.32)	29.00(4.83)	5.00(2.33)	57.22(7.09)	55.56(7.01)	33.56(5.16)	10.78(3.16)	99.89(9.23)
	CD(0.05)	NS	0.03	0.25	0.2	0.12	0.26	0.13	0.18
	CV%	3.89	0.79	15.61	3.61	2.28	6.37	5.58	2.46
Mean of Factor-2									
	S1	51.67(7.22)	42.22(6.52)	4.44(2.19)	98.33(9.93)	102.78(10.15)	74.22(8.64)	16.56(4.06)	193.56(13.91)
	S2	8.00(2.91)	1.67(1.45)	3.33(1.92)	13.00(3.67)	23.67(4.89)	7.33(2.78)	5.00(2.34)	36.00(6.01)
	S3	6.44(2.63)	34.89(5.93)	2.44(1.61)	43.78(6.64)	20.11(4.52)	9.78(3.19)	3.22(1.89)	33.11(5.77)
	CD(0.05)	0.22	0.2	0.32	0.18	0.15	0.15	0.19	0.13
	CV%	5.08	4.2	16.13	2.54	2.31	3.06	6.71	1.47
Interaction									
	M and T	NS	NS	NS	NS	NS	NS	0.33	NS
	T and M	NS	NS	NS	NS	NS	NS	0.28	NS
Experimental Mean		4.25	4.64	1.91	6.75	6.52	4.87	2.76	8.56

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check
S2-Mechanical weeding using weeder
S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Chinsurah							
		Active tillering stage				Panicle initiation stage			
		Grasses	Sedges	BLW	Total	Grasses	Sedges	BLW	Total
M1	S1	36.42(6.07)	19.20(4.42)	18.56(4.36)	74.18(8.64)	55.02(7.44)	29.01(5.42)	28.04(5.34)	112.08(10.61)
	S2	2.76(1.80)	2.54(1.74)	3.44(1.98)	8.74(3.04)	3.06(1.89)	2.83(1.82)	3.83(2.07)	9.71(3.19)
	S3	1.64(1.46)	1.77(1.50)	2.36(1.68)	5.76(2.50)	1.81(1.52)	1.96(1.56)	2.61(1.75)	6.38(2.62)
M2	S1	65.48(8.11)	33.36(5.80)	32.05(5.70)	130.89(11.46)	92.40(9.62)	47.07(6.87)	45.23(6.76)	184.70(13.61)
	S2	4.95(2.33)	4.40(2.21)	5.91(2.53)	15.26(3.97)	5.99(2.55)	5.33(2.41)	7.16(2.76)	18.49(4.36)
	S3	2.94(1.85)	3.09(1.89)	4.04(2.12)	10.07(3.25)	3.18(1.92)	3.34(1.95)	4.37(2.20)	10.88(3.37)
M3	S1	68.09(8.27)	35.21(5.95)	33.75(5.85)	137.05(11.73)	101.54(10.09)	52.50(7.25)	50.32(7.12)	204.36(14.31)
	S2	5.29(2.40)	4.64(2.26)	6.23(2.59)	16.16(4.08)	6.67(2.67)	5.85(2.52)	7.85(2.88)	20.37(4.57)
	S3	3.06(1.89)	3.26(1.93)	4.25(2.17)	10.57(3.33)	3.37(1.97)	3.60(2.01)	4.69(2.27)	11.66(3.49)
Mean of Factor-1									
M1		13.60(3.11)	7.84(2.56)	8.12(2.68)	29.56(4.73)	19.97(3.62)	11.27(2.93)	11.49(3.06)	42.72(5.47)
M2		24.46(4.10)	13.62(3.30)	14.00(3.45)	52.07(6.23)	33.86(4.69)	18.58(3.74)	18.92(3.90)	71.36(7.11)
M3		25.48(4.19)	14.37(3.38)	14.74(3.54)	54.59(6.38)	37.19(4.91)	20.65(3.93)	20.95(4.09)	78.80(7.45)
CD(0.05)		0.11	0.11	0.04	0.61	0.12	0.13	0.05	0.03
CV%		3.36	4.37	1.59	1.61	3.34	4.38	1.58	0.56
Mean of Factor-2									
S1		56.66(7.48)	29.26(5.39)	28.12(5.30)	114.04(10.61)	82.99(9.05)	42.86(6.51)	41.20(6.41)	167.04(12.84)
S2		4.33(2.18)	3.86(2.07)	5.19(2.37)	13.39(3.69)	5.24(2.37)	4.67(2.25)	6.28(2.57)	16.19(4.04)
S3		2.55(1.73)	2.71(1.77)	3.55(1.99)	8.80(3.03)	2.79(1.80)	2.97(1.84)	3.89(2.07)	9.64(3.16)
CD(0.05)		0.26	0.3	0.28	2.67	0.32	0.37	0.32	0.17
CV%		6.75	9.45	8.37	5.72	7.15	10.07	8.42	2.49
Interaction									
M and T		0.46	NS	NS	4.62	0.56	NS	NS	0.3
T and M		0.38	NS	NS	3.79	0.46	NS	NS	0.24
Experimental Mean		3.8	3.08	3.22	45.41	4.41	3.53	3.68	6.68

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check
S2-Mechanical weeding using weeder
S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Chiplima				Ghaghrahat	
		Active tillering stage			Total	Total weed population at active tillering stage	Total weed population at panicle initiation stage
		Grasses	Sedges	BLW			
M1	S1	1.33(1.29)	22.00(4.73)	36.33(6.06)	59.67(7.74)	16.33(4.10)	22.33(4.78)
	S2	0.33(0.88)	7.00(2.73)	11.67(3.46)	19.00(4.40)	17.00(4.18)	23.00(4.84)
	S3	1.00(1.17)	10.33(3.29)	8.67(3.02)	20.00(4.52)	25.00(5.05)	31.00(5.61)
M2	S1	13.00(3.66)	32.67(5.76)	38.00(6.19)	83.67(9.17)	19.67(4.49)	25.67(5.11)
	S2	1.67(1.39)	10.67(3.33)	9.00(3.07)	21.33(4.66)	20.67(4.60)	26.67(5.21)
	S3	3.67(2.03)	9.33(3.09)	10.33(3.29)	23.33(4.88)	28.33(5.37)	34.33(5.90)
M3	S1	16.00(4.02)	43.00(6.59)	27.67(5.29)	86.67(9.33)	24.33(4.97)	30.33(5.54)
	S2	1.00(1.17)	8.00(2.90)	8.67(2.99)	17.67(4.26)	25.00(5.05)	31.00(5.61)
	S3	5.67(2.41)	12.33(3.57)	10.33(3.29)	28.33(5.37)	28.00(5.33)	34.00(5.86)
Mean of Factor-1							
M1	M1	0.89(1.11)	13.11(3.58)	18.89(4.18)	32.89(5.56)	19.44(4.44)	25.44(5.08)
	M2	6.11(2.36)	17.56(4.06)	19.11(4.18)	42.78(6.23)	22.89(4.82)	28.89(5.41)
	M3	7.56(2.53)	21.11(4.36)	15.56(3.86)	44.22(6.32)	25.78(5.11)	31.78(5.67)
CV%	CD(0.05)	0.3	0.28	0.14	0.05	0.29	0.26
	CV%	17.71	8.4	4.18	0.9	7.17	5.7
Mean of Factor-2							
S1	S1	10.11(2.99)	32.56(5.69)	34.00(5.85)	76.67(8.75)	20.11(4.52)	26.11(5.14)
	S2	1.00(1.15)	8.56(2.99)	9.78(3.18)	19.33(4.44)	20.89(4.61)	26.89(5.22)
	S3	3.44(1.87)	10.67(3.32)	9.78(3.20)	23.89(4.92)	27.11(5.25)	33.11(5.79)
CD(0.05)	CD(0.05)	0.6	0.4	0.48	0.47	0.26	0.23
	CV%	29	9.65	11.51	7.56	5.2	4.13
Interaction	M and T	1.03	NS	NS	0.81	NS	NS
	T and M	0.86	NS	NS	0.66	NS	NS
	Experimental Mean	2	4	4.07	6.04	4.79	5.39

*(Values in parentheses are transformed values)
M1- Mechanized transplanting/Transplanting (if transplanters not available)
M2-Puddled direct seeding (preferably line sowing by drumseeder)
M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check
S2-Mechanical weeding using weeder
S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot		Sub plot treatments	Gangavathi									
			Active tillering stage					Panicle initiation stage				
			Grasses	Sedges	BLW	Total	Grasses	Sedges	BLW	Total		
M1	S1	6.48(2.36)	118.52(10.03)	0.00(0.71)	125.00(10.33)	3.70(1.88)	76.85(8.66)	0.00(0.71)	80.56(8.86)			
	S2	1.85(1.29)	15.74(3.47)	1.85(1.29)	19.44(3.87)	9.26(3.08)	14.81(3.73)	0.00(0.71)	24.07(4.89)			
	S3	0.00(0.71)	5.56(1.85)	0.00(0.71)	5.56(1.85)	0.93(1.07)	4.63(1.74)	0.00(0.71)	5.56(1.85)			
M2	S1	75.00(8.36)	142.59(11.94)	18.52(3.78)	236.11(15.34)	42.59(6.56)	95.37(9.77)	15.74(3.22)	153.70(12.36)			
	S2	37.96(6.00)	64.81(7.51)	2.78(1.46)	105.56(10.10)	26.85(5.17)	57.41(7.46)	0.00(0.71)	84.26(9.10)			
	S3	6.48(2.63)	23.15(4.85)	0.00(0.71)	29.63(5.48)	12.04(3.05)	11.11(2.99)	0.00(0.71)	23.15(4.19)			
M3	S1	188.89(13.68)	27.78(5.13)	18.52(3.66)	235.19(15.31)	87.04(9.32)	15.74(3.47)	27.78(5.32)	130.56(11.42)			
	S2	74.07(8.63)	62.04(7.81)	7.41(2.44)	143.52(11.96)	37.04(5.92)	44.44(6.42)	6.48(2.36)	87.96(9.32)			
	S3	38.89(6.05)	67.59(7.29)	0.00(0.71)	106.48(10.27)	29.63(4.87)	33.33(5.59)	0.00(0.71)	62.96(7.51)			
Mean of Factor-1			M1	2.78(1.45)	46.60(5.12)	0.62(0.90)	50.00(5.35)	4.63(2.01)	32.10(4.71)	0.00(0.71)	36.73(5.20)	
			M2	39.81(5.67)	76.85(8.10)	7.10(1.98)	123.77(10.31)	27.16(4.93)	54.63(6.74)	5.25(1.54)	87.04(8.55)	
			M3	100.62(9.45)	52.47(6.74)	8.64(2.27)	161.73(12.51)	51.23(6.70)	31.17(5.16)	11.42(2.80)	93.83(9.42)	
CD(0.05)			1.9	NS	NS	2.02	1.09	NS	NS	0.91	1.66	
CV%			41.05	32.48	102.18	25.68	28.73	30.95	64.48	25.62		
Mean of Factor-2			S1	90.12(8.13)	96.30(9.03)	12.35(2.72)	198.77(13.66)	44.44(5.92)	62.65(7.30)	14.51(3.08)	121.60(10.88)	
			S2	37.96(5.31)	47.53(6.27)	4.01(1.73)	89.51(8.64)	24.38(4.72)	38.89(5.87)	2.16(1.26)	65.43(7.77)	
			S3	15.12(3.13)	32.10(4.66)	0.00(0.71)	47.22(5.87)	14.20(3.00)	16.36(3.44)	0.00(0.71)	30.56(4.52)	
CD(0.05)			1.23	3.23	1.52	2.67	1.77	2.15	1.13	2.2		
CV%			21.73	47.22	86.02	27.67	37.89	37.74	65.42	27.69		
Interaction												
M and T			NS	NS	NS	NS	NS	NS	3.72	1.96	NS	
T and M			NS	NS	NS	NS	NS	NS	3.13	1.67	NS	
Experimental Mean			5.52	6.65	1.72	9.39	4.55	5.54	1.68	7.72		

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check
S2-Mechanical weeding using weeder
S3-Chemical weed control

Trial 4.3.3: Contd.

		Jagdalpur							
		Active tillering stage				Panicle initiation stage			
Main plot	Sub plot treatments	Grasses	Sedges	BLW	Total	Grasses	Sedges	BLW	Total
M1	S1	15.67(3.99)	7.11(2.73)	10.67(3.31)	33.45(5.82)	28.08(5.32)	12.25(3.55)	12.03(3.51)	52.36(7.26)
	S2	16.90(4.13)	6.54(2.56)	5.78(2.45)	29.22(5.44)	18.73(4.37)	10.74(3.31)	4.62(2.25)	34.09(5.88)
	S3	21.63(4.70)	2.87(1.66)	0.85(1.08)	25.35(5.08)	9.74(3.16)	4.05(1.96)	1.17(1.19)	14.96(3.87)
M2	S1	12.27(3.55)	8.52(2.97)	17.80(4.23)	38.58(6.19)	14.93(3.90)	11.80(3.49)	19.97(4.48)	46.70(6.82)
	S2	2.97(1.83)	5.83(2.45)	10.02(3.21)	18.81(4.39)	4.42(2.20)	6.91(2.69)	8.53(2.86)	19.86(4.50)
	S3	5.90(2.52)	2.73(1.64)	0.44(0.93)	9.07(3.04)	4.81(2.30)	3.53(1.87)	0.87(1.06)	9.21(3.07)
M3	S1	58.85(7.66)	24.02(4.93)	30.48(5.51)	113.36(10.64)	68.52(8.25)	33.77(5.80)	21.67(4.68)	123.96(11.14)
	S2	14.47(3.86)	7.55(2.80)	10.00(3.19)	32.02(5.68)	17.56(4.25)	13.46(3.72)	10.28(3.25)	41.30(6.46)
	S3	15.07(3.88)	3.91(2.07)	1.83(1.40)	20.81(4.55)	13.90(3.75)	5.58(2.43)	2.90(1.74)	22.38(4.70)
Mean of Factor-1									
	M1	18.07(4.28)	5.51(2.32)	5.77(2.28)	29.34(5.45)	18.85(4.28)	9.01(2.94)	5.94(2.32)	33.80(5.67)
	M2	7.04(2.63)	5.69(2.36)	9.42(2.79)	22.16(4.54)	8.05(2.80)	7.42(2.68)	9.79(2.80)	25.26(4.80)
	M3	29.46(5.14)	11.83(3.27)	14.11(3.37)	55.40(6.96)	33.33(5.41)	17.60(3.98)	11.62(3.22)	62.55(7.43)
CD(0.05)		0.52	NS	NS	0.47	0.28	NS	NS	0.33
CV%		15.33	35.04	25.98	9.94	8.05	31.41	23.02	6.61
Mean of Factor-2									
	S1	28.93(5.07)	13.22(3.54)	19.65(4.35)	61.80(7.55)	37.18(5.82)	19.27(4.28)	17.89(4.22)	74.34(8.41)
	S2	11.44(3.28)	6.64(2.61)	8.60(2.95)	26.68(5.17)	13.57(3.61)	10.37(3.24)	7.81(2.79)	31.75(5.61)
	S3	14.20(3.70)	3.17(1.79)	1.04(1.14)	18.41(4.22)	9.48(3.07)	4.39(2.09)	1.64(1.33)	15.52(3.88)
CD(0.05)		0.64	0.59	0.71	0.77	0.75	0.6	0.78	0.82
CV%		15.64	21.58	24.71	13.24	17.52	18.24	27.37	13.41
Interaction									
	M and T	1.12	NS	NS	1.33	1.3	NS	NS	1.42
	T and M	0.95	NS	NS	1.11	1.07	NS	NS	1.17
Experimental Mean		4.02	2.65	2.81	5.65	4.17	3.2	2.78	5.97

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Malan						
		Active tillering stage			Panicle initiation stage			
		Grasses	Sedges	BLW	Total	Grasses	Sedges	BLW
M1	S1	28.33(5.37)	10.00(3.24)	13.67(3.76)	52.00(7.24)	28.33(5.37)	8.33(2.97)	15.67(4.02)
	S2	19.67(4.49)	7.67(2.85)	7.00(2.73)	34.33(5.90)	21.33(4.66)	6.00(2.54)	10.00(3.23)
	S3	11.00(3.36)	6.33(2.60)	7.00(2.70)	24.33(4.96)	8.33(2.97)	12.00(3.34)	5.67(2.48)
M2	S1	37.33(6.15)	23.67(4.92)	27.33(5.27)	88.33(9.42)	32.33(5.73)	20.33(4.55)	24.00(4.95)
	S2	23.00(4.84)	19.67(4.48)	16.33(4.10)	59.00(7.71)	18.67(4.38)	17.00(4.17)	16.33(4.09)
	S3	9.00(3.06)	7.00(2.73)	8.67(3.02)	24.67(5.01)	9.67(3.19)	5.67(2.48)	9.00(3.08)
M3	S1	40.67(6.41)	33.00(5.76)	33.67(5.83)	107.33(10.35)	35.33(5.98)	27.67(5.28)	36.00(6.02)
	S2	25.33(5.08)	23.00(4.84)	22.00(4.74)	70.33(8.41)	23.67(4.90)	23.00(4.84)	20.00(4.52)
	S3	12.67(3.62)	8.33(2.97)	7.00(2.70)	28.00(5.34)	10.00(3.23)	7.67(2.85)	7.33(2.76)
Mean of Factor-1								
Mean of Factor-2	M1	19.67(4.40)	8.00(2.90)	9.22(3.06)	36.89(6.04)	19.33(4.33)	8.78(2.95)	10.44(3.24)
	M2	23.11(4.68)	16.78(4.04)	17.44(4.13)	57.33(7.38)	20.22(4.43)	14.33(3.73)	16.44(4.04)
	M3	26.22(5.04)	21.44(4.52)	20.89(4.42)	68.56(8.03)	23.00(4.70)	19.44(4.32)	21.11(4.44)
	CD(0.05)	NS	0.38	0.29	0.48	NS	0.61	0.36
	CV%	10	11.99	8.84	8.05	8.58	19.69	10.88
	S1	35.44(5.97)	22.22(4.64)	24.89(4.95)	82.56(9.01)	32.00(5.69)	18.78(4.27)	25.22(5.00)
	S2	22.67(4.80)	16.78(4.06)	15.11(3.86)	54.56(7.34)	21.22(4.65)	15.33(3.85)	15.44(3.95)
	S3	10.89(3.35)	7.22(2.77)	7.56(2.81)	25.67(5.10)	9.33(3.13)	8.44(2.89)	7.33(2.77)
	CD(0.05)	0.31	0.3	0.42	0.43	0.2	0.5	0.32
	CV%	6.44	7.62	10.52	5.85	4.27	13.38	7.95
	Interaction							
	M and T	NS	0.52	NS	0.74	NS	0.87	NS
	T and M	NS	0.48	NS	0.67	NS	0.8	NS
Experimental Mean		4.71	3.82	3.87	7.15	4.49	3.67	3.91

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check
S2-Mechanical weeding using weeder
S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Moncompu						
		Active tillering stage			Panicle initiation stage			
		Grasses	Sedges	BLW	Total	Grasses	Sedges	BLW
M1	S1	308.00(17.54)	2.67(1.44)	13.33(3.59)	324.00(18.00)	270.67(16.41)	0.00(0.71)	5.33(2.18)
	S2	110.67(10.23)	0.00(0.71)	9.33(2.77)	120.00(10.74)	176.00(13.18)	0.00(0.71)	8.00(2.59)
	S3	238.67(15.42)	0.00(0.71)	0.00(0.71)	238.67(15.42)	226.67(14.95)	0.00(0.71)	0.00(0.71)
M2	S1	148.00(11.73)	2.67(1.44)	10.67(3.24)	161.33(12.43)	254.67(15.71)	5.33(1.83)	8.00(2.56)
	S2	90.67(9.42)	0.00(0.71)	13.33(3.68)	104.00(10.14)	158.67(12.61)	0.00(0.71)	0.00(0.71)
	S3	236.00(15.23)	0.00(0.71)	0.00(0.71)	236.00(15.23)	248.00(15.70)	0.00(0.71)	0.00(0.71)
M3	S1	268.00(16.17)	8.00(2.12)	14.67(3.39)	290.67(16.82)	245.33(15.22)	0.00(0.71)	0.00(0.71)
	S2	116.00(9.83)	0.00(0.71)	8.00(2.59)	124.00(10.46)	93.33(8.87)	0.00(0.71)	4.00(1.91)
	S3	129.33(10.91)	2.67(1.44)	0.00(0.71)	132.00(11.00)	128.00(10.53)	0.00(0.71)	0.00(0.71)
Mean of Factor-1								
M1	M1	219.11(14.40)	0.89(0.95)	7.56(2.36)	227.56(14.72)	224.44(14.84)	0.00(0.71)	4.44(1.83)
	M2	158.22(12.13)	0.89(0.95)	8.00(2.54)	167.11(12.60)	220.44(14.68)	1.78(1.08)	2.67(1.33)
	M3	171.11(12.30)	3.56(1.42)	7.56(2.23)	182.22(12.76)	155.56(11.54)	0.00(0.71)	1.33(1.11)
CV%	CD(0.05)	NS	NS	NS	NS	NS	NS	NS
	CV%	33.2	135.17	47.13	30.45	20.47	77.66	81.7
	Mean of Factor-2							
S1	S1	241.33(15.14)	4.44(1.67)	12.89(3.41)	258.67(15.75)	256.89(15.78)	1.78(1.08)	4.44(1.82)
	S2	105.78(9.83)	0.00(0.71)	10.22(3.01)	116.00(10.44)	142.67(11.55)	0.00(0.71)	4.00(1.74)
	S3	201.33(13.85)	0.89(0.95)	0.00(0.71)	202.22(13.88)	200.89(13.73)	0.00(0.71)	0.00(0.71)
CD(0.05)	CD(0.05)	2.76	NS	1.31	2.49	2.44	NS	0.86
	CV%	20.75	83.65	53.71	18.15	17.36	77.66	59.23
	Interaction							
M and T	M and T	NS	NS	NS	NS	NS	NS	NS
	T and M	NS	NS	NS	NS	NS	NS	NS
	Experimental Mean	12.94	1.11	2.38	13.36	13.69	0.83	1.42

*(Values in parentheses are transformed values)
M1- Mechanized transplanting/Transplanting (if transplanters not available)
M2-Puddled direct seeding (preferably line sowing by drumseeder)
M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check
S2-Mechanical weeding using weeder
S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Nagina			
		Active tillering stage			Total
		Grasses	Sedges	BLW	
M1	S1	4.08(2.14)	1.79(1.51)	3.06(1.88)	8.93(3.07)
	S2	2.89(1.84)	1.63(1.45)	2.16(1.63)	6.69(2.68)
	S3	2.15(1.63)	1.05(1.24)	1.92(1.51)	5.12(2.36)
M2	S1	5.03(2.35)	2.90(1.84)	4.26(2.18)	12.19(3.56)
	S2	3.55(2.01)	2.41(1.70)	2.87(1.83)	8.84(3.05)
	S3	3.06(1.89)	2.37(1.69)	2.66(1.77)	8.09(2.93)
M3	S1	6.87(2.71)	5.14(2.37)	4.50(2.23)	16.51(4.12)
	S2	3.76(2.06)	2.95(1.86)	3.31(1.94)	10.03(3.23)
	S3	3.32(1.95)	2.80(1.81)	3.18(1.92)	9.30(3.13)
Mean of Factor-1					
	M1	3.04(1.87)	1.49(1.40)	2.38(1.67)	6.91(2.70)
	M2	3.88(2.08)	2.56(1.74)	3.27(1.93)	9.71(3.18)
	M3	4.65(2.24)	3.63(2.01)	3.67(2.03)	11.94(3.49)
	CD(0.05)	0.11	0.11	0.16	0.22
	CV%	6.25	7.71	10.15	8.39
Mean of Factor-2					
	S1	5.33(2.40)	3.28(1.90)	3.94(2.10)	12.54(3.58)
	S2	3.40(1.97)	2.33(1.67)	2.78(1.80)	8.52(2.99)
	S3	2.84(1.82)	2.07(1.58)	2.59(1.73)	7.50(2.80)
	CD(0.05)	0.12	0.17	0.23	0.21
	CV%	5.8	9.5	11.96	6.45
	Interaction				
	M and T	NS	NS	NS	NS
	T and M	NS	NS	NS	NS
	Experimental Mean	2.06	1.72	1.88	3.13

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot		Sub plot treatments		Nawagam									
		Active tillering stage					Panicle initiation stage						
		Grasses	Sedges	BLW	Total	Grasses	Sedges	BLW	Total				
M1	S1	516.00(22.72)	300.67(17.35)	250.00(15.80)	1066.67(32.65)	818.33(28.54)	357.00(18.83)	392.33(19.74)	1567.67(39.58)				
	S2	232.00(15.25)	232.33(15.19)	167.67(12.88)	632.00(25.09)	493.33(22.14)	196.00(13.85)	262.67(15.98)	952.00(30.86)				
	S3	190.67(13.81)	193.33(13.81)	124.33(11.17)	508.33(22.51)	280.33(16.75)	136.33(11.66)	162.33(12.67)	579.00(24.07)				
M2	S1	514.00(22.65)	245.33(15.58)	272.33(16.51)	1031.67(32.13)	710.67(26.55)	264.67(16.19)	302.67(17.38)	1278.00(35.68)				
	S2	261.00(16.17)	184.00(13.51)	152.67(12.37)	597.67(24.43)	424.00(20.60)	140.00(11.85)	243.00(15.53)	807.00(28.41)				
	S3	236.00(15.36)	160.00(12.36)	132.00(11.34)	528.00(22.81)	233.67(15.30)	138.33(11.51)	149.00(12.16)	521.00(22.79)				
M3	S1	586.33(24.20)	252.00(15.88)	230.33(15.15)	1068.67(32.68)	662.67(25.68)	356.00(18.81)	378.00(19.29)	1396.67(37.37)				
	S2	321.33(17.92)	201.00(14.10)	114.33(10.46)	636.67(25.22)	418.00(20.39)	241.00(15.37)	297.67(17.17)	956.67(30.93)				
	S3	266.67(16.34)	169.00(12.92)	95.00(9.69)	530.67(22.98)	193.67(13.78)	137.00(11.64)	241.33(15.52)	572.00(23.90)				
Mean of Factor-1													
	M1	312.89(17.26)	242.11(15.45)	180.67(13.28)	735.67(26.75)	530.67(22.47)	229.78(14.78)	272.44(16.13)	1032.89(31.50)				
	M2	337.00(18.06)	196.44(13.82)	185.67(13.41)	719.11(26.46)	456.11(20.82)	181.00(13.18)	231.56(15.02)	868.67(28.96)				
	M3	391.44(19.49)	207.33(14.30)	146.56(11.77)	745.33(26.96)	424.78(19.95)	244.67(15.28)	305.67(17.32)	975.11(30.73)				
	CD(0.05)	0.73	NS	0.84	NS	NS	NS	NS	NS				
	CV%	4.77	16.71	7.79	4.83	10.95	10.12	12.51	6.08				
Mean of Factor-2													
	S1	538.78(23.19)	266.00(16.27)	250.89(15.82)	1055.67(32.49)	730.56(26.92)	325.89(17.94)	357.67(18.80)	1414.11(37.54)				
	S2	271.44(16.44)	205.78(14.27)	144.89(11.90)	622.11(24.92)	445.11(21.04)	192.33(13.69)	267.78(16.23)	905.22(30.06)				
	S3	231.11(15.17)	174.11(13.03)	117.11(10.74)	522.33(22.77)	235.89(15.28)	137.22(11.60)	184.22(13.45)	557.33(23.59)				
	CD(0.05)	0.93	1.33	1.87	1.72	1.84	2.07	2.47	1.29				
	CV%	4.95	8.93	14.2	6.27	8.5	14	14.9	4.12				
Interaction													
	M and T	NS	NS	NS	NS	NS	NS	NS	NS				
	T and M	NS	NS	NS	NS	NS	NS	NS	NS				
Experimental Mean		18.27	14.52	12.82	26.72	21.08	14.41	16.16	30.4				

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Pantnagar							
		Active tillering stage				Panicle initiation stage			
		Grasses	Sedges	BLW	Total	Grasses	Sedges	BLW	Total
M1	S1	14.00(3.80)	20.67(4.60)	22.67(4.78)	57.33(7.59)	58.00(7.64)	16.00(4.05)	14.00(3.78)	88.00(9.39)
	S2	2.00(1.47)	9.33(3.11)	4.00(2.08)	15.33(3.94)	6.67(2.58)	6.00(2.47)	2.67(1.44)	15.33(3.79)
	S3	5.33(2.41)	2.00(1.58)	6.00(2.49)	13.33(3.69)	4.00(2.08)	4.67(2.21)	2.33(1.57)	11.00(3.27)
M2	S1	22.00(4.73)	26.67(5.21)	22.67(4.80)	71.33(8.47)	66.33(8.17)	20.00(4.52)	26.00(5.15)	112.33(10.62)
	S2	4.67(2.21)	9.33(3.12)	4.67(2.26)	18.67(4.36)	10.67(3.30)	8.00(2.90)	10.67(3.21)	29.33(5.42)
	S3	1.33(1.18)	8.67(3.02)	2.67(1.61)	12.67(3.62)	4.67(2.06)	2.33(1.64)	2.67(1.65)	9.67(3.15)
M3	S1	19.33(4.45)	24.00(4.95)	24.00(4.95)	67.33(8.24)	79.00(8.91)	27.33(5.27)	26.00(5.10)	132.33(11.51)
	S2	6.67(2.67)	5.33(2.41)	14.00(3.79)	26.00(5.15)	14.67(3.87)	8.00(2.77)	8.00(2.92)	30.67(5.55)
	S3	4.67(2.26)	3.95(2.07)	0.00(0.71)	11.95(3.48)	0.00(0.71)	4.00(2.08)	5.33(2.12)	15.67(3.90)
Mean of Factor-1									
	M1	7.11(2.56)	10.67(3.10)	10.89(3.12)	28.67(5.08)	22.89(4.10)	8.89(2.91)	6.33(2.26)	38.11(5.49)
	M2	9.33(2.71)	14.89(3.79)	10.00(2.89)	34.22(5.48)	27.22(4.51)	10.11(3.02)	13.11(3.33)	50.44(6.40)
	M3	10.22(3.13)	11.10(3.14)	12.67(3.15)	35.10(5.62)	31.22(4.49)	13.11(3.37)	13.11(3.38)	59.56(6.99)
	CD(0.05)	NS	0.25	NS	0.24	NS	NS	0.45	0.3
	CV%	18.86	8.82	8.95	5.22	13.88	13.9	17.79	5.79
Mean of Factor-2									
	S1	18.44(4.33)	23.78(4.92)	23.11(4.84)	65.33(8.10)	67.78(8.24)	21.11(4.61)	22.00(4.68)	110.89(10.51)
	S2	4.44(2.12)	8.00(2.88)	7.56(2.71)	20.00(4.48)	10.67(3.25)	7.33(2.71)	7.11(2.52)	25.11(4.92)
	S3	3.78(1.95)	4.87(2.22)	2.89(1.60)	12.65(3.60)	2.89(1.62)	3.67(1.98)	3.44(1.78)	12.11(3.44)
	CD(0.05)	0.51	0.32	0.61	0.58	0.61	0.58	1.08	1.05
	CV%	17.86	9.44	19.44	10.47	13.52	18.35	35.27	16.24
Interaction									
	M and T	NS	NS	NS	NS	NS	NS	NS	NS
	T and M	NS	NS	NS	NS	NS	NS	NS	NS
Experimental Mean		2.8	3.34	3.05	5.39	4.37	3.1	2.99	6.29

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Pattambi							
		Active tillering stage				Panicle initiation stage			
		Grasses	Sedges	BLW	Total	Grasses	Sedges	BLW	Total
M1	S1	26.67(5.20)	17.33(4.22)	35.00(5.93)	79.00(8.91)	100.33(10.03)	30.00(5.51)	50.67(7.13)	181.00(13.47)
	S2	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	36.33(6.06)	18.33(4.33)	0.00(0.71)	54.67(7.42)
	S3	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	63.67(7.80)	10.00(3.23)	3.00(1.86)	76.67(8.60)
M2	S1	72.33(8.52)	64.33(8.00)	38.33(6.19)	175.00(13.22)	121.67(11.05)	51.67(7.16)	55.00(7.40)	228.33(15.12)
	S2	32.67(5.76)	26.67(5.19)	3.00(1.81)	62.33(7.92)	36.00(6.01)	24.00(4.89)	8.00(2.89)	68.00(8.23)
	S3	23.33(4.86)	8.33(2.90)	0.00(0.71)	31.67(5.63)	105.67(10.28)	9.00(3.06)	0.00(0.71)	114.67(10.72)
M3	S1								
	S2								
	S3								
Mean of Factor-1									
M1	M1	8.89(2.20)	5.78(1.88)	11.67(2.45)	26.33(3.44)	66.78(7.96)	19.44(4.36)	17.89(3.23)	104.11(9.83)
	M2	42.78(6.38)	33.11(5.36)	13.78(2.90)	89.67(8.92)	87.78(9.12)	28.22(5.04)	21.00(3.67)	137.00(11.35)
	M3								
CD(0.05)	CD	0.77	0.5	0.17	0.8	NS	NS	0.18	0.62
	CV%	17.65	16.95	7.82	13.99	12.62	16.36	6.52	7.11
Mean of Factor-2									
S1	S1	62.67(7.72)	33.33(5.52)	34.56(5.89)	130.56(11.29)	100.78(9.99)	38.67(6.18)	54.56(7.39)	194.00(13.91)
	S2	23.89(4.24)	13.22(3.19)	1.00(1.08)	38.11(5.28)	36.78(6.08)	20.44(4.54)	2.67(1.43)	59.89(7.74)
	S3	17.00(3.60)	3.67(1.78)	0.00(0.71)	20.67(3.95)	82.78(9.00)	8.67(3.00)	1.00(1.09)	92.44(9.54)
CD(0.05)	CD	0.35	0.49	0.48	0.38	1.18	0.40	0.51	1.05
	CV%	6.53	13.57	18.35	5.46	13.73	8.54	14.96	9.81
Interaction									
M and T	M and T	NS	0.84	NS	0.66	NS	NS	0.88	NS
	T and M	NS	0.75	NS	0.76	NS	NS	0.72	NS
Experimental Mean		5.19	3.49	2.56	6.84	8.36	4.58	3.31	10.39

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	ARI-Rajendranagar							
		Active tillering stage				Panicle initiation stage			
		Grasses	Sedges	BLW	Total	Grasses	Sedges	BLW	Total
M1	S1	16.74(4.13)	8.91(3.05)	2.70(1.78)	28.35(5.34)	12.64(3.61)	10.09(3.25)	4.24(2.17)	26.98(5.23)
	S2	6.41(2.62)	3.41(1.97)	1.03(1.24)	10.85(3.36)	11.38(3.45)	7.68(2.86)	3.92(2.10)	22.98(4.84)
	S3	3.72(2.04)	1.98(1.57)	0.60(1.05)	6.30(2.59)	5.26(2.40)	3.56(2.02)	1.81(1.52)	10.62(3.33)
M2	S1	36.37(6.06)	19.36(4.45)	5.87(2.52)	61.60(7.87)	48.87(7.03)	34.58(5.92)	16.83(4.16)	100.29(10.04)
	S2	19.84(4.51)	10.56(3.32)	3.20(1.92)	33.60(5.83)	23.47(4.89)	16.61(4.14)	7.63(2.85)	47.72(6.94)
	S3	12.61(3.53)	6.71(2.62)	2.03(1.56)	21.35(4.56)	13.29(3.71)	8.76(3.04)	4.60(2.26)	26.64(5.21)
M3	S1	39.68(6.33)	21.12(4.64)	6.40(2.62)	67.20(8.22)	56.90(7.58)	49.70(7.08)	12.67(3.63)	119.27(10.94)
	S2	22.73(4.81)	12.10(3.55)	3.67(2.04)	38.50(6.24)	32.76(5.76)	28.10(5.35)	7.48(2.83)	68.34(8.29)
	S3	16.74(4.13)	8.91(3.05)	2.70(1.78)	28.35(5.34)	14.51(3.87)	13.18(3.70)	3.26(1.94)	30.95(5.61)
Mean of Factor-1									
	M1	8.96(2.93)	4.77(2.20)	1.44(1.36)	15.17(3.76)	9.76(3.15)	7.11(2.71)	3.32(1.93)	20.19(4.47)
	M2	22.94(4.70)	12.21(3.46)	3.70(2.00)	38.85(6.08)	28.54(5.21)	19.98(4.37)	9.69(3.09)	58.21(7.40)
	M3	26.38(5.09)	14.04(3.75)	4.26(2.15)	44.68(6.60)	34.72(5.74)	30.32(5.38)	7.80(2.80)	72.85(8.28)
	CD(0.05)	0.26	0.19	0.1	0.34	0.15	0.1	0.06	0.17
	CV%	7.35	7.18	6.41	7.44	3.86	2.89	2.95	3.06
Mean of Factor-2									
	S1	30.93(5.51)	16.46(4.05)	4.99(2.31)	52.38(7.14)	39.47(6.07)	31.46(5.42)	11.25(3.32)	82.18(8.74)
	S2	16.33(3.98)	8.69(2.95)	2.63(1.73)	27.65(5.14)	22.54(4.70)	17.46(4.11)	6.34(2.59)	46.34(6.69)
	S3	11.02(3.23)	5.87(2.41)	1.78(1.46)	18.67(4.16)	11.02(3.33)	8.50(2.92)	3.22(1.90)	22.74(4.72)
	CD(0.05)	0.58	0.42	0.22	0.76	0.19	0.11	0.09	0.22
	CV%	13.4	13.03	11.53	13.58	3.96	2.64	3.46	3.22
Interaction									
	M and T	NS	NS	NS	NS	0.33	0.19	0.16	0.38
	T and M	NS	NS	NS	NS	0.28	0.17	0.14	0.33
Experimental Mean		4.24	3.14	1.83	5.48	4.7	4.15	2.61	6.72

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot		Sub plot treatments	Titabar							
			Active tillering stage				Panicle initiation stage			
			Grasses	Sedges	BLW	Total	Grasses	Sedges	BLW	Total
M1		S1	35.67(6.01)	9.00(3.06)	9.00(3.06)	53.67(7.36)	41.67(6.48)	14.00(3.77)	13.00(3.66)	68.67(8.31)
		S2	28.00(5.32)	6.00(2.54)	6.67(2.67)	40.67(6.41)	28.67(5.40)	8.33(2.94)	8.67(3.02)	45.67(6.79)
		S3	17.33(4.22)	6.33(2.57)	5.00(2.32)	28.67(5.40)	24.00(4.93)	6.33(2.58)	7.67(2.83)	38.00(6.20)
M2		S1	42.67(6.57)	12.33(3.58)	12.33(3.57)	67.33(8.23)	47.33(6.91)	18.33(4.33)	18.00(4.30)	83.67(9.17)
		S2	34.00(5.87)	9.67(3.17)	9.67(3.18)	53.33(7.33)	39.67(6.34)	11.67(3.48)	13.00(3.66)	64.33(8.05)
		S3	23.00(4.83)	6.67(2.67)	6.67(2.64)	36.33(6.07)	32.33(5.72)	8.67(3.02)	9.33(3.12)	50.33(7.12)
M3		S1	48.00(6.96)	18.00(4.29)	17.00(4.18)	83.00(9.13)	49.67(7.08)	20.67(4.59)	21.00(4.63)	91.33(9.58)
		S2	38.67(6.25)	13.33(3.71)	12.33(3.58)	64.33(8.05)	39.33(6.31)	19.33(4.43)	14.33(3.84)	73.00(8.57)
		S3	26.67(5.20)	7.33(2.77)	9.67(3.18)	43.67(6.64)	34.33(5.90)	9.67(3.18)	9.00(3.06)	53.00(7.31)
Mean of Factor-1		M1	27.00(5.18)	7.11(2.73)	6.89(2.68)	41.00(6.39)	31.44(5.60)	9.56(3.10)	9.78(3.17)	50.78(7.10)
		M2	33.22(5.76)	9.56(3.14)	9.56(3.13)	52.33(7.21)	39.78(6.32)	12.89(3.61)	13.44(3.69)	66.11(8.12)
		M3	37.78(6.14)	12.89(3.59)	13.00(3.65)	63.67(7.94)	41.11(6.43)	16.56(4.07)	14.78(3.84)	72.44(8.49)
		CD(0.05)	0.32	0.3	0.14	0.25	0.42	0.11	0.17	0.33
		CV%	6.77	11.21	5.33	4.17	8.13	3.59	5.65	5
Mean of Factor-2		S1	42.11(6.51)	13.11(3.64)	12.78(3.60)	68.00(8.24)	46.22(6.82)	17.67(4.23)	17.33(4.20)	81.22(9.02)
		S2	33.56(5.81)	9.67(3.14)	9.56(3.14)	52.78(7.26)	35.89(6.01)	13.11(3.62)	12.00(3.51)	61.00(7.80)
		S3	22.33(4.75)	6.78(2.67)	7.11(2.71)	36.22(6.03)	30.22(5.52)	8.22(2.93)	8.67(3.00)	47.11(6.88)
		CD(0.05)	0.39	0.4	0.39	0.3	0.3	0.45	0.34	0.23
		CV%	6.65	12.36	12.18	4.1	4.74	12.15	9.26	2.89
Interaction										
		M and T	NS	NS	NS	NS	NS	NS	NS	NS
		T and M	NS	NS	NS	NS	NS	NS	NS	NS
Experimental Mean			5.69	3.15	3.15	7.18	6.12	3.59	3.57	7.9

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Varanasi								
		Active tillering stage				Panicle initiation stage				
		Grasses	Sedges	BLW	Total	Grasses	Sedges	BLW	Total	
M1	S1	31.33(5.61)	25.33(5.07)	16.33(4.08)	73.00(8.57)	66.00(8.10)	42.33(6.50)	21.33(4.66)	129.67(11.34)	
	S2	15.00(3.94)	26.00(5.11)	10.00(3.18)	51.00(7.15)	20.67(4.59)	14.67(3.88)	10.33(3.26)	45.67(6.79)	
	S3	21.67(4.70)	16.00(4.06)	8.00(2.90)	45.67(6.79)	19.00(4.36)	16.33(4.06)	6.33(2.58)	41.67(6.42)	
M2	S1	57.00(7.56)	121.33(10.63)	23.67(4.90)	202.00(14.03)	84.33(9.18)	33.67(5.84)	18.67(4.36)	136.67(11.68)	
	S2	43.33(6.61)	48.33(6.87)	11.33(3.41)	103.00(10.13)	39.00(6.25)	14.67(3.88)	7.67(2.81)	61.33(7.82)	
	S3	31.33(5.64)	45.33(6.76)	9.00(3.06)	85.67(9.27)	22.67(4.80)	16.33(4.02)	5.33(2.40)	44.33(6.65)	
M3	S1	55.33(7.44)	132.00(11.19)	25.33(5.07)	212.67(14.46)	59.67(7.74)	38.67(6.25)	20.67(4.58)	119.00(10.92)	
	S2	37.33(6.11)	67.33(8.11)	19.67(4.47)	124.33(11.15)	21.00(4.60)	11.33(3.43)	8.33(2.94)	40.67(6.38)	
	S3	31.00(5.58)	40.33(6.27)	13.33(3.70)	84.67(9.20)	21.00(4.62)	11.00(3.37)	6.00(2.53)	38.00(6.19)	
Mean of Factor-1		M1	22.67(4.75)	22.44(4.75)	11.44(3.39)	56.56(7.50)	35.22(5.68)	24.44(4.81)	12.67(3.50)	72.33(8.18)
		M2	43.89(6.60)	71.67(8.09)	14.67(3.79)	130.22(11.14)	48.67(6.75)	21.56(4.58)	10.56(3.19)	80.78(8.72)
		M3	41.22(6.37)	79.89(8.53)	19.44(4.42)	140.56(11.61)	33.89(5.65)	20.33(4.35)	11.67(3.35)	65.89(7.83)
	CD(0.05)	0.58	NS	0.27	1.29	0.47	NS	NS	NS	NS
	CV%	11.71	33.56	8.2	15.31	9.22	14.77	10.1	9.96	
Mean of Factor-2		S1	47.89(6.87)	92.89(8.96)	21.78(4.68)	162.56(12.35)	70.00(8.34)	38.22(6.20)	20.22(4.53)	128.44(11.31)
		S2	31.89(5.55)	47.22(6.70)	13.67(3.69)	92.78(9.48)	26.89(5.15)	13.56(3.73)	8.78(3.00)	49.22(6.99)
		S3	28.00(5.30)	33.89(5.70)	10.11(3.22)	72.00(8.42)	20.89(4.59)	14.56(3.82)	5.89(2.51)	41.33(6.42)
	CD(0.05)	0.54	1.51	0.42	1.14	0.49	0.43	0.33	0.47	
	CV%	8.86	20.6	10.46	10.97	7.97	9.16	9.7	5.53	
Interaction		M and T	NS	NS	NS	NS	NS	NS	NS	NS
		T and M	NS	NS	NS	NS	NS	NS	NS	NS
Experimental Mean			5.91	7.12	3.86	10.08	6.03	4.58	3.35	8.24

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3(R): Summary on Group wise weed population no. /m² of Long term trial on Weed Dynamics in rice under different establishment methods, Rabi 2023-2024.

Main plot		Sub plot treatments	Karaikal (Rabi)							
			Active tillering stage			Panicle initiation stage				
			Grasses	Sedges	BLW	Total	Grasses	Sedges	BLW	Total
M1		S1	8.33(2.83)	3.33(1.85)	2.67(1.74)	14.33(3.67)	32.00(5.58)	5.00(2.34)	19.00(4.37)	56.00(7.45)
		S2	3.00(1.84)	1.33(1.29)	2.00(1.56)	6.33(2.59)	5.33(2.39)	1.33(1.34)	17.00(3.91)	23.67(4.84)
		S3	3.33(1.80)	2.67(1.74)	3.00(1.81)	9.00(3.06)	8.67(3.03)	0.00(0.71)	5.67(2.48)	14.33(3.85)
M2		S1	52.00(7.08)	19.00(4.37)	2.33(1.68)	73.33(8.48)	78.00(8.84)	6.67(2.67)	8.00(2.91)	92.67(9.63)
		S2	27.67(5.30)	10.33(3.15)	0.67(1.00)	38.67(6.24)	4.00(1.91)	0.33(0.88)	22.67(4.75)	27.00(5.15)
		S3	48.67(7.01)	4.67(2.13)	0.33(0.88)	53.67(7.35)	4.00(2.11)	0.00(0.71)	8.67(3.03)	12.67(3.63)
M3		S1	165.67(12.86)	19.33(4.41)	5.00(2.32)	190.00(13.79)	141.00(11.88)	7.33(2.79)	49.00(7.00)	197.33(14.04)
		S2	49.67(7.07)	4.67(2.21)	2.00(1.47)	56.33(7.52)	5.33(2.39)	1.33(1.34)	17.33(4.22)	24.00(4.95)
		S3	31.00(5.54)	7.00(2.73)	2.33(1.54)	40.33(6.31)	16.00(4.06)	0.00(0.71)	8.00(2.88)	24.00(4.94)
Mean of Factor-1										
		M1	4.89(2.16)	2.44(1.63)	2.56(1.70)	9.89(3.11)	15.33(3.66)	2.11(1.46)	13.89(3.59)	31.33(5.38)
		M2	42.78(6.46)	11.33(3.22)	1.11(1.19)	55.22(7.36)	28.67(4.29)	2.33(1.42)	13.11(3.56)	44.11(6.14)
		M3	82.11(8.49)	10.33(3.11)	3.11(1.78)	95.56(9.21)	54.11(6.11)	2.89(1.61)	24.78(4.70)	81.78(7.98)
CD(0.05)			0.9	0.42	NS	0.86	0.61	NS	NS	0.93
CV%			18.75	19.13	42.66	15.66	15.64	14.46	44.41	17.13
Mean of Factor-2										
		S1	75.33(7.59)	13.89(3.54)	3.33(1.91)	92.56(8.65)	83.67(8.77)	6.33(2.60)	25.33(4.76)	115.33(10.38)
		S2	26.78(4.74)	5.44(2.21)	1.56(1.34)	33.78(5.45)	4.89(2.23)	1.00(1.19)	19.00(4.29)	24.89(4.98)
		S3	27.67(4.78)	4.78(2.20)	1.89(1.41)	34.33(5.57)	9.56(3.07)	0.00(0.71)	7.44(2.80)	17.00(4.14)
CD(0.05)			0.97	0.8	0.42	0.96	0.81	0.19	7.58	0.73
CV%			16.57	29.45	26.32	14.31	16.8	12.54	42.77	10.96
Interaction										
		M and T	1.68	NS	NS	1.67	1.4	NS	NS	1.27
		T and M	1.46	NS	NS	1.45	1.19	NS	NS	1.18
Experimental Mean			5.7	2.65	1.56	6.56	4.69	1.5	17.26	6.5

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control* (Herbicide recommendation of respective University may be followed)

Trial 4.3.3(R): Contd.

Main plot		Sub plot treatments	Pattambi (Rabi)							
			Active tillering stage			Panicle initiation stage				
			Grasses	Sedges	BLW	Total	Grasses	Sedges	BLW	Total
M1		S1	27.67(5.30)	46.67(6.83)	54.33(7.40)	128.67(11.35)	110.67(10.49)	33.33(5.81)	79.67(8.94)	223.67(14.95)
		S2	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	45.33(6.50)	28.67(5.39)	0.00(0.71)	74.00(8.47)
		S3	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	72.33(7.64)	17.00(4.16)	5.67(2.46)	95.00(9.20)
M2		S1	31.33(5.63)	77.00(8.77)	55.33(7.47)	163.67(12.80)	134.00(11.56)	55.33(7.47)	62.33(7.90)	251.67(15.85)
		S2	21.33(4.63)	34.00(5.87)	19.33(4.42)	74.67(8.67)	46.67(6.70)	28.67(5.36)	11.00(3.34)	86.33(9.24)
		S3	23.67(4.89)	12.33(3.49)	0.00(0.71)	36.00(5.99)	26.33(5.12)	11.67(3.45)	0.00(0.71)	38.00(6.13)
M3		S1								
		S2								
		S3								
Mean of Factor-1										
		M1	9.22(2.24)	15.56(2.75)	18.11(2.94)	42.89(4.26)	76.11(8.21)	26.33(5.12)	28.44(4.04)	130.89(10.87)
		M2	25.44(5.05)	41.11(6.04)	24.89(4.20)	91.44(9.15)	69.00(7.79)	31.89(5.42)	24.44(3.98)	125.33(10.41)
		M3								
		CD(0.05)	0.32	0.39	0.28	0.54	NS	NS	0.09	NS
		CV%	8	10.64	10.01	8.65	15.91	9.36	2.94	10.28
		Mean of Factor-2								
		S1	47.11(6.65)	49.11(6.84)	55.22(7.46)	151.44(12.29)	110.89(10.43)	46.00(6.78)	70.78(8.42)	227.67(15.05)
		S2	20.11(3.86)	18.78(3.78)	6.44(1.95)	45.33(5.74)	45.78(6.58)	28.67(5.38)	3.67(1.58)	78.11(8.74)
		S3	16.78(3.60)	7.22(2.44)	0.00(0.71)	24.00(4.25)	61.78(7.34)	13.56(3.71)	1.89(1.29)	77.22(8.41)
		CD(0.05)	0.82	0.57	0.21	0.71	1.28	0.44	0.53	1.11
		CV%	16.99	12.64	6.19	9.24	15.35	8.05	13.77	10.07
		Interaction								
		M and T	NS	0.98	0.37	1.22	NS	NS	0.92	NS
		T and M	NS	0.83	0.35	1.04	NS	NS	0.75	NS
		Experimental Mean	4.7	4.35	3.37	7.42	8.11	5.29	3.76	10.73

* (Values in parentheses are transformed values)

M1-Mechanized transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control* (Herbicide recommendation of respective University may be followed)

Trial 4.3.3(R): Summary on Species wise weed population no/m² of Long term trial on Weed Dynamics in rice under different establishment methods, Rabi 2023-2024.

		Karaikal (Rabi)										
Main plot	Sub plot treatment s	Active tillering stage					Panicle initiation stage					
		Grasses	Sedges	BLW		Total	Grasses		Sedges	BLW		Total
		<i>Echinochloa colona</i>	Cyperus rotundus	Hydrolea zeylanica	Bergia amminoides		<i>Echinochloa colonom</i>	Leptochloa chinensis	Cyperus rotundus	Hydrolea zeylanica	Bergia amminoides	
M1	S1	8.33(2.83)	3.33(1.85)	1.67(1.44)	1.00(1.17)	14.33(3.67)	29.33(5.33)	2.67(1.77)	5.00(2.34)	17.67(4.21)	1.33(1.34)	56.00(7.45)
	S2	3.00(1.84)	1.33(1.29)	0.33(0.88)	1.67(1.44)	6.33(2.59)	5.33(2.39)	0.00(0.71)	1.33(1.34)	16.00(3.75)	1.00(1.22)	23.67(4.84)
	S3	3.33(1.80)	2.67(1.74)	2.00(1.43)	1.00(1.10)	9.00(3.06)	8.67(3.03)	0.00(0.71)	0.00(0.71)	5.67(2.48)	0.00(0.71)	14.33(3.85)
M2	S1	52.00(7.08)	19.00(4.37)	0.00(0.71)	2.33(1.68)	73.33(8.48)	70.67(8.42)	7.33(2.76)	6.67(2.67)	5.00(2.30)	3.00(1.86)	92.67(9.63)
	S2	27.67(5.30)	10.33(3.15)	0.00(0.71)	0.67(1.00)	38.67(6.24)	4.00(1.91)	0.00(0.71)	0.33(0.88)	22.33(4.71)	0.33(0.88)	27.00(5.15)
	S3	48.67(7.01)	4.67(2.13)	0.00(0.71)	0.33(0.88)	53.67(7.35)	0.00(0.71)	4.00(2.11)	0.00(0.71)	8.67(3.03)	0.00(0.71)	12.67(3.63)
M3	S1	165.67(12.86)	19.33(4.41)	0.33(0.88)	4.67(2.26)	190.00(13.79)	125.00(11.19)	16.00(4.04)	7.33(2.79)	35.00(5.91)	14.00(3.80)	197.33(14.04)
	S2	49.67(7.07)	4.67(2.21)	1.00(1.10)	1.00(1.17)	56.33(7.52)	5.33(2.39)	0.00(0.71)	1.33(1.34)	17.33(4.22)	0.00(0.71)	24.00(4.95)
	S3	31.00(5.54)	7.00(2.73)	0.00(0.71)	2.33(1.54)	40.33(6.31)	9.33(3.13)	6.67(2.65)	0.00(0.71)	3.33(1.93)	4.67(2.23)	24.00(4.94)
Mean of Factor-1												
Mean of Factor-2	M1	4.89(2.16)	2.44(1.63)	1.33(1.25)	1.22(1.24)	9.89(3.11)	14.44(3.58)	0.89(1.06)	2.11(1.46)	13.11(3.48)	0.78(1.09)	31.33(5.38)
	M2	42.78(6.46)	11.33(3.22)	0.00(0.71)	1.11(1.19)	55.22(7.36)	24.89(3.68)	3.78(1.86)	2.33(1.42)	12.00(3.35)	1.11(1.15)	44.11(6.14)
	M3	82.11(8.49)	10.33(3.11)	0.44(0.89)	2.67(1.66)	95.56(9.21)	46.56(5.57)	7.56(2.47)	2.89(1.61)	18.56(4.02)	6.22(2.25)	81.78(7.98)
	CD(0.05)	0.9	0.42	NS	NS	0.86	0.62	0.26	NS	NS	0.21	0.93
	CV%	18.75	19.13	44.83	36.95	15.66	17.26	17.46	14.46	28.08	16.8	17.13
Interaction	S1	75.33(7.59)	13.89(3.54)	0.67(1.01)	2.67(1.70)	92.56(8.65)	75.00(8.31)	8.67(2.86)	6.33(2.60)	19.22(4.14)	6.11(2.33)	115.33(10.38)
	S2	26.78(4.74)	5.44(2.21)	0.44(0.89)	1.11(1.20)	33.78(5.45)	4.89(2.23)	0.00(0.71)	1.00(1.19)	18.56(4.22)	0.44(0.94)	24.89(4.98)
	S3	27.67(4.78)	4.78(2.20)	0.67(0.95)	1.22(1.17)	34.33(5.57)	6.00(2.29)	3.56(1.82)	0.00(0.71)	5.89(2.48)	1.56(1.21)	17.00(4.14)
	CD(0.05)	0.97	0.8	ns	0.38	0.96	0.77	0.34	0.19	0.9	0.26	0.73
	CV%	16.57	29.45	44.68	27.23	14.31	17.54	18.26	12.54	24.21	17.07	10.96
Experimental Mean	M and T	1.68	NS	NS	NS	1.67	1.33	0.58	NS	NS	0.45	1.27
	T and M	1.46	NS	NS	NS	1.45	1.14	0.5	NS	NS	0.39	1.18
	Experimental Mean	5.7	2.65	0.95	1.36	6.56	4.28	1.8	1.5	3.61	1.5	6.5

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control* (Herbicide recommendation of respective University may be followed)

Trial 4.3.3(R): Contd.

Main plot		Sub plot treatments		Pattambi (Rabi)							
				Active tillering stage							
		Grasses		Sedges			BLW				
		Isachne miliaceae	Oplismenus burmannii	Cyperus rotundus	<i>Fimbristylis miliaceae</i>	Marselia quadrifolia	Monochoria vaginalis	Sphenoclea zeylanica	Total		
M1	S1	10.67(3.33)	17.00(4.15)	20.00(4.48)	26.67(5.20)	20.33(4.53)	13.67(3.76)	20.33(4.54)	128.67(11.35)		
	S2	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)		
	S3	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)		
M2	S1	13.67(3.76)	17.67(4.25)	11.33(3.36)	65.67(8.11)	14.33(3.85)	5.67(2.40)	35.33(5.99)	163.67(12.80)		
	S2	4.33(2.16)	17.00(4.14)	8.33(2.95)	25.67(5.11)	4.00(2.08)	0.00(0.71)	15.33(3.96)	74.67(8.67)		
	S3	11.00(3.34)	12.67(3.62)	4.33(2.09)	8.00(2.87)	0.00(0.71)	0.00(0.71)	0.00(0.71)	36.00(5.99)		
M3	S1										
	S2										
	S3										
Mean of Factor-1											
M1	M1	3.56(1.58)	5.67(1.85)	6.67(1.96)	8.89(2.20)	6.78(1.98)	4.56(1.72)	6.78(1.99)	42.89(4.26)		
	M2	9.67(3.09)	15.78(4.00)	8.00(2.80)	33.11(5.37)	6.11(2.21)	1.89(1.27)	16.89(3.55)	91.44(9.15)		
	M3										
CD(0.05)	CV%	0.86	0.65	0.25	0.32	NS	0.24	0.18	0.54		
		32.15	22.42	13.84	9.89	22.32	18.34	8.33	8.65		
Mean of Factor-2											
S1	S1	19.44(4.21)	27.67(5.10)	10.89(3.06)	38.22(6.03)	17.44(4.20)	11.33(3.35)	26.44(5.15)	151.44(12.29)		
	S2	9.89(2.63)	10.22(2.87)	4.67(2.05)	14.11(3.32)	1.33(1.17)	0.00(0.71)	5.11(1.79)	45.33(5.74)		
	S3	9.67(2.78)	7.11(2.42)	2.22(1.49)	5.00(2.10)	0.00(0.71)	0.00(0.71)	0.00(0.71)	24.00(4.25)		
CD(0.05)	CV%	0.98	0.59	0.57	0.34	0.35	0.28	0.24	0.71		
		29.83	16.71	25.18	8.59	17	17.44	9.32	9.24		
Interaction											
M and T	M and T	NS	1.03	0.99	0.58	NS	NS	0.42	1.22		
	T and M	NS	0.92	0.81	0.51	NS	NS	0.36	1.04		
Experimental Mean		3.2	3.46	2.2	3.82	2.03	1.59	2.55	7.42		

*(Values in parentheses are transformed values)

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control* (Herbicide recommendation of respective University may be followed)

Trial 4.3.3(R): Contd.

Main plot		Sub plot treatments		Pattambi (Rabi)							
				Panicle initiation stage							
		Grasses		Sedges			BLW				
		Isachne milliaceae	Opismenus burmannii	<i>Fimbristylis milliaceae</i>	Cyperus rotundus	Sphenoclea zeylanica	Marselia quadrifolia	Monochoria vaginalis	Total		
M1	S1	95.33(9.73)	15.33(3.93)	21.67(4.69)	11.67(3.47)	31.67(5.65)	23.67(4.90)	24.33(4.98)	223.67(14.95)		
	S2	37.00(5.63)	8.33(2.93)	21.67(4.70)	7.00(2.72)	0.00(0.71)	0.00(0.71)	0.00(0.71)	74.00(8.47)		
	S3	67.67(7.22)	4.67(2.26)	13.33(3.69)	3.67(2.03)	0.00(0.71)	5.67(2.46)	0.00(0.71)	95.00(9.20)		
M2	S1	111.67(10.55)	22.33(4.77)	42.67(6.57)	12.67(3.61)	33.33(5.79)	17.00(4.18)	12.00(3.50)	251.67(15.85)		
	S2	35.00(5.75)	11.67(3.45)	18.67(4.21)	10.00(3.22)	0.00(0.71)	11.00(3.34)	0.00(0.71)	86.33(9.24)		
	S3	20.67(4.54)	5.67(2.46)	4.67(2.18)	7.00(2.73)	0.00(0.71)	0.00(0.71)	0.00(0.71)	38.00(6.13)		
M3	S1										
	S2										
	S3										
Mean of Factor-1		M1									
		M2	66.67(7.53)	9.44(3.04)	18.89(4.36)	7.44(2.74)	10.56(2.36)	9.78(2.69)	8.11(2.13)	130.89(10.87)	
		M3	55.78(6.95)	13.22(3.56)	22.00(4.32)	9.89(3.19)	11.11(2.40)	9.33(2.74)	4.00(1.64)	125.33(10.41)	
		CD(0.05)	NS	NS	NS	0.4	NS	NS	0.14	NS	
		CV%	21.64	12.15	20.13	14.99	7.75	10.77	8.93	10.28	
Mean of Factor-2		S1									
		S2	90.67(9.35)	20.22(4.52)	30.89(5.54)	15.11(3.90)	31.00(5.59)	23.56(4.86)	16.22(4.01)	227.67(15.05)	
		S3	34.56(5.52)	11.22(3.38)	18.78(4.32)	9.89(3.19)	0.00(0.71)	3.67(1.58)	0.00(0.71)	78.11(8.74)	
		CD(0.05)	56.67(6.91)	5.11(2.34)	8.00(2.79)	5.56(2.43)	0.00(0.71)	1.89(1.29)	0.00(0.71)	77.22(8.41)	
		CV%	1.47	0.5	0.59	0.39	0.32	0.37	0.32	1.11	
Interaction		M and T	19.74	14.27	13.64	11.9	13.37	14.13	17.22	10.07	
		T and M	NS	NS	NS	NS	NS	0.65	NS	NS	
		Experimental Mean	NS	NS	NS	NS	NS	0.54	NS	NS	
			7.26	3.41	4.22	3.17	2.34	2.58	1.81	10.73	

*(Values in parentheses are transformed values)
M1- Mechanized transplanting/Transplanting (if transplanters not available)
M2-Puddled direct seeding (preferably line sowing by drumseeder)
M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check
S2-Mechanical weeding using weeder
S3-Chemical weed control* (Herbicide recommendation of respective University may be followed)

Trial 4.3.3: Summary on Weed Control Efficiency % & Weed Index of Long term trial on Weed Dynamics in rice under different establishment methods, Kharif-2024.

Mai n plot	Sub plot Treatments	Weed Control Efficiency %															Weed Index		
		Active tillering stage						Panicle initiation stage											
		Gangavat hi	Mala n	Moncomp u	Nawga m	Pantnaga r	Pattamb i	Gangavat hi	Mala n	Moncomp u	Nawga m	Pantnaga r	Pattamb i	Moncomp u	Pantnaga r	Pattamb i			
M1	S1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	69.42	48.60	67.78			
	S2	80.87	31.78	67.89	38.88	78.90	100.00	3.66	27.04	24.37	39.17	84.71	69.26	36.67	10.23	61.11			
	S3	67.84	54.06	76.11	51.33	74.03	100.00	71.76	53.61	71.76	62.39	91.88	61.25	6.08	4.90	52.54			
M2	S1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	66.74	43.90	57.94			
	S2	65.80	31.18	21.65	42.78	81.88	70.42	37.63	33.79	40.47	34.02	80.79	66.02	56.58	19.70	46.98			
	S3	87.57	73.06	71.54	49.49	89.90	84.42	84.03	69.05	64.14	59.01	93.95	60.23	13.89	10.10	36.35			
M3	S1	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00		72.00	49.83				
	S2	47.70	33.59	36.20	43.08	70.89		57.04	31.21	35.73	31.99	84.74		47.87	9.73				
	S3	54.76	72.05	77.99	51.88	84.97		60.13	73.69	77.99	55.92	93.41		21.62	9.57				

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Summary on Species wise Relative Weed Density of Long term trial on weed dynamics in rice under different establishment methods, Kharif 2024.

Main plot	Sub plot treatments	Aduthurai												
		Active tillering stage												
		Grasses					Sedges			BLW				
		Echinochloa colona	Echinochloa crusgalli	Leptochloa chinensis	Panicum repens	Cynodon dactylon	Cyperus rotundus	Cyperus difformis	Fimbristylis miliacea	Eclipta alba	Euphorbia prostrata	Ammania baccifera	Marselia quadrifolia	Bergia capensis
M1	S1	20.53	9.17	10.70	5.60	2.87	5.60	2.21	1.87	19.35	12.41	5.45	2.90	1.35
	S2	17.93	7.65	12.59	10.24	5.42	8.61	6.23	0.00	10.11	7.07	7.78	6.38	0.00
	S3	11.66	11.66	10.87	9.16	5.01	6.65	4.15	3.36	16.67	10.81	5.01	3.30	1.71
M2	S1	18.59	9.95	13.31	6.13	5.02	4.88	2.81	1.68	17.91	10.21	4.90	2.38	2.23
	S2	8.97	28.22	10.34	7.71	5.92	9.93	4.55	0.00	7.70	4.10	4.96	4.46	3.15
	S3	21.12	13.02	13.02	8.25	5.44	7.65	2.74	2.70	9.58	4.81	5.55	3.40	2.74
M3	S1	17.62	9.70	11.64	7.47	5.05	4.73	3.03	2.60	15.44	10.29	5.88	3.96	2.59
	S2	15.62	11.58	11.95	8.25	5.79	7.55	6.92	1.46	10.55	5.07	5.83	5.07	4.37
	S3	14.55	9.16	9.67	7.98	20.65	7.53	3.96	1.33	9.35	4.84	4.84	3.51	2.65

Main plot		Sub plot treatments	Chatha																	
			Active tillering stage							Panicle initiation stage										
			Grasses				Sedges			BLW			Grasses				Sedges		BLW	
			<i>Echinochloa spp</i>	<i>Dactyloctenium aegyptium</i>	<i>Cynodon dactylon</i>	<i>Elusine indica</i>	<i>Cyperus spp</i>	<i>Solanum nigrum</i>	<i>Physalis minima</i>	<i>Echinochloa spp</i>	<i>Dactyloctenium aegyptium</i>	<i>Cynodon dactylon</i>	<i>Elusine indica</i>	<i>Cyperus spp</i>	<i>Solanum nigrum</i>	<i>Physalis minima</i>				
M1	S1	25.94	15.87	13.98	1.15	41.12	0.77	1.16	22.05	18.57	13.25	1.83	40.82	1.84	1.64					
	S2	30.63	22.14	16.98	5.16	11.83	7.54	5.71	16.24	23.74	25.02	5.03	18.76	6.22	4.99					
	S3	7.38	5.54	3.60	0.93	80.88	0.83	0.83	13.85	27.75	19.41	2.78	32.04	2.84	1.33					
M2	S1	24.16	14.03	12.09	1.94	45.17	1.29	1.32	23.79	17.64	11.49	3.49	37.60	2.66	3.33					
	S2	24.36	19.41	14.65	4.95	17.03	9.89	9.71	18.81	24.06	23.23	4.54	20.47	5.37	3.52					
	S3	8.37	3.84	3.83	1.55	80.10	0.76	1.55	15.35	22.78	22.92	2.58	30.06	3.56	2.75					
M3	S1	23.67	15.25	13.08	1.87	42.39	1.56	2.18	25.81	17.36	9.52	3.69	37.17	2.92	3.53					
	S2	19.84	19.84	17.86	4.76	10.32	12.30	15.08	20.48	21.92	23.47	5.27	21.30	3.77	3.77					
	S3	4.57	4.55	3.24	3.23	78.56	3.90	1.95	19.86	19.02	21.54	3.49	27.48	4.32	4.28					
		M1- Mechanised transplanting/Transplanting (if transplanters not available)																		
		M2-Puddled direct seeding (preferably line sowing by drumseeder)																		
		M3-Un-puddled dry direct seeding (line sowing)																		
		S1-Weedy check																		
		S2-Mechanical weeding using weeder																		
		S3-Chemical weed control																		

Trial 4.3.3: Contd.

Main plot		Sub plot treatments	Gangavathi										
			Active tillering stage					Panicle initiation stage					
			Grasses			Sedges		BLW	Grasses			Sedges	BLW
			<i>Echinochloa crusgalli</i>	<i>Digiteria longifolia</i>	<i>Oryza sativa sp spontanea</i>	<i>Cyperus rotundus</i>	<i>Cyperus difformis</i>	<i>Cynotis cristata</i>	<i>Echinochloa crusgalli</i>	<i>Digiteria longifolia</i>	<i>Oryza sativa sp spontanea</i>	<i>Cyperus rotundus</i>	<i>Cynotis cristata</i>
M1	S1	5.31	0.00	0.35	93.63	0.71	0.00	4.41	0.00	0.00	95.59	0.00	
	S2	6.67	0.00	0.00	33.33	20.00	0.00	40.05	0.00	2.56	57.39	0.00	
	S3	0.00	0.00	0.00	27.78	5.56	0.00	5.56	0.00	0.00	27.78	0.00	
M2	S1	8.99	0.00	21.68	56.94	5.01	0.00	1.99	0.00	26.35	63.03	1.17	
	S2	33.56	1.45	7.34	53.87	2.08	0.00	4.76	0.00	28.56	66.67	0.00	
	S3	15.56	6.67	0.00	77.78	0.00	0.00	0.00	0.00	33.55	33.12	0.00	
M3	S1	0.00	0.00	79.48	13.14	0.00	7.38	0.00	0.00	66.75	11.61	21.64	
	S2	1.63	0.00	51.23	38.15	4.07	4.92	0.00	0.00	41.43	49.58	8.99	
	S3	0.00	41.10	3.62	54.55	0.72	0.00	0.00	8.89	30.90	60.21	0.00	

Main plot		Sub plot treatments	Jagdalpur									
			Active tillering stage					Sedges				
			Grasses			Sedges		Grasses			BLW	
			<i>Echinochloa spp</i>	<i>Cynodon dactylon</i>	<i>Paspalum dilatam</i>	<i>Ischaemum rugosum</i>	<i>Cyprus rotundus</i>	<i>Cyprus iria</i>	<i>Cyprus diformis</i>	<i>Ludwigia spp</i>	<i>Aegeratum spp</i>	
M1		S1	14.97	0.00	7.29	23.90	4.49	12.63	5.43	31.29	0.00	
		S2	38.19	2.15	1.69	14.78	2.64	8.89	10.71	20.94	0.00	
		S3	39.78	1.72	3.67	40.53	0.88	4.21	5.63	3.59	0.00	
M2		S1	25.29	0.27	2.34	4.25	6.57	6.20	9.19	45.89	0.00	
		S2	7.20	2.41	0.84	5.65	8.35	10.55	11.83	53.18	0.00	
		S3	45.79	0.00	6.03	19.91	3.00	13.20	7.25	4.82	0.00	
M3		S1	14.08	6.30	5.25	25.76	4.00	14.29	3.92	15.03	11.37	
		S2	19.24	10.09	10.09	6.57	7.69	10.26	5.86	20.37	9.83	
		S3	32.26	21.12	6.78	12.60	6.06	3.98	9.93	6.59	0.68	
		M1- Mechanised transplanting/Transplanting (if transplanters not available)										S1-Weedy check
		M2-Puddled direct seeding (preferably line sowing by drumseeder)										S2-Mechanical weeding using weeder
		M3-Un-puddled dry direct seeding (line sowing)										S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Jagdalpur									
		Panicle initiation stage									
		Grasses					Sedges			BLW	
		<i>Echinochloa spp</i>	<i>Cynodon dactylon</i>	<i>Paspalum dilatatum</i>	<i>Ischaemum rugosum</i>	<i>Cyperus rotundus</i>	<i>Cyperus iria</i>	<i>Cyperus difformis</i>	Ludwigia spp	Aegeratum spp	
M1	S1	26.15	1.56	3.49	21.97	3.85	10.20	9.77	23.00	0.00	
	S2	29.20	0.26	9.19	16.13	3.59	11.94	15.85	13.84	0.00	
	S3	36.21	0.00	10.34	19.78	0.89	11.24	9.98	11.57	0.00	
M2	S1	20.70	0.21	3.12	8.15	6.83	6.66	12.00	42.34	0.00	
	S2	7.50	2.36	1.18	12.70	9.77	10.52	15.38	40.59	0.00	
	S3	44.61	0.00	5.71	9.35	4.56	16.74	12.03	7.01	0.00	
M3	S1	12.96	6.44	5.31	29.84	4.86	16.07	7.04	16.67	0.81	
	S2	14.70	9.31	8.84	10.11	7.88	17.49	7.21	21.58	2.88	
	S3	30.36	20.92	5.81	6.60	9.80	5.71	9.63	11.18	0.00	

Main plot	Sub plot treatments	Malan									
		Active tillering stage									
		Grasses					Sedges			BLW	
		<i>Echinochloa colonum</i>	<i>Echinochloa crusgalli</i>	<i>Panicum sp.</i>	<i>Cyperus iria</i>	<i>Cyperus rotundus</i>	<i>Cyperus difformis</i>	<i>Alternanthera sp.</i>	<i>Eclipta alba</i>	<i>Monochoria vaginalis</i>	
M1	S1	30.12	16.10	8.28	6.42	5.10	7.71	8.28	7.03	10.96	
	S2	29.11	18.59	9.76	7.74	6.76	7.74	4.77	5.80	9.73	
	S3	26.48	10.66	7.92	8.51	5.77	12.62	12.18	7.92	7.92	
M2	S1	18.86	14.38	9.04	7.91	9.87	9.04	8.00	12.36	10.52	
	S2	21.60	13.56	3.92	15.66	8.44	9.12	8.44	8.52	10.74	
	S3	20.19	9.11	6.73	8.18	9.63	11.08	13.20	12.27	9.63	
M3	S1	15.97	13.67	8.54	9.68	10.47	10.33	8.14	11.90	11.30	
	S2	14.02	12.81	9.15	11.86	12.26	8.49	8.64	8.60	14.17	
	S3	29.83	7.23	8.38	10.72	11.96	7.10	7.15	9.44	8.17	
M1- Mechanised transplanting/Transplanting (if transplanters not available)		S1-Weedy check									
M2-Puddled direct seeding (preferably line sowing by drumseeder)		S2-Mechanical weeding using weeder									
M3-Un-puddled dry direct seeding (line sowing)		S3-Chemical weed control									

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Malan									
		Panicle initiation stage									
		Grasses					Sedges				
		<i>Echinochloa colonum</i>	<i>Echinochloa crusgalli</i>	<i>Panicum sp.</i>	<i>Cyperus iria</i>	<i>Cyperus rotundus</i>	<i>Cyperus difformis</i>	<i>Alernanthera sp.</i>	<i>Eclipta alba</i>	BLW	
M1	S1	34.45	12.09	7.68	6.94	3.82	5.16	9.58	8.26	12.03	
	S2	32.10	14.27	10.80	5.32	4.47	6.27	8.96	7.11	10.69	
	S3	23.90	5.13	6.03	8.46	4.28	28.21	6.88	7.70	9.41	
M2	S1	22.17	11.77	8.26	7.86	9.50	9.08	10.41	10.92	10.02	
	S2	21.97	11.05	3.28	14.66	8.39	9.42	11.96	8.98	10.31	
	S3	23.27	12.34	4.13	5.41	8.26	9.65	10.88	15.01	11.06	
M3	S1	18.16	9.87	7.91	9.19	7.34	11.20	9.47	13.22	13.63	
	S2	16.73	9.52	9.05	11.51	11.99	10.87	11.13	8.57	10.64	
	S3	28.52	6.67	5.22	10.90	12.09	7.60	10.44	8.00	10.58	

M1- Mechanised transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Main plot	Sub plot treatments	Moncompu																	
		Active tillering stage						Panicle initiation stage											
		Grasses			Sedges			BLW			Grasses			Sedges			BLW		
		<i>Isachne miliacea</i>	<i>Echinochloa stagnina</i>	<i>O. sativa f.sp. spontanea</i>	<i>Cyperus difformis</i>	<i>Monochoria vaginalis</i>	<i>Ludwigia hyssopifolia</i>	<i>Ischnae miliacea</i>	<i>Echinochloa stagnina</i>	<i>Cyperus difformis</i>	<i>Monochoria vaginalis</i>	<i>Ludwigia hyssopifolia</i>	<i>Ischnae miliacea</i>	<i>Echinochloa stagnina</i>	<i>Cyperus difformis</i>	<i>Monochoria vaginalis</i>	<i>Ludwigia hyssopifolia</i>		
M1	S1	67.83	27.04	0.00	0.87	2.67	1.60	64.72	33.11	0.00	0.00	2.17							
	S2	49.87	39.38	0.00	0.00	10.75	0.00	72.82	23.21	0.00	2.38	1.59							
	S3	99.02	0.00	0.98	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00							
M2	S1	51.83	34.80	0.00	3.51	6.36	3.51	74.54	19.68	1.52	3.51	0.76							
	S2	41.58	43.98	0.00	0.00	10.33	4.11	79.15	20.85	0.00	0.00	0.00							
	S3	100.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00							
M3	S1	78.70	13.90	0.00	1.85	3.28	2.26	84.01	15.99	0.00	0.00	0.00							
	S2	52.84	28.17	0.00	0.00	13.44	5.56	56.70	31.48	0.00	11.11	0.71							
	S3	95.78	0.00	3.03	1.19	0.00	0.00	100.00	0.00	0.00	0.00	0.00							
M1- Mechanised transplanting/Transplanting (if transplanters not available)		S1-Weedy check																	
M2-Puddled direct seeding (preferably line sowing by drumseeder)		S2-Mechanical weeding using weeder																	
M3-Un-puddled dry direct seeding (line sowing)		S3-Chemical weed control																	

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Nawagam											
		Active tillering stage											
		Grasses					Sedges			BLW			
		<i>Echinochloa crusgalli</i>	<i>Echinochloa colonum</i>	<i>Cynodon dactylon</i>	<i>Chloris barbata</i>	<i>Digitaria sanguinalis</i>	<i>Cyperus rotundus</i>	<i>Cyperus iria</i>	<i>Cyperus esculentus</i>	<i>Mollugo verticillata</i>	<i>Eclipta prostrata</i>	<i>Ipomoea aquatica</i>	<i>Solanum retroflexum</i>
M1	S1	10.14	10.18	10.02	9.97	8.13	7.66	10.73	9.82	6.60	5.86	6.10	4.79
	S2	6.64	7.56	6.15	7.55	9.38	11.27	11.14	14.11	5.61	5.90	6.97	7.71
	S3	6.15	7.01	6.22	7.34	10.93	10.58	10.44	16.38	6.61	4.72	8.64	4.98
M2	S1	10.50	11.29	11.20	9.03	7.73	8.24	7.59	8.02	4.81	8.08	6.27	7.23
	S2	7.17	9.92	8.71	8.39	9.72	6.78	11.41	12.27	7.41	4.40	3.81	9.99
	S3	7.56	6.28	8.70	10.65	13.46	8.30	10.47	10.18	6.59	5.13	4.09	8.59
M3	S1	12.04	8.92	13.15	12.84	7.84	7.79	8.39	7.59	5.85	5.47	4.64	5.48
	S2	9.47	10.48	9.24	7.66	13.73	11.07	8.90	11.36	5.60	3.77	3.94	4.79
	S3	9.61	11.68	10.12	13.42	6.15	12.74	9.04	9.62	4.55	3.19	4.71	5.18

		Nawagam											
		Panicle initiation stage											
Main plot	Sub plot treatments	Grasses				Sedges			BLW				
		<i>Echinochloa crusgalli</i>	<i>Echinochloa colonum</i>	<i>Cynodon dactylon</i>	<i>Chloris barbata</i>	<i>Digitaria sanguinalis</i>	<i>Cyperus rotundus</i>	<i>Cyperus iria</i>	<i>Cyperus esculentus</i>	<i>Mollugo verticillata</i>	<i>Eclipta prostrata</i>	<i>Ipomoea aquatica</i>	<i>Solanum retroflexum</i>
M1	S1	9.550	11.815	10.598	13.659	6.416	6.61	8.63	7.40	6.84	4.26	8.57	5.65
	S2	11.590	9.750	13.641	10.312	6.244	6.20	7.02	7.29	7.15	7.69	7.13	5.99
	S3	7.881	14.166	9.113	8.979	8.263	8.43	8.44	6.64	5.36	6.53	7.72	8.48
M2	S1	11.489	16.312	11.947	7.529	8.135	7.75	5.72	7.39	5.08	6.25	4.83	7.56
	S2	9.088	13.635	10.016	8.506	11.465	6.47	4.95	5.93	5.96	6.90	7.29	9.81
	S3	10.936	8.525	9.056	8.813	8.061	9.09	7.51	9.18	6.91	8.60	6.94	6.38
M3	S1	11.644	10.128	9.796	5.517	10.145	8.66	9.31	7.39	5.38	4.88	7.47	9.69
	S2	5.828	7.109	10.096	5.826	14.722	7.29	5.75	12.53	9.29	5.84	12.33	3.39
	S3	5.966	9.918	7.055	5.010	5.317	5.05	12.80	6.81	10.03	10.81	9.89	11.33
M1- Mechanised transplanting/Transplanting (if transplanters not available)		S1-Weedy check											
M2-Puddled direct seeding (preferably line sowing by drumseeder)		S2-Mechanical weeding using weeder											
M3-Un-puddled dry direct seeding (line sowing)		S3-Chemical weed control											

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Pantnagar											
		Active tillering stage					Panicle initiation stage						
		Grasses		Sedges		BLW		Grasses		Sedges		BLW	
		<i>Echinochloa colonum</i>	<i>Cyperus iria</i>	<i>Cyperus difformis</i>	<i>Alternanthera sessilis</i>	<i>Commelina Diffusa</i>	<i>Echinochloa colonum</i>	<i>Eleusine indica</i>	<i>Cyperus iria</i>	<i>Cyperus difformis</i>	<i>Alternanthera sessilis</i>	<i>Commelina diffusa</i>	
M1	S1	24.42	23.63	12.87	16.13	22.96	21.55	44.47	11.48	6.72	2.95	12.83	
	S2	11.67	39.17	21.67	20.00	7.50	20.37	25.93	29.63	12.96	5.56	5.56	
	S3	41.11	3.70	12.22	39.26	3.70	20.37	19.53	24.07	19.53	6.06	10.44	
M2	S1	30.71	23.42	14.30	16.65	14.92	22.53	36.48	13.70	4.17	11.24	11.88	
	S2	24.16	34.98	15.58	15.58	9.70	8.93	28.11	23.15	6.36	8.93	24.52	
	S3	9.52	55.24	16.19	14.29	4.76	6.67	33.85	20.34	6.67	22.22	10.26	
M3	S1	28.74	24.74	10.86	17.80	17.85	19.18	40.73	14.10	6.61	9.52	9.86	
	S2	25.95	12.67	7.94	25.34	28.11	22.95	25.38	15.26	9.23	10.26	16.92	
	S3	41.47	3.67	28.62	22.57	3.67	17.59	20.99	8.02	27.47	0.00	25.93	

Main plot	Sub plot treatments	Pattambi						
		Active tillering stage						
		Grasses		Sedges			BLW	
		<i>Isachne milliaceae</i>	<i>Oplismenus burmannii</i>	<i>Cyperus rotundus</i>	<i>Fimbristylis milliaceae</i>	<i>Marselia quadrifolia</i>	<i>Monochoria vaginalis</i>	<i>Sphenoclea zeylanica</i>
M1	S1	15.26	18.67	5.13	16.92	21.66	0.00	22.37
	S2	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	S3	0.00	0.00	0.00	0.00	0.00	0.00	0.00
M2	S1	15.13	26.71	4.19	32.10	8.11	3.13	10.63
	S2	18.75	34.16	14.80	27.68	0.00	0.00	4.62
	S3	34.70	39.83	12.61	12.85	0.00	0.00	0.00
M3	S1	-	-	-	-	-	-	-
	S2	-	-	-	-	-	-	-
	S3	-	-	-	-	-	-	-

M1- Mechanised transplanting/Transplanting (if transplanters not available)
M2-Puddled direct seeding (preferably line sowing by drumseeder)
M3-Un-puddled dry direct seeding (line sowing)

S1-Weedy check
S2-Mechanical weeding using weeder
S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Pattambi						
		Panicle initiation stage						
		Grasses		Sedges			BLW	
		Isachne milliaceae	Opismenus burmannii	Cyperus rotundus	<i>Fimbristylis milliaceae</i>	Marselia quadrifolia	Monochoria vaginalis	Sphenoclea zeylanica
M1	S1	49.02	6.44	4.41	12.15	12.14	0.00	15.83
	S2	55.38	11.18	8.35	25.09	0.00	0.00	0.00
	S3	77.17	3.88	3.18	11.60	4.17	0.00	0.00
M2	S1	46.42	7.28	3.75	18.70	8.90	4.00	10.95
	S2	41.52	12.00	6.78	28.11	11.59	0.00	0.00
	S3	88.96	2.98	3.17	4.90	0.00	0.00	0.00
M3	S1	-	-	-	-	-	-	-
	S2	-	-	-	-	-	-	-
	S3	-	-	-	-	-	-	-

Main plot	Sub plot treatments	Varanasi						
		Active tillering stage						
		Grasses		Sedges			BLW	
		<i>Cynodon dactylon</i>	<i>Echinochloa crusgalli</i>	<i>Cyperus difformis</i>	<i>Cyperus rotundus</i>	<i>Euphorbia hirta</i>	<i>Phyllanthus niruri</i>	<i>Parthenium hysterophorus</i>
M1	S1	30.24	12.42	2.69	32.05	6.92	8.39	7.30
	S2	25.68	5.03	12.22	38.16	3.20	8.73	6.98
	S3	42.25	5.06	6.84	28.47	4.85	5.79	6.74
M2	S1	27.59	3.18	6.33	49.56	2.74	6.77	3.83
	S2	40.95	1.82	6.91	38.61	2.23	5.59	3.88
	S3	34.77	1.91	3.83	48.94	2.73	4.58	3.24
M3	S1	25.47	3.04	4.65	54.06	3.22	5.47	4.09
	S2	25.06	6.20	5.55	47.17	4.28	7.14	4.60
	S3	33.50	4.50	4.33	42.03	3.29	7.63	4.73
M1- Mechanised transplanting/Transplanting (if transplanters not available)		S1-Weedy check						
M2-Puddled direct seeding (preferably line sowing by drumseeder)		S2-Mechanical weeding using weeder						
M3-Un-puddled dry direct seeding (line sowing)		S3-Chemical weed control						

Trial 4.3.3: Contd.

		Varanasi							
		Panicle initiation stage							
		Grasses			Sedges		BLW		
Sub plot treatments		Cynodon dactylon	Echinochloa colonum	Echinochloa crusgalli	Cyperus difformis	Cyperus rotundus	Eclipta prostrata	Phyllanthus niruri	Solanum nigrum
M1	S1	45.74	2.63	2.28	6.47	26.08	3.15	7.86	5.78
	S2	32.16	7.27	5.72	6.03	26.54	2.23	10.08	9.97
	S3	35.65	5.81	3.85	6.20	33.11	6.39	5.26	3.72
M2	S1	55.11	3.89	2.61	1.44	23.30	2.89	6.19	4.58
	S2	53.53	4.52	5.82	4.50	19.61	3.65	5.80	2.58
	S3	40.90	4.70	6.86	3.00	32.30	3.08	4.70	4.47
M3	S1	44.33	3.78	1.88	5.73	27.08	5.34	7.46	4.40
	S2	39.08	6.76	5.28	5.50	23.13	4.24	12.39	3.61
	S3	39.36	7.39	8.54	6.73	22.42	5.90	4.35	5.31

M1- Mechanised transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Summary on Group wise Relative Weed Density of Long term trial on Weed Dynamics in rice under different establishment methods, Kharif 2024.

Main plot	Sub plot treatments	Aduthurai			Chatha		
		Active tillering stage			Panicle initiation stage		
		Grasses	Sedges	BLW	Grasses	Sedges	BLW
M1	S1	48.86	9.68	41.46	55.80	41.12	3.08
	S2	53.83	14.84	31.33	69.76	11.83	18.41
	S3	48.35	14.16	37.48	16.52	80.88	2.59
M2	S1	53.01	9.37	37.63	50.28	45.17	4.55
	S2	61.16	14.48	24.36	58.42	17.03	24.54
	S3	60.83	13.09	26.07	16.04	80.10	3.86
M3	S1	51.48	10.36	38.15	52.00	42.39	5.61
	S2	53.20	15.93	30.88	57.54	10.32	32.14
	S3	62.00	12.82	25.18	12.36	78.56	9.08

Main plot	Sub plot treatments	Gangavathi			Jagdulpur		
		Active tillering stage			Panicle initiation stage		
		Grasses	Sedges	BLW	Grasses	Sedges	BLW
M1	S1	5.66	94.34	0.00	4.41	95.59	0.00
	S2	6.67	53.33	6.67	42.61	57.39	0.00
	S3	0.00	33.33	0.00	5.56	27.78	0.00
M2	S1	30.67	61.95	7.38	28.34	63.03	8.63
	S2	42.35	55.96	1.69	33.33	66.67	0.00
	S3	22.22	77.78	0.00	33.55	33.12	0.00
M3	S1	79.48	13.14	7.38	66.75	11.61	21.64
	S2	52.86	42.22	4.92	41.43	49.58	8.99
	S3	44.72	55.28	0.00	39.79	60.21	0.00

M1- Mechanised transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Malan						Moncompu					
		Active tillering stage			Panicle initiation stage			Active tillering stage			Panicle initiation stage		
		Grasses	Sedges	BLW	Grasses	Sedges	BLW	Grasses	Sedges	BLW	Grasses	Sedges	BLW
M1	S1	54.50	19.23	26.27	54.22	15.92	29.86	94.87	0.87	4.27	97.83	0.00	2.17
	S2	57.46	22.24	20.30	57.17	16.07	26.76	89.25	0.00	10.75	96.03	0.00	3.97
	S3	45.07	26.91	28.03	35.06	40.95	23.99	100.00	0.00	0.00	100.00	0.00	0.00
M2	S1	42.29	26.83	30.88	42.20	26.44	31.36	86.63	3.51	9.86	94.22	1.52	4.27
	S2	39.08	33.22	27.71	36.29	32.47	31.24	85.56	0.00	14.44	100.00	0.00	0.00
	S3	36.02	28.88	35.09	39.74	23.32	36.94	100.00	0.00	0.00	100.00	0.00	0.00
M3	S1	38.17	30.49	31.34	35.94	27.73	36.33	92.60	1.85	5.54	100.00	0.00	0.00
	S2	35.98	32.61	31.41	35.30	34.37	30.33	81.01	0.00	18.99	88.18	0.00	11.82
	S3	45.45	29.79	24.77	40.41	30.58	29.01	98.81	1.19	0.00	100.00	0.00	0.00

Main plot	Sub plot treatments	Nawagam						Pantnagar					
		Active tillering stage			Panicle initiation stage			Active tillering stage			Panicle initiation stage		
		Grasses	Sedges	BLW	Grasses	Sedges	BLW	Grasses	Sedges	BLW	Grasses	Sedges	BLW
M1	S1	48.44	28.21	23.35	52.04	22.65	25.32	24.42	36.50	39.08	66.02	18.20	15.78
	S2	37.29	36.51	26.19	51.54	20.51	27.96	11.67	60.83	27.50	46.30	42.59	11.11
	S3	37.65	37.40	24.95	48.40	23.51	28.08	41.11	15.93	42.96	39.90	43.60	16.50
M2	S1	49.75	23.85	26.40	55.41	20.87	23.72	30.71	37.72	31.57	59.01	17.87	23.12
	S2	43.91	30.46	25.62	52.71	17.34	29.95	24.16	50.56	25.28	37.04	29.51	33.45
	S3	46.65	28.94	24.41	45.39	25.78	28.83	9.52	71.43	19.05	40.51	27.01	32.48
M3	S1	54.79	23.77	21.44	47.23	25.36	27.41	28.74	35.61	35.65	59.91	20.71	19.38
	S2	50.58	31.32	18.09	43.58	25.57	30.85	25.95	20.60	53.45	48.33	24.49	27.18
	S3	50.98	31.40	17.63	33.27	24.66	42.08	41.47	32.29	26.24	38.58	35.49	25.93

M1- Mechanised transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Pattambi						Varanasi					
		Active tillering stage			Panicle initiation stage			Active tillering stage			Panicle initiation stage		
		Grasses	Sedges	BLW	Grasses	Sedges	BLW	Grasses	Sedges	BLW	Grasses	Sedges	BLW
M1	S1	33.93	22.04	44.03	55.46	16.56	27.97	42.66	34.74	22.60	50.65	32.55	16.80
	S2	0.00	0.00	0.00	66.56	33.44	0.00	30.71	50.38	18.90	45.16	32.56	22.28
	S3	0.00	0.00	0.00	81.05	14.78	4.17	47.30	35.31	17.38	45.32	39.31	15.37
M2	S1	41.84	36.30	21.86	53.69	22.45	23.86	30.77	55.89	13.34	61.60	24.74	13.66
	S2	52.90	42.47	4.62	53.52	34.89	11.59	42.78	45.52	11.70	63.86	24.11	12.03
	S3	74.54	25.46	0.00	91.93	8.07	0.00	36.67	52.77	10.56	52.45	35.30	12.25
M3	S1	-	-	-	-	-	-	28.51	58.71	12.78	49.98	32.82	17.20
	S2	-	-	-	-	-	-	31.26	52.72	16.02	51.12	28.63	20.24
	S3	-	-	-	-	-	-	38.00	46.36	15.64	55.29	29.15	15.56

M1- Mechanised transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3(R): Summary on Group wise Relative Weed Density of Long term trial on weed dynamics in rice under different establishment methods, Rabi 2023-24.

Main plot	Sub plot treatments	Karaikal						Pattambi					
		Active tillering stage			Panicle initiation stage			Active tillering stage			Panicle initiation stage		
		Grasses	Sedges	BLW	Grasses	Sedges	BLW	Grasses	Sedges	BLW	Grasses	Sedges	BLW
M1	S1	56.94	22.50	20.56	55.00	9.76	35.24	21.62	35.92	42.46	49.06	14.99	35.95
	S2	47.02	17.86	35.12	29.89	7.47	62.64	0.00	0.00	0.00	56.85	43.15	0.00
	S3	32.41	27.78	39.81	60.69	0.00	39.31	0.00	0.00	0.00	61.94	27.82	10.24
M2	S1	68.62	27.83	3.55	84.09	7.32	8.59	19.34	46.72	33.94	53.02	22.24	24.73
	S2	72.92	24.93	2.15	12.49	0.90	86.61	28.67	45.49	25.84	52.49	34.14	13.37
	S3	91.05	8.35	0.61	31.41	0.00	68.59	67.13	32.87	0.00	69.22	30.78	0.00
M3	S1	86.87	10.44	2.69	71.62	3.71	24.68	-	-	-	-	-	-
	S2	88.38	7.86	3.76	22.02	5.62	72.36	-	-	-	-	-	-
	S3	77.11	18.13	4.76	67.39	0.00	32.61	-	-	-	-	-	-

M1- Mechanised transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control* (Herbicide recommendation of respective University may be followed)

Trial 4.3.3: Summary on Species wise Relative Weed Density of Long term trial on Weed Dynamics in rice under different establishment methods, Rabi 2023-2024.

Main plot	Sub plot treatments	Karaikal									
		Active tillering stage					Panicle initiation stage				
		Grasses		Sedges		BLW	Grasses		Sedges	BLW	
		<i>Echinochloa colona</i>		Cyperus rotundus			<i>Echinochloa colonum</i>	Leptochloa chinensis	Cyperus rotundus	Hydrolea zeylanica	Bergia ammoimoides
M1	S1	56.94		22.50		14.72	50.11	4.89	9.76	32.72	2.52
	S2	47.02		17.86		8.33	29.89	0.00	7.47	57.73	4.91
	S3	32.41		27.78		31.48	60.69	0.00	0.00	39.31	0.00
M2	S1	68.62		27.83		0.00	76.23	7.86	7.32	5.20	3.39
	S2	72.92		24.93		0.00	12.49	0.00	0.90	84.23	2.38
	S3	91.05		8.35		0.00	0.00	31.41	0.00	68.59	0.00
M3	S1	86.87		10.44		0.17	63.57	8.04	3.71	17.58	7.10
	S2	88.38		7.86		1.75	22.02	0.00	5.62	72.36	0.00
	S3	77.11		18.13		0.00	40.24	27.15	0.00	14.00	18.61

M1- Mechanised transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control* (Herbicide recommendation of respective University may be followed)

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Pattambi						
		Active tillering stage						
		Grasses		Sedges		BLW		
		Ischne miliacea	Oplismenus burmannii	Cyperus rotundus	<i>Fimbristylis miliacea</i>	Marselia quadrifolia	Monochoria vaginalis	Sphenoclea zeylanica
M1	S1	8.26	13.36	15.28	20.64	15.79	10.82	15.86
	S2	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	S3	0.00	0.00	0.00	0.00	0.00	0.00	0.00
M2	S1	8.51	10.83	6.70	40.02	8.79	3.32	21.82
	S2	5.87	22.81	11.10	34.39	5.34	0.00	20.50
	S3	30.69	36.44	11.08	21.79	0.00	0.00	0.00
M3	S1	-	-	-	-	-	-	-
	S2	-	-	-	-	-	-	-
	S3	-	-	-	-	-	-	-

Main plot	Sub plot treatments	Pattambi							
		Panicle initiation stage							
		Grasses		Sedges		BLW			
		Ischne milliacea	Oplismenus burmannii	<i>Fimbristylis milliacea</i>	Cyperus rotundus	Marselia quadrifolia	Monochoria vaginalis	Sphenoclea zeylanica	
M1	S1	42.27	6.79	9.75	5.24	10.51	10.97	14.47	
	S2	42.33	14.52	33.09	10.06	0.00	0.00	0.00	
	S3	54.52	7.42	21.43	6.39	10.24	0.00	0.00	
M2	S1	44.10	8.92	17.26	4.98	6.78	4.70	13.25	
	S2	38.09	14.40	21.35	12.79	13.37	0.00	0.00	
	S3	54.15	15.07	11.69	19.09	0.00	0.00	0.00	
M3	S1	-	-	-	-	-	-	-	
	S2	-	-	-	-	-	-	-	
	S3	-	-	-	-	-	-	-	

M1- Mechanised transplanting/Transplanting (if transplanters not available)
M2-Puddled direct seeding (preferably line sowing by drumseeder)
M3-Un-puddled dry direct seeding (line sowing)

S1-Weedy check
S2-Mechanical weeding using weeder
S3-Chemical weed control

Trial 4.3.3: Summary on Species wise weed dry biomass g/m² of Long term trial on Weed Dynamics in rice under different establishment methods, Kharif 2024.

		Gangavathi														
Main plot	Sub plot treatments	Active tillering stage						Panicle initiation stage								
		Grasses			Sedges			Total	Grasses			Sedges				
		Echinochloa crussgalli	Digiteria longifolia	Oryza sativa sp spontanea	Cyperus rotundus	Cyperus difformis	BLW		Cynotis cristata	Echinochloa crussgalli	Digiteria longifolia	Oryza sativa sp spontanea	Cyperus rotundus	Cynotis cristata	BLW	Total
M1	S1	15.83	0.00	1.02	82.96	1.85	0.00	101.67	15.65	0.00	0.00	112.96	0.00	0.00	0.00	128.61
	S2	2.31	0.00	0.00	8.70	8.43	0.00	21.11	59.91	0.00	17.69	15.46	0.00	0.00	93.06	
	S3	0.00	0.00	0.00	3.80	1.30	0.00	5.09	15.74	0.00	0.00	3.24	0.00	0.00	18.98	
M2	S1	44.54	0.00	195.00	102.69	3.24	0.00	352.59	12.04	0.00	297.78	69.07	11.57	392.59		
	S2	26.76	2.22	37.13	37.22	0.37	0.00	105.56	13.52	0.00	179.81	47.50	0.00	240.83		
	S3	4.63	5.74	0.00	38.61	0.00	0.00	48.98	0.00	0.00	49.35	12.87	0.00	62.22		
M3	S1	0.00	0.00	351.02	10.74	0.00	35.46	397.22	0.00	0.00	675.83	15.65	141.20	832.69		
	S2	0.65	0.00	157.50	32.50	3.06	13.24	206.94	0.00	0.00	303.70	45.37	24.81	373.89		
	S3	0.00	125.46	7.96	49.26	0.74	0.00	183.43	0.00	23.89	161.20	55.56	0.00	240.65		
Mean of Factor-1																
CD(0.05) CV%	M1	6.05	0.00	0.34	31.82	3.86	0.00	42.62	30.43	0.00	5.90	43.89	0.00	80.22		
	M2	25.31	2.65	77.38	59.51	1.20	0.00	169.04	8.52	0.00	175.65	43.15	3.86	231.88		
	M3	0.22	41.82	172.16	30.83	1.27	16.23	262.53	0.00	7.96	380.25	38.86	55.34	482.41		
Mean of Factor-2		NS	NS	59.82	NS	NS	NS	87.36	13.10	NS	121.84	NS	13.40	118.03		
		144.16	321.68	85.78	69.05	200.87	387.46	66.01	120.50	519.62	77.71	90.61	81.10	53.23		
CD(0.05) CV%	S1	20.12	0.00	182.35	65.46	1.70	11.82	283.83	9.23	0.00	324.54	65.90	50.93	451.30		
	S2	9.91	0.74	64.88	26.14	3.95	4.41	111.20	24.48	0.00	167.07	36.11	8.27	235.93		
	S3	1.54	43.73	2.65	30.56	0.68	0.00	79.17	5.25	7.96	70.19	23.89	0.00	107.28		
CD(0.05) CV%		12.67	NS	71.34	NS	NS	NS	73.13	NS	NS	171.32	33.11	32.88	172.53		
		117.24	324.54	83.38	111.69	247.99	258.96	45.04	153.92	519.62	89.07	76.81	162.23	63.42		
Interaction M and T T and M Experimental Mean		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS		
		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS		
		10.52	14.83	83.29	40.72	2.11	5.41	158.07	12.98	2.65	187.26	41.97	19.73	264.84		

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control* (Herbicide recommendation of respective University may be followed)

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Malan									
		Active tillering stage					Sedges				
		Grasses			Cyperus		BLW				
		<i>Echinochloa colonum</i>	<i>Echinochloa crusgalli</i>	<i>Panicum spp.</i>	<i>Cyperus iria</i>	<i>Cyperus rotundus</i>	<i>Cyperus difformis</i>	<i>Monochoria vaginalis</i>	<i>Alternanthera spp.</i>	<i>Eclipta alba</i>	Total
M1	S1	13.43	6.92	3.12	2.78	2.28	2.85	2.62	1.58	1.53	37.12
	S2	8.52	5.32	2.35	2.26	1.98	1.93	1.52	0.59	0.81	25.28
	S3	5.6	2.28	1.38	1.71	1.14	2.12	0.94	1.09	0.85	17.12
M2	S1	14.42	10.58	5.75	5.98	7.3	5.75	4.25	2.61	4.49	61.14
	S2	10.8	6.7	1.67	7.87	4.19	3.73	2.96	1.89	2.09	41.9
	S3	4.24	1.98	1.21	1.71	1.9	1.85	1.06	1.19	1.24	16.4
M3	S1	14.71	11.85	6.45	8.84	9.28	8.27	5.46	3.36	5.29	73.5
	S2	8.44	7.45	4.45	7.15	7.15	4.33	4.66	2.23	2.49	48.34
	S3	7.1	1.68	1.67	2.57	2.82	1.45	1.05	0.76	1.09	20.18
Mean of Factor-1											
M1	M1	9.19	4.84	2.28	2.25	1.8	2.3	1.69	1.09	1.06	26.51
	M2	9.82	6.42	2.88	5.19	4.46	3.78	2.76	1.9	2.61	39.81
	M3	10.09	6.99	4.19	6.19	6.42	4.68	3.72	2.12	2.95	47.34
CD(0.05) CV%	CD(0.05)	NS	NS	0.49	0.78	0.88	NS	0.15	0.49	0.42	5.51
	CV%	30.66	34.67	18.91	20.48	24.85	50.49	6.65	34.24	22.79	17.36
	Mean of Factor-2										
S1	S1	14.19	9.78	5.11	5.87	6.29	5.62	4.11	2.52	3.77	57.25
	S2	9.26	6.49	2.82	5.76	4.44	3.33	3.05	1.57	1.79	38.51
	S3	5.65	1.98	1.42	2	1.95	1.81	1.02	1.02	1.06	17.9
CD(0.05) CV%	CD(0.05)	2.04	1.35	0.82	0.93	0.92	1.25	0.78	0.49	0.81	4.39
	CV%	20.49	21.64	25.58	19.99	21.1	33.96	27.8	27.85	35.83	11.29
	Interaction										
M and T T and M	M and T	NS	NS	NS	1.62	NS	NS	NS	NS	NS	7.61
	T and M	NS	NS	NS	1.39	NS	NS	NS	NS	NS	7.05
	Experimental Mean	9.7	6.08	3.12	4.54	4.23	3.59	2.73	1.7	2.21	37.89

M1- Mechanized transplanting/Transplanting (if transplanters not available)
M2-Puddled direct seeding (preferably line sowing by drumseeder)
M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check
S2-Mechanical weeding using weeder
S3-Chemical weed control

Trial 4.3.3: Contd.

		Malan									
		Panicle initiation stage									
		Grasses					Sedges			BLW	
Main plot	Sub plot treatments	Echinochloa colonum	Echinochloa crusgalli	Panicum spp.	Cyperus iria	Cyperus rotundus	Cyperus difformis	Monochoria vaginalis	Alternanthera spp.	Eclipta alba	Total
M1	S1	24.61	8.94	5.65	3.56	2.07	2.72	5.23	3.9	2.98	59.67
	S2	16.53	7.55	5.67	1.96	1.77	2.33	3.3	2.6	1.83	43.54
	S3	7.73	1.87	1.89	1.99	1.03	8.88	1.93	1.31	1.1	27.73
M2	S1	23.17	12.73	8.94	5.82	7.62	6.91	6.36	6.21	5.64	83.41
	S2	15.51	8.01	2.35	7.49	4.49	4.97	4.43	4.9	3.13	55.29
	S3	7.79	4.23	1.41	1.29	2.07	2.27	2.21	2.08	2.46	25.8
M3	S1	24.39	13.65	10.84	8.8	7.44	11.33	11.04	7.27	9.29	104.04
	S2	15.24	8.94	8.48	7.46	8.26	7.39	5.82	5.72	3.87	71.19
	S3	9.62	2.35	1.87	2.61	3.1	1.98	2.2	2.08	1.37	27.18
Mean of Factor-1											
M1	M1	16.29	6.12	4.4	2.51	1.63	4.64	3.49	2.6	1.97	43.65
	M2	15.49	8.32	4.24	4.87	4.73	4.72	4.33	4.4	3.74	54.83
	M3	16.42	8.31	7.06	6.29	6.27	6.9	6.35	5.02	4.84	67.47
CD(0.05)	CV%	NS	1.06	1.1	1.15	1.12	NS	1.05	0.95	1.29	8.33
		30.35	16.67	25.12	30.1	31.79	77.08	26.55	28.41	43.71	17.99
	Mean of Factor-2										
S1	S1	24.06	11.77	8.48	6.06	5.71	6.99	7.54	5.79	5.97	82.37
	S2	15.76	8.16	5.5	5.64	4.84	4.9	4.52	4.41	2.95	56.67
	S3	8.38	2.82	1.72	1.96	2.07	4.38	2.11	1.82	1.64	26.91
CD(0.05)	CV%	2.01	1.22	0.89	0.83	1.58	NS	0.75	0.89	1.48	6.22
		12.2	15.72	16.62	17.78	36.62	66.82	15.38	21.6	40.81	10.95
	Interaction										
M and T	M and T	NS	NS	1.55	1.44	NS	NS	1.29	NS	NS	10.78
	T and M	NS	NS	1.43	1.37	NS	NS	1.24	NS	NS	10.18
	Experimental Mean	16.07	7.59	5.23	4.55	4.21	5.42	4.73	4.01	3.52	55.32
M1- Mechanized transplanting/Transplanting (if transplanters not available)		S1-Weedy check									
M2-Puddled direct seeding (preferably line sowing by drumseeder)		S2-Mechanical weeding using weeder									
M3-Un-puddled dry direct seeding (Line sowing)		S3-Chemical weed control									

Trial 4.3.3: Contd.

Nawagam														
		Active tillering stage												
Main plot	Sub plot treatments	Grasses				Sedges			BLW				Total	
		<i>Echinochloa crusgalli</i>	<i>Echinochloa colonum</i>	<i>Cynodon dactylon</i>	<i>Chloris barbata</i>	<i>Digitaria sanguinalis</i>	<i>Cyperus rotundus</i>	<i>Cyperus iria</i>	<i>Cyperus esculentus</i>	<i>Mollugo verticillata</i>	<i>Eclipta prostrata</i>	<i>Ipomoea aquatica</i>		<i>Solanum retroflexum</i>
M1	S1	24.95	25.41	24.87	24.95	20.23	19.52	27.21	24.83	35.84	32.43	33.45	26.28	319.96
	S2	9.78	11.24	9.01	10.24	13.73	17.14	16.98	21.18	18.09	19.80	23.38	24.58	195.14
	S3	7.47	8.24	7.08	8.16	13.49	13.17	13.17	19.67	17.41	11.78	21.51	12.97	154.12
M2	S1	28.51	30.89	30.54	24.55	18.80	19.81	18.17	19.42	24.00	40.00	31.04	35.68	321.42
	S2	11.09	15.67	13.46	13.20	13.73	9.44	16.38	17.24	21.44	12.48	11.20	28.16	183.49
	S3	8.71	9.06	12.14	14.52	15.83	11.08	13.89	12.48	16.32	13.76	11.52	21.76	161.07
M3	S1	38.87	28.51	41.76	41.16	18.07	17.71	19.29	17.43	27.48	26.88	22.40	26.43	325.99
	S2	17.44	20.23	17.64	14.75	18.79	15.41	12.31	15.69	16.13	10.75	10.90	13.44	183.49
	S3	15.15	18.93	15.85	20.23	6.91	14.55	10.51	11.45	10.60	8.21	11.50	12.24	156.14
Mean of Factor-1														
	M1	14.07	14.97	13.65	14.45	15.81	16.61	19.12	21.90	23.78	21.33	26.11	21.28	223.07
	M2	16.10	18.54	18.71	17.42	16.12	13.44	16.15	16.38	20.59	22.08	17.92	28.53	221.99
	M3	23.82	22.56	25.08	25.38	14.59	15.89	14.04	14.86	18.07	15.28	14.93	17.37	221.88
CD(0.05)		NS	NS	2.73	NS	NS	NS	NS	NS	NS	NS	NS	4.93	NS
CV%		49.72	33.51	17.05	36.58	28.79	27.93	52.66	31.47	41.13	31.46	35.31	26.31	6.20
Mean of Factor-2														
	S1	30.78	28.27	32.39	30.22	19.03	19.01	21.56	20.56	29.10	33.10	28.96	29.47	322.46
	S2	12.77	15.71	13.37	12.73	15.42	13.99	15.22	18.04	18.55	14.34	15.16	22.06	187.38
	S3	10.44	12.08	11.69	14.30	12.08	12.93	12.52	14.53	14.78	11.25	14.84	15.66	157.11
CD(0.05)		6.22	6.71	6.14	6.74	NS	4.64	4.23	4.56	7.29	9.63	9.63	NS	30.19
CV%		33.63	34.97	31.22	34.36	40.09	29.49	25.07	25.07	34.12	47.89	47.72	53.01	13.22
Interaction														
	M and T	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	T and M	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Experimental Mean		18.00	18.69	19.15	19.09	15.51	15.31	16.44	17.71	20.81	19.57	19.66	22.39	222.32

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot		Sub plot treatments		Nawagam														
				Panicle initiation stage														
				Grasses				Sedges			BLW							
				<i>Echinochloa crusgalli</i>	<i>Echinochloa colonum</i>	<i>Cynodon dacty/lon</i>	<i>Chloris barbata</i>	<i>Digitaria sanguinalis</i>	<i>Cyperus rotundus</i>	<i>Cyperus iria</i>	<i>Cyperus esculentus</i>	<i>Mollugo verticillata</i>	<i>Eclipta prostrata</i>	<i>Ipomoea aquatica</i>	<i>Solanum retroflexum</i>	Total		
M1		S1		44.10	54.80	50.20	66.20	32.41	33.28	44.44	37.24	46.80	26.14	74.59	49.48	559.67		
		S2		33.20	28.10	38.80	29.80	19.43	18.78	21.68	22.64	30.30	28.64	37.20	31.43	340.01		
		S3		13.70	24.60	15.90	15.60	15.35	15.78	15.78	12.34	13.95	14.92	24.93	27.34	210.18		
M2		S1		45.28	63.14	45.48	30.80	30.30	27.48	19.93	24.84	24.07	25.87	27.48	43.61	408.26		
		S2		22.48	33.67	24.85	21.25	25.12	14.47	10.83	12.92	18.27	17.82	26.73	35.69	264.10		
		S3		16.94	12.73	14.58	14.37	11.83	12.74	10.92	14.11	12.85	14.60	17.18	14.04	166.88		
M3		S1		55.10	46.48	47.15	25.76	32.68	27.21	30.10	23.86	33.75	25.60	56.40	71.99	476.08		
		S2		18.81	23.29	32.37	18.37	32.30	15.96	12.46	26.52	40.02	21.76	65.10	17.41	324.38		
		S3		11.65	19.60	13.89	9.63	6.99	6.38	16.42	8.44	25.84	23.29	31.01	35.90	209.05		
Mean of Factor-1				M1		30.33	35.83	34.97	37.20	22.40	22.61	27.30	24.08	30.35	23.23	45.57	36.08	369.96
				M2		28.23	36.51	28.30	22.14	22.42	18.23	13.89	17.29	18.40	19.43	23.79	31.11	279.75
				M3		28.52	29.79	31.14	17.92	23.99	16.52	19.66	19.61	33.20	23.55	50.83	41.77	336.50
CD(0.05)					NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	31.38	
CV%					40.79	54.67	41.94	60.96	54.80	52.13	48.68	35.55	34.44	79.60	51.32	58.43	11.40	
Mean of Factor-2				S1		48.16	54.81	47.61	40.92	31.80	29.32	31.49	28.65	34.87	25.87	52.82	55.02	481.34
				S2		24.83	28.36	32.00	23.14	25.62	16.41	14.99	20.7	29.53	22.74	43.01	28.18	309.50
				S3		14.10	18.98	14.79	13.20	11.39	11.63	14.37	11.63	17.55	17.60	24.37	25.76	195.37
CD(0.05)					13.36	21.45	15.12	17.57	12.50	9.23	13.13	10.99	NS	NS	17.72	19.89	31.65	
CV%					44.80	61.34	46.77	66.43	53.06	47	63.04	52.64	71.34	44.13	43.05	53.32	9.37	
Interaction				M and T		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
				T and M		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
Experimental Mean					29.03	34.05	31.47	25.75	22.94	19.12	20.28	20.32	27.32	22.07	40.07	36.32	328.74	

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Pantnagar										
		Active tillering stage					Panicle initiation stage					
		Grasses		Sedges		Total	Grasses		Sedges		BLW	
		Echinochloa colonum	Cyperus iria	Cyperus difformis	Commelina diffusa		Echinochloa colonum	Eleusine indica	Cyperus iria	Cyperus difformis	Commelina diffusa	Alternanthera sessilis
M1	S1	24.30	10.00	9.50	5.87	58.03	21.17	37.10	7.18	2.23	3.77	2.60
	S2	3.87	1.43	5.03	0.67	11.80	0.87	6.67	1.97	0.87	0.63	0.40
	S3	8.93	0.27	2.00	0.23	15.00	0.67	2.80	1.03	0.67	0.70	0.10
M2	S1	31.20	15.10	10.50	6.97	75.63	30.57	57.83	9.50	1.90	9.53	10.30
	S2	8.27	2.20	1.03	0.90	13.30	2.07	13.67	3.57	0.80	1.83	1.10
	S3	2.37	2.20	1.17	0.30	7.37	0.37	4.00	1.80	0.37	0.40	0.23
M3	S1	32.60	9.07	10.63	5.40	68.57	32.00	71.60	14.83	4.27	8.77	7.87
	S2	11.13	1.60	1.77	3.37	20.00	4.90	9.43	3.20	1.33	1.33	1.20
	S3	7.80	0.27	0.00	0.37	10.33	1.20	4.00	0.83	1.17	1.50	0.00
Mean of Factor-1												
	M1	12.37	3.90	5.51	2.26	28.28	7.57	15.52	3.39	1.26	1.70	1.03
	M2	13.94	6.50	4.23	2.72	32.10	11.00	25.17	4.96	1.02	3.92	3.88
	M3	17.18	3.64	4.13	3.04	32.97	12.70	28.34	6.29	2.26	3.87	3.02
CD(0.05) CV%		NS	0.31	NS	0.36	NS	1.49	4.08	0.99	0.55	1.02	0.90
		29.48	8.03	21.35	15.88	10.03	17.07	21.19	24.16	43.81	38.42	40.47
	Mean of Factor-2											
	S1	29.37	11.39	10.21	6.08	67.41	27.91	55.51	10.51	2.80	7.36	6.92
	S2	7.76	1.74	2.61	1.64	15.03	2.61	9.92	2.91	1.00	1.27	0.90
	S3	6.37	0.91	1.06	0.30	10.90	0.74	3.60	1.22	0.73	0.87	0.11
CD(0.05) CV%		3.92	0.58	1.14	1.15	5.56	2.35	5.23	1.61	0.96	1.52	1.35
		26.34	12.00	23.98	41.89	17.38	21.97	22.12	32.07	61.98	46.80	49.81
	Interaction											
M and T T and M Experimental Mean		NS	1.00	NS	NS	NS	NS	9.06	NS	NS	NS	NS
		NS	0.83	NS	NS	NS	NS	7.72	NS	NS	NS	NS
		14.50	4.68	4.63	2.67	31.11	10.42	23.01	4.88	1.51	3.16	2.64
M1- Mechanized transplanting/Transplanting (if transplanters not available)		S1-Weedy check										
M2-Puddled direct seeding (preferably line sowing by drumseeder)		S2-Mechanical weeding using weeder										
M3-Un-puddled dry direct seeding (Line sowing)		S3-Chemical weed control										

Trial 4.3.3: Contd.

Main plot		Sub plot treatments	Pattambi							
			Active tillering stage							
			Grasses		Sedges		BLW			
			<i>Isachne milliaceae</i>	<i>Opilsmenus burmannii</i>	<i>Fimbristylis milliaceae</i>	<i>Cyperus rotundus</i>	<i>Sphenoclea zeylanica</i>	<i>Marselia quadrifolia</i>	<i>Monochoria vaginalis</i>	Total
M1	S1	2.93	8.30	3.40	1.03	8.43	9.47	0.00	33.57	
	S2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	S3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
M2	S1	9.73	22.37	35.00	1.33	8.27	8.57	1.33	86.60	
	S2	3.07	12.37	5.80	3.07	0.90	0.00	0.00	25.20	
	S3	3.07	8.30	1.13	0.90	0.00	0.00	0.00	13.40	
M3	S1	-	-	-	-	-	-	-	-	
	S2	-	-	-	-	-	-	-	-	
	S3	-	-	-	-	-	-	-	-	
Mean of Factor-1		M1	0.98	2.77	1.13	0.34	2.81	3.16	0.00	11.19
		M2	5.29	14.34	13.98	1.77	3.06	2.86	0.44	41.73
		M3	-	-	-	-	-	-	-	-
CD(0.05)			2.80	2.05	2.60	0.06	NS	NS	NS	5.45
CV%			67.19	22.70	49.43	9.56	19.68	50.57	110.31	22.77
Mean of Factor-2		S1	7.61	21.00	14.76	0.82	8.31	8.10	0.83	61.43
		S2	3.98	7.17	3.48	1.06	0.30	0.00	0.00	15.98
		S3	3.36	4.16	0.58	0.30	0.00	0.00	0.00	8.39
CD(0.05)			1.44	2.88	3.02	0.18	0.85	1.39	0.37	5.19
CV%			28.18	26.06	46.91	24.44	28.93	50.12	129.61	17.65
Interaction		M and T	2.50	4.99	5.23	0.32	NS	NS	0.64	8.98
		T and M	2.74	4.22	4.51	0.26	NS	NS	0.54	7.99
Experimental Mean			4.98	10.77	6.27	0.73	2.87	2.70	0.28	28.60
M1- Mechanized transplanting/Transplanting (if transplanters not available)		S1-Weedy check								
M2-Puddled direct seeding (preferably line sowing by drumseeder)		S2-Mechanical weeding using weeder								
M3-Un-puddled dry direct seeding (Line sowing)		S3-Chemical weed control								

Trial 4.3.3: Contd.

Main plot		Sub plot treatments	Pattambi						
			Grasses		Sedges		Panicle initiation stage		
			<i>Isachne miliaceae</i>	<i>Opismenus burmannii</i>	<i>Fimbristylis miliaceae</i>	<i>Cyperus rotundus</i>	<i>Sphenoclea zeylanica</i>	BLW	
								<i>Marselia quadrifolia</i>	<i>Monochoria vaginalis</i>
M1		S1	19.63	6.37	6.10	4.10	14.13	11.07	0.00
		S2	8.30	4.20	3.87	2.47	0.00	0.00	0.00
		S3	17.27	1.23	3.70	1.17	0.00	0.33	0.00
M2		S1	26.67	8.53	10.67	2.83	12.67	7.47	3.37
		S2	6.43	6.93	4.43	1.90	0.00	4.33	0.00
		S3	23.70	0.43	2.47	1.93	0.00	0.00	0.00
M3		S1	-	-	-	-	-	-	-
		S2	-	-	-	-	-	-	-
		S3	-	-	-	-	-	-	-
Mean of Factor-1									
	M1		15.07	3.93	4.56	2.58	4.71	3.80	0.00
	M2		18.93	5.30	5.86	2.22	4.22	3.93	1.12
	M3		-	-	-	-	-	-	-
CD(0.05) CV%			NS	0.76	NS	0.42	NS	NS	0.67
			28.50	16.74	38.89	18.97	23.50	47.75	90.23
Mean of Factor-2									
	S1		19.67	8.68	8.38	4.07	12.93	8.69	2.64
	S2		7.50	6.52	4.48	2.43	0.00	1.44	0.00
	S3		18.59	0.99	2.80	1.47	0.00	0.11	0.00
CD(0.05) CV%			4.93	1.06	0.99	0.97	2.07	1.68	0.91
			31.44	19.19	18.46	35.61	46.70	47.86	100.88
Interaction									
M and T T and M Experimental Mean			NS	1.84	1.71	NS	NS	2.91	1.58
			NS	1.56	1.77	NS	NS	2.49	1.34
			15.25	5.40	5.22	2.66	4.31	3.41	0.88

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Titabar									
		Active tillering stage					Panicle initiation stage				
		Grasses			Total	Grasses			Cyperus iria	Leersia hexandra	BLW
		Echinochloa crusgalli	Leersia hexandra	Sedges		Echinochloa crusgalli	Leersia hexandra	Sedges			
M1	S1	4.53	4.13	2.47	13.47	5.27	4.23	3.13	2.67	15.3	
	S2	3.47	3.37	1.50	10.00	4.27	2.63	1.9	2.1	10.9	
	S3	2.33	2.10	1.73	7.87	3.17	2.67	1.63	1.8	9.27	
M2	S1	5.47	4.60	3.13	16.10	5.53	5.43	4.23	4.03	19.23	
	S2	4.27	3.93	2.40	12.80	5.03	4.8	2.63	3.13	15.6	
	S3	3.07	2.47	2.13	9.23	4.2	3.7	1.97	2.13	12	
M3	S1	6.20	4.60	4.40	19.30	6.1	5.57	4.77	4.87	21.3	
	S2	4.93	4.37	2.97	15.20	5.13	4.13	3.97	3.37	16.6	
	S3	3.27	2.90	1.87	10.20	4.43	3.63	2.3	2.87	13.23	
Mean of Factor-1											
M1	M1	3.44	3.20	1.90	10.44	4.23	3.18	2.22	2.19	11.82	
	M2	4.27	3.67	2.56	12.71	4.92	4.64	2.94	3.1	15.61	
	M3	4.80	3.96	3.08	14.90	5.22	4.44	3.68	3.7	17.04	
CD(0.05) CV%		0.57	NS	0.40	0.80	NS	NS	0.13	NS	1.02	
		16.31	20.52	18.87	7.51	12.91	31.62	5.1	29.25	8.19	
	Mean of Factor-2										
S1	S1	5.40	4.44	3.33	16.29	5.63	5.08	4.04	3.86	18.61	
	S2	4.22	3.89	2.29	12.67	4.81	3.86	2.83	2.87	14.37	
	S3	2.89	2.49	1.91	9.10	3.93	3.33	1.97	2.27	11.5	
CD(0.05) CV%		0.62	0.69	0.63	1.10	0.76	0.64	0.71	0.5	1.14	
		14.47	18.72	24.37	8.41	15.37	15.22	23.55	16.38	7.46	
	Interaction										
M and T T and M	M and T	NS	NS	NS	NS	NS	NS	NS	NS	NS	
	T and M	NS	NS	NS	NS	NS	NS	NS	NS	NS	
	Experimental Mean	4.17	3.61	2.51	12.69	4.79	4.09	2.95	3	14.83	

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

Trial 4.3.3: Summary on Group wise Weed dry biomass g/m² of Long term trial on Weed Dynamics in rice under different establishment methods, Kharif 2024.

Main plot	Sub plot treatments	Chinsurah						Ghaghraghat	
		Active tillering stage			Panicle initiation stage			Total biomass at active tillering stage	Total biomass at panicle initiation stage
		Grasses	Sedges	BLW	Total	Grasses	Sedges	BLW	Total
M1	S1	0.58	2.49	7.91	10.98	3.77	2.13	2.13	8.03
	S2	0.85	0.23	0.38	1.46	0.25	0.16	0.16	0.58
	S3	0.17	0.15	0.68	1.01	0.15	0.11	0.11	0.38
M2	S1	5.71	2.79	2.63	11.13	6.76	3.70	3.70	14.16
	S2	0.43	0.36	0.48	1.27	0.45	0.28	0.28	1.02
	S3	0.26	0.26	0.33	0.84	0.27	0.20	0.20	0.67
M3	S1	7.55	3.90	3.74	15.19	7.04	3.91	3.91	14.85
	S2	0.59	0.51	0.69	1.79	0.50	0.45	0.45	1.41
	S3	0.34	0.36	0.47	1.17	0.29	0.31	0.31	0.92
Mean of Factor-1									
	M1	0.53	0.96	2.99	4.48	1.39	0.80	0.80	3.00
	M2	2.13	1.14	1.14	4.41	2.50	1.39	1.39	5.28
	M3	2.83	1.59	1.63	6.05	2.61	1.56	1.56	5.73
CD(0.05)		0.11	0.18	0.10	0.22	0.08	0.14	0.14	0.24
CV%		7.13	17.85	6.00	5.34	4.33	13.62	13.62	6.11
Mean of Factor-2									
	S1	4.61	3.06	4.76	12.43	5.86	3.24	3.24	12.35
	S2	0.62	0.37	0.52	1.51	0.40	0.30	0.30	1.00
	S3	0.26	0.26	0.49	1.01	0.24	0.21	0.21	0.65
CD(0.05)		0.64	0.42	0.34	0.58	0.21	0.41	0.41	0.91
CV%		34.13	33.22	17.08	11.33	9.53	31.94	31.94	18.96
Interaction									
	M and T	1.11	NS	0.58	1.00	0.37	NS	NS	1.57
	T and M	0.91	NS	0.48	0.83	0.30	NS	NS	1.29
	Experimental Mean	1.83	1.23	1.92	4.98	2.17	1.25	1.25	4.67

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control* (Herbicide recommendation of respective University may be followed)

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Gangavathi							
		Active tillering stage				Panicle initiation stage			
		Grasses	Sedges	BLW	Total	Grasses	Sedges	BLW	Total
M1	S1	16.85	84.81	0.00	101.67	15.65	112.96	0.00	128.61
	S2	2.31	17.13	1.67	21.11	77.59	15.46	0.00	93.06
	S3	0.00	5.09	0.00	5.09	15.74	3.24	0.00	18.98
M2	S1	239.54	105.93	7.13	352.59	309.81	69.07	13.70	392.59
	S2	66.11	37.59	1.85	105.56	193.33	47.50	0.00	240.83
	S3	10.37	38.61	0.00	48.98	49.35	12.87	0.00	62.22
M3	S1	351.02	10.74	35.46	397.22	675.83	15.65	141.20	832.69
	S2	158.15	35.56	13.24	206.94	303.70	45.37	24.81	373.89
	S3	133.43	50.00	0.00	183.43	185.09	55.56	0.00	240.65
Mean of Factor-1									
M1		6.39	35.68	0.56	42.62	36.33	43.89	0.00	80.22
M2		105.34	60.71	2.99	169.04	184.17	43.15	4.57	231.88
M3		214.20	32.10	16.23	262.53	388.21	38.86	55.34	482.41
CD(0.05)		78.09	NS	NS	87.36	126.49	NS	12.80	118.03
CV%		85.85	74.87	324.52	66.01	74.46	90.61	76.54	53.23
Mean of Factor-2									
S1		202.47	67.16	14.20	283.83	333.77	65.90	51.64	451.30
S2		75.52	30.09	5.59	111.20	191.54	36.11	8.27	235.93
S3		47.93	31.23	0.00	79.17	83.40	23.89	0.00	107.28
CD(0.05)		68.40	NS	NS	73.13	172.04	33.11	32.77	172.53
CV%		61.29	104.70	215.79	45.04	82.55	76.81	159.78	63.42
Interaction									
M and T		NS	NS	NS	NS	NS	NS	NS	NS
T and M		NS	NS	NS	NS	NS	NS	NS	NS
Experimental Mean		108.64	42.83	6.59	158.07	202.90	41.97	19.97	264.84

M1- Mechanized transplanting/Transplanting (if transplanters not available)
M2-Puddled direct seeding (preferably line sowing by drumseeder)
M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check
S2-Mechanical weeding using weeder
S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Malan						
		Active tillering stage				Panicle initiation stage		
		Grasses	Sedges	BLW	Total	Grasses	Sedges	Total
M1	S1	23.47	7.92	5.73	37.12	39.2	8.36	12.11
	S2	16.2	6.16	2.92	25.28	29.75	6.06	7.74
	S3	9.26	4.98	2.88	17.12	11.49	11.91	4.34
M2	S1	30.75	19.03	11.36	61.14	44.85	20.35	18.21
	S2	19.17	15.79	6.94	41.9	25.87	16.96	12.46
	S3	7.44	5.47	3.49	16.4	13.43	5.62	6.75
M3	S1	33.01	26.39	14.11	73.5	48.88	27.57	27.59
	S2	20.34	18.62	9.38	48.34	32.66	23.11	15.42
	S3	10.45	6.83	2.9	20.18	13.84	7.69	5.65
Mean of Factor-1								
	M1	16.31	6.35	3.84	26.51	26.81	8.77	8.06
	M2	19.12	13.43	7.27	39.81	28.05	14.31	12.48
	M3	21.27	17.28	8.79	47.34	31.79	19.46	16.22
CD(0.05) CV%		NS	2.62	0.78	5.51	NS	4.77	2.13
		18.56	25.29	13.98	17.36	17.61	40.15	20.76
Mean of Factor-2	S1	29.08	17.78	10.4	57.25	44.31	18.76	19.31
	S2	18.57	13.53	6.41	38.51	29.42	15.38	11.87
	S3	9.05	5.76	3.09	17.9	12.92	8.41	5.58
CD(0.05) CV%		1.99	2.19	1.39	4.39	2.29	4.14	2.48
		10.27	17.24	20.38	11.29	7.71	28.45	19.73
Interaction M and T T and M		NS	3.79	NS	7.61	NS	NS	NS
		NS	3.47	NS	7.05	NS	NS	NS
		18.9	12.35	6.63	37.89	28.88	14.18	12.25
Experimental Mean								

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Moncompu									
		Active tillering stage					Panicle initiation stage				
		Grasses	Sedges	BLW	Total		Grasses	Sedges	BLW	Total	
M1	S1	207.73	11.83	6.05	225.61		232.75	0.00	9.15	241.89	
	S2	61.43	0.00	9.05	70.48		127.37	0.00	17.07	144.44	
	S3	53.04	0.00	0.00	53.04		52.48	0.00	0.00	52.48	
M2	S1	100.52	2.56	5.04	108.12		148.00	6.93	9.76	164.69	
	S2	72.72	0.00	7.65	80.37		95.84	0.00	0.00	95.84	
	S3	31.11	0.00	0.00	31.11		58.91	0.00	0.00	58.91	
M3	S1	125.43	9.75	6.28	141.45		155.33	0.00	0.00	155.33	
	S2	81.81	0.00	3.40	85.21		89.63	0.00	9.35	98.97	
	S3	27.59	4.65	0.00	32.24		33.96	0.00	0.00	33.96	
Mean of Factor-1											
	M1	107.40	3.94	5.04	116.38		137.53	0.00	8.74	146.27	
	M2	68.12	0.85	4.23	73.20		100.92	2.31	3.25	106.48	
	M3	78.28	4.80	3.23	86.30		92.97	0.00	3.12	96.09	
	CD(0.05)	NS	NS	NS	NS		21.08	NS	NS	15.74	
	CV%	69.88	252.75	92.95	66.41		22.79	519.62	173.67	16.17	
Mean of Factor-2											
	S1	144.56	8.04	5.79	158.40		178.69	2.31	6.30	187.31	
	S2	71.99	0.00	6.70	78.69		104.28	0.00	8.80	113.08	
	S3	37.24	1.55	0.00	38.80		48.45	0.00	0.00	48.45	
	CD(0.05)	33.58	6.52	5.63	30.99		51.14	NS	6.46	51.96	
	CV%	38.64	198.52	131.55	32.81		45.07	519.62	124.93	43.51	
	Interaction										
	M and T	NS	NS	NS	NS		NS	NS	NS	NS	
	T and M	NS	NS	NS	NS		NS	NS	NS	NS	
	Experimental Mean	84.60	3.20	4.16	91.96		110.47	0.77	5.04	116.28	

M1- Mechanized transplanting/Transplanting (if transplanters not available)
M2-Puddled direct seeding (preferably line sowing by drumseeder)
M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check
S2-Mechanical weeding using weeder
S3-Chemical weed control

Trial 4.3.3: Contd.

		Nawagam									
Main plot	Sub plot treatments	Active tillering stage					Panicle initiation stage				
		Grasses	Sedges	BLW	Total		Grasses	Sedges	BLW	Total	
M1	S1	100.18	91.79	128.00	319.96		215.30	147.37	197.00	559.67	
	S2	40.27	69.02	85.85	195.14		129.90	82.53	127.58	340.01	
	S3	30.96	59.50	63.66	154.12		69.80	59.25	81.14	210.18	
M2	S1	114.49	76.21	130.72	321.42		184.70	102.55	121.02	408.26	
	S2	53.42	56.79	73.28	183.49		102.25	63.34	98.51	264.10	
	S3	44.43	53.28	63.36	161.07		58.62	49.60	58.66	166.88	
M3	S1	150.30	72.50	103.19	325.99		174.49	113.85	187.74	476.08	
	S2	70.07	62.21	51.22	183.49		92.84	87.25	144.29	324.38	
	S3	70.16	43.42	42.56	156.14		54.78	38.23	116.04	209.05	
Mean of Factor-1											
	M1	57.14	73.44	92.50	223.07		138.33	96.38	135.24	369.96	
	M2	70.78	62.09	89.12	221.99		115.19	71.83	92.73	279.75	
	M3	96.84	59.38	65.66	221.88		107.37	79.78	149.36	336.50	
CD(0.05) CV%		8.84	NS	11.13	NS		NS	NS	25.21	31.38	
Mean of Factor-2		14.10	28.00	16.13	6.20		16.28	24.28	23.94	11.40	
	S1	121.66	80.17	120.64	322.46		191.50	121.26	168.58	481.34	
	S2	54.59	62.67	70.11	187.38		108.33	77.71	123.46	309.50	
	S3	48.52	52.07	56.53	157.11		61.07	49.02	85.28	195.37	
CD(0.05) CV%		10.92	11.64	21.43	30.19		20.26	21.48	41.10	31.65	
Interaction		14.19	17.44	25.31	13.22		16.40	25.30	31.81	9.37	
Experimental Mean	M and T	NS	NS	NS	NS		NS	NS	NS	NS	
	T and M	NS	NS	NS	NS		NS	NS	NS	NS	
		74.92	64.97	82.43	222.32		120.30	82.66	125.77	328.74	

M1- Mechanized transplanting/Transplanting (if transplanters not available)
M2-Puddled direct seeding (preferably line sowing by drumseeder)
M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check
S2-Mechanical weeding using weeder
S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Pantnagar							
		Active tillering stage				Panicle initiation stage			
		Grasses	Sedges	BLW	Total	Grasses	Sedges	BLW	Total
M1	S1	24.30	19.50	14.23	58.03	58.27	9.42	6.37	74.05
	S2	3.87	6.47	1.47	11.80	7.53	2.83	1.03	11.40
	S3	8.93	2.27	3.80	15.00	3.47	1.70	0.80	5.97
M2	S1	31.20	25.60	18.83	75.63	88.40	11.40	19.83	119.63
	S2	8.27	3.23	1.80	13.30	15.73	4.37	2.93	23.03
	S3	2.37	3.37	1.63	7.37	4.37	2.17	0.63	7.17
M3	S1	32.60	19.70	16.27	68.57	103.60	19.10	16.63	139.33
	S2	11.13	3.37	5.50	20.00	14.33	4.53	2.53	21.40
	S3	7.80	0.27	2.27	10.33	5.20	2.00	1.50	8.70
Mean of Factor-1									
M1		12.37	9.41	6.50	28.28	23.09	4.65	2.73	30.47
M2		13.94	10.73	7.42	32.10	36.17	5.98	7.80	49.94
M3		17.18	7.78	8.01	32.97	41.04	8.54	6.89	56.48
CD(0.05)		NS	1.01	NS	NS	4.92	1.32	0.79	5.80
CV%		29.48	12.98	22.94	10.03	17.57	24.66	16.33	15.18
Mean of Factor-2									
S1		29.37	21.60	16.44	67.41	83.42	13.31	14.28	111.01
S2		7.76	4.36	2.92	15.03	12.53	3.91	2.17	18.61
S3		6.37	1.97	2.57	10.90	4.34	1.96	0.98	7.28
CD(0.05)		3.92	1.10	2.64	5.56	5.93	1.60	2.16	8.24
CV%		26.34	11.52	35.18	17.38	17.26	24.38	36.19	17.59
Interaction									
M and T		NS	1.91	NS	NS	10.27	2.77	3.74	14.28
T and M		NS	1.66	NS	NS	8.81	2.38	3.08	12.06
Experimental Mean		14.50	9.31	7.31	31.11	33.43	6.39	5.81	45.63

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot		Sub plot treatments		Pattambi									
				Active tillering stage					Panicle initiation stage				
				Grasses	Sedges	BLW	Total	Grasses	Sedges	BLW	Total		
M1			S1	11.23	4.43	17.90	33.57	26.00	10.20	25.20	61.40		
			S2	0.00	0.00	0.00	0.00	12.50	6.33	0.00	18.83		
			S3	0.00	0.00	0.00	0.00	18.50	4.87	0.33	23.70		
M2			S1	32.10	36.33	18.17	86.60	35.20	13.50	23.50	72.20		
			S2	15.43	8.87	0.90	25.20	13.37	6.33	4.33	24.03		
			S3	11.37	2.03	0.00	13.40	24.13	4.40	0.00	28.53		
M3			S1	-	-	-	-	-	-	-	-		
			S2	-	-	-	-	-	-	-	-		
			S3	-	-	-	-	-	-	-	-		
Mean of Factor-1				3.74	1.48	5.97	11.19	19.00	7.13	8.51	34.64		
				19.63	15.74	6.36	41.73	24.23	8.08	9.28	41.59		
				-	-	-	-	-	-	-	-		
CD(0.05)				4.35	2.59	NS	5.45	NS	NS	NS	2.82		
CV%				32.95	44.23	22.69	22.77	21.24	21.74	22.78	9.08		
Mean of Factor-2				28.61	15.58	17.24	61.43	28.34	12.44	24.27	65.06		
				11.14	4.53	0.30	15.98	14.02	6.91	1.44	22.38		
				7.51	0.88	0.00	8.39	19.58	4.27	0.11	23.96		
CD(0.05)				3.12	3.09	1.94	5.19	4.88	1.05	3.82	5.83		
CV%				19.25	42.95	32.35	17.65	23.00	12.97	43.15	15.28		
Interaction													
M and T				5.40	5.35	NS	8.98	NS	1.82	NS	NS		
T and M				5.16	4.59	NS	7.99	NS	1.73	NS	NS		
Experimental Mean				15.76	7.00	5.85	28.60	20.65	7.87	8.61	37.13		

M1- Mechanized transplanting/Transplanting (if transplanters not available)
M2-Puddled direct seeding (preferably line sowing by drumseeder)
M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check
S2-Mechanical weeding using weeder
S3-Chemical weed control

Trial 4.3.3: Contd.

Main plot	Sub plot treatments	Titabar										Varanasi			
		Active tillering stage					Panicle initiation stage					Active tillering stage			
		Grasses	Sedges	BLW	Total	Grasses	Sedges	BLW	Total	Grasses	Sedges	BLW	Total	Grasses	Total
M1	S1	8.67	2.47	2.33	13.47	9.5	3.13	2.67	15.3	8.07	11.30	5.23	24.60		
	S2	6.83	1.50	1.67	10.00	6.9	1.9	2.1	10.9	6.30	9.70	4.13	20.13		
	S3	4.43	1.73	1.70	7.87	5.83	1.63	1.8	9.27	4.73	8.33	2.80	15.87		
M2	S1	10.07	3.13	2.90	16.10	10.97	4.23	4.03	19.23	16.97	46.20	7.13	70.30		
	S2	8.20	2.40	2.20	12.80	9.83	2.63	3.13	15.6	11.53	31.70	4.80	48.03		
	S3	5.53	2.13	1.57	9.23	7.9	1.97	2.13	12	9.53	28.23	3.23	41.00		
M3	S1	10.80	4.40	4.10	19.30	11.67	4.77	4.87	21.3	18.43	45.07	8.73	72.23		
	S2	9.30	2.97	2.93	15.20	9.27	3.97	3.37	16.6	13.83	23.93	4.67	42.43		
	S3	6.17	1.87	2.17	10.20	8.07	2.3	2.87	13.23	10.00	31.63	4.23	45.87		
Mean of Factor-1															
M1	M1	6.64	1.90	1.90	10.44	7.41	2.22	2.19	11.82	6.37	9.78	4.06	20.20		
	M2	7.93	2.56	2.22	12.71	9.57	2.94	3.1	15.61	12.68	35.38	5.06	53.11		
	M3	8.76	3.08	3.07	14.90	9.67	3.68	3.7	17.04	14.09	33.54	5.88	53.51		
CD(0.05) CV%	CD(0.05)	0.81	0.40	0.35	0.80	NS	0.13	NS	1.02	0.79	2.34	0.51	2.90		
	CV%	12.51	18.87	17.48	7.51	19.26	5.1	29.25	8.19	8.52	10.67	12.19	8.19		
	Mean of Factor-2														
S1	S1	9.84	3.33	3.11	16.29	10.71	4.04	3.86	18.61	14.49	34.19	7.03	55.71		
	S2	8.11	2.29	2.27	12.67	8.67	2.83	2.87	14.37	10.56	21.78	4.53	36.87		
	S3	5.38	1.91	1.81	9.10	7.27	1.97	2.27	11.5	8.09	22.73	3.42	34.24		
CD(0.05) CV%	CD(0.05)	1.07	0.63	0.49	1.10	0.98	0.71	0.5	1.14	1.27	2.50	1.02	3.11		
	CV%	13.41	24.37	20.05	8.41	10.73	23.55	16.38	7.46	11.23	9.27	19.93	7.17		
	Interaction														
M and T T and M	M and T	NS	NS	NS	NS	NS	NS	NS	NS	2.21	4.33	NS	5.39		
	T and M	NS	NS	NS	NS	NS	NS	NS	NS	1.85	3.77	NS	4.70		
	Experimental Mean	7.78	2.51	2.40	12.69	8.88	2.95	3	14.83	11.04	26.23	5.00	42.27		

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control

Trial 4.3.3(R): Summary on Group wise weed dry biomass g/m² of Long term trial on Weed Dynamics in rice under different establishment methods, Rabi 2023-2024.

Main plot	Sub plot treatments	Karaikal							
		Active tillering stage				Panicle initiation stage			
		Grasses	Sedges	BLW	Total	Grasses	Sedges	BLW	Total
M1	S1	9.17	6.29	1.58	17.04	11.94	1.98	8.33	22.25
	S2	3.90	2.07	2.18	8.15	3.76	2.27	2.27	8.29
	S3	2.00	5.47	1.43	8.89	0.92	0.00	3.06	3.98
M2	S1	23.91	36.37	0.52	60.80	62.82	4.25	7.78	74.84
	S2	16.36	1.23	0.05	17.64	7.25	0.28	9.71	17.23
	S3	11.60	2.04	0.04	13.68	2.82	0.00	0.00	2.82
M3	S1	39.06	7.97	0.47	47.50	105.04	14.84	47.21	167.09
	S2	32.59	1.08	1.03	34.71	2.69	1.98	16.28	20.95
	S3	8.74	2.44	0.47	11.64	36.50	0.00	9.93	46.43
Mean of Factor-1									
M1	M1	5.02	4.61	1.73	11.36	5.54	1.42	4.55	11.51
	M2	17.29	13.21	0.20	30.71	24.30	1.51	5.83	31.63
	M3	26.80	3.83	0.66	31.28	48.08	5.61	24.47	78.16
CD(0.05)	CD(0.05)	8.88	2.91	NS	10.65	8.17	0.95	3.13	9.30
	CV%	64.77	48.18	110.45	52.03	37.57	39.75	32.17	27.47
	Mean of Factor-2								
S1	S1	24.05	16.88	0.86	41.78	59.93	7.02	21.10	88.06
	S2	17.62	1.46	1.09	20.16	4.56	1.51	9.42	15.49
	S3	7.45	3.32	0.64	11.41	13.42	0.00	4.33	17.75
CD(0.05)	CD(0.05)	10.96	2.49	NS	12.31	9.35	1.23	6.11	8.79
	CV%	65.21	33.53	113.47	49.03	35.04	42.24	51.23	21.16
	Interaction								
M and T	M and T	NS	4.31	NS	NS	16.19	2.14	NS	15.22
	T and M	NS	3.92	NS	NS	13.99	1.82	NS	13.56
	Experimental Mean	16.37	7.22	0.86	24.45	25.97	2.84	11.62	40.43

M1- Mechanized transplanting/Transplanting (if transplanters not available) S1-Weedy check
M2-Puddled direct seeding (preferably line sowing by drumseeder) S2-Mechanical weeding using weeder
M3-Un-puddled dry direct seeding (Line sowing) S3-Chemical weed control* (Herbicide recommendation of respective University may be followed)

Trial 4.3.3(R): Contd.

Main plot	Sub plot treatments	Pattambi									
		Active tillering stage					Panicle initiation stage				
		Grasses	Sedges	BLW	Total		Grasses	Sedges	BLW	Total	
M1	S1	11.17	12.83	26.13	50.13		27.23	15.00	32.23	74.47	
	S2	0.00	0.00	0.00	0.00		17.40	11.13	0.00	28.53	
	S3	0.00	0.00	0.00	0.00		19.63	9.67	4.60	33.90	
M2	S1	19.33	43.33	18.80	81.47		35.60	18.30	31.70	85.60	
	S2	15.53	9.07	8.10	32.70		17.77	11.13	4.50	33.40	
	S3	11.87	3.20	0.00	15.07		8.90	9.20	0.00	18.10	
M3	S1	-	-	-	-		-	-	-	-	
	S2	-	-	-	-		-	-	-	-	
	S3	-	-	-	-		-	-	-	-	
Mean of Factor-1											
M1	M1	3.72	4.28	8.71	16.71		21.42	11.93	12.28	45.63	
	M2	15.58	18.53	8.97	43.08		20.76	12.88	12.07	45.70	
	M3	-	-	-	-		-	-	-	-	
CD(0.05)	CV%	1.27	1.85	NS	2.43		NS	NS	NS	NS	
		11.24	24.21	11.41	9.23		25.50	13.51	23.86	9.24	
	Mean of Factor-2										
S1	S1	22.38	20.57	23.77	66.71		29.39	17.24	30.97	77.60	
	S2	11.11	5.09	2.70	18.90		17.32	11.71	1.50	30.53	
	S3	7.12	1.67	0.00	8.79		15.79	9.07	1.53	26.39	
CD(0.05)	CV%	2.88	2.07	2.14	3.99		4.36	1.05	3.15	5.27	
	Interaction	20.71	22.09	23.63	12.35		20.36	8.06	27.06	11.44	
	M and T	4.99	3.58	3.71	NS		7.55	1.82	NS	NS	
T and M	T and M	4.12	3.10	3.05	NS		6.68	1.73	NS	NS	
	Experimental Mean	13.54	9.11	8.82	31.47		20.83	12.67	11.33	44.84	

M1- Mechanized transplanting/Transplanting (if transplanters not available) S1-Weedy check
M2-Puddled direct seeding (preferably line sowing by drumseeder) S2-Mechanical weeding using weeder
M3-Un-puddled dry direct seeding (Line sowing) S3-Chemical weed control* (Herbicide recommendation of respective University may be followed)

Trial 4.3.3(R): Summary on Species wise weed dry biomass g/m² of Long term trial on Weed Dynamics in rice under different establishment methods, Rabi 2023-2024.

Main plot	Sub plot Treatments	Karaikal									
		Active tillering stage					Panicle initiation stage				
		Grasses	Sedges	Hydrolea zeylanica	BLW	Total	Grasses	Sedges	Hydrolea zeylanica	BLW	Total
		<i>Echinochloa colonum</i>	Cyperus rotundus		Bergia ammoinnoides		<i>Echinochloa colonum</i>	Leptochloa chinensis	Cyperus rotundus		Bergia ammoinnoides
M1	S1	9.17	6.29	0.80	0.79	17.04	9.07	2.87	1.98	5.75	2.58
	S2	3.90	2.07	0.05	2.13	8.15	3.76	0.00	2.27	1.39	0.88
	S3	2.00	5.47	0.28	1.15	8.89	0.92	0.00	0.00	3.06	0.00
M2	S1	23.91	36.37	0.00	0.52	60.80	59.64	3.18	4.25	4.96	2.82
	S2	16.36	1.23	0.00	0.05	17.64	7.25	0.00	0.28	8.92	0.79
	S3	11.60	2.04	0.00	0.04	13.68	0.00	2.82	0.00	0.00	0.00
M3	S1	39.06	7.97	0.07	0.40	47.50	64.22	40.81	14.84	24.49	22.72
	S2	32.59	1.08	0.01	1.03	34.71	2.69	0.00	1.98	16.28	0.00
	S3	8.74	2.44	0.00	0.47	11.64	13.73	22.78	0.00	6.22	3.71
Mean of Factor-1											
Mean of Factor-2	M1	5.02	4.61	0.38	1.36	11.36	4.58	0.96	1.42	3.40	1.15
	M2	17.29	13.21	0.00	0.20	30.71	22.30	2.00	1.51	4.62	1.20
	M3	26.80	3.83	0.02	0.63	31.28	26.88	21.20	5.61	15.66	8.81
	CD(0.05)	8.88	2.91	NS	NS	10.65	7.36	1.55	0.95	3.31	0.54
	CV%	64.77	48.18	297.20	114.11	52.03	49.04	23.02	39.75	50.05	17.27
	S1	24.05	16.88	0.29	0.57	41.78	44.31	15.62	7.02	11.73	9.37
	S2	17.62	1.46	0.02	1.07	20.16	4.56	0.00	1.51	8.86	0.56
	S3	7.45	3.32	0.09	0.55	11.41	4.88	8.53	0.00	3.09	1.24
	CD(0.05)	10.96	2.49	0.19	NS	12.31	9.88	2.39	1.23	6.59	1.69
	CV%	65.21	33.53	138.67	142.85	49.03	53.69	28.90	42.24	81.24	44.10
Interaction											
M and T T and M	M and T	NS	4.31	NS	NS	NS	17.12	4.14	2.14	NS	2.92
	T and M	NS	3.92	NS	NS	NS	14.53	3.48	1.82	NS	2.40
	Experimental Mean	16.37	7.22	0.13	0.73	24.45	17.92	8.05	2.84	7.90	3.72
M1- Mechanized transplanting/Transplanting (if transplanters not available)											
M2-Puddled direct seeding (preferably line sowing by drumseeder)											
M3-Un-puddled dry direct seeding (Line sowing)											
						S1-Weedy check					
						S2-Mechanical weeding using weeder					
						S3-Chemical weed control* (Herbicide recommendation of respective University may be followed)					

Trial 4.3.3(R): Contd.

Main plot		Sub plot Treatments		Pattambi							
				Active tillering stage							
		Grasses		Sedges			BLW				
		Isachne milliaceae	Optismenus burmannii	<i>Fimbristylis milliaceae</i>	Cyperus rotundus	Sphenoclea zeylanica	Marselia quadrifolia	Monochoria vaginalis	Total		
M1	S1	2.73	8.43	7.40	5.43	9.97	10.57	5.60	50.13		
	S2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
	S3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
M2	S1	6.87	12.47	39.90	3.43	10.57	6.97	1.27	81.47		
	S2	2.00	13.53	6.33	2.73	8.10	0.00	0.00	32.70		
	S3	3.00	8.87	2.33	0.87	0.00	0.00	0.00	15.07		
M3	S1	-	-	-	-	-	-	-	-		
	S2	-	-	-	-	-	-	-	-		
	S3	-	-	-	-	-	-	-	-		
Mean of Factor-1		M1	0.91	2.81	2.47	1.81	3.32	3.52	1.87	16.71	
		M2	3.96	11.62	16.19	2.34	6.22	2.32	0.42	43.08	
		M3	-	-	-	-	-	-	-	-	
		CD(0.05)	2.63	2.07	1.68	0.57	0.61	NS	0.43	2.43	
		CV%	77.32	26.06	26.68	43.66	15.15	38.68	37.04	9.23	
Mean of Factor-2		S1	5.79	16.59	17.54	3.02	11.68	7.89	4.20	66.71	
		S2	3.56	7.56	3.81	1.28	2.70	0.00	0.00	18.90	
		S3	2.86	4.27	1.27	0.40	0.00	0.00	0.00	8.79	
		CD(0.05)	1.41	2.10	1.68	0.72	1.27	1.33	0.45	3.99	
		CV%	33.71	21.62	21.71	44.73	25.74	49.34	31.20	12.35	
Interaction		M and T	2.44	3.64	2.91	1.25	2.19	2.31	0.78	NS	
		T and M	2.62	3.20	2.57	1.07	1.82	1.94	0.68	NS	
		Experimental Mean	4.07	9.47	7.54	1.57	4.79	2.63	1.40	31.47	

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy

check

S2-Mechanical weeding using weeder

S3-Chemical weed control* (Herbicide recommendation of respective University may be followed)

Trial 4.3.3(R): Contd.

Main plot	Sub plot Treatments	PATTAMBI									
		Panicle initiation stage									
		Grasses		Sedges			BLW			Total	
		Isachne milliaceae	Oplismenus burmannii	<i>Fimbristylis milliaceae</i>	Cyperus rotundus	Sphenoclea zeylanica	Marselia quadrifolia	Monochoria vaginalis			
M1	S1	18.20	9.03	8.50	6.50	17.90	14.33	0.00	74.47		
	S2	10.90	6.50	6.27	4.87	0.00	0.00	0.00	28.53		
	S3	16.10	3.53	6.10	3.57	0.00	4.60	0.00	33.90		
M2	S1	24.77	10.83	13.07	5.23	16.63	11.20	3.87	85.60		
	S2	8.53	9.23	6.83	4.30	0.00	4.50	0.00	33.40		
	S3	6.17	2.73	4.87	4.33	0.00	0.00	0.00	18.10		
M3	S1	-	-	-	-	-	-	-	-		
	S2	-	-	-	-	-	-	-	-		
	S3	-	-	-	-	-	-	-	-		
Mean of Factor-1		M1	15.07	6.36	6.96	4.98	5.97	6.31	0.00	45.63	
		M2	13.16	7.60	8.26	4.62	5.54	5.23	1.29	45.70	
		M3	-	-	-	-	-	-	-	-	
		CD(0.05)	NS	0.93	NS	0.42	NS	1.08	NS	NS	
		CV%	40.02	14.38	26.64	9.97	31.26	26.25	170.02	9.24	
Mean of Factor-2		S1	18.29	11.10	10.78	6.47	15.90	11.73	3.33	77.60	
		S2	8.50	8.82	6.88	4.83	0.00	1.50	0.00	30.53	
		S3	12.50	3.29	5.20	3.87	0.00	1.53	0.00	26.39	
		CD(0.05)	4.27	0.98	0.99	0.97	2.03	1.69	1.88	5.27	
		CV%	31.75	12.32	12.64	18.70	37.26	33.42	164.94	11.44	
		Interaction									
		M and T	7.40	1.70	1.71	NS	NS	2.93	NS	NS	
		T and M	6.55	1.48	1.77	NS	NS	2.46	NS	NS	
		Experimental Mean	13.10	7.74	7.62	5.06	5.30	4.92	1.11	44.84	

M1- Mechanized transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (Line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control* (Herbicide recommendation of respective University may be followed)

Trial 4.3.3: Yield parameters and grain yield of Long term trial on Weed Dynamics in rice under different establishment methods, Kharif 2024.

Main plot treatments	Sub plot treatments	Grain Yield t/ha				
		ADUTHURAI	CHATHA	CH IPLIMA	CHINSURAH	GANGAVATHI
M1	S1	4.20	1.42	3.80	2.25	4.58
	S2	7.30	3.27	3.57	4.39	5.19
	S3	6.60	3.05	3.50	5.13	5.52
M2	S1	3.60	1.24	3.37	1.77	2.38
	S2	6.54	3.07	3.40	3.98	4.72
	S3	6.17	2.93	4.37	4.85	6.75
M3	S1	3.47	1.05	3.67	1.42	1.62
	S2	5.23	2.94	4.03	3.44	2.89
	S3	5.77	2.78	4.37	4.48	4.12
Mean of Factor-1						
	1	6.03	2.58	3.62	3.92	5.10
	2	5.44	2.41	3.71	3.53	4.62
	3	4.82	2.26	4.02	3.11	2.88
	CD(0.05)	0.16	0.02	NS	0.21	0.54
	CV(%)	3.44	1.18	8.18	7.09	15.44
Mean of Factor-2						
	S1	3.76	1.24	3.61	1.81	2.86
	S2	6.36	3.09	3.67	3.94	4.27
	S3	6.18	2.92	4.08	4.82	5.46
	CD(0.05)	0.23	0.03	0.23	0.25	0.85
	CV(%)	4.14	1.18	5.94	6.86	19.73
Interaction						
	M and T	0.40	NS	NS	NS	NS
	T and M	0.34	NS	NS	NS	NS
Experimental Mean		5.43	2.42	3.79	3.52	4.20
Applied N:P:K:Zn Kg/ha		150:50:50	30:20:10	80:40:40		150:75:75
Avail N:P:K (kg/ha)		285:48:460	245.15:14.34:146.31			
Name of the variety		ADT 59	Basmati 370	MTU 1156	Lalat	Gangavathi sona
Soil type		Clay	Sandy clay loam		Clay loan	
pH		7.32	8.03	5.6	7.2	8
EC (dsm-1)			0.21		0.21	
Soil Organic carbon		0.45	0.57	0.18		0.52

M1- Mechanised transplanting/Transplanting (if transplanter not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control* (Herbicide recommendation of respective University may be followed)

Trial 4.3.3: Contd.

Main plot treatments	Sub plot treatments	Grain Yield t/ha					
		GHAGHRAGHAT	JAGDALPUR	MALAN	MONCOMPU	NAGINA	NAWAGAM
M1	S1	3.31	1.93	2.93	1.28	2.09	4.65
	S2	3.36	4.12	3.28	2.66	4.55	5.09
	S3	3.42	5.27	4.57	3.94	4.87	5.17
M2	S1	2.17	2.03	2.16	1.46	2.04	4.57
	S2	2.52	2.97	3.20	1.91	4.13	4.84
	S3	3.07	5.23	4.33	3.79	4.59	5.11
M3	S1	1.40	1.40	2.53	1.04	1.82	4.41
	S2	2.00	2.77	3.38	1.93	4.28	5.07
	S3	2.16	5.13	4.24	2.90	4.34	5.31
Mean of Factor-1							
1		3.36	3.77	3.59	2.63	3.84	4.97
2		2.59	3.41	3.23	2.39	3.59	4.84
3		1.85	3.10	3.38	1.95	3.48	4.93
CD(0.05)		0.2	NS	NS	0.28	0.03	NS
CV(%)		9.09	11.34	8.38	14.34	0.84	9.55
Mean of Factor-2							
S1		2.29	1.79	2.54	1.26	1.98	4.54
S2		2.63	3.29	3.28	2.17	4.32	5.00
S3		2.88	5.21	4.38	3.54	4.60	5.20
CD(0.05)		0.31	0.3	0.23	0.35	0.09	0.27
CV(%)		11.76	8.51	6.66	14.8	2.41	5.33
Interaction							
M and T		NS	NS	NS	NS	NS	NS
T and M		NS	NS	NS	NS	NS	NS
Experimental Mean		2.60	3.43	3.4	2.32	3.63	4.91
Applied N:P:K:Zn Kg/ha		120:60:30:25		90:40:40			
Avail N:P:K (kg/ha)		120:60:25	240:18.60:345				
Name of the variety		NDR 2065	Samleshwari	HPR(1068)	MO 16 (uma)		
Soil type		Sandy loam	Clay	Silt			
pH		7.4	5.65	5.6	5.5		
EC (dsm-1)							
Soil Organic carbon		0.3	0.48	0.92	1.8		

M1- Mechanised transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control* (Herbicide recommendation of respective University may be followed)

Trial 4.3.3: Contd.

Main plot treatments	Sub plot treatments	Grain Yield t/ha				
		PANTNAGAR	PATTAMBI	ARI-RAJENDRANAGAR	TITABAR	VARANASI
M1	S1	3.22	1.93	3.64	4.43	4.26
	S2	5.62	2.33	6.82	5.06	5.51
	S3	5.96	2.85	6.99	5.25	5.70
M2	S1	2.82	2.52	3.43	4.14	4.15
	S2	4.04	3.18	5.00	4.82	5.44
	S3	4.52	3.82	6.29	4.92	5.83
M3	S1	2.60	-	2.08	3.80	4.28
	S2	4.69	-	3.19	4.60	5.54
	S3	4.71	-	4.20	4.76	5.75
Mean of Factor-1						
	1	4.93	2.37	3.16	4.91	5.16
	2	3.79	3.17	4.91	4.63	5.14
	3	4.00	-	5.82	4.39	5.19
	CD(0.05)	0.2	NS	0.58	NS	NS
	CV(%)	5.74	20.9	15.04	18.39	2.31
Mean of Factor-2						
	S1	2.88	2.27	3.05	4.12	4.23
	S2	4.78	3.05	5.01	4.82	5.50
	S3	5.06	3.15	5.83	4.98	5.76
	CD(0.05)	0.22	0.17	0.7	0.6	0.11
	CV(%)	5	5.96	14.62	12.56	2.13
Interaction						
	M and T	NS	0.3	NS	NS	NS
	T and M	NS	0.41	NS	NS	NS
Experimental Mean		4.24	2.82	4.63	4.64	5.16
Applied N:P:K:Zn Kg/ha			90:45:45	120:60:40	60:20:40	
Avail N:P:K (kg/ha)		230-21.1-220				188:18.21:210.8
Name of the variety		PD-24	Aiswarya	PNR 15048	Numoli	Malviya manila sinchit dhan 1
Soil type		Silt loam			clay	loam
pH		7.3			5.6	7.6
EC (dsm-1)						
Soil Organic carbon		1.01			0.55	0.34

M1- Mechanised transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control* (Herbicide recommendation of respective University may be followed)

Trial 4.3.3: Contd.

Main plot treatment s	Sub plot treatment s	Straw yield t/ha						
		Aduthuraj	Chatha	Chiplima	Chinsurah	Gangavathi	Ghaghraghat	Jagdapur
M1	S1	6.30	2.85	4.13	2.54	7.50	4.10	8.77
	S2	10.95	6.53	3.97	4.79	8.33	4.04	8.06
	S3	9.90	6.10	4.27	5.54	7.92	3.97	7.54
M2	S1	5.40	2.47	3.80	2.07	5.42	3.68	6.37
	S2	10.85	6.13	3.77	4.50	5.83	3.02	8.57
	S3	8.18	5.86	4.90	5.26	6.25	2.60	10.63
M3	S1	4.89	2.10	3.97	1.65	1.25	2.66	6.87
	S2	7.38	5.88	4.57	3.88	3.75	2.40	8.53
	S3	8.13	5.57	5.07	4.89	4.58	1.68	9.00
Mean of Factor-1								
M1		9.05	5.16	4.12	4.29	7.92	4.04	8.12
M2		8.14	4.82	4.16	3.95	5.83	3.10	8.52
M3		6.80	4.52	4.53	3.47	3.19	2.25	8.13
CD(0.05)		0.34	0.05	NS	0.24	1.49	0.23	NS
CV(%)		5.07	1.18	8.67	7.37	31.59	8.71	13.59
Mean of Factor-2								
S1		5.53	2.47	3.97	2.09	4.72	3.48	7.33
S2		9.73	6.18	4.10	4.39	5.97	3.15	8.39
S3		8.74	5.84	4.74	5.23	6.25	2.75	9.06
CD(0.05)		0.68	0.06	0.28	0.3	NS	0.38	0.87
CV(%)		8.34	1.18	6.33	7.46	24.28	11.74	10.25
Interaction								
M and T		NS	NS	NS	NS	NS	NS	NS
T and M		NS	NS	NS	NS	NS	NS	NS
Experimental Mean		8.00	4.83	4.27	3.90	5.65	3.13	8.26

M1- Mechanised transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control* (Herbicide recommendation of respective University may be followed)

Trial 4.3.3: Contd.

Main plot treatment s	Sub plot treatment s	Straw yield t/ha							
		Malan	Moncomp u	Nawgam	Pantnaga r	Pattamb i	ARI-Rajendranaga r	Titabar	Varanasi
M1	S1	3.93	1.68	5.30	3.35	5.77	4.71	10.00	9.70
	S2	4.65	3.21	5.97	5.85	5.26	8.38	10.33	10.10
	S3	6.54	4.18	6.03	6.04	5.82	8.53	12.67	10.14
M2	S1	2.94	1.79	5.44	3.46	3.56	4.04	8.87	8.93
	S2	4.51	2.18	5.85	4.26	6.74	6.14	11.00	10.87
	S3	6.54	5.09	6.06	4.97	5.92	7.89	12.00	11.73
M3	S1	3.37	1.40	5.28	2.66	-	2.71	8.73	10.20
	S2	4.86	2.57	6.08	5.09	-	4.03	8.83	10.35
	S3	6.36	4.01	6.37	5.24	-	4.75	9.37	10.77
Mean of Factor-1									
	M1	5.04	3.02	5.77	5.08	5.62	3.83	11.00	9.98
	M2	4.66	3.02	5.78	4.23	5.41	6.02	10.62	10.51
	M3	4.86	2.66	5.91	4.33	-	7.21	8.98	10.44
	CD(0.05)	NS	NS	NS	0.26	0.47	0.69	0.9	NS
	CV(%)	8.11	19.99	11.14	6.73	10.81	14.58	10.52	4.91
Mean of Factor-2									
	S1	3.41	1.62	5.34	3.16	4.51	3.82	9.20	9.61
	S2	4.67	2.65	5.97	5.07	5.78	6.18	10.06	10.44
	S3	6.48	4.43	6.15	5.41	5.28	7.06	11.34	10.88
	CD(0.05)	0.33	0.72	0.37	0.38	NS	0.76	1.44	0.7
	CV(%)	6.54	24.06	6.12	8.06	29.79	13.03	13.77	6.63
Interaction									
	M and T	NS	NS	NS	NS	NS	NS	NS	NS
	T and M	NS	NS	NS	NS	NS	NS	NS	NS
Experimental Mean		4.85	2.90	5.82	4.55	5.19	5.68	10.20	10.31

M1- Mechanised transplanting/Transplanting (if transplanter not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Unpuddled dry direct seeding (line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control* (Herbicide recommendation of respective University may be followed)

Trial 4.3.3: Contd.

Main plot treatments	Sub plot treatments	No of Panicles/m ²							
		Aduthur ai	Chatha	Chiplima	Chinsurah	Gangavathi	Ghaghraghat	Jagdulpur	Malan
M1	S1	179	104	204	228	365	171	88	156
	S2	323	239	212	314	381	229	162	190
	S3	318	208	211	357	469	208	192	216
M2	S1	195	139	186	238	363	165	102	133
	S2	327	229	219	338	421	207	133	208
	S3	281	218	233	365	518	195	170	212
M3	S1	180	139	171	229	231	156	74	138
	S2	257	218	237	314	374	169	127	205
	S3	222	210	277	343	356	157	183	210
Mean of Factor-1									
M1		273	183	209	299	405	203	147	188
M2		268	195	213	314	434	189	135	184
M3		220	189	228	296	320	161	128	184
CD(0.05)		14	1	NS	NS	35	16	NS	NS
CV(%)		7	1	10	5	11	10	14	5
Mean of Factor-2									
S1		185	127	187	232	319	164	88	142
S2		302	229	223	322	392	202	141	201
S3		274	212	240	355	447	187	182	213
CD(0.05)		13	3	17	11	74	23	17	10
CV(%)		5	1	8	3	19	12	12	5
Interaction									
M and T		23	5	NS	NS	NS	NS	NS	NS
T and M		21	4	NS	NS	NS	NS	NS	NS
Experimental Mean		254	189	217	303	386	184	137	185

M1- Mechanised transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control* (Herbicide recommendation of respective University may be followed)

Trial 4.3.3: Contd.

Main plot treatments	Sub plot treatments	No of Panicles/m ²							
		Moncompu	Nagina	Nawagam	Pantnagar	Pattambi	ARI-Rajendranagar	Titabar	Varanasi
M1	S1	248	216	201	153	229	273	217	274
	S2	339	317	218	235	206	340	231	278
	S3	304	321	208	233	187	347	250	290
M2	S1	367	212	201	211	273	205	189	318
	S2	327	305	234	303	271	230	213	348
	S3	349	315	204	323	300	292	233	327
M3	S1	283	201	193	229	-	128	118	333
	S2	313	244	228	297	-	141	134	344
	S3	364	306	227	298	-	200	156	351
Mean of Factor-1									
	M1	297	284	209	207	207	156	233	281
	M2	348	277	213	279	281	242	212	331
	M3	320	250	216	274	-	320	136	343
	CD(0.05)	NS	10	NS	7	15	15	11	18
	CV(%)	13	4	11	4	7	7	7	7
Mean of Factor-2									
	S1	299	210	199	198	254	202	175	308
	S2	326	289	226	278	262	237	192	323
	S3	339	314	213	285	279	280	213	323
	CD(0.05)	30	10	NS	7	17	34	12	NS
	CV(%)	9	4	10	3	6	14	6	4
Interaction									
	M and T	NS	17	NS	NS	30	NS	NS	NS
	T and M	NS	15	NS	NS	26	NS	NS	NS
Experimental Mean		321	271	213	253	265	239	193	318

M1- Mechanised transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control* (Herbicide recommendation of respective University may be followed)

Trial 4.3.3: Contd.

Main plot treatments	Sub plot treatments	Panicle weight (g)						
		Aduthurai	Chatha	Chiplima	Chinsurah	Gangavathi	Ghaghraghat	Jagdapur
M1	S1	4.14	0.93	3.47	2.20	3.93	2.97	3.07
	S2	4.60	2.19	4.43	2.47	4.57	3.60	4.00
	S3	4.44	2.11	4.23	2.76	4.24	3.31	4.08
M2	S1	4.14	0.90	3.50	2.16	2.86	2.44	3.57
	S2	4.62	2.17	3.90	2.53	3.26	3.32	4.13
	S3	4.52	2.00	4.70	2.68	2.91	2.90	4.37
M3	S1	4.12	0.79	3.43	2.12	3.03	3.13	2.85
	S2	4.24	2.11	4.47	2.39	3.78	2.40	4.17
	S3	4.32	2.02	4.77	2.54	3.58	1.82	4.27
Mean of Factor-1								
M1		4.39	1.74	4.04	2.48	4.25	3.29	3.72
M2		4.43	1.69	4.03	2.46	3.01	2.89	4.02
M3		4.23	1.64	4.22	2.35	3.46	2.45	3.76
CD(0.05)		0.01	0.02	NS	NS	0.25	0.30	NS
CV(%)		0.25	1.26	6.08	4.76	8.23	12.45	5.99
Mean of Factor-2								
S1		4.13	0.87	3.47	2.16	3.27	2.85	3.16
S2		4.49	2.16	4.27	2.46	3.87	3.11	4.10
S3		4.43	2.04	4.57	2.66	3.58	2.68	4.24
CD(0.05)		0.02	0.01	0.37	0.05	NS	0.33	0.34
CV(%)		0.41	0.63	8.82	1.95	13.75	11.16	8.56
Interaction								
M and T		0.03	0.02	NS	NS	NS	NS	NS
T and M		0.03	0.02	NS	NS	NS	NS	NS
Experimental Mean		4.35	1.69	4.10	2.43	3.57	2.88	3.83

M1- Mechanised transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control* (Herbicide recommendation of respective University may be followed)

Trial 4.3.3: Contd.

Main plot treatments	Sub plot treatments	Panicle weight (g)								
		Malan	Moncompu	Nagina	Nawagam	Pantnagar	Pattambi	ARI-Rajendranagar	Titabarr	Varanasi
M1	S1	2.73	2.25	2.81	2.80	2.59	7.47	2.49	2.67	1.60
	S2	4.35	3.24	2.85	3.21	2.68	7.67	3.13	3.17	1.71
	S3	4.52	3.77	2.86	3.37	2.89	8.23	3.70	3.90	1.63
M2	S1	2.16	1.58	2.75	3.09	1.59	7.57	2.15	2.70	1.45
	S2	4.34	3.23	2.84	3.61	1.58	8.17	2.39	2.93	1.90
	S3	4.39	2.69	2.86	3.91	1.60	9.30	2.68	3.33	1.93
M3	S1	2.20	2.90	2.72	3.30	1.37	-	2.17	2.80	1.61
	S2	4.19	2.84	2.84	3.80	1.83	-	2.93	3.17	1.69
	S3	4.36	2.71	2.85	3.65	1.79	-	3.16	3.50	1.76
Mean of Factor-1										
	M1	3.87	3.09	2.84	3.13	2.72	7.79	2.75	3.24	1.65
	M2	3.63	2.50	2.82	3.54	1.59	8.34	2.41	2.99	1.76
	M3	3.58	2.82	2.80	3.58	1.66	-	3.11	3.16	1.69
	CD(0.05)	NS	NS	NS	NS	0.06	0.19	NS	NS	0.05
	CV(%)	4.90	21.66	0.80	12.02	3.66	2.84	60.85	19.82	3.66
Mean of Factor-2										
	S1	2.36	2.24	2.76	3.06	1.85	7.46	2.27	2.72	1.55
	S2	4.29	3.10	2.84	3.54	2.03	8.08	2.82	3.09	1.77
	S3	4.42	3.06	2.86	3.65	2.10	8.94	3.18	3.58	1.77
	CD(0.05)	0.21	NS	0.02	0.30	0.06	0.55	NS	NS	0.13
	CV(%)	5.55	29.73	0.56	8.69	2.95	6.54	27.29	23.70	7.70
Interaction										
	M and T	NS	NS	NS	NS	0.10	NS	NS	NS	NS
	T and M	NS	NS	NS	NS	0.09	NS	NS	NS	NS
Experimental Mean		3.69	2.80	2.82	3.42	1.99	8.16	2.76	3.13	1.70

M1- Mechanised transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control* (Herbicide recommendation of respective University may be followed)

Trial 4.3.3: Contd.

Main plot treatments	Sub plot treatments	Test weight (g)						
		Aduthurai	Chatha	Chiplima	Chinsurah	Gangavathi	Ghaghraghat	Jagdapur
M1	S1	21.33	19.17	22.53	21.22	16.03	24.66	22.67
	S2	23.57	21.27	22.13	22.40	15.36	25.01	20.00
	S3	23.47	20.90	23.93	21.91	15.47	24.01	20.33
M2	S1	22.47	18.97	22.03	21.01	15.37	22.90	24.00
	S2	24.23	21.00	23.47	21.63	15.25	23.85	24.33
	S3	23.40	20.57	23.77	21.31	15.32	22.22	25.00
M3	S1	20.67	19.17	22.97	20.85	15.00	22.13	24.33
	S2	23.17	20.80	22.80	21.43	14.78	22.49	26.33
	S3	23.13	20.27	24.10	21.47	15.49	21.43	23.00
Mean of Factor-1								
M1		22.79	20.44	22.87	21.84	15.62	24.56	21.00
M2		23.37	20.18	23.09	21.32	15.32	22.99	24.44
M3		22.32	20.08	23.29	21.25	15.09	22.02	24.56
CD(0.05)		0.13	0.07	NS	NS	0.22	0.40	0.71
CV(%)		0.70	0.40	1.82	1.95	1.74	2.07	3.64
Mean of Factor-2								
S1		21.49	19.10	22.51	21.02	15.47	23.23	23.67
S2		23.66	21.02	22.80	21.82	15.13	23.78	23.56
S3		23.33	20.58	23.93	21.57	15.43	22.55	22.78
CD(0.05)		0.23	0.05	1.03	0.31	NS	0.59	NS
CV(%)		0.99	0.26	4.35	1.41	2.15	2.47	6.25
Interaction								
M and T		0.40	0.09	NS	NS	NS	NS	NS
T and M		0.33	0.09	NS	NS	NS	NS	NS
Experimental Mean		22.83	20.23	23.08	21.47	15.34	23.19	23.33

M1- Mechanised transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control* (Herbicide recommendation of respective University may be followed)

Trial 4.3.3: Contd.

Main plot treatments	Sub plot treatments	Test weight (g)							
		Malan	Moncompu	Nagina	Nawagam	Pantnagar	Pattambi	Titabar	Varanasi
M1	S1	24.95	25.50	23.20	18.43	30.60	21.30	24.10	21.10
	S2	26.45	25.25	23.46	18.43	29.50	20.50	24.37	22.00
	S3	27.95	25.65	23.51	18.43	29.30	21.80	24.70	22.30
M2	S1	23.94	24.35	23.16	18.43	29.53	20.97	24.50	21.47
	S2	26.09	27.75	23.45	18.60	29.20	19.50	24.70	22.63
	S3	27.46	23.85	23.49	18.47	32.50	20.97	24.20	22.37
M3	S1	24.63	25.35	23.13	18.27	31.53	-	25.03	21.67
	S2	25.95	25.81	23.46	18.50	29.37	-	25.03	22.53
	S3	27.13	25.55	23.52	18.13	29.70	-	24.33	21.80
Mean of Factor-1									
M1		26.45	25.47	23.39	18.43	29.80	21.20	24.39	21.80
M2		25.83	25.32	23.37	18.50	30.41	20.48	24.47	22.16
M3		25.90	25.57	23.37	18.30	30.20	-	24.80	22.00
CD(0.05)		0.29	NS	0.00	NS	NS	NS	NS	NS
CV(%)		1.34	6.76	0.02	5.36	1.64	3.65	2.38	1.58
Mean of Factor-2									
S1		24.51	25.07	23.16	18.38	30.56	21.26	24.54	21.41
S2		26.16	26.27	23.46	18.51	29.36	20.52	24.70	22.39
S3		27.52	25.02	23.51	18.34	30.50	21.38	24.41	22.16
CD(0.05)		0.43	NS	0.03	NS	0.30	NS	NS	0.28
CV(%)		1.59	5.20	0.12	4.33	0.96	4.74	2.86	1.26
Interaction									
M and T		NS	NS	NS	NS	0.51	NS	NS	NS
T and M		NS	NS	NS	NS	0.49	NS	NS	NS
Experimental Mean		26.06	25.45	23.38	18.41	30.14	21.05	24.55	21.99

M1- Mechanised transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control* (Herbicide recommendation of respective University may be followed)

Trial 4.3.3: Contd.

Main plot treatments	Sub plot treatments	Crop dry matter g/m ² at Active tillering stage									
		Chatha	Chiplima	Jagdapur	Malan	Moncompu	Pantnagar	Pattambi	ARI-Rajendra nagar	Titabar	Varanasi
M1	S1	137.67	96.50	55.85	52.70	336.75	96.90	122.13	111.73	678.33	122.29
	S2	264.00	112.97	63.58	64.00	332.56	127.97	128.47	204.07	777.33	125.68
	S3	209.67	119.70	66.87	71.57	338.84	109.67	124.47	210.64	977.33	128.98
M2	S1	201.33	98.20	43.85	49.30	315.60	135.77	132.80	103.82	661.33	137.08
	S2	223.67	111.23	60.20	62.80	328.25	163.20	133.13	153.74	773.00	152.57
	S3	233.67	124.07	82.82	66.23	277.76	127.57	125.03	189.40	841.67	148.63
M3	S1	207.33	106.23	43.15	51.43	300.20	172.70	-	60.88	541.67	157.88
	S2	250.67	105.13	58.99	62.37	405.04	183.57	-	96.71	615.00	158.91
	S3	228.00	121.23	73.78	64.43	361.08	153.47	-	126.82	762.67	170.30
Mean of Factor-1											
	M1	203.78	109.72	62.10	62.76	336.05	111.51	125.02	94.80	811.00	125.65
	M2	219.56	111.17	62.29	59.44	307.20	142.18	130.32	148.99	758.67	146.10
	M3	228.67	110.87	58.64	59.41	355.44	169.91	-	175.48	639.78	162.36
	CD(0.05)	2.18	NS	NS	0.70	NS	19.55	2.13	7.56	NS	1.79
	CV(%)	1.20	8.50	12.38	1.38	14.41	16.53	1.98	6.46	19.64	1.48
Mean of Factor-2											
	S1	182.11	100.31	47.62	51.14	317.52	135.12	129.22	92.14	627.11	139.08
	S2	246.11	109.78	60.92	63.06	355.28	158.24	129.78	151.51	721.78	145.72
	S3	223.78	121.67	74.49	67.41	325.89	130.23	125.97	175.62	860.56	149.31
	CD(0.05)	5.94	10.74	4.33	0.75	NS	18.65	NS	8.82	68.76	4.88
	CV(%)	2.66	9.45	6.91	1.21	10.87	12.86	2.71	6.15	9.09	3.28
Interaction											
	M and T	10.28	NS	NS	1.30	NS	NS	NS	NS	NS	NS
	T and M	8.46	NS	NS	1.13	NS	NS	NS	NS	NS	NS
Experimental Mean		217.33	110.59	61.01	60.54	332.90	141.20	128.32	139.76	736.48	144.70

M1- Mechanised transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control* (Herbicide recommendation of respective University may be followed)

Trial 4.3.3: Contd.

Main plot treatments	Sub plot treatments	Crop dry matter g/m ² at at Panicle Initiation stage								
		Chatha	Jagdapur	Malan	Moncompu	Pantnagar	Pattambi	ARI-Rajendranagar	Titabar	Varanasi
M1	S1	168.67	86.67	281.00	802.45	190.84	303.13	305.65	875.67	255.30
	S2	454.00	98.66	346.00	1204.17	229.32	433.13	573.17	1124.33	275.62
	S3	404.33	103.76	350.33	1512.67	202.28	463.13	587.33	1186.00	278.46
M2	S1	305.33	68.04	245.67	521.48	210.60	446.47	288.18	887.00	275.80
	S2	428.67	93.42	342.00	749.29	262.08	510.13	420.34	1020.00	313.39
	S3	435.33	128.52	346.67	1889.03	237.64	489.70	528.19	1134.33	312.11
M3	S1	305.67	66.96	241.33	310.00	363.48	-	174.72	779.33	298.54
	S2	438.67	91.53	316.33	726.15	276.64	-	267.93	921.33	315.14
	S3	429.67	114.48	325.00	1831.23	279.76	-	352.58	1001.00	330.31
Mean of Factor-1										
M1		342.33	96.36	325.78	1173.10	207.48	399.80	265.07	1062.00	269.79
M2		389.78	96.66	311.44	1053.27	236.77	482.10	412.23	1013.78	300.43
M3		391.33	90.99	294.22	955.79	306.63	-	488.72	900.56	314.66
CD(0.05)		0.58	NS	2.62	NS	6.96	NS	48.94	18.11	3.28
CV(%)		0.19	12.38	1.01	25.46	3.32	37.67	15.04	2.18	1.33
Mean of Factor-2										
S1		259.89	73.89	256.00	544.64	254.97	362.67	256.18	847.33	276.55
S2		440.44	94.54	334.78	893.20	256.01	489.44	420.48	1021.89	301.38
S3		423.11	115.59	340.67	1744.31	239.89	502.63	489.37	1107.11	306.96
CD(0.05)		2.64	6.72	4.82	252.80	8.46	100.33	58.38	45.57	4.49
CV(%)		0.69	6.91	1.51	23.20	3.29	21.63	14.62	4.47	1.48
Interaction										
M and T		4.57	NS	8.34	NS	14.65	NS	NS	NS	NS
T and M		3.74	NS	6.94	NS	12.56	NS	NS	NS	NS
Experimental Mean		374.48	94.67	310.48	1060.72	250.29	451.58	388.67	992.11	294.96

M1- Mechanised transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control* (Herbicide recommendation of respective University may be followed)

rial 4.3.3: Contd.

Main plot treatments	Sub plot treatments	Cost of cultivation Rs/ha						
		Aduthurai	Gangavathi	Jagdapur	Moncompu	Nawagam	Pantnagar	Pattambi
M1	S1	46232	64217	45600	64060	46027	37158	63025
	S2	49007	72217	50250	92060	47487	40968	75220
	S3	49812	66567	47020	72060	47559	43543	66180
M2	S1	43577	52530	51250	56560	41608	34086	65450
	S2	46351	60530	55720	84560	43015	37896	77320
	S3	47436	54880	52570	64560	43203	40471	68050
M3	S1	40694	46980	43460	56370	42686	33636	-
	S2	43566	54980	44650	84370	44133	37446	-
	S3	44768	49663	45700	64370	44238	39521	-

M1- Mechanised transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control* (Herbicide recommendation of respective University may be followed)

Trial 4.3.3: Contd.

Main plot treatments	Sub plot treatments	Benefit -Cost Ratio					
		Aduthurai	Gangavathi	Jagdapur	Nawagam	Pantnagar	Pattambi
M1	S1	1.90	1.64	0.98	2.65	1.47	1.48
	S2	2.89	1.65	1.89	2.81	2.91	1.08
	S3	2.76	1.91	2.58	2.86	2.90	1.47
M2	S1	1.74	1.04	0.91	2.90	1.36	1.24
	S2	2.88	1.79	1.22	2.97	2.04	1.41
	S3	2.70	2.83	2.29	3.12	2.18	1.83
M3	S1	1.79	0.79	0.74	2.72	1.21	-
	S2	2.51	1.21	1.43	3.03	2.57	-
	S3	2.69	1.90	2.58	3.17	2.39	-
Mean of Factor-1							
	M1	2.52	1.73	1.81	2.77	2.42	1.34
	M2	2.44	1.89	1.48	3.00	1.86	1.50
	M3	2.33	1.30	1.58	2.98	2.06	-
	CD(0.05)	0.05	0.23	0.15	NS	0.17	NS
	CV(%)	2.38	16.81	11.04	9.80	9.53	20.79
Mean of Factor-2							
	S1	1.81	1.16	0.88	2.76	1.34	1.28
	S2	2.76	1.55	1.51	2.94	2.51	1.30
	S3	2.72	2.21	2.48	3.05	2.49	1.50
	CD(0.05)	0.09	0.38	0.15	0.16	0.18	0.13
	CV(%)	3.54	22.57	8.94	5.35	8.36	9.17
Interaction							
	M and T	NS	NS	NS	NS	NS	0.22
	T and M	NS	NS	NS	NS	NS	0.24
Experimental Mean		2.43	1.64	1.62	2.92	2.11	1.36

M1- Mechanised transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control* (Herbicide recommendation of respective University may be followed)

Trial 4.3.3(R): Yield parameters and grain yield of Long term trial on Weed Dynamics in rice under different establishment methods, Rabi 2023-2024 .

Main plot treatments	Sub plot treatments	Karaikal (Rabi)						
		Grain yield t/ha	Straw yield t/ha	Panicle weight(g)	Test weight(g)	Crop dry matter g/m ² at Panicle Initiation stage	Benefit - Cost Ratio	Cost of cultivation Rs/ha
M1	S1	3.42	4.31	3.34	24.49	319.20	1.87	43000
	S2	6.20	7.34	3.84	23.63	626.50	2.90	50000
	S3	6.27	7.46	4.17	23.40	602.00	3.14	46757
M2	S1	2.04	3.68	3.27	24.97	245.70	1.17	43000
	S2	5.67	6.98	3.98	24.66	495.83	2.66	50000
	S3	5.74	7.94	3.83	24.03	586.83	2.92	46757
M3	S1	1.84	3.46	2.98	24.34	227.07	1.06	43000
	S2	5.31	6.51	3.33	23.58	400.17	2.49	50000
	S3	5.06	6.33	3.37	24.39	582.17	2.45	48633
Mean of Factor-1								
M1		5.30	6.37	3.78	23.84	515.90	2.63	
M2		4.48	6.20	3.69	24.55	442.79	2.25	
M3		4.07	5.43	3.23	24.10	403.13	2.00	
CD(0.05)		0.31	NS	0.28	NS	NS	0.15	
CV(%)		8.08	12.1	9.41	2.95	14.91	7.64	
Mean of Factor-2								
S1		2.43	3.82	3.20	24.60	263.99	1.36	
S2		5.73	6.94	3.72	23.96	507.50	2.68	
S3		5.69	7.25	3.79	23.94	590.33	2.83	
CD(0.05)		0.45	0.72	0.27	NS	48.63	0.22	
CV(%)		9.59	11.66	7.37	4.43	10.43	9.26	
Interaction								
M and T		NS	NS	NS	NS	NS	NS	
T and M		NS	NS	NS	NS	NS	NS	
Experimental Mean		4.62	6.00	3.57	24.16	453.94	2.29	
Applied N:P:K:Zn Kg/ha		150:50:50						
Avail N:P:K (kg/ha)								
Name of the variety		KKKL(R)2						
Soil type		Clay loam						
pH		6.5						
EC (dsm-1)								
Soil Organic carbon		0.3						

M1- Mechanised transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control* (Herbicide recommendation of respective University may be followed)

Trial 4.3.3(R): Contd.

Main plot treatments	Sub plot treatments	Pattambi (Rabi)							
		Grain yield t/ha	Straw yield t/ha	No of panicles/m ²	Panicle weight(g)	Test weight(g)	Crop dry matter g/m ² at Active tillering stage	Crop dry matter g/m ² at Panicle Initiation stage	Benefit - Cost Ratio
M1	S1	1.89	6.73	168	5.73	21.37	120.57	239.00	1.16
	S2	2.19	6.22	184	6.63	20.93	126.90	275.00	1.06
	S3	2.7	6.78	197	7.83	19.70	137.57	295.57	1.45
M2	S1	2.01	4.52	177	4.80	21.07	131.23	337.33	1.07
	S2	3.27	7.21	213	6.05	21.23	134.33	417.17	1.46
	S3	3.77	8.14	234	8.43	20.70	145.30	489.00	1.91
M3	S1	-	-	-	-	-	-	-	-
	S2	-	-	-	-	-	-	-	-
	S3	-	-	-	-	-	-	-	-
Mean of Factor-1									
M1		2.26	6.58	183	6.73	20.67	128.34	269.86	1.22
M2		3.02	6.63	208	6.43	21.00	136.96	414.50	1.48
M3		-	-	-	-	-	-	-	-
CD(0.05)		0.26	0.42	NS	NS	NS	4.06	36.00	0.11
CV(%)		11.57	7.87	9	6.77	5.52	3.64	12.60	9.76
Mean of Factor-2									
S1		1.89	5.24	169	5.42	20.68	126.26	285.18	1.04
S2		3.03	6.62	199	6.37	21.60	132.40	348.24	1.32
S3		3.08	7.15	209	7.93	20.99	140.82	390.52	1.55
CD(0.05)		0.2	0.37	18	0.39	NS	3.60	25.31	0.07
CV(%)		7.25	5.66	9	5.81	8.88	2.63	7.22	5.55
Interaction									
M and T		0.34	0.64	NS	NS	NS	NS	NS	0.13
T and M		0.32	0.58	NS	NS	NS	NS	NS	0.12
Experimental Mean		2.66	6.34	192	6.58	21.09	133.16	341.31	1.30
Applied N:P:K:Zn Kg/ha		90-45-45							
Avail N:P:K (kg/ha)									
Name of the variety		Aiswarya							
Soil type									
pH									
EC (dsm-1)									
Soil Organic carbon									

M1- Mechanised transplanting/Transplanting (if transplanters not available)

M2-Puddled direct seeding (preferably line sowing by drumseeder)

M3-Un-puddled dry direct seeding (line sowing)

S1-Weedy check

S2-Mechanical weeding using weeder

S3-Chemical weed control* (Herbicide recommendation of respective University may be followed)

4.3.4. Weed survey in different Rice systems

In view of changing climate, changing resource abundance, paddy cultivation is shifting to different establishment methods and resultant increase in weed problems. The research studies aid in understanding of weed biology, its interference with crop and resulting losses, as well as suitable control methods. Systematic evaluation of the weed population is therefore indispensable in crop areas as a guide for the control measures to be implemented. With the objective of obtaining information on changes in weed flora, data on the level of infestation, herbicide effectivity or resistance etc. through surveys of weeds in representative fields of different establishment systems like transplanted rice, Wet Direct Sown Rice, Dry Direct Sown Rice, the trial was initiated in *kharif* 2024. The Survey was conducted by 12 locations (seven zones) viz., **Bankura, Chinsurah, Chiplima, Karaikal, Ludhiana, Moncompu, Navsari, Pantnagar, Raipur, Titabar, Vytilla** in *kharif* 2024, in a systematic proforma. No weed information was received from other locations. The data received is summarized and the results are presented.

Zone II (Northern)

Ludhiana and Pantnagar have reported the results of weed survey in nine Districts in Punjab State and three Districts in Uttarakhand State respectively. Ludhiana report shows the problematic and dominant rice weeds of *Echinochloa crusgalli*, *Cyperus iria*, *Leptochloa chinensis*, *Digitaria sanguinalis*, *Cyperus difformis*. Both pre and post-emergence herbicides and one manual weeding. From this survey it was found that major weed problem is due to grasses and sedges and farmers are applying right chemicals in right dose at right time in the surveyed rice areas. At **Pantnagar**, the problematic weeds are *Echinochloa colona*, *Echinochloa crusgalli*, *Echinochloa indica*, *Cyperus iria*, *Cyperus difformis* and *Cyperus rotundus*. All the farmers are applying pre and post-emergence herbicides and one hand weeding. The cost of weed control was Rs. 5,250/ha and total cost of cultivation was Rs.1,03,572/- .

Zone III (Eastern)

Bankura and Chinsurah conducted survey in Bankura and Hoogly Districts of West Bengal State. In Bankura District, the problematic and dominant rice weeds are *Ludwigia parviflora*, *Marselia quadrifolia*, *Eclipta alba*, *Alternanthera philoxeroides*, *Echinochloa crusgalli*. All the farmers are applying pre and post-emergence herbicides and two hand weeding. The cost of weed control was Rs. 11,700/ ha and total cost of cultivation was Rs. 79,500/-. In Hoogly District, the problematic and dominant rice weeds are *Echinochloa colona*, *Echinochloa crusgalli*, *Cyperus difformis*, *Cyperus iria*, *Ludwigia parviflora*. All the farmers are applying pre and post-emergence herbicides and two hand weeding. The cost of weed control was Rs.13555/ ha and total cost of cultivation was Rs 68139. **Chiplima** has conducted survey in Sambalpur, Jharsuguda, Malkangiri Districts of Odisha State and the problematic and dominant rice weeds are *Echinochloa crusgalli*, *Echinochloa colona*, *Cyperus esculentus*, *Cyperus rotundus*, *Fimbristylis teragona*. All the farmers are applying pre and

post-emergence herbicides and one hand weeding. The cost of weed control was Rs. 5,660/ha.

Zone IV (North- Eastern)

Titabar has reported weed survey in Jorhat, Goalpara and Golaghat Districts of Assam State. The rice soils are clay loam. Problematic weeds in the order of dominance were *Echinochloa crusgalli*, *Amaranthus spp*, *Cyperus spp*, *Scirpus spp*, *Marsilia spp*. Farmers have applied pre and post-emergence herbicides and one hand weeding was done. The total weed control cost was around Rs. 2240/ha and total cost of cultivation was Rs. 55600. Based on the survey it was found that manual weeding is prevalent and common practice due to timely and cheaper availability of labour.

Zone V (Central)

Raipur has reported the weed survey conducted in Damteri, Kabirdham Districts of Chattisgarh State. The rice soils are vertisols. The problematic weeds be the order of dominance are *Echinochloa colona*, *Cyperus iria*, *Cyperus difformis*, *Cynodon dactylon*, *Alternanthera triandra*. Farmers have applied pre and post-emergence herbicides for weed control and one hand weeding. From this survey it was found that in Chattisgarh state the hand weeding is still practice though it is expensive. The total cost of weed control is higher with Rs. 7,965/ha.

Zone VI (Western)

Navsari has reported weed survey conducted in Navsari, Surat, Tapi Districts of Gujarat state. The rice soils are clayey in nature. The problematic weeds in the order of dominance are *Echinochloa colona*, *Echinochloa crusgalli*, *Cyperus iria*, *Marsilea quadrifolia*, *Cyperus difformis*. The surveyed farmers are not using chemical weed control method. Only manual weeding is being practiced and higher expenditure is incurred towards weed control. The total cost of weed control is Rs. 8878/ha and total cost of cultivation is Rs. 74,016/ha. From this survey it was found that in this part of Gujarat, only manual weeding is adopted with higher expenditure.

Zone VII (Southern)

Karaikkal has reported weed survey information of Karaikkal District in Puducherry Union Territory. The soils are clay and sandy loam soils. The problematic weeds in order of dominance were *Echinochloa colona*, *Leptochloa chinensis*, *Cyperus rotundus*, *Marsilea quadrifolia*, *Bergiac apensis*. The farmers have applied pre and post-emergence herbicides along with one hand weeding. Total cost of weed control was Rs. 9,725/ha. Based on this survey, it was found that the farmers need to know and understand about the correct herbicide dosage which is must to-follow technology to avoid additional expenditure overuse of resources and environmental pollution.

Moncompu has reported the weed survey information of the Kuttanadu region, Alappuzha District of Kerala. The soils are silty clay loam and the problematic weeds in order of dominance are *Fimbristilis miliaceae*, *Cyperus difformis*, *Leptochloa chinensis*,

Echinochloa stagnina, *Monochoria vaginalis*. In the surveyed area are not adopting pre emergence herbicide application. They are applying post-emergence herbicides and one hand weeding. Total cost of weed control was Rs. 7,862/ha and total cost of cultivation was Rs. 33,500/ha. From this survey it was found that sedges, wild rice, aquatic weeds are major concern and farmers are applying latest chemicals, combinations.

Pattambi has reported the weed survey information of the Palakkad region in Palakkad, Thrissur, Kollam Districts of Kerala. The soils are silty clay loam and the problematic weeds in order of dominance are *Echinochloa colona*, *Echinochloa spp*, *Cyperus spp*, *Oryza rufipogon*, *Monochoria vaginalis*. In the surveyed area farmers are adopting pre emergence herbicide application and one hand weeding. Total cost of weed control was Rs. 7,280/ha.

Vytilla has reported weed survey conducted in Pokkali saline ecosystem of Ernakulam District, Kerala. Weeds of Pokkali ecosystem have adoptive mechanism in the order of dominance are *Echinochloa crusgalli*, wild rice, *Cyperus iria*, *Monochoria vaginalis* and *Fimbristylis mieliacea* farmers do weeding only once at the time of dismantling mounds.

The results of Rice Weed survey, conducted in six zones, seven States and One Union Territory, 28 Districts, showed that, in Zone II, *Echinochloa crusgalli*, *Cyperus iria*, *Leptochloa chinensis*; in Zone III, *Echinochloa colona*, *Echinochloa crusgalli*, *Cyperus difformis*, *Ludwigia parviflora*, *Marselia quadrifolia*; in Zone IV, *Echinochloa crusgalli*, *Amaranthus*, *Cyperus*; in Zone V, *Echinochloa colona*, *Cyperus iria*, *Cyperus difformis*; in Zone VI *Echinochloa colona*, *Echinochloa crusgalli*, *Cyperus iria*; in Zone VII, *Echinochloa colona*, *Echinochloa crusgalli*, *Leptochloa chinensis*, *Cyperus rotundus*, *Fimbristylis miliacea*, *Weedy rice*, *Monochoria vaginalis* were major and dominant. The chemical weed control of both pre and post-emergence herbicides was in practice at all the zones except zone VI (Western), where two times manual weeding is common practice. The average cost of weed control ranged from Rs. 3,848/ha in Karaikkal District of Puducherry (UT Zone VII Southern) and Rs. 13,555/ha in Hoogly District of West Bengal (Zone III Eastern) indicating the weed pressure and expenses in controlling weeds in irrigated transplanted rice.

Table 4.3.4: Weed survey in different zones, kharif 2024.

AICRPR Zones	Villages	District & State	Dominant weed Ranking	Weed control methods			Total Weed Control Cost Rs/ha
				Pre emergence herbicide	Post emergence herbicide	Manual weeding	
<u>Zone II</u>							
Ludhiana	Nidhanwala, Powat, Mehray, Harian, Dandupur, Budh singhwala, Hargobindpur, Sanaur, Marru Pur, Bhanra, Bhanba, Sadhawala, Ratta khera, Wah moul, Jhandiana, Kamal wala, Gill Waraich, Blair, Balad Kalan, Kakra, Balian	Moga, Ludhiana, Bathinda, kapurthala, Gurdaspur, Patiala, Firozepur, Tam Taran, Sangrur	<i>Echinochloa crusgalli</i> , <i>Cyperus iria</i> , <i>Leptochloa chinensis</i> , <i>Digitaria sanguinalis</i> , <i>Cyperus difformis</i> , <i>Paspalum distichum</i> , <i>Eleusine aegyptium</i> , <i>Eragrostis</i> spp., <i>Alternanthera</i> spp, <i>Echinochloa colona</i> , <i>Ammannia baccifera</i> , <i>Ludwigia</i> spp, <i>Eragrostis tenella</i> , <i>Eclipta alba</i>	Pretlachlor 37 EW (Rifti), Pendlethalin + Pyrazosulfuron-ethyl 10 WP (Saathi), Metsulfuron methyl (Revenge), Pretlachlor 50 EC, Butachlor 50 EC, Pendlethalin,	Bispyribac sodium 10 SL, Fenoxaprop-p-ethyl (Rice star), Chlorimuron + Metsulfuron methyl (Almix), Pretlachlor 50 EC, Bispyribac sodium + Chlorimuron + Metsulfuron methyl (Ekets-U)	one hand weeding 30-45 Days,	3,232
Pantnagar	Gangapur, Bhagwada, Gadarpur, Ganeshpur, Phulsungha, Anandpur, Pratappur, Rameshwarpur, Saktifaram, Uttam nagar, Rekkhifaram, Kichha, Kanakpur, Dineshpur, Darau Kichha	Udham Singh Nagar, Haridwar, Nainital	<i>Echinochloa colona</i> , <i>Echinochloa crusgalli</i> , <i>Echinochloa indica</i> , <i>Cyperus iria</i> , <i>Cyperus difformis</i> , <i>Cyperus rotundus</i>	Pretlachlor 37% EW before transplanting	Bispyribac Sodium (Nomine gold) + Metsulfuron methyl (MSM)	Hand Weeding (one)	2,150
<u>Zone III</u>							
Bankura	Bikrampur	Bankura - West Bengal	<i>Ludwigia parviflora</i> , <i>Marselia quadrifolia</i> , <i>Eclipta alba</i> , <i>Alternanthera philoxeroides</i> , <i>Echinochloa crusgalli</i> , <i>Cyperus difformis</i> , <i>Commelina benghalensis</i>	Pretlachlor @ 750g/ha (2-3 DAT)	Bispyribac sodium @ 40g/ha(45 DAT)	2 hand weeding at 25-30 DAT and 45-50 DAT	11,700
Chinsurah	Uttar Simla, Damra, Khalsi, Naksa, Bharatpur, Birpala, Bagri	Hoogly - West Bengal	<i>Echinochloa colona</i> , <i>Echinochloa crusgalli</i> , <i>Cyperus difformis</i> , <i>Cyperus iria</i> , <i>Ludwigia parviflora</i> , <i>Monochoria vaginalis</i> , <i>Marsilea quadrifolia</i> , <i>Blainvillea latifolia</i> , Algal weeds, <i>Cyperus rotundus</i> , <i>Leptochloa chinensis</i> , <i>Hydrodictyonreticulatum</i> , <i>Sphenoclea zeylanica</i> , <i>Chara zeylanica</i> , <i>Ammannia baccifera</i> , <i>Nitella lyaline</i> .	Pyrazosulfuron-ethyl 10 WP (Saathi), Pretlachlor 50 EC (Erase)	Triafamone+Ethoxysulfuron 30 WG (Council Activ), Bispyribac-sodium 10 SC (Nominee Gold), Ethoxysulfuron 15 WDG (Sunrice)	Hand weeding twice at 3 & 6 weeks after transplanting	13,555
Chiplima	Charpali, Andharipali, Govindpali	Sambalpur, Jharsuguda, Malkangiri - Odisha	<i>Echinochloa crusgalli</i> , <i>Cyperus esculentus</i> , <i>Fimbristylis miliace</i> , <i>Fimbristylis teragona</i> , <i>Monochoria vaginalis</i> , <i>Marsilea quadrifolia</i> , <i>Ludwigia parviflora</i> , <i>Cyperus rotundus</i> , <i>Echinochloa colona</i> , <i>Sphenoclea zeylanica</i> , <i>Cyperus iria</i> , <i>Fimbristylis dichotoma</i>	Pretlachlor 50 EC, Pretlachlor 50 EC + Pyrazosulfuron ethyl 10% WP	Bispyribac sodium 10% SC, Bispyribac sodium 10%SC + Almix @20 g (Chlorimuron Ethyl 10% + Metsulfuron methyl 10%), Bispyribac sodium 10%SC + Triafamone (20%) with ethoxysulfuron (10%) WG	One hand weeding at 45 DAT	5,660

Table 4.3.4: Contd.

AICRPR Zones	Villages	District & State	Dominant weeds	Weed control methods			Total Weed Control Cost Rs/ha
				Pre emergence herbicide	Post emergence herbicide	Manual weeding	
<u>Zone IV</u> Titabar	Dihingia, Lekheraj, Bengenakhowa, Deogharia Grant, Falengichuk, Lalung Gaon	Jorhat, Goalpara, Golaghat - Assam	<i>Echinochloa crusgalli</i> , <i>Amaranthus</i> spp, <i>Cyperus</i> spp, <i>Scirpus</i> spp, <i>Marsilia</i> spp, <i>Ceratophyllum</i> spp, <i>Eleocharis</i> spp	Pretilachlor	Bispyribac Sodium	5 MD, Time- 5 days	5,600
<u>Zone V</u> Raipur	Sehradabri, Sambalpur, Bodra, Lohara, Pandariya, Bhuladih, Khairjiti Khurd, Kutkipara, Mainpuri, Thuhadih	Dhamtari, Kabirdham - Chhattisgarh	<i>Echinochloa colona</i> , <i>Cyperus iria</i> , <i>Cyperus difformis</i> , <i>Cynodon dactylon</i> , <i>Alternanthera triandra</i> , <i>Ischaemum rugosum</i> , <i>Fimbristylis miliacea</i> , <i>Echinochloa crusgalli</i> , <i>Commelina benghalensis</i> , <i>Cyperus rotundus</i> , <i>Parthenium hysterophorus</i> , <i>Dinebra retroflexa</i> , <i>Digera arvensis</i> , <i>Eclipta alba</i>	Pyrazosulfuron ethyl 10% WP, Pretilachlor 50 EC, Pretilachlor 50 EC @ 500 ml/acre at 3 DAT, Cost Rs. 380/acre + Chlorimuron + Metsulfuron methyl (Almix)	Bispyribac sodium 10% SC, Chlorimuron + Metsulfuron methyl (Almix), Penoxsulam + Cyhalofop butyl (Granite), Bispyribac sodium + Chlorimuron + Metsulfuron methyl (Almix), Fenoxaprop-p-ethyl (Whip super) + Chlorimuron + Metsulfuron methyl (Almix)	one hand weeding 30-45 Days	7,966
<u>Zone VI</u> Navsari	Sindhai, Sarav, Dabhlai, Sarpore, Zervavra, Kandolpada, Ranveri Khurd, Ponsara, Panwadi, Bhnavadi, Pinjra vegam, Mahudi, Eru, Khergam, Singod, Satem, Vadapada, Manavkhadak, Talavchhora, Kalakava,Mora, Vandardevi,Dhandhua.	Navsari,Surat,Tapi - Gujrat	<i>Echinochloa colona</i> , <i>Echinochloa crusgalli</i> , <i>Cyperus iria</i> , <i>Marsilea quadrifolia</i> , <i>Cyperus difformis</i> , <i>Eclipta alba</i> , <i>Bergia capensis</i> , <i>Dactyloctenium</i> spp			2 times at Maximum tillering stage & Panicle initiation stage	8,878

Table 4.3.4: Contd.

AICRPR Zones	Villages	District & State	Dominant weeds	Weed control methods			Total Weed Control Cost Rs/ha
				Pre emergence herbicide	Post emergence herbicide	Manual weeding	
<u>Zone VII</u>							
Karaikal	Surakudi, Vizhithiyur, Thirunallar, Serumaviyangai, Thirunallar, Tharumapuram, Melakasakudi, Nedungadu, Thamanangudi, muppathangudi, Pettai, Athipadugai	Karaikal - Puducherry	<i>Echinochloa colona</i> , <i>Leptochloa chinensis</i> , <i>Cyperus rotundus</i> , <i>Marsilea quadrifolia</i> , <i>Bergia capensis</i> , <i>Echinochloa crusgalli</i> , <i>Echinochloa frumentacea</i> , <i>Cyperus iria</i> , <i>Aeschynomene indica</i>	Pretilachlor	2-4 D, Bispyribac Sodium, Florypyrauxifen-benzyl + Cyhalofop-butyl (Novlect)	15 - 40 DAT	3,848
Moncompu	Pulincunno, Champakulam, Thalavady, Veliyanad Karuvatta, Nedumudy, Ramankary, Kainakary	Alappuzha - Kerala	<i>Fimbristylis miliacea</i> , <i>Cyperus difformis</i> , <i>Leptochloa chinensis</i> , <i>Echinochloa stagnina</i> , <i>Monochoria vaginalis</i> , <i>Oryza sativa</i> f.sp. Spontanea,		Penoxsulam + Cyhalofopbutyl (Vivaya) + Carfentrazone ethyl (Affinity), florypyrauxifen-benzyl (Loyant) + Carfentrazone ethyl (Affinity), Dinotefuran 20% w/w SG (Dishum) + Carfentrazone ethyl (Affinity), penoxsulam and cyhalofop-butyl + Carfentrazone ethyl (Affinity), 2-4 D	7 women / hectre	7,862
Pattambi	Chalissery, Kuzhalmannam, Wadakkanchery, Peringottukurussi, Mannoor, Ottappalam, Thrithala, Desamangalam	Palakkad, Thrissur, Kollam - Kerala	<i>Echinochloa colona</i> , <i>Echinochloa</i> spp, <i>Cyperus</i> spp, <i>Oryza rufipogon</i> , <i>Monochoria vaginalis</i> , <i>Marselia quadrifolia</i> , <i>Isachne miliacea</i> , <i>Eichornia crassipes</i> , <i>Ludwigia perennis</i> , <i>Chara</i> spp., <i>Echinochloa crusgalli</i> , <i>Sacciolepis interrupta</i>	Pyrazosulfuron ethyl (Sathi)		30 DAT	6,990
Vytilla	Vytilla	Ernakulam - Kerala	<i>Echinochloa crusgalli</i> , Wild rice, <i>Cyperus iria</i> , <i>Monochoria Vaginalis</i> , <i>Fimbristylis miliacea</i> , <i>Diplachae fusca</i> , <i>Cyperus difformis</i> , <i>Sphaenoclea zeylanica</i> , <i>Hydrilla verticillata</i> , <i>Najas graminiae</i> , <i>Eichornia crassipes</i> , <i>Eliocharis dulcis</i> , <i>Pistia stratiotes</i> , <i>Sphaeranthus africanus</i> , <i>Cyperus exaltatus</i> , <i>Alternanthera sessilis</i>			At the time of dismantling the mounds and transplanting – Rs.26250	8,750

4.3.5 Analysis of long-term meteorology data (temperatures and rainfall) for identifying the reasons for yield reduction

The Dataset consists of rice yield data and meteorological data of 10 locations viz; **Navasari, Rajendranagar, Mandya, Coimbatore, Gangavathi, Kaul, Khudwani, Ludhiana, Pattambi, Chinsurah and Karaikal** for the years 2005 to 2024. This data includes yield of rice crop (t/ha), rainfall of the crop season(mm) and mean weekly minimum temperature and maximum temperature of the crop season ($^{\circ}\text{C}$).

Yield prediction models were developed using six machine learning algorithms namely Gaussian Process Regressor with Rational Quadratic kernel, Random Forest, K Neighbors Regressor, Kernel Ridge with three different kernels i.e. Linear, RBF and Poly. R program was used for Random forest algorithm and Python program was used for other five models. The dataset was divided into two parts for the purpose of training (80%) and testing (20%). The relation between rice yield and weather parameters was also analyzed.

The Random forest ($R^2=0.82$) and KNeighbors Regressor ($R^2=0.69$) algorithms performed well compared to other four machine learning models in predicting the yield of the rice crop (Figs. 1&2). These models will be further used for predicting yield and suggesting best sowing week for rice crop. From the meteorological analysis, it is clear that weather conditions like min. temp $>20^{\circ}\text{C}$, max. temp $>30^{\circ}\text{C}$ and crop season rainfall between 300-1000 mm are favorable for rice crop in producing higher yield (>6 t/ha) as well as weather conditions like min. temp $>18^{\circ}\text{C}$, max. temp $>28^{\circ}\text{C}$ and crop season rainfall 50-1000 mm are favorable in producing yield ranging from 3-6 t/ha and low yields (< 3 t/ha) are influenced by rainfall >1000 mm or min. temp $<18^{\circ}\text{C}$ or max. temp $<30^{\circ}\text{C}$ (Fig. 3). There is scope for improvement of these learning models by training with larger samples of datasets.

```
KNeighborsRegressor(algorithm='ball_tree', leaf_size=1, n_neighbors=10, p=1)
R Square : 0.6949604276836874
Mean Absolute Error : 0.6578236842105262
Mean Squared Error : 0.7700714592105263
<Axes: ylabel='Yield'>
```

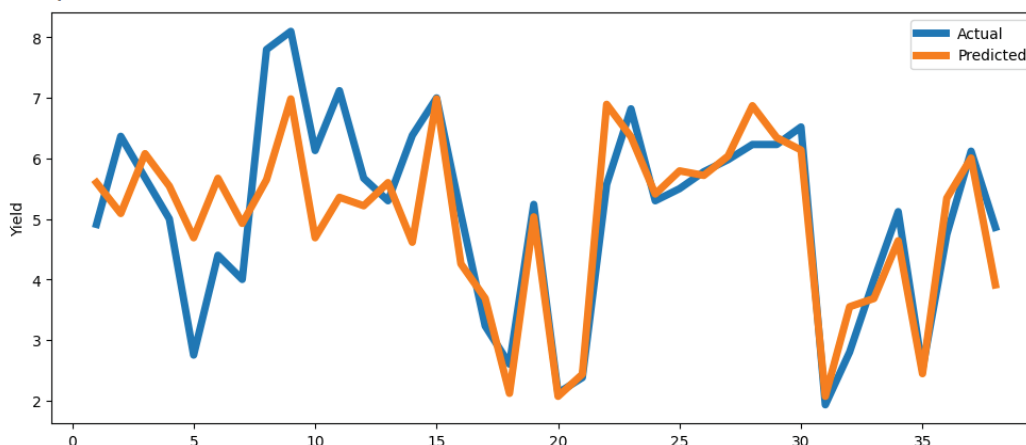


Fig 1: Predicted Vs Actual yield of Rice crop-KNN Algorithm

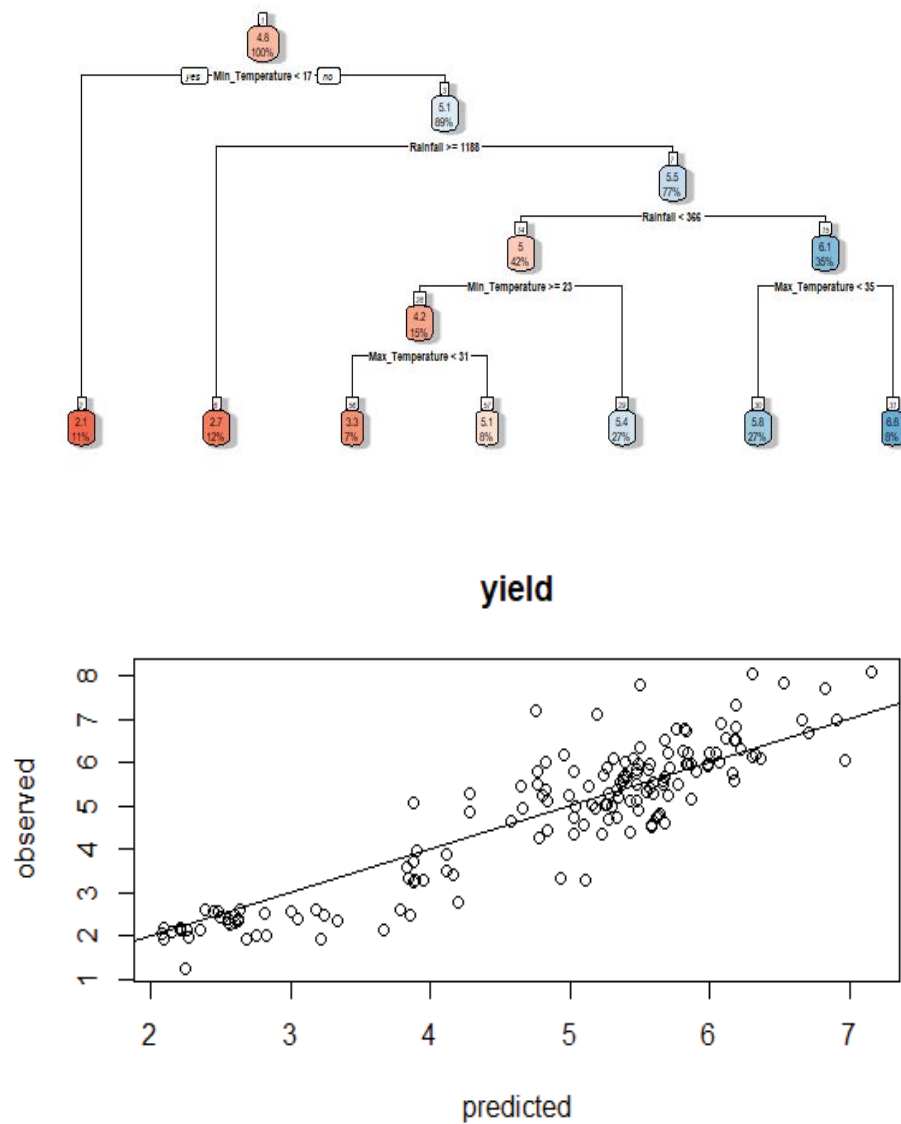


Fig 2: Predicted Vs Actual yield of Rice Crop-Random Forest Algorithm

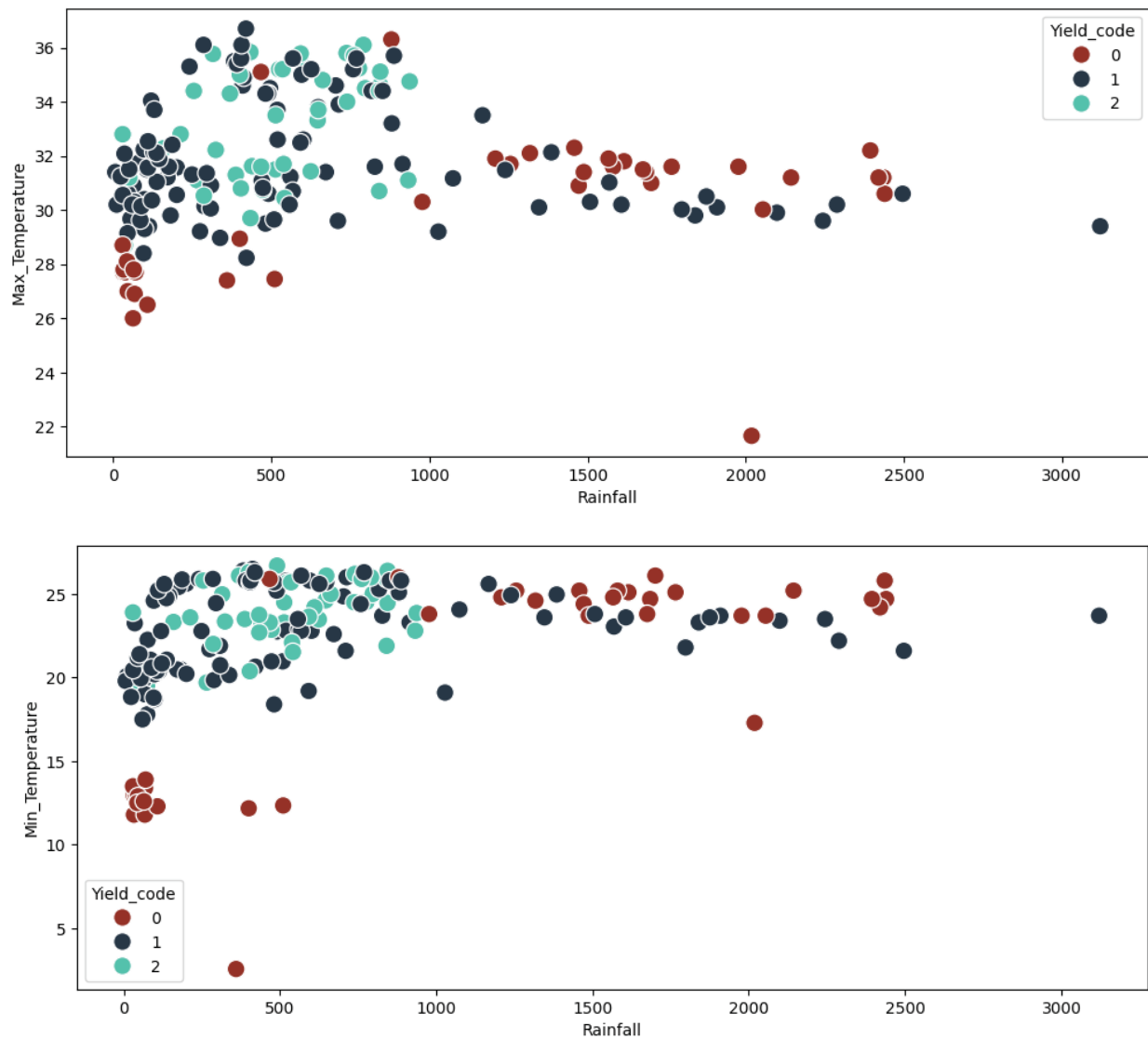


Fig 2: Three yield scenarios with maximum and minimum temperatures and rainfall in the rice crop season (where x- axis represents rainfall in the season and y-axis represents Mean Weekly Maximum Temperature in the season. Yield code 0 represents the scenarios where the yield < 3, Yield code 1 represents the scenarios where yield > = 3 and yield < 6, Yield code 2 represents yield >= 6)

INTER DISCIPLINARY TRIALS



4.4 INTER DISCIPLINARY TRIALS

4.4.1. Yield maximization of rice in different zones (new trial initiated in *kharif* 2020)

Rice (*Oryza sativa* L.) is grown in India over a gross area of 44 million hectares (ha). The total production in 2019 was about 107 million ones. However, India would need to produce at least 200 million ones of paddy to meet its ever-growing population requirements, and this figure would have to increase by almost 75% by 2050. Rice occupies a pivotal position concerning food security in India. The future of food security in this region will depend on its ability to improve rice productivity continuously on an ecologically sustainable basis. One of the main reasons for low rice productivity in India is the variation in fertilizer usage between the country's different agro-climatic zones and between states in each region. Low input use in general is a further factor accounting for the plateau or declining trend of grain yields. To evaluate the suitable, promising and best management practices in rice crop, a new trial was formulated with the following objectives 1. To maximize the yield in different zones 2. To compare yield and economics of the best management practices. The trial consisted of 8 treatments and laid out in RBD design with 3 replications. Treatments are T₁: RDF as per site-specific nutrient management; T₂: T₁ + FYM @ 5 t/ha; T₃: T₁ + sampoorana (KAU) @ 10g/L (250 L/ha/application); T₄: 125% RDF of T₁; T₅: 125% RDF of T₁ + FYM @ 5 t/ha; T₆: T₁ + application of micronutrient; T₇: Optional (location specific). The trial was conducted at 24 locations (**Bankura, Chinsurah, Chinsurah (boro), Faizabad, Gangavathi, Ghaghraghat, Karaikal, Kota, Malan, Mandya, Maruteru, Pantnagar, Pattambi, Pattambi (rabi), Raipur, Ranchi, Titabar, Warangal, Khudwani, Chiplima, Kanpur, Karaikal, Ludhiana, Moncompu, Pusa and Titabar**). The results were summarized and presented in **Table 4.4.1(a)** and the salient findings are as followed.

In sandy loam soils of **Bankura**, RDF + sampoorana (KAU) @ 10g/L (250 L/ha) resulted in the highest grain yield (5.37 t/ha) followed by 125% RDF of T₁ (5.13 t/ha). In **Chinsurah**, RDF + FYM @ 5 t/ha resulted in the highest grain yield (5.97 t/ha) closely followed and at par with 125% RDF of T₁ + FYM @ 5 t/ha (5.92 t/ha). In boro season at **Chinsurah**, RDF + FYM @ 5 t/ha resulted in the highest grain yield (6.0 t/ha) closely followed and at par with 125% RDF of T₁ + FYM @ 5 t/ha (5.95 t/ha). In **Faizabad**, RDF + sampoorana (KAU) @ 10g/L (250 L/ha) resulted the highest grain yield of 7.07 t/ha followed by 125% RDF of T₁ + FYM @ 5 t/ha (6.83 t/ha). At **Gangavathi**, 125% RDF of T₁ + FYM @ 5 t/ha resulted in the highest grain yield (6.22 t/ha) followed by 125% of RDF (6.07 t/ha). Similarly, gross return was also the highest (Rs. 1,50,229/-) under same treatment. At **Ghaghraghat**, 125% RDF of T₁ + FYM @ 5 t/ha resulted in the highest grain yield (3.78 t/ha) followed by T₁ + FYM @ 5 t/ha (3.59 t/ha). In **Karaikal**, 125% RDF of T₁ + FYM @ 5 t/ha resulted in the highest grain yield (6.01 t/ha) followed by T₁ + FYM @ 5 t/ha (5.89 t/ha). In clay soils of **Kota**, 125% RDF of T₁ + FYM @ 5 t/ha resulted the highest grain yield (6.11 t/ha) followed by 125% RDF of T₁ (5.85 t/ha). In clay loam soil of **Malan**, 125% RDF of T₁ + FYM @ 5 t/ha resulted in the highest grain yield (6.81 t/ha) followed by location specific (6.56 t/ha). In red sandy loam soils of **Mandya**, 125% RDF of T₁ + FYM @ 5 t/ha resulted in the highest grain yield (6.20 t/ha) followed by 125% RDF of T₁ (5.71 t/ha). The highest gross

return (Rs. 1,72,828/-) was under same treatment though cost of cultivation was higher (Rs. 74,545/-). In **Maruteru**, RDF + sampoorana (KAU) @ 10g/L (250 L/ha) resulted in the highest grain yield (6.24 t/ha) followed by 125% RDF of T₁ + FYM @ 5 t/ha (6.10 t/ha). In silt loam soils of **Pantnagar**, 125% RDF of T₁ + FYM @ 5 t/ha resulted in the highest grain yield (5.94 t/ha) followed by and at par with T₁ + FYM @ 5 t/ha (5.79 t/ha). Higher gross returns also followed the similar trend. At **Pattambi**, RDF + sampoorana (KAU) @ 10g/L (250 L/ha) resulted in the highest grain yield (5.00 t/ha) followed by T₁ + FYM @ 5 t/ha (3.40 t/ha). The highest gross returns also recorded in RDF + sampoorana (KAU) @ 10g/L (250 L/ha) (Rs.1,68,917/-). In *rabi* season at **Pattambi**, RDF + sampoorana (KAU) @ 10g/L (250 L/ha) resulted in the highest grain yield (5.27 t/ha) followed by 125% RDF of T₁ + FYM @ 5 t/ha (3.47 t/ha). The highest gross returns also recorded in RDF + sampoorana (KAU) @ 10g/L (250 L/ha) (Rs.1,73,800/-). In vertisols of **Raipur**, 125% RDF of T₁ + FYM @ 5 t/ha resulted in the highest grain yield (5.63 t/ha) followed by and at par with 125% RDF of T₁ (5.29 t/ha). In **Ranchi**, 125% RDF of T₁ + FYM @ 5 t/ha resulted the highest grain yield (6.78 t/ha) followed by 125% RDF of T₁ (6.02 t/ha). In **Titabar**, 125% RDF of T₁ + FYM @ 5 t/ha resulted in the highest grain yield (5.67 t/ha) followed by 125% RDF of T₁ (5.46 t/ha). In **Warangal**, 125% RDF of T₁ resulted the highest grain yield (8.00 t/ha) followed by T₁ + FYM @ 5 t/ha (7.62 t/ha).

In **Chiplima** effect of treatments on grain yield was found to be non-significant. However, 125% RDF of T₁ + FYM @ 5 t/ha resulted in the highest grain yield (5.78 t/ha) closely followed by RDF + FYM @ 5 t/ha (5.73 t/ha). In **Kanpur**, effect of treatments on grain yield was found to be non-significant. However, 125% RDF of T₁ + FYM @ 5 t/ha resulted the highest grain yield (6.02 t/ha) followed by 125% RDF of T₁ (5.71 t/ha). At **Khudwani**, location specific best treatment resulted the highest grain yield (7.55 t/ha) followed by T₁+ application of micronutrient (7.42 t/ha). Similarly, N and K uptake was the highest under same treatment. Soil available N and K was also the highest under same treatment. At **Ludhiana**, 125% RDF of T₁ + FYM @ 5 t/ha resulted in the highest grain yield (8.15 t/ha) followed by 125% of RDF (7.80 t/ha). In **Moncompu**, RDF + FYM @ 5 t/ha resulted the highest grain yield (6.30 t/ha) followed by 125% RDF + FYM @ 5 t/ha (6.20 t/ha). In **Pusa**, 125% RDF of T₁ + FYM @ 5 t/ha resulted the highest grain yield (5.69 t/ha) followed by 125% RDF (5.38 t/ha). In sandy loam soils of **Titabar**, 125% RDF of T₁ + FYM @ 5 t/ha resulted the highest grain yield (5.67 t/ha) followed by 125% RDF (5.46 t/ha).

Table 4.4.1: Yield maximization of rice in different Zones, kharif 2024.

Treatment	BANKURA									
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Grain yield (kg/20 m ²)	Straw yield (kg/20 m ²)	Tillers/m ² (No.)	Panicle/m ² (No.)	Test wt (g)	Filled grains/ panicle	Un-Filled grains/ panicle
T1	4.29	7	6.02	8.58	12.04	288	226	21.26	162	33
T2	4.84	5	6.31	9.68	12.61	325	265	22.32	176	31
T3	5.37	1	7.29	10.74	14.58	357	297	23.15	221	22
T4	5.13	2	7.12	10.25	14.24	349	290	22.94	210	27
T5	4.88	4	6.78	9.76	13.56	339	283	22.10	177	28
T6	4.69	6	6.49	9.38	12.99	324	257	21.74	167	32
T7	4.99	3	6.97	9.97	13.93	345	285	22.77	191	28
Exp. mean	4.88		6.71	9.77	13.42	332	272	22.33	186	29
CD(0.05)	0.1		0.08	0.19	0.15	8.95	9.23	0.28	14.01	3.76
CV	1.1		0.64	1.09	0.63	1.51	1.91	0.69	4.23	7.34
res	**		**	**	**	**	**	**	**	**
Soil type	Red & Lateritic (Sandy Loam)									
pH	-									
EC	-									
Variety	-									
Applied NPK kg/ha	70:35:35									
Available NPK kg/ha	-									

T₁: Location specific recommended dose of fertilizer (RDF)
T₂: T₁ + FYM@ 5t/ha
T₃: T₁ + Sampoorna (KAU) @10 g per litre of water twice in the cropping season (250 litre/hectare/application)
T₄: 125% RDF of T₁
T₅: 125% RDF of T₁ + FYM@5 t/ha
T₆: T₁+ Application of micro nutrient (deficient to that location)
T₇ : Optional (According to location)

Table 4.4.1: Contd.

Treatment	CHINSURAH												
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Tillers/m ² (No.)	Panicle/m ² (No.)	Test wt (g)	Soil available kg/ha				Soil pH	Soil EC	Soil OC
							N	P	K	Zn			
T1	3.79	7	3.92	371	333	19.28	471.00	88.50	282.65	17.35	7.06	0.22	1.21
T2	5.97	1	6.09	426	390	19.90	478.75	90.38	292.60	17.33	7.06	0.19	1.12
T3	4.78	6	4.90	379	342	19.53	485.50	97.00	292.00	17.58	7.07	0.21	1.17
T4	5.90	3	6.02	406	366	19.80	448.00	96.50	295.53	17.55	7.07	0.22	1.10
T5	5.92	2	6.04	409	387	19.83	488.75	97.50	286.05	17.33	7.02	0.28	1.18
T6	5.17	5	5.29	388	344	19.65	464.00	99.00	295.45	17.48	7.08	0.21	1.17
T7	5.82	4	5.94	429	345	19.70	442.75	93.00	281.38	17.60	7.07	0.21	1.10
Exp. mean	5.34		5.46	401	358	19.67	468.39	94.55	289.38	17.46	7.06	0.22	1.15
CD(0.05)	0.24		0.24	26.05	32.66	0.49	24.55	7.28	14.21	0.51	0.08	0.05	0.1
CV	3.04		2.97	4.37	6.14	1.67	3.53	5.18	3.3	1.97	0.81	16.51	6.11
res	**		**	**	**	NS	**	NS	NS	NS	NS	NS	NS
Soil type	Clay loam												
pH	-												
EC	-												
Variety	Muktashree												
Applied NPK kg/ha	80:40:40												
Available NPK kg/ha	-												

T₁: Location specific recommended dose of fertilizer (RDF)
T₂: T₁ + FYM@ 5t/ha
T₃: T₁+ Sampoorna (KAU) @10 g per litre of water twice in the cropping season (250 litre/hectare/application)
T₄: 125% RDF of T₁
T₅: 125% RDF of T₁ + FYM@5 t/ha
T₆: T₁+ Application of micro nutrient - (Two sprays of Zn)
T₇ : Optional (According to location) - (125% RDF of T₁+ Sampoorna (KAU) (2 Sprays) + Zn (2 Sprays))

Table 4.4.1: Contd.

Treatment	CHINSURAH (Boro)														
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant height (cm)	Tillers/m ² (No.)	Panicle/m ² (No.)	Panicle length (cm)	Test wt (g)	Soil available kg/ha				Soil pH	Soil EC	Soil OC
									N	P	K	Zn			
T1	4.73	7	4.98	105.38	368	338	27.29	19.47	467.00	87.82	282.00	17.31	7.06	0.22	1.18
T2	6.00	1	6.30	114.65	430	395	27.80	20.00	470.50	89.91	294.57	17.45	7.06	0.21	1.15
T3	4.99	6	5.25	107.70	377	346	27.12	19.61	480.75	97.62	292.69	17.65	7.07	0.22	1.17
T4	5.91	3	6.22	111.18	406	372	27.66	19.93	455.25	95.73	293.69	17.46	7.05	0.21	1.11
T5	5.95	2	6.26	113.65	426	392	27.27	19.92	482.00	97.85	286.68	17.39	7.03	0.23	1.19
T6	5.35	5	5.63	107.48	380	349	27.61	19.77	463.75	100.62	294.35	17.45	7.06	0.22	1.18
T7	5.88	4	6.19	104.08	383	347	26.92	19.79	442.75	95.34	284.64	17.55	7.09	0.21	1.10
Exp. mean	5.54		5.83	109.16	395	363	27.38	19.78	466.00	94.98	289.80	17.47	7.06	0.22	1.15
CD(0.05)	0.34		0.35	5.8	33.07	32.08	1.25	0.47	20.34	6.95	13.65	0.39	0.05	0.02	0.07
CV	4.11		4.08	3.58	5.63	5.95	3.08	1.61	2.94	4.92	3.17	1.52	0.47	5.67	4.36
res	**		**	**	**	**	NS	NS	**	*	NS	NS	NS	NS	NS
Soil type	Clay loam														
pH	-														
EC	-														
Variety	Muktashree														
Applied NPK kg/ha	130:65:65														
Available NPK kg/ha	-														

T₁: Location specific recommended dose of fertilizer (RDF)
T₂: T₁ + FYM@ 5t/ha
T₃: T₁+ Sampoorna (KAU) @10 g per litre of water twice in the cropping season (250 litre/hectare/application)
T₄: 125% RDF of T₁
T₅: 125% RDF of T₁ + FYM@5 t/ha
T₆: T₁+ Application of micro nutrient - (Two sprays of Zn)
T₇ : Optional (According to location) - (T₁+ Geoxol.COM @ 40 kg/ha during basal fertilizer application)

Table 4.4.1: Contd.

Treatment	FAIZABAD											
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Grain yield (kg/20 m ²)	Straw yield (kg/20 m ²)	Tillers/m ² (No.)	Panicle/m ² (No.)	Test wt (g)	Filled grains/panicle	Un-Filled grains/panicle	Cost of cultivation Rs./ha	Gross returns Rs./ha
T1	5.37	6	5.79	10.73	11.59	235	225	26.75	238	21	55429	122175
T2	5.81	5	6.36	11.56	12.72	248	237	27.50	253	18	59212	122980
T3	7.07	1	7.83	14.13	15.67	322	312	27.00	296	16	58355	138933
T4	6.06	3	6.69	12.16	13.38	265	257	26.75	273	19	59780	131462
T5	6.83	2	7.55	12.61	15.11	285	278	27.00	278	18	60456	134321
T6	5.94	4	6.51	11.83	13.00	272	262	26.00	274	17	61942	132333
T7	3.89	7	4.31	8.86	9.66	230	230	25.75	179	19	61920	103576
Exp. mean	5.85		6.43	11.70	13.02	265	257	26.68	256	18	59585	126540
CD(0.05)	0.27		0.3	0.54	0.59	12.1	11.71	1.36	11.8	0.87	3559.52	7769.93
CV	3.07		3.1	3.08	3.07	3.07	3.06	3.44	3.11	3.23	3.36	3.45
res	**		**	**	**	**	**	NS	**	**	*	**
Soil type	Sandy loam											
pH	-											
EC	-											
Variety	-											
Applied NPK kg/ha	120:60:40											
Available NPK kg/ha	75.4:13.5:22.5											

T₁: Location specific recommended dose of fertilizer (RDF)
T₂: T₁ + FYM@ 5t/ha
T₃: T₁ + Sampoorna (KAU) @10 g per litre of water twice in the cropping season (250 litre/hectare/application)
T₄: 125% RDF of T₁
T₅: 125% RDF of T₁ + FYM@5 t/ha
T₆: T₁+ Application of micro nutrient (deficient to that location)
T₇: Optional (According to location)

Table 4.4.1: Contd.

Treatment	GANGAVATHI							GHAGHRAGHAT									
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Grain yield (kg/20 m ²)	Straw yield (kg/20 m ²)	Tillers/m ² (No.)	Panicle/m ² (No.)	Test wt (g)	Cost of cultivation/ha	Gross returns/ha	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days to 50% flowering
T1	5.53	7	8.13	11.06	16.25	381	333	15.51	67417	130966	2.47	5	4.05	89	2.35	18.98	126
T2	5.77	3	8.56	11.54	17.13	402	351	15.79	74917	138173	3.02	4	4.10	102	2.68	19.73	117
T3	5.70	5	8.58	11.40	17.15	393	348	15.75	68817	132768	3.40	3	4.23	106	3.10	21.08	112
T4	6.07	2	9.06	12.14	18.13	410	365	15.80	69517	136030	3.59	2	4.83	111	3.53	20.63	112
T5	6.22	1	9.31	12.44	18.63	416	369	16.07	77017	150229	3.78	1	5.55	122	3.88	22.95	106
T6	5.71	4	8.75	11.42	17.50	395	348	15.64	70537	135834	-	-	-	-	-	-	-
T7	5.63	6	8.44	11.27	16.88	384	346	15.69	70747	133899	-	-	-	-	-	-	-
Exp. mean	5.80		8.69	11.61	17.38	397	351	15.75	71281.29	136843	3.25		4.55	106	3.11	20.67	115
CD(0.05)	0.7		1.13	1.39	2.27	42.79	78.64	1.48	3905.12	14204.96	0.29		0.47	13.49	0.27	2.39	8.17
CV	8.07		8.78	8.09	8.78	7.25	15.06	6.31	3.69	6.99	5.77		6.69	8.27	5.6	7.49	4.62
res	NS		NS	NS	NS	NS	NS	NS	*	NS	**		**	**	**	*	**
Soil type	-										-						
pH	-										-						
EC	-										-						
Variety	Gangavathi sona, 135 days																
Applied NPK kg/ha	150:75:75																
Available NPK kg/ha	-																

T₁: Location specific recommended dose of fertilizer (RDF)

T₂: T₁ + FYM@ 5t/ha

T₃: T₁ + Sampooma (KAU) @10 g per litre of water twice in the cropping season (250 litre/hectare/application)

T₄: 125% RDF of T₁

T₅: 125% RDF of T₁ + FYM@5 t/ha

T₆: T₁+ Application of micro nutrient (deficient to that location)

T₇: Optional (According to location)- (T₁+ Geoxol.com@ 40kg/ha)

T₁: Location specific recommended dose of fertilizer (RDF)

T₂: T₁ + FYM@ 5t/ha

T₃: T₁ + Sampooma (KAU) @10 g per litre of water twice in the cropping season (250 litre/hectare/application)

T₄: 125% RDF of T₁

T₅: 125% RDF of T₁ + FYM@5 t/ha

T₆: T₁+ Application of micro nutrient (deficient to that location)

T₇: Optional (According to location)- (T₁+ Geoxol.com@ 40kg/ha)

Table 4.4.1: Contd.

Treatment	KARAIKAL									
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Grain yield (kg/20 m ²)	Straw yield (kg/20 m ²)	Tillers/m ² (No.)	Panicle/m ² (No.)	Test wt (g)	Filled grains/ panicle	Un-Filled grains/ panicle
T1	4.90	5	6.27	9.79	12.55	447	418	28.87	106	11
T2	5.89	2	7.07	11.79	14.14	432	405	28.57	113	13
T3	5.66	3	7.96	11.31	15.93	428	402	28.80	131	14
T4	4.63	7	7.66	9.26	15.33	415	350	28.57	106	13
T5	6.01	1	8.04	12.02	16.08	475	408	27.57	104	11
T6	4.93	4	7.60	9.85	15.20	417	378	28.03	105	12
T7	4.88	6	6.79	9.76	13.59	428	385	28.43	120	11
Exp. mean	5.27		7.34	10.54	14.69	435	392	28.41	112	12
CD(0.05)	1		1.18	2	2.35	81.6	71.52	1.07	17.1	2.71
CV	10.67		9.01	10.67	9	10.56	10.25	2.11	8.56	12.49
res	*		NS	*	NS	NS	NS	NS	*	NS
Soil type	-									
pH	-									
EC	-									
Variety	-									
Applied NPK kg/ha	150:50:50									
Available NPK kg/ha	-									

T₁: Location specific recommended dose of fertilizer (RDF)
T₂: T₁ + FYM@ 5t/ha
T₃: T₁ + Sampoorna (KAU) @10 g per litre of water twice in the cropping season (250 litre/hectare/application)
T₄: 125% RDF of T₁
T₅: 125% RDF of T₁ + FYM@5 t/ha
T₆: T₁ + Application of micro nutrient (deficient to that location) - (0.5% ZnSO4)
T₇: Optional (According to location) - (100% NP and 150%K of RDF)

Table 4.4.1: Contd.

Treatment	KOTA											
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Grain yield (kg/20 m ²)	Straw yield (kg/20 m ²)	Tillers/m ² (No.)	Panicle/m ² (No.)	Test wt (g)	Filled grains/ panicle	Un-Filled grains/ panicle	Cost of cultivation Rs./ha	Gross returns Rs./ha
T1	5.16	7	6.62	10.32	13.25	293	263	25.33	131	21	66728	175879
T2	5.76	3	7.22	11.52	14.43	324	287	26.06	150	22	70583	195938
T3	5.60	6	6.97	11.21	13.93	297	272	25.88	142	19	69878	190459
T4	5.85	2	7.39	11.70	14.78	319	290	25.93	148	22	68422	199122
T5	6.11	1	7.79	12.22	15.58	338	298	26.14	155	25	72277	208121
T6	5.66	5	7.12	11.33	14.23	316	280	25.76	145	20	68728	192760
T7	5.71	4	7.11	11.42	14.22	302	277	26.08	145	19	69628	194008
Exp. mean	5.69		7.17	11.39	14.35	313	281	25.88	145	21	69463	193755
CD(0.05)	0.38		0.47	0.76	0.94	22.22	15.9	0.48	10.49	3.47	0	11879.22
CV	3.79		3.69	3.77	3.69	3.99	3.18	1.04	4.06	9.25	0	3.45
res	**		**	**	**	**	**	*	*	*	NS	**
Soil type	-											
pH	-											
EC	-											
Variety	-											
Applied NPK kg/ha	120:60:40											
Available NPK kg/ha	210.34:25.6:350.2											

T₁: Location specific recommended dose of fertilizer (RDF)

T₂: T₁ + FYM@ 5t/ha

T₃: T₁ + Sampoorna (KAU) @10 g per litre of water twice in the cropping season (250 litre/hectare/application)

T₄: 125% RDF of T₁

T₅: 125% RDF of T₁ + FYM@5 t/ha

T₆: T₁+ Application of micro nutrient (deficient to that location) - (Soil application of ZnSO₄@20 kg/ha)

T₇: Optional (According to location)- (T₁ + two foliar sprays of NPK 19:19:19 at maximum tillering and PI stage)

Table 4.4.1: Contd.

Treatment	MALAN									
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Grain yield (kg/20 m ²)	Straw yield (kg/20 m ²)	Tillers/m ² (No.)	Panicle/m ² (No.)	Test wt (g)	Filled grains/ panicle	Un-Filled grains/ panicle
T1	3.61	7	4.51	7.21	9.02	211	212	25.63	122	22
T2	5.42	5	6.78	10.84	13.55	243	236	26.27	139	18
T3	5.65	4	7.00	11.29	14.00	264	251	27.13	148	21
T4	5.79	3	7.17	11.57	14.35	270	259	27.53	150	23
T5	6.81	1	8.65	13.62	17.30	283	265	28.70	159	18
T6	5.22	6	6.58	10.44	13.15	238	229	26.03	134	19
T7	6.56	2	8.20	13.12	16.40	276	257	28.30	153	19
Exp. mean	5.58		6.98	11.16	13.97	255	244	27.08	144	20
CD(0.05)	0.98		1.23	1.96	2.45	27.77	26.94	1.5	18.68	2.94
CV	9.85		9.87	9.86	9.88	6.12	6.21	3.11	7.32	8.22
res	**		**	**	**	**	*	**	*	*
Soil type	Clay loam									
pH	-									
EC	-									
Variety	HPR 2143(120 days)									
Applied NPK kg/ha	90:40:40									
Available NPK kg/ha	-									

T₁: Location specific recommended dose of fertilizer (RDF)
T₂: T₁ + FYM@ 5t/ha
T₃: T₁ + Sampoorna (KAU) @10 g per litre of water twice in the cropping season (250 litre/hectare/application)
T₄: 125% RDF of T₁
T₅: 125% RDF of T₁ + FYM@5 t/ha (deficient to that location)
T₆: T₁+ Application of micro nutrient - (Application of Zinc Sulphate@25 kg/ha)
T₇: Optional (According to location) - (T₁ + Vermicompost@ 2.5 t/ha)

Table 4.4.1: Contd.

Treatment	MANDYA											
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Grain yield (kg/20 m ²)	Straw yield (kg/20 m ²)	Tillers/m ² (No.)	Panicle/m ² (No.)	Test wt (g)	Filled grains/ panicle	Un-Filled grains/ panicle	Cost of cultivation Rs./ha	Gross returns Rs./ha
T1	4.94	7	6.90	9.89	13.80	366	337	14.23	218	34	60975	137911
T2	5.50	4	7.84	10.99	15.68	387	353	12.95	238	43	71447	153841
T3	5.46	5	7.76	10.92	15.53	353	323	12.78	244	48	65125	152789
T4	5.71	2	8.07	11.43	16.14	381	350	13.73	260	63	64751	159651
T5	6.20	1	8.64	12.40	17.29	403	358	16.82	198	36	74545	172828
T6	5.28	6	7.87	10.56	15.74	362	337	14.11	208	47	65075	148971
T7	5.66	3	7.95	11.32	15.90	379	354	14.36	190	28	63929	158048
Exp. mean	5.54		7.86	11.07	15.73	376	345	14.14	222	43	66549	154863
CD(0.05)	0.73		1.02	1.45	2.03	45.09	48.24	3.1	84.63	21.57	913.5	17973.61
CV	7.37		7.26	7.37	7.26	6.74	7.87	12.34	21.4	28.44	0.77	6.52
res	NS		NS	NS	NS	NS	NS	NS	NS	NS	**	*
Soil type	Red sandy loam											
pH	7.71											
EC	0.04											
Variety	93-R (IET 26241), 120 to 125 days											
Applied NPK kg/ha	100:50:50:20											
Available NPK kg/ha	259.23:62.58:282.50											

T₁: Location specific recommended dose of fertilizer (RDF)

T₂: T₁ + FYM@ 5t/ha

T₃: T₁ + Sampoorna (KAU) @10 g per litre of water twice in the cropping season (250 litre/hectare/application)

T₄: 125% RDF of T₁

T₅: 125% RDF of T₁ + FYM@5 t/ha

T₆: T₁+ Application of micro nutrient (deficient to that location)

T₇ : Optional (According to location)- (T₁ + Foliar spray @ 2% water soluble 19-19-19 fertilizer at 30 and 55 DAT)

Table 4.4.1: Contd.

Treatment	MARUTERU									
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Grain yield (kg/20 m ²)	Straw yield (kg/20 m ²)	Tillers/m ² (No.)	Panicle/m ² (No.)	Test wt (g)	Cost of cultivation Rs./ha	Gross returns Rs./ha
T1	5.39	7	12.52	0.54	25.04	320	303	18.83	70132	124085
T2	5.67	5	11.34	0.57	22.67	341	304	18.83	72932	130410
T3	6.24	1	12.70	0.62	25.40	328	291	18.90	70419	143558
T4	6.05	3	12.55	0.61	25.09	323	286	18.90	70855	139073
T5	6.10	2	13.76	0.61	27.51	336	319	19.13	73655	140185
T6	5.96	4	12.23	0.60	24.46	322	304	18.47	70600	136965
T7	5.59	6	10.99	0.56	21.98	329	309	18.67	70518	128601
Exp. mean	5.86		12.30	0.59	24.59	328	302	18.82	71302	134697
CD(0.05)	0.75		1.7	0.08	3.4	35.88	37	0.5	0	17236.89
CV	7.2		7.78	7.46	7.77	6.14	6.88	1.5	0	7.19
res	NS		NS	NS	NS	NS	NS	NS	NS	NS
Soil type	-									
pH	-									
EC	-									
Variety	-									
Applied NPK kg/ha	-									
Available NPK kg/ha	-									

T₁: Location specific recommended dose of fertilizer (RDF)
T₂: T₁ + FYM@ 5t/ha
T₃: T₁+ Sampooma (K-AU) @10 g per litre of water twice in the cropping season (250 litre/hectare/application)
T₄: 125% RDF of T₁
T₅: 125% RDF of T₁ + FYM@5 t/ha
T₆: T₁+ Application of micro nutrient (deficient to that location)
T₇: Optional (According to location)- (Farmers application dose(101:50:20))

Table 4.4.1: Contd.

Treatment	PANTNAGAR												
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Grain yield (kg/20 m ²)	Straw yield (kg/20 m ²)	Tillers/m ² (No.)	Panicle/m ² (No.)	Test wt (g)	Filled grains/panicle	Un-Filled grains/panicle	Total uptake (kg/ha) in plant		
											N	P	K
T1	5.23	7	6.40	10.47	12.80	241	233	27.30	95	8	98.67	27.87	86.97
T2	5.79	2	6.72	11.58	13.45	254	242	27.63	80	8	107.27	34.03	103.13
T3	5.70	3	6.69	11.39	13.38	252	235	27.30	92	7	103.20	33.80	101.27
T4	5.48	4	5.94	10.96	11.88	241	236	26.83	80	7	97.90	34.73	96.90
T5	5.94	1	6.27	11.89	12.54	259	242	27.80	83	7	104.97	34.67	98.93
T6	5.45	5	5.99	10.90	11.98	241	236	27.57	88	9	98.70	29.40	91.93
T7	5.40	6	5.62	10.79	11.24	236	229	27.20	80	7	94.03	30.03	88.27
Exp. mean	5.58		6.21	11.15	12.43	245	235	27.62	85	8	100.41	31.83	95.08
CD(0.05)	0.22		0.6	0.43	1.21	9.04	7.17	0.28	2.43	1.49	6.04	2.86	6.09
CV	2.2		5.55	2.2	5.55	2.11	1.74	0.58	1.63	10.89	3.44	5.13	3.66
res	**		*	**	*	**	**	**	**	*	**	**	**
Soil type	Silt loam												
pH	-												
EC	-												
Variety	-												
Applied NPK kg/ha	-												
Available NPK kg/ha	230.22:25.1:212.0												

T₁: Location specific recommended dose of fertilizer (RDF)
T₂: T₁ + FYM@ 5t/ha
T₃: T₁+ Sampoorna (KAU) @10 g per litre of water twice in the cropping season (250 litre/hectare/application)
T₄: 125% RDF of T₁
T₅: 125% RDF of T₁ + FYM@5 t/ha
T₆: T₁+ Application of micro nutrient (deficient to that location)
T₇: Optional (According to location)

Table 4.4.1: Contd.

Treatment	PATTAMBI											
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Grain yield (kg/20 m ²)	Straw yield (kg/20 m ²)	Tillers/m ² (No.)	Panicle/m ² (No.)	Test wt (g)	Filled grains/panicle	Un-Filled grains/panicle	Cost of cultivation Rs./ha	Gross returns Rs./ha
T1	3.17	4	8.63	6.30	17.23	341	331	22.13	55	13	67310	114050
T2	3.40	2	9.00	6.77	17.97	353	344	19.80	63	14	96980	121683
T3	5.00	1	10.00	9.93	19.90	388	375	21.30	83	10	69300	168917
T4	3.27	3	8.23	6.47	16.43	362	346	19.97	53	13	70125	115183
T5	2.97	6	7.93	5.90	15.80	342	310	21.47	51	13	99855	106300
T6	2.90	7	8.20	5.77	16.37	331	300	18.93	43	12	69260	105283
T7	3.13	5	8.50	6.20	16.90	331	314	20.73	50	11	45100	112150
Exp. mean	3.41		8.64	6.76	17.23	350	331	20.62	57	12	73990	120510
CD(0.05)	0.45		0.75	0.89	1.5	30.14	24	1.99	10.19	3.35	0	13039.23
CV	7.49		4.9	7.39	4.88	4.84	4.07	5.42	10.09	15.45	0	6.08
res	**		**	**	**	*	**	NS	**	NS	NS	**
Soil type	-											
pH	-											
EC	-											
Variety	-											
Applied NPK kg/ha	90:45:45											
Available NPK kg/ha	-											

T₁: Location specific recommended dose of fertilizer (RDF)
T₂: T₁ + FYM@ 5t/ha
T₃: T₁ + Sampoorna (KAU) @10 g per litre of water twice in the cropping season (250 litre/hectare/application)
T₄: 125% RDF of T₁
T₅: 125% RDF of T₁ + FYM@5 t/ha
T₆: T₁+ Application of micro nutrient (deficient to that location)
T₇ : Optional (According to location) - (Control)

Table 4.4.1: Contd.

Treatment	PATTAMBI (Rabi)											
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Grain yield (kg/20 m ²)	Straw yield (kg/20 m ²)	Tillers/m ² (No.)	Panicle/m ² (No.)	Test wt (g)	Filled grains/panicle	Un-Filled grains/ panicle	Cost of cultivation Rs./ha	Gross returns Rs./ha
T1	3.10	6	9.03	6.10	18.03	308	278	23.67	45	13	67310	112450
T2	3.20	5	7.27	6.30	14.47	279	230	22.10	58	16	96980	109900
T3	5.27	1	8.97	10.50	17.87	420	375	21.67	88	12	69300	173800
T4	2.83	7	7.13	5.63	14.27	317	302	21.13	53	15	70125	100267
T5	3.47	2	7.30	6.90	14.57	307	277	21.37	59	14	99855	118450
T6	3.30	4	6.97	6.57	13.87	227	208	20.87	51	13	69260	112733
T7	3.43	3	6.47	6.83	12.87	341	328	21.30	55	12	45100	114967
Exp. mean	3.51		7.59	6.98	15.14	314	285	21.73	58	14	73990	120367
CD(0.05)	0.77		1.54	1.58	3.07	82.54	88.04	3.86	10.37	4.27	0	21588.29
CV	12.38		11.38	12.7	11.41	14.77	17.34	9.98	9.97	17.43	0	10.08
res	**		*	**	*	**	*	NS	**	NS	NS	**
Soil type	-											
pH	-											
EC	-											
Variety	-											
Applied NPK kg/ha	90:45:45											
Available NPK kg/ha	-											

T₁: Location specific recommended dose of fertilizer (RDF)
T₂: T₁ + FYM@ 5t/ha
T₃: T₁ + Sampoorna (KAU) @10 g per litre of water twice in the cropping season (250 litre/hectare/application)
T₄: 125% RDF of T₁
T₅: 125% RDF of T₁ + FYM@5 t/ha
T₆: T₁+ Application of micro nutrient (deficient to that location)
T₇: Optional (According to location) - (Control)

Table 4.4.1: Contd.

Treatment	RAIPUR											
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Grain yield (kg/20 m ²)	Straw yield (kg/20 m ²)	Tillers/m ² (No.)	Panicle/m ² (No.)	Test wt (g)	Filled grains/panicle	Un-filled grains/panicle	Cost of cultivation Rs./ha	Gross returns Rs./ha
T1	4.56	7	5.88	9.11	11.76	285	258	20.63	126	32	41025	116563
T2	4.90	5	6.27	9.80	12.54	316	289	21.37	148	33	43525	125240
T3	4.92	4	6.33	9.85	12.66	318	291	21.90	150	27	42175	125897
T4	5.29	2	6.76	10.59	13.52	357	324	22.30	157	22	43281	135271
T5	5.63	1	7.16	11.26	14.32	380	345	22.63	168	21	45781	143814
T6	4.59	6	5.92	9.18	11.84	292	269	21.80	131	31	42275	117414
T7	5.10	3	6.61	10.31	13.22	342	308	22.70	152	25	41985	130597
Exp. mean	5.00		6.42	10.01	12.84	327	298	21.90	147	27	42864	127828
CD(0.05)	0.63		0.74	1.27	1.48	59.02	53.04	2.15	25.38	7.12	0	13176.07
CV	7.12		6.47	7.11	6.46	10.14	10.01	5.51	9.69	14.65	0	5.79
res	*		*	*	*	*	*	NS	*	*	NS	**
Soil type	Vertisols											
pH	7.10											
EC	-											
Variety	Vikram TCR(122 days)											
Applied NPK kg/ha	120:60:60											
Available NPK kg/ha	-											

T₁: Location specific recommended dose of fertilizer (RDF)

T₂: T₁ + FYM@ 5t/ha

T₃: T₁ + Sampoorna (KAU) @10 g per litre of water twice in the cropping season (250 litre/hectare/application)

T₄: 125% RDF of T₁

T₅: 125% RDF of T₁ + FYM@5 t/ha

T₆: T₁+ Application of micro nutrient (deficient to that location)

T₇: Optional (According to location)

Table 4.4.1: Contd.

Treatment	RANCHI														B:C Ratio
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Panicle/m ² (No.)	Test wt (g)	Filled grains/panicle	Un-filled grains/panicle	Total uptake (kg/ha) in plant				Cost of cultivation Rs./ha	Gross returns Rs./ha		
								N	P	K	N			P	
T1	5.65	6	8.36	253	24.8	103.07	5.92	113.64	20.64	103.93	168.5	37.82	166.32	123620	2.92
T2	5.96	3	8.58	279	24.96	108	5.21	122.74	22.62	112.22	170.33	37.87	163.09	130183.3	2.79
T3	5.81	5	8.45	269.67	24.82	106	5.67	115.9	21.7	108.58	166.1	36.38	151.25	127042	2.89
T4	6.02	2	8.62	289.33	25.07	111.26	5.12	129.09	23.36	118.36	153	37.28	161.07	131363.3	2.95
T5	6.78	1	9.55	320	25.23	121.07	4.23	148.65	26.77	132.49	157	36.99	156.52	147858.7	3.03
T6	5.85	4	8.49	268	24.85	106.67	5.52	118.78	21.99	109.52	163.23	37.79	170.89	127829.3	2.83
T7	3.49	7	5.21	196	24.69	85	6.53	69.53	11.45	50.11	185.5	37.2	163.31	76443.33	2.14
Exp. mean	5.651429		8.18	267.8571	24.91714	105.8671	5.457143	116.9043	21.21857	105.03	166.2371	37.33286	161.7786	43849.57	2.792857
CD(0.05)	0.85		1.2	34.71	2.15	11.66	0.67	16.55	2.85	11.94	16.21	2.22	8.91	0	0.4
CV	8.47		8.26	7.28	4.85	6.19	6.93	7.96	7.55	6.39	5.48	3.34	3.1	0	8.05
res	**		**	**	NS	**	**	**	**	**	*	NS	**	NS	**
Soil type	-														
pH	6.20														
EC	-														
Variety	Arize 6444 Gold														
Applied NPK kg/ha	150:60:60														
Available NPK kg/ha	215:34.2:172.5														

T₁: Location specific recommended dose of fertilizer (RDF)

T₂: T₁ + FYM@ 5t/ha

T₃: T₁ + Sampoorna (KAU) @10 g per litre of water twice in the cropping season (250 litre/hectare/application)

T₄: 125% RDF of T₁

T₅: 125% RDF of T₁ + FYM@5 t/ha

T₆: T₁+ Application of micro nutrient (deficient to that location) - (Zn 5 kg/ha as basal)

T₇: Optional (According to location) - (50 Kg DAP/ha as basal +50 Kg urea/ha as top dressing after weeding)

Table 4.4.1: Contd.

Treatment	TITABAR															
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Grain yield (kg/20 m ²)	Straw yield (kg/20 m ²)	Tillers/m ² (No.)	Panicle/m ² (No.)	Test wt (g)	Filled grains/panicle	Un-filled grains/panicle	Total uptake (kg/ha) in plant			Soil available kg/ha		
											N	P	K	N	P	K
T1	4.90	5	6.55	9.79	13.10	235	229	24.35	129	26	120.63	24.90	104.04	249.98	18.65	125.90
T2	4.82	7	6.95	9.63	13.90	245	238	24.50	177	18	126.63	26.80	108.62	250.67	17.20	126.05
T3	5.08	4	8.18	10.16	16.35	244	236	24.90	199	19	141.50	28.94	119.48	264.69	18.10	126.60
T4	5.46	2	8.53	10.93	17.05	260	253	24.53	198	18	159.48	31.80	132.37	277.10	19.65	124.28
T5	5.67	1	9.18	11.34	18.35	266	259	24.88	202	21	165.13	33.15	136.35	262.68	18.95	126.68
T6	4.86	6	8.13	9.73	16.25	254	247	24.30	199	17	138.60	28.50	121.19	263.30	18.30	127.60
T7	5.21	3	8.05	10.42	16.10	244	239	23.48	161	23	139.10	27.25	119.30	262.43	19.78	123.75
Exp. mean	5.14		7.94	10.29	15.87	249	243	24.42	181	20	141.58	28.76	120.19	261.55	18.66	125.84
CD(0.05)	0.64		2.52	1.29	5.04	10.19	9.41	0.99	52.18	8.93	21.68	5.2	27.33	12.96	1.33	8.7
CV	8.43		21.35	8.43	21.36	2.75	2.61	2.73	19.44	29.73	10.31	12.16	15.31	3.33	4.79	4.66
res	NS		NS	NS	NS	**	**	NS	NS	NS	**	*	NS	**	**	NS
Soil type	Clay loam															
pH	-															
EC	-															
Variety	-															
Applied NPK kg/ha	60:20:40															
Available NPK kg/ha	-															

T₁: Location specific recommended dose of fertilizer (RDF)
T₂: T₁ + FYM@ 5t/ha
T₃: T₁ + Sampooma (KAU) @10 g per litre of water twice in the cropping season (250 litre/hectare/application)
T₄: 125% RDF of T₁
T₅: 125% RDF of T₁ + FYM@5 t/ha
T₆: T₁+ Application of micro nutrient (deficient to that location)
T₇ : Optional (According to location)

Table 4.4.1: Contd.

Treatment	WARANGAL											Over all Mean	Rank
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Grain yield (kg/20 m ²)	Straw yield (kg/20 m ²)	Tillers/m ² (No.)	Panicle/m ² (No.)	Test wt (g)	Filled grains/ panicle	Un-filled grains/ panicle	Cost of cultivation Rs./ha	Gross returns Rs./ha	
T1	7.58	3	4.82	15.17	6.63	333	333	13.67	202	15	63637	173930	4.69
T2	7.62	2	4.88	15.23	6.77	340	340	14.57	177	14	76637	174694	5.30
T3	7.28	4	5.17	14.57	7.33	360	360	14.33	182	14	66637	167049	5.50
T4	8.00	1	4.83	16.00	6.67	358	358	15.00	202	9	64072	183486	5.39
T5	6.97	6	4.83	13.93	6.67	341	341	14.67	187	19	77072	159786	5.68
T6	7.28	4	4.78	14.57	6.57	343	343	13.47	165	20	65137	167049	5.18
T7	6.42	7	5.02	12.83	7.03	337	337	13.40	177	22	63202	147171	5.11
Exp. mean	7.31		4.90	14.61	6.81	345	345	14.16	184	16	68056	167595	5.23
CD(0.05)	0.97		0.67	1.94	1.34	29.5	29.5	1.44	46.65	12.45	0	22237.5	
CV	7.46		7.65	7.46	11.02	4.81	4.81	5.7	14.22	43.4	0	7.46	
res	NS		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
Soil type	Black												
pH	-												
EC	-												
Variety	-												
Applied NPK kg/ha	120:60:40												
Available NPK kg/ha	138:48:452												

T₁: Location specific recommended dose of fertilizer (RDF)
T₂: T₁ + FYM@ 5t/ha
T₃: T₁ + Sampoorana (KAU) @10 g per litre of water twice in the cropping season (250 litre/hectare/application)
T₄: 125% RDF of T₁
T₅: 125% RDF of T₁ + FYM@5 t/ha
T₆: T₁+ Application of micro nutrient (deficient to that location)
T₇: Optional (According to location)

Table 4.4.1: Contd.

Treatments	Grain yield kg/ha					
	CHIPLIMA	KANPUR	KHUDWANI	LUDHIANA	MONCOMPU	PUSA
T1 - RDF (location specific)	5560	5067	6839	7482	5781	4377
T2 - RDF + FYM @ 5t/ha	5730	5550	7095	7722	6302	4857
T3 - RDF + Sampoorna (KAU) @ 10 g per litre	5600	5483	7345	7167	6000	4670
T4 - 125% RDF	5710	5708	6697	7796	5990	5383
T5 - 125% RDF + FYM @ 5t/ha	5783.3	6017	6800	8148	6198	5690
T6 - RDF + Micronutrient application	5396.7	5292	7416	7315	5886	5040
T7 - Optional (Location Bases recommendation)	4960	5233	7554		6091	2977
T8 - Optional (Location Bases recommendation)						
Mean	5534.3	5478.5	7106.3	7605	6035	4713.3
CV	5.6	6.13	4.18	2.9	10	9.2
LSD	NS	NS	528.66	407	NS	772.6

Table 4.4.1: Contd.

Treatments	Straw yield kg/ha					
	CHIPLIMA	KANPUR	KHUDWANI	LUDHIANA	MONCOMPU	PUSA
T1 - RDF (location specific)	5933	6458	7891	13889	8054	5490
T2 - RDF + FYM @ 5t/ha	6497	7133	8175	14444	8615	6297
T3 - RDF + Sampoorna (KAU) @ 10 g per litre	6173	7017	8231	13259	8240	6100
T4 - 125% RDF	6410	7367	7918	14926	8855	6897
T5 - 125% RDF + FYM @ 5t/ha	6673	7817	7848	15741	9302	7057
T6 - RDF + Micronutrient application	5807	6775	8569	13778	8167	6530
T7 - Optional (Location Bases recommendation)	5493	6733	8685		8302	4180
T8 - Optional (Location Bases recommendation)						
Mean	6141	7042.8	8188	14340	8505	6078.7
CV	7.5	6.4	3.2	0.93	8.7	12.3
LSD	NS	804.0	470.3	244	NS	1329.3

Table 4.4.1: Contd.

Treatments	Tillers/m ² (No.)					
	CHIPLIMA	KANPUR	KHUDWANI	LUDIANA	MONCOMPU	PUSA
T1 - RDF (location specific)	5933	448	334	305	216	267
T2 - RDF + FYM @ 5t/ha	6497	469	360	308	204	283
T3 - RDF + Sampoorna (KAU) @ 10 g per litre	6173	453	364	315	219	278
T4 - 125% RDF	6410	481	354	320	236	308
T5 - 125% RDF + FYM @ 5t/ha	6673	502	367	317	250	328
T6 - RDF + Micronutrient application	5807	459	360	313	219	278
T7 - Optional (Location Bases recommendation)	5493	455	381		208	215
T8 - Optional (Location Bases recommendation)						
Mean	6141	466.71	360.05	313	222	279.6
CV	7.5	6.15	4.48	6.66	8.67	7.8
LSD	NS	NS	NS	NS	NS	38.7

Table 4.4.1: Contd.

Treatments	Panicles/m ² (No.)				
	CHIPLIMA	KANPUR	KHUDWANI	MONCOMPU	PUSA
T1 - RDF (location specific)	226	373	296	198	252
T2 - RDF + FYM @ 5t/ha	274	402	304	209	242
T3 - RDF + Sampoorna (KAU) @ 10 g per litre	260	396.33	305	207	235
T4 - 125% RDF	261	412	302	215	279
T5 - 125% RDF + FYM @ 5t/ha	288	421	316	231	294
T6 - RDF + Micronutrient application	244	387	316	199	242
T7 - Optional (Location Bases recommendation)	208	384	316	204	237
T8 - Optional (Location Bases recommendation)					
Mean	251.7	396.48	307.76	209	254.5
CV	7.4	6.36	6.23	10.88	7.6
LSD	33.1	NS	NS	NS	34.2

Table 4.4.1: Contd.

Treatments	Test wt (g)					
	CHIPLIMA	KANPUR	KHUDWANI	LUDIANA	MONCOMPU	PUSA
T1 - RDF (location specific)	20.767	24.95	27.1	22.7	24.93	25.9
T2 - RDF + FYM @ 5t/ha	21.567	25.22	27.0	23.0	25.63	26.2
T3 - RDF + Sampoorna (KAU) @ 10 g per litre	21.167	25.08	27.4	22.0	26.73	26.5
T4 - 125% RDF	21.367	25.33	27.0	25.0	25.97	27.2
T5 - 125% RDF + FYM @ 5t/ha	22.033	25.62	27.0	25.0	26.43	27.4
T6 - RDF + Micronutrient application	21.067	25.03	27.4	23.8	24.80	26.6
T7 - Optional (Location Bases recommendation)	20.4	25.01	27.4		26.53	25.8
T8 - Optional (Location Bases recommendation)						
Mean	21.2	25.177	27.19	23.583	25.9	26.5
CV	1.1	3.54	2.45	1.16	3.7	2.0
LSD	0.4	NS	NS	0.50	NS	0.9

Table 4.4.1: Contd.

Treatments	Filled grain (No.)			
	CHIPLIMA	KHUDWANI	LUDIANA	MONCOMPU
T1 - RDF (location specific)	112	105	155	170.33
T2 - RDF + FYM @ 5t/ha	126	109	157	176.67
T3 - RDF + Sampoorna (KAU) @ 10 g per litre	124	112	153	179.67
T4 - 125% RDF	122	105	161	182.33
T5 - 125% RDF + FYM @ 5t/ha	134	111	165	191.00
T6 - RDF + Micronutrient application	111	120	156	175.00
T7 - Optional (Location Bases recommendation)	108	125		180.33
T8 - Optional (Location Bases recommendation)				
Mean	119.7	112.52	157.78	179.3
CV	8.9	7.54	0.65	9.0
LSD	NS	NS	1.87	NS

Table 4.4.1: Contd.

Treatments	Total uptake (kg/ha) in plant N				
	CHIPLIMA	KANPUR	KHUDWANI	MONCOMPU	PUSA
T1 - RDF (location specific)	70	106	107	113	94
T2 - RDF + FYM @ 5t/ha	73	120	111	137	110
T3 - RDF + Sampoorna (KAU) @ 10 g per litre	66	117	115	115	102
T4 - 125% RDF	80	127	110	133	125
T5 - 125% RDF + FYM @ 5t/ha	77	135	112	149	133
T6 - RDF + Micronutrient application	62	114	119	118	109
T7 - Optional (Location Bases recommendation)	55	112	124	115	59
T8 - Optional (Location Bases recommendation)					
Mean	69	119	113.8	125.7	104.6
CV	6.1	6	4.0	9.0	11.1
LSD	7.5	13.3	8.118	20.1	20.6

Table 4.4.1: Contd.

Treatments	Total uptake (kg/ha) in plant P				
	CHIPLIMA	KANPUR	KHUDWANI	MONCOMPU	PUSA
T1 - RDF (location specific)	40	32	21	72	24
T2 - RDF + FYM @ 5t/ha	44	36	23	78	27
T3 - RDF + Sampoorna (KAU) @ 10 g per litre	42	35	23	70	26
T4 - 125% RDF	48	38	21	77	33
T5 - 125% RDF + FYM @ 5t/ha	47	42	21	84	33
T6 - RDF + Micronutrient application	37	34	24	69	28
T7 - Optional (Location Bases recommendation)	31	34	24	74	17
T8 - Optional (Location Bases recommendation)					
Mean	41	36	22.4	75.0	26.8
CV	6.6	6	6.2	10.9	16.0
LSD	4.9	3.7	NS	NS	7.6

Table 4.4.1: Contd.

Treatments	Total uptake (kg/ha) in plant K				
	CHIPLIMA	KANPUR	KHUDWANI	MONCOMPU	PUSA
T1 - RDF (location specific)	49	109	96	135	94
T2 - RDF + FYM @ 5t/ha	50	123	101	154	117
T3 - RDF + Sampoorna (KAU) @ 10 g per litre	50	120	103	140	105
T4 - 125% RDF	55	128	95	151	121
T5 - 125% RDF + FYM @ 5t/ha	54	137	96	165	129
T6 - RDF + Micronutrient application	46	116	106	148	113
T7 - Optional (Location Bases recommendation)	41	114	107	145	62
T8 - Optional (Location Bases recommendation)					
Mean	49	121	100.7	148.3	105.9
CV	6.5	6	3.9	10.2	11.6
LSD	5.7	13.5	7.045	NS	21.8

Table 4.4.1: Contd.

Treatments	Nutrient use efficiency (N)				
	CHIPLIMA	KANPUR	KHUDWANI	MONCOMPU	PUSA
T1 - RDF (location specific)	79	48	64	80	47
T2 - RDF + FYM @ 5t/ha	78	46	64	80	44
T3 - RDF + Sampoorna (KAU) @ 10 g per litre	86	47	64	85	46
T4 - 125% RDF	72	45	61	78	43
T5 - 125% RDF + FYM @ 5t/ha	75	45	61	75	43
T6 - RDF + Micronutrient application	87	46	63	86	46
T7 - Optional (Location Bases recommendation)	91	47	61	82	50
T8 - Optional (Location Bases recommendation)					
Mean	81	46	62.5	81.0	45.7
CV	2.5	2	4.2	11.6	5.0
LSD	3.6	1.4	NS	NS	4.1

Table 4.4.1: Contd.

Treatments	Nutrient use efficiency (P)				
	CHIPLIMA	KANPUR	KHUDWANI	MONCOMPU	PUSA
T1 - RDF (location specific)	114	47	71	43	47
T2 - RDF + FYM @ 5t/ha	115	45	70	41	42
T3 - RDF + Sampoorna (KAU) @ 10 g per litre	112	46	71	43	45
T4 - 125% RDF	104	45	70	40	45
T5 - 125% RDF + FYM @ 5t/ha	108	44	71	38	44
T6 - RDF + Micronutrient application	118	46	70	40	45
T7 - Optional (Location Bases recommendation)	122	46	70	42	48
T8 - Optional (Location Bases recommendation)					
Mean	113	45	70.6	41.0	45.0
CV	2.6	3	1.6	12.7	8.5
LSD	5.2	NS	NS	NS	NS

Table 4.4.1: Contd.

Treatments	Nutrient use efficiency (K)				
	CHIPLIMA	KANPUR	KHUDWANI	MONCOMPU	PUSA
T1 - RDF (location specific)	140	159	325	80	186
T2 - RDF + FYM @ 5t/ha	129	152	316	80	179
T3 - RDF + Sampoorna (KAU) @ 10 g per litre	133	157	318	85	183
T4 - 125% RDF	120	149	317	78	165
T5 - 125% RDF + FYM @ 5t/ha	124	145	328	75	173
T6 - RDF + Micronutrient application	148	156	312	86	182
T7 - Optional (Location Bases recommendation)	158	156	317	82	179
T8 - Optional (Location Bases recommendation)					
Mean	136	153	318.7	81.0	178.0
CV	2.2	4	5.2	11.6	8.4
LSD	5.2	NS	NS	NS	NS

4.4.2. Assessment of yield gap analysis- Interdisciplinary with Economics (Yield Gaps in Rice in different Zones)

In the context of growing food demand, limited arable land, and the imperative for sustainable agriculture, analysing yield gaps in major crops like rice has become crucial. Yield gap refers to the difference between the potential yield (as realized under experimental or optimal farm conditions) and the actual yield obtained by farmers under conventional management. In economic terms, the yield gap serves as a proxy for assessing technical efficiency, resource utilization, and scope for productivity enhancement without the need for additional land or water resources.

India, being one of the largest rice-producing countries, has witnessed significant disparities in rice yields across states and districts due to variations in agro-climatic conditions, input use efficiency, access to technology, and institutional support. Identifying and quantifying these yield gaps can help in formulating targeted interventions to maximize returns on investment, reduce per-unit production costs, and ensure food security.

The present study was undertaken in selected districts across eight major rice-growing states of India Assam, Gujarat, Karnataka, Kerala, Tamil Nadu, Uttarakhand, and Uttar Pradesh to assess the yield gap in rice cultivation. To obtain a comprehensive understanding, primary data were collected from 25 farmers in each state using a structured interview schedule through the personal interview method. Additionally, data on potential yields from research stations and yields achieved by progressive farmers were gathered to serve as benchmarks for evaluating the yield gap under field conditions.

The yield gap index (YGI) was computed using the following formula:

$$\text{Yield Gap (\%)} = \frac{Y_p - Y_a}{Y_p} * 100$$

Where,

Y_p is the Research station yield
Y_a is the Average farmers' yield

Table 4.4.2(1). Yield gap in different states

Sl. No.	State	Potential yield	Farmers' field yield	Yield Gap (%)
1	Assam	5.30	4.70	11.32
2	Gujrat	5.20	4.53	12.88
3	Karnataka	5.50	4.50	18.18
4	Kerala	7.20	5.93	17.64
5	Tamil Nadu	4.50	4.11	8.67
6	Uttarakhand	5.50	5.00	9.09
7	Uttar Pradesh	6.19	5.57	10.01
8	Average	5.63	4.91	12.82

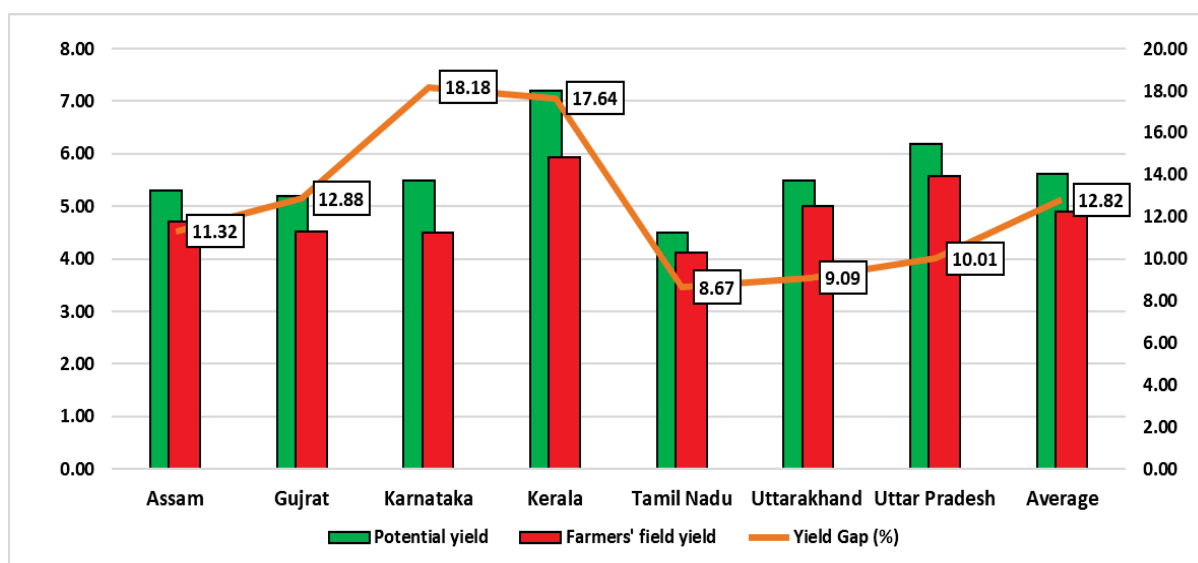


Fig 1: Yield Gaps in Rice Cultivation Across Selected States

The analysis revealed considerable variation in rice yield gaps across the selected states (Table 4.4.2(1) and Fig 1). The average potential yield was estimated at 5.63 t/ha, while the actual yield at the farmers' field level averaged 4.91 t/ha, resulting in an overall yield gap of 12.82%. Karnataka (18.18%) and Kerala (17.64%) exhibited the highest yield gaps. In contrast, Tamil Nadu (8.67%) and Uttarakhand (9.09%) recorded the lowest gaps, reflecting better adoption of recommended practices and stronger institutional support. Gujarat (12.88%), Assam (11.32%), and Uttar Pradesh (10.01%) showed moderate gaps, indicating the potential for improvement.

The study clearly demonstrates the presence of yield gaps in rice cultivation across major Indian states, ranging from 8.67% to 18.18%, with an average of 13.34%. These yield gaps are indicative of untapped productivity potential. Policies aiming at technology dissemination, capacity building, site-specific nutrient management, and strengthened extension systems are essential for converting this potential into realized gains. From an economic standpoint, closing yield gaps is one of the most efficient strategies to enhance rice output, improve livelihoods, and contribute to national food security.

Impact of Direct Seeded Rice (DSR) on Yield Variability Across Indian States

Calculating the yield gap between Direct Seeding of Rice (DSR) and Transplanted Rice (TPR) is essential to evaluate the potential of DSR in improving productivity, resource-use efficiency, and sustainability. This analysis helps identify the comparative performance of both methods, recognize adoption constraints, and highlight areas for agronomic or institutional improvements. It also supports informed policy decisions, technology transfer, and extension services to optimize rice production, especially in regions facing labor

shortages or water scarcity. Understanding the yield gap further aids in assessing the economic viability of transitioning from TPR to DSR.

Table 4.4.2(2): Comparative Yield Performance of Direct Seeded Rice (DSR) and Transplanted Rice (TPR) in Different States of India

Sl. No.	State	TPR	DSR	% change of yield in DSR over TPR
1	Assam	5.00	3.80	-24.00
2	Gujrat	4.30	2.40	-44.19
3	Karnataka	4.50	4.00	-11.11
4	Kerala	7.00	7.50	7.14
5	Tamil Nadu	4.10	3.80	-7.32
6	Uttar Pradesh	6.29	4.26	-32.27
7	Average	5.20	4.29	-17.41

Keeping this in view, an attempt was made to compare the yields under Direct Seeding of Rice (DSR) and Transplanted Rice (TPR) methods. Using the same structured questionnaire mentioned earlier, yield data were collected from farmers practicing DSR across selected districts in six major rice-growing states—Assam, Gujarat, Karnataka, Kerala, Tamil Nadu, and Uttar Pradesh. These DSR yields were then compared with the TPR yields from the same locations to ensure consistency and enable a meaningful assessment of the yield differences between the two methods.

The above Table 4.2.2(2) presents a comparative analysis of rice yield performance under Direct Seeded Rice (DSR) and Transplanted Rice (TPR) systems across selected Indian states. The percentage change in yield highlights the productivity response of rice under DSR relative to conventional TPR. On average, DSR yields are 17.41% lower than TPR, indicating that despite its resource-conserving potential, DSR may currently be facing agronomic and adoption challenges in several regions.

Significant yield reductions in Gujarat (-44.19%), Uttar Pradesh (-32.27%), Assam (-24%), and Karnataka (-11.11%) suggest constraints such as weed infestation, poor crop establishment, and moisture stress due to limited water control. However, Kerala shows a positive yield gain (7.14%), possibly due to better-suited agroecological conditions and more effective management practices under DSR. These variations underscore the importance of region-specific adaptation strategies, including improved DSR-compatible varieties, weed and water management, and capacity-building efforts to enhance the yield reliability and scalability of DSR in India's rice-based production systems.

4.4.3. Evaluation of Organic fertilizers and Natural farming practices for enhancing the productivity and soil health

For detailed report refer Soil Science Progress Report.

4.4.4. Nano-fertilizers for increasing nutrient use efficiency, yield and economic returns in transplanted rice

For detailed report refer Soil Science Progress Report.

4.4.5. Integrated Pest Management – on farm management of insects, diseases and weeds in DSR. Special interdisciplinary trial (Entomology, Pathology and Agronomy), Kharif 2024

In recent years, intensive cultivation of rice and changing establishment methods like DSR has resulted in the frequent occurrence of biotic stresses that formed major constraint in rice production. Although, IPM has been accepted as the most effective option for protection of crops from the ravages of pests, however, its implementation at the farmer's level has been limited. As IPM involves a number of components, farmers must have capability of taking decisions and selecting IPM options accordingly for economical and long term management. Most of these options also need to be refined at individual farm level keeping in view the availability of resources and feasibility of farmers. Therefore, IPM involves working with the farmers in their fields and devising technologies suitable to their conditions. Keeping this in view, IPM special trial was conducted with an aim to manage pests (including insects, diseases and weeds) in a holistic way in farmers' fields involving them in a participatory way and allowing them to select IPM practices from a basket of options available.

During Kharif 2024, the trial was conducted in six zones at 13 locations viz., **Malan, Kaul, Ludhiana, Chinsurah, Faizabad, Titabar, Navasari, Vadagaon, Aduthurai, Coimbatore, Gangavathi, Mandya and Puducherry**. The data on weed population and weed dry biomass in critical period of crop weed competition (Active Tillering and Panicle Initiation stages), grain yields were reported; and the results are summarized and presented in **Tables 4.4.5**.

Species wise weed data reported by eight locations viz., **Faizabad, Gangavathi, Ludhiana, Malan, Mandya, Navasari, Titabar and Vadagaon**. The weed flora reported in the test locations included **Grasses:** *Cynodon dactylon*, *Dactylactenium aegyptium*, *Dactylactenium spp*, *Echinochloa colona*, *Echinochloa crusgalli*, *Echinochloa spp*, *Eleusine indica*, *Leptochloa chinensis*, *Leptochloa spp*, *Leersia hexandra*, *Panicum repens*, *Panicum spp*, *Panicum tripheron* and *Oryza sativa sp spontanea*. **Sedges:** *Cyperus difformis*, *Cyperus iria*, *Cyperus procerus*, *Cyperus rotundus*, *Fimbristylis miliacea*, *Scirpus maritimus* *Scirpus spp*, *Eleocharis dulcis*. **BLW:** *Alternanthera sessilis*, *Alternanthera spp*, *Alternanthera philxeroides*, *Ammania baccifera*, *Bergia capensis*, *Cynotis cristata*, *Eclipta alba*, *Eclipta spp*, *Glinus oppositifolia*, *Ludwigia parviflora*, *Marsilea quadrifolia*, *Monochoria vaginalis*,

Physalis minima, *Rotala densiflora*, *Sphenoclea zeylanica*, *Spilanthus acmella*. and *Solanum nigrum*.

Zone I – Hilly Regions

Himachal Pradesh-Malan: IPM trial was conducted in Research Farm of Rice and Wheat Research Centre, Malan, Kangra District, Himachal Pradesh State. The IPM practices were followed as per the technical program. In this Zone, the weed population at Active Tillering and Panicle Initiation stage in IPM plots was lower than farmers practice by 60.26 and 61.42% respectively. The dry weed biomass was lower in IPM implemented fields by 59.03 and 68.90 % respectively. The mean grain yield advantage was 10.63% in IPM adopted plots.

Zone II – North West

Haryana -Kaul: IPM trial was conducted at Rasina,, Khaital District, Haryana State. Pest problem in general was negligible in both IPM and Farmers practice and yield advantage was 1.22%.

Punjab-Ludhiana: In the IPMs trial conducted at PAU, Ludhiana. The weed population and weed biomass at Panicle Initiation stage in IPM plots was lower than farmers practice by 20 and 27% respectively. The mean grain yield advantage was 0.94% in IPM adopted plots.

Zone III – Eastern

Uttar Pradesh- Faizabad: In the IPM trial conducted by Faizabad, the data on weed population recorded at Active Tillering and Panicle Initiation stage showed significant decrease in weed population by 65.80 and 69.73% respectively. The dry weed biomass was lower in IPM implemented fields by 28.68 and 25.67 % respectively. IPM implemented fields, resulted in higher growth, yield attributes and grain yield advantage was 30.80%.

West Bengal- Chinsurah: In the IPM field trial conducted, the weed population at Active Tillering and Panicle Initiation stage was lower than farmers practice by 66.66 and 63.63 % respectively. The dry weed biomass also was lower in IPM implemented fields by 87.63 and 67.44 respectively. The mean grain yield advantage was 15.84 in IPM adopted plots.

Zone IV – North-Eastern

Assam – Titabar: IPMs trial was conducted in Titabar, Jorhat district of Assam. Ranjit sub-1 variety was grown in both IPM and FP plots. Practices followed in IPM and farmers' practices were given in the table. Weed population and biomass were reported for Active Tillering and Panicle Initiation stages. Significant reduction in weed population (52.47 and 46.40%) and dry weed biomass (46.36 and 47.78%) in IPM fields was recorded. The grain yield advantage of 23.05 % was recorded in IPM adopted fields.

Zone VI – Western

Gujarat- Navsari: The IPM trial conducted showed significant reduction in weed population 59.25 and 41.66% and dry weed biomass 53.31 and 38.71% at Active Tillering and Panicle Initiation stages. Significant improvement in grain yield advantage was noticed with 11.05% in IPM adopted fields.

Maharashtra- Vadgaon: The trial was conducted in three farmers fields in Chandkhed village, Maval Tal, Pune District. The weed population at Active Tillering and Panicle Initiation stages was lower than farmers practice by 76.92 and 69.25% and weed dry biomass by 75.84 and 69.38% respectively. The mean grain yield advantage was 31.53 % in IPM adopted plots.

Zone VII – Southern

Tamil Nadu- Aduthurai: The field trial was conducted in 3 farmers fields in the villages of Sreekandapuram, Nakkambadi, Sitamalli, Thanjavur District using the variety IR 20. The weed population at Active Tillering was lower than farmers practice by 49.62% respectively. The weed dry biomass at Active Tillering stage in IPM plots was lower than farmers practice by 33.82 % respectively and contributed to the mean grain yield advantage of 13.67 % in IPM adopted plots.

Tamil Nadu- Coimbatore: The field trial was conducted in three farmers fields in the villages of Kumaralingam (West), Kumaralingam, Pappankulam, Tirupur District using the variety CR 1009. The weed population at Active Tillering and Panicle Initiation was lower than farmers practice by 4.23 and 10.00% respectively. The weed dry biomass in IPM plots was lower than farmers practice by 34.34 and 9.38% respectively and contributed to the mean grain yield advantage of 12.02 % in IPM adopted plots.

Karnataka- Gangavathi: The IPM field trial was conducted in the Research Farm of Agriculture Research Station, Gangavathi in Karnataka using the variety BPT 5204. The weed population at Active Tillering and Panicle Initiation stages in IPM plots was lower than farmers practice by 59.70 and 28.58% respectively, and the weed dry biomass was lower than farmers practice by 40.19 and 29.05%. The mean grain yield advantage of 28.20 % was recorded in IPM adopted plots.

Karnataka-Mandya: The IPM field trial was conducted at Mandya, Mandya District, Karnataka state with variety RNR 15048. The weed population at Active Tillering and Panicle Initiation stages in IPM plots was lower than farmers practice by 68.42 and 82.39% respectively. The weed dry biomass at in IPM plots was lower by 72.00 and 82.87% respectively and contributed to the mean grain yield advantage of 24.97 %.

Union Territory of Puducherry- Puducherry: The IPM field trial was conducted with variety ADT 54. The weed population at Active Tillering and Panicle Initiation stages in IPM plots was lower than farmers practice by 53.93 and 55.97% respectively; with lower weed biomass in IPM implemented fields by 47.47 and 52.31%. The mean grain yield advantage was 7.04% in IPM adopted plots.

The Integrated Pest Management special (IPMs) trial was conducted at 12 locations in *Kharif* 2024 with an objective of managing all pests i.e., weeds, insects, diseases in a holistic way in farmer's fields involving them in a participatory mode. Across the locations, weeds, insect pests and disease incidence were significantly low in IPM plots. IPM implemented plots resulted mean grain yield advantage was 10.63%, 1.08%, 23.32%, 23.05%, 21.29% and 17.18% respectively in Zone-I, II, III, IV, VI and VII over the farmer practices. In IPM adopted fields, the mean weed population reduction over the Zones ranged from 4.23 % in Zone-VII to 76.92% in Zone-VI at Active Tillering stage and from 10.00 % in Zone-VII to 82.39% in Zone-VII at Panicle Initiation stage respectively. The dry weed biomass reported by 11 locations showed that, both Active Tillering and Panicle Initiation stages were significantly reduced by 28.68% in Zone III to 80.07% in Zone-III; 9.38% in Zone VII to 82.87% in Zone-VII respectively.

IDT 4.4.5: Yield parameters and Grain yield & weed population no/m², weed biomass g/m² of Integrated Pest Management - on farm management of insects, diseases and weeds IPMs (Entomology, Pathology and Agronomy) - Special Interdisciplinary trial, Kharif 2024.

Location	Treatments	Panicle no/m ²	Panicle wt (g)	Grain Yield t/ha	Yield advantage	Straw Yield t/ha	Weed population no/m ²		Weed dry biomass g/m ²	
							Active tillering stage	Panicle initiation stage	Active tillering stage	Panicle initiation stage
ZONE-I										
MALAN	IPM	209	4.83	4.42	10.63	6.19	24.00(4.93)	26.00(5.14)	18.75	95.59
	Farmers Practice	194	4.56	3.95		5.77	60.40(7.79)	67.40(8.24)	45.77	307.37
	Exp. mean CD(0.05)	202 7	4.7 0.1	4.18 0.12		5.98 0.15	6.36 0.46	6.69 0.44	32.26 3.05	201.48 40.79
ZONE-II										
KAUL	IPM			5.72	1.22		1.00(1.10)			
	Farmers Practice			5.65			1.00(1.13)			
	Exp. mean CD(0.05)			5.69 0.37			1.11 0.51			
LUDHIANA	IPM	312	3.17	8.55	0.94	10.07		3.20(1.80)		20.03
	Farmers Practice	310	3.15	8.47		9.99		4.00(2.01)		27.66
	Exp. mean CD(0.05)	311 5	3.16 0.03	8.51 0.04		10.03 0.21		1.91 0.41		23.85 8.96
ZONE-III										
CHINSURAH	IPM	369	2.79	5.87		6.29	3.60(2.02)	0.96(1.20)	0.47	0.14
	Farmers Practice	324	2.62	4.94	15.84	5.29	10.80(3.36)	2.64(1.77)	3.80	0.43
	Exp. mean CD(0.05)	346 23	2.7 0.12	5.4 0.24		5.79 0.27	2.69 0.17	1.49 0.12	2.14 0.29	0.28 0.06
FAIZABAD	IPM	357	4.59	4.87	30.80	6.42	88.20(9.41)	94.22(9.68)	74.07	81.99
	Farmers Practice	212	3.18	3.37		4.57	257.90(16.07)	311.33(17.66)	103.86	110.31
	Exp. mean CD(0.05)	285 70	3.89 0.66	4.12 0.25		5.5 0.25	12.74 0.36	13.67 0.73	88.96 3.30	96.15 3.60

IDT 4.4.5: Contd.

Location	Treatments	Panicle no/m ²	Panicle wt (g)	Grain Yield t/ha	Yield advantage	Straw Yield t/ha	Weed population no/m ²		Weed dry biomass g/m ²	
							Active tillering stage	Panicle initiation stage	Active tillering stage	Panicle initiation stage
ZONE-IV										
TITABAR	IPM	228		4.86	23.05	9.44	38.40(6.23)	53.60(7.32)	9.30	12.52
	Farmers Practice	191		3.74		7.12	80.80(9.00)	100.00(10.01)	17.34	23.98
	Exp. mean CD(0.05)	209.5 12.41		4.3 0.17		8.28 1.36	7.62 0.42	8.67 0.34	13.32 1.86	18.25 2.12
ZONE-VI										
NAVSARI	IPM	335.8	5.06	5.34	11.05	7.29	6.60(2.64)	11.20(3.42)	8.53	13.69
	Farmers Practice	314.8	4.61	4.75		6.97	16.20(4.08)	19.20(4.43)	18.27	22.34
	Exp. mean CD(0.05)	325.3 23.11	4.83 0.43	5.05 0.35		7.13 0.14	3.36 0.31	3.93 0.21	13.40 3.05	18.02 1.79
VADAGOAN	IPM	231.2	5.45	5.93	31.53	6.28	12.59(3.60)	19.68(4.49)	22.70	33.14
	Farmers Practice	166.49	3.86	4.06		4.3	54.57(7.42)	64.01(8.03)	93.98	108.24
	Exp. mean CD(0.05)	198.85 9.16	4.66 0.21	4.99 0.23		5.29 0.25	5.51 0.34	6.26 0.19	58.34 6.69	70.69 4.37

IDT 4.4.5: Contd.

Location	Treatments	Panicle no/m ²	Panicle wt (g)	Grain Yield t/ha	Yield advantage	Straw Yield t/ha	Weed population no/m ²		Weed dry biomass g/m ²	
							Active tillering stage	Panicle initiation stage	Active tillering stage	Panicle initiation stage
ZONE-VII										
ADUTHURAI	IPM			4.17	13.67		13.30(3.70)		13.50	
	Farmers Practice			3.6			26.40(5.17)		20.40	
	Exp. mean CD(0.05)			3.88 0.52			4.44 0.38		16.95 3.24	
COIMBATORE	IPM			4.91	12.02		29.93(5.50)	10.80(3.35)	4.34	5.12
	Farmers Practice			4.32			31.27(5.63)	12.00(3.53)	6.61	5.65
	Exp. mean CD(0.05)			4.62 0.55			5.57 0.29	3.44 0.23	5.47 5.26	5.38 1.42
GANGAVATHI	IPM	336	2.78	6.10	28.20	5.25	18.33(4.22)	19.44(4.37)	44.72	65.78
	Farmers Practice	234	2.97	4.38		4.50	45.56(6.64)	27.22(5.22)	74.78	92.72
	Exp. mean CD(0.05)	285 47	2.87 0.36	5.24 0.46		4.88 0.54	5.43 1.53	4.79 1.09	59.75 40.58	79.25 23.04
MANDYA	IPM	360	3.84	7.17	24.97	7.97	3.60(1.92)	5.00(2.33)	1.35	3.26
	Farmers Practice	345	3.59	5.38		7.3	11.40(3.43)	28.40(5.35)	4.98	19.04
	Exp. mean CD(0.05)	353 11	3.72 0.53	6.27 1.29		7.63 0.69	2.67 0.56	3.84 0.59	3.17 1.75	11.15 2.84
PUDUCHERRY	IPM	347	3.97	5.97	7.04	8.79	52.87(7.30)	35.59(6.01)	33.55	22.37
	Farmers Practice	288	3.47	5.55		8.11	114.77(10.73)	80.84(9.02)	63.87	46.91
	Exp. mean CD(0.05)	317 2	3.72 0.02	5.76 0.01		8.45 0.07	9.02 0.14	7.51 0.12	48.71 2.01	34.64 1.54

IDT 4.4.5: Reduction% in weed parameters in Integrated Pest Management - on farm management of insects, diseases and weeds IPMs (Entomology, Pathology and Agronomy)-Special Interdisciplinary trial, Kharif 2024.

Zones	Centers	Weed Population (% reduction in IPM)		Weed dry biomass (% reduction in IPM)	
		Active tillering stage	Panicle initiation stage	Active tillering stage	Panicle initiation stage
ZONE-I	MALAN	60.26	61.42	59.03	68.90
	KAUL	0.00	-	-	-
		-	20.00	-	27.58
ZONE-II	LUDHIANA	-	20.00	-	27.58
	CHINSURAH	66.66	63.63	87.63	67.44
	FAIZABAD	65.80	69.73	28.68	25.67
ZONE-III	TITABAR	52.47	46.40	46.36	47.78
	NAVASARI	59.25	41.66	53.31	38.71
	VADAGOAN	76.92	69.25	75.84	69.38
ZONE-IV	ADUTHURAI	49.62	-	33.82	-
	COIMBATORE	4.23	10.00	34.34	9.38
	GANGAVATHI	59.70	28.58	40.19	29.05
ZONE-V	MANDYA	68.42	82.39	72.00	82.87
	PUDUCHERRY	53.93	55.97	47.47	52.31

4.4.6 Evaluation of drone for its suitability to various agronomy interventions

As much as India depends upon the agriculture, still it is far short from adapting latest technologies in it to get good farm. Developed countries have already started use of UAV's in their precision Agriculture. It is very fast and it could reduce the workload of a farmer. A technical analysis of UAVs in precision agriculture is to analyze their applicability in agriculture operations like pesticide Spraying, soil and field analysis. Drones have long been thought of as expensive equipment's. One area that has seen little attention from drones, perhaps to its detriment, is the agricultural sector. Drones are preferred over full size aircrafts due to major factors like combination of high spatial resolution and fast turnaround capabilities together with low operation cost and easy to trigger. Drone being a modern technology can be solution for farmers to achieve these challenges. Agricultural drones provide relief for the modern-day farmer to reduce drudgery and with less time lots of work can be achieved to bring sustainability in futuristic rice cultivation. Although the use of UAVs in agriculture has been steadily increasing, such growth is hindered by many technical challenges that still need to be overcome. In this context, the objective of this trial is to provide a comprehensive overview of the application of Drone (UAVs) for Agronomy operations in rice for its suitability and cost effectiveness. As indicated, UAV's have been used in many areas in agriculture, although they still have many limitations and challenges to overcome. To evaluate the suitability of drones to various Agronomic practices (sowing, herbicide spray and top dressing of fertilisers) drone technology, a new trial was formulated with the following objectives 1. To Evaluate the suitability of drones to various Agronomic practices (sowing, herbicide spray and top dressing of fertilisers) 2. To evaluate cost reduction and economics of the drone technology. The trial consisted of 6 treatments and laid out in RBD design with 3 replications. Treatments are T₁: Broadcasting in Wet DSR; T₂: Drone broad casting in Wet DSR; T₃: Pre-emergence herbicide manually; T₄- Pre-emergence herbicide with drone; T₅- Nano or micro nutrients as top dressing at 30- 45 DAS manually and T₆- Nano or micro nutrients as top dressing at 30- 45 DAS by drone. However, only the data received only for 3 treatments (S₁: Drone; S₂: Battery operated knapsack sprayer and S₃: Untreated control) from 5 locations (**Chinsurah, Gangavathi, Ludhiana, Moncompu and ARI-Rajendranagar**). The results were summarized and presented in **Table 4.4.6** and the salient findings are as followed.

At **Chinsurah**, swarna variety resulted in the highest grain yield of 5.36 t/ha under pre- and post-emergence application of herbicide through knapsack sprayer. However, it was at par with drone based herbicide application (5.23 t/ha). Sedges population two weeks after pre-emergence application was found to be controlled effectively both in knapsack and drone treated plots. Similar control of broad leaf weeds is also observed in knapsack and drone treated plots. Similar results were also observed 2 weeks after post-emergence applications of herbicide. Biomass production of weeds also reflected similar results at 2 weeks after pre as well as post-emergence application of herbicide.

At **Gangavathi**, drone treated plot resulted in the highest grain yield 6.58 t/ha than that of knapsack treated plots (6.28 t/ha). In pre-emergence treated plots 2 weeks after spraying,

knapsack sprayer significantly reduced grasses population than that of drone treated plots. However, sedges and BLWs populations were less in drone treated plots compared to that of knapsack sprayer treated plots. In post-emergence treated plots 2 weeks after sowing, drone sprayed herbicide found to be equally effective in controlling the grasses, sedges and BLWs populations. Similarly, weed biomass either 2 weeks after pre-emergence or 2 weeks after post-emergence application of herbicide were reduced significantly in both drone and knapsack treated plots.

At **Ludhiana**, growth, yield and weed parameters were found to be non-significant. The highest grain yield (7.92 t/ha) was recorded in knapsack sprayer treated plots at par with drone treated plots (7.89 t/ha). At **Moncompu**, significantly the highest grain yield (7.57 t/ha) was recorded in drone treated plots over knapsack sprayer treated plots (6.47 t/ha). The lower grasses, sedges and BLWs populations were the lowest in drone treated plots. At **ARI-Rajendranagar**, drone treated plots resulted in the highest grain yield (6.14 t/ha) followed by knapsack treated plots. In pre-emergence as well as post-emergence treated plots, herbicide sprayed by knapsack sprayer reduced maximum weed population compared to that of drone treated plots. Weed biomass after 2 weeks of pre-emergence herbicide application was the lowest in drone treated plots. But weed biomass after 2 weeks of post-emergence herbicide application was the lowest in knapsack sprayed plots.

The overall mean grain yield of 5 locations revealed that pre-emergence and post-emergence application of herbicides through drone resulted in the highest grain yield (6.68 t/ha) followed by knapsack sprayed plots (6.31 t/ha).

Table 4.4.6: Evaluation of drone for its suitability to various Agronomy interventions (New experiment), kharif 2024.

Methods of crop establishment	CHINSURAH																	
	Grain yield (t/ha)	Rank	Plant height (cm)	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Weed population 2 weeks after pre emergent herbicide application (no/m ²)			Weed population 2weeks after Post emergent herbicide application (no/m ²)			Weed Bio mass 2weeks after pre emergent herbicide application(g/m ²)			Weed Bio mass 2weeks after Post emergent herbicide application(g/m ²)		
							Grasses	Sedges	BLW	Grasses	Sedges	BLW	Grasses	Sedges	BLW	Grasses	Sedges	BLW
S1	5.23	2	92.94	368	2.51	21.55	0.00(0.71)	2.16(1.62)	2.84(1.82)	4.33(2.19)	2.62(1.76)	3.01(1.86)	0.53	0.14	1.22	0.65	0.50	1.42
S2	5.36	1	96.55	382	2.58	21.61	0.00(0.71)	1.89(1.54)	2.00(1.58)	2.48(1.72)	1.85(1.50)	2.52(1.73)	0.33	0.12	0.67	0.40	0.42	0.85
S3	3.28	3	82.60	307	2.37	21.00	0.00(0.71)	19.10(4.42)	16.51(4.12)	30.60(5.55)	67.69(8.21)	37.49(6.15)	2.72	1.21	5.90	18.02	7.06	10.62
Expt. Mean	4.62		90.70	352	2.49	21.39	0.71	2.53	2.51	3.16	3.82	3.24	1.19	0.49	2.60	6.36	2.66	4.29
C.D. (0.05)	0.13		2.92	10.53	0.19	0.5	0	0.31	0.35	0.55	0.96	0.62	1.24	0.73	2.6	7.79	3.42	4.21
C.V. (%)	1.6		2.22	1.73	4.33	1.35	0.03	7.18	8.01	10.06	14.56	11.1	60.03	85.25	57.95	70.81	74.36	56.72
res(t)	**		**	**	NS	*	NS	**	**	**	**	**	**	*	**	**	**	**
Soil type	Clay loam																	
pH	-																	
EC	-																	
Variety & Duration	Swarna (145-147 days)																	
Applied NPK kg/ha	80:40:40																	
Available NPK kg/ha	-																	

T1 - Drone

T2 - Battery operated Knapsack sprayer

T3 - Untreated control

Table 4.4.6: Contd.

GANGAVATHI																			
Methods of crop establishment	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant height (cm)	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Weed population 2 weeks after pre emergent herbicide application (no/m ²)			Weed population 2weeks after Post emergent herbicide application(no/m ²)			Weed Bio mass 2weeks after pre emergent herbicide application(g/m ²)			Weed Bio mass 2weeks after Post emergent herbicide application(g/m ²)		
								Grasses	Sedges	BLW	Grasses	Sedges	BLW	Grasses	Sedges	BLW	Grasses	Sedges	BLW
S1	6.58	1	6.67	91.67	374	3.48	1.51	17.59(4.20)	1.85(1.29)	3.47(1.97)	2.78(1.70)	1.39(1.15)	0.00(0.71)	15.97	1.67	13.26	7.16	4.38	0.00
S2	6.28	2	6.25	86.67	336	3.11	1.46	7.41(2.73)	2.78(1.46)	9.72(3.05)	6.25(2.15)	2.08(1.27)	1.39(1.15)	10.42	1.94	25.97	16.67	13.33	3.96
S3	3.38	3	4.58	83.33	293	3.03	1.43	28.70(5.40)	15.74(3.90)	25.00(5.02)	47.22(6.89)	14.58(3.78)	20.14(4.51)	26.39	15.35	71.88	216.60	25.28	114.17
Expt. Mean	5.41		5.83	87.22	334	3.20	1.46	4.11	2.22	3.35	3.58	2.07	2.12	17.59	6.32	37.04	80.14	14.33	39.38
C.D. (0.05)	0.27		1.48	6.2	82.62	0.29	0.02	0.82	2.12	1.37	1.59	2.07	1.2	11.75	9.87	35.53	103.86	26.59	58.37
C.V. (%)	3.42		17.5	4.9	17.04	6.22	1.14	13.71	66.04	23.56	25.64	58	32.64	38.59	90.29	55.44		107.24	85.68
res(t)	**		NS	NS	NS	NS	**	*	NS	**	**	*	**	*	*	*	**	NS	**
Soil type	Black soil																		
pH	-																		
EC	-																		
Variety	BPT 5204 (120 days)																		
Applied NPK	150:75:75																		
Available NPK	-																		

T1 - Drone

T2 - Battery operated Knapsack sprayer

T3 - Untreated control

Table 4.4.6: Contd.

Methods of crop establishment	LUDHIANA							Harvest Index
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant height (cm)	Panicle wt (g)	Weed population at flowering stage (no/m ²)	Weed Biomass at flowering stage (g/m ²)	
S1	7.89	2	9.43	98.10	2.74	1.00(1.17)	5.66	45.54
S2	7.92	1	9.43	98.37	2.75	1.00(1.17)	5.83	45.65
S3	7.43	3	8.88	97.70	2.68	4.00(2.11)	17.83	45.55
Expt. Mean	7.75		9.25	98.06	2.72	1.48	9.77	45.58
C.D. (0.05)	0.19		0.31	2.27	0.22	0.66	8.63	0.56
C.V. (%)	1.69		2.34	1.59	5.56	30.44	60.92	0.85
res(t)	*		NS	NS	NS	NS	NS	NS
Soil type	-							
pH	-							
EC	-							
Variety & Duration	-							
Applied NPK kg/ha	-							
Available NPK kg/ha	-							

T1 - Drone

T2 - Battery operated Knapsack sprayer

T3 - Untreated control

Table 4.4.6: Contd.

MONCOMPU													
Methods of crop establishment	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant height (cm)	Panicle/m ² (No.)	Panicle wt (g)	Test wt (g)	Days to 50% flowering	Weed population 2weeks after Post emergent herbicide application(no/m ²)			Weed Bio mass 2weeks after Post emergent herbicide application(g/m ²)	
									Grasses	Sedges	BLW	Grasses	Sedges
S1	7.57	1	10.23	87.67	403	3.57	24.83	81	1.75(1.44)	1.50(1.40)	1.25(1.27)	4.25	2.48
S2	6.47	2	8.50	99.00	400	2.85	24.17	82	5.75(2.47)	2.75(1.79)	3.25(1.93)	15.80	4.65
S3	3.67	3	6.23	85.00	196	2.10	21.00	80	34.00(5.86)	3.25(1.89)	6.25(2.55)	159.00	7.45
Expt. Mean	5.90		8.32	90.56	333	2.84	23.33	81	3.26	1.69	1.92	59.68	4.86
C.D. (0.05)	0.63		0.81	5.05	14.17	0.25	1.18	0.97	0.68	0.41	0.7	24.45	4.04
C.V. (%)	7.36		6.7	3.84	2.93	6.02	3.5	0.83	11.98	13.99	21.09	23.68	48.02
res(f)	**		**	*	**	**	**	NS	**	NS	*	**	NS
Soil type	Clay loam												
pH	-												
EC	-												
Variety & Duration	MO 16-Uma (120 days)												
Applied NPK kg/ha	90:45:45												
Available NPK kg/ha	90:45:45												

T1 - Drone
T2 - Battery operated Knapsack sprayer
T3 - Untreated control

Table 4.4.6: Contd.

Methods of crop establishment	ARI-RAJENDRANAGAR									Over all Mean	Rank
	Grain yield (t/ha)	Rank	Straw yield (t/ha)	Plant height (cm)	Panicle/m ² (No.)	Weed population 2 weeks after pre emergent herbicide application (no/m ²)	Weed population 2weeks after Post emergent herbicide application(no/m ²)	Weed Bio mass 2weeks after pre emergent herbicide application(g/m ²)	Weed Bio mass 2weeks after Post emergent herbicide application(g/m ²)		
S1	6.14	1	6.50	104.77	279	23.50(4.78)	27.80(5.29)	11.87	22.58	6.68	1
S2	5.52	2	6.18	102.40	328	19.20(4.31)	25.30(5.06)	14.09	19.36	6.31	2
S3	3.20	3	3.36	98.33	189	42.50(6.46)	54.60(7.38)	32.36	49.71	4.19	3
Expt. Mean	4.95		5.35	101.83	266	5.18	5.91	19.44	30.55	5.73	
C.D. (0.05)	0.86		1.09	2.4	38.73	1.17	0.59	8.89	9.48		
C.V. (%)	12.01		14.02	1.62	10.06	24.04	10.71	48.66	33.02		
res(f)	**		*	*	**	**	**	**	**	**	
Soil type	Clay loam										
pH	-										
EC	-										
Variety & Duration	RNR 15048										
Applied NPK kg/ha	120:60:40										
Available NPK kg/ha	-										

T1 - Drone
T2 - Battery operated Knapsack sprayer
T3 - Untreated control

ANNEXURES

Annexure - I

Major weeds observed during Kharif - 2024

Grasses	Sedges	BLW
<i>Cynodon dactylon</i> <i>Chloris barbata</i> <i>Dactylactenium aegyptium</i> <i>Digiteria longifolia</i> <i>Digiteria sanguinalis</i> <i>Echinochloa acolona</i> <i>Echinochloa crusgalli</i> <i>Echinochloa stagnina</i> <i>Eleusine indica</i> <i>Isachne miliacea</i> <i>Ischaemum rugosum</i> <i>Leptochloa chinensis</i> <i>Leersia hexandra</i> <i>Panicum repens</i> <i>Paspalum dilatatum</i> <i>Oplismenus burmannii</i> Weedy rice (<i>Oryzasativa</i> f. <i>spontanea</i>)	<i>Cyperus difformis</i> <i>Cyperus</i> <i>esulentus</i> <i>Cyperus iria</i> <i>Cyperus rotundus</i> <i>Fimbristylis miliacea</i> <i>Fimbristylis teragona</i>	<i>Alternanthera sessilis</i> <i>Ammania baccifera</i> <i>Ageratum conyzoides</i> <i>Alternanthera spp</i> <i>Bergia ammoides</i> <i>Commelina diffusa</i> <i>Cynotis cristata</i> <i>Eclipta alba</i> <i>Euphorbia prostrata</i> <i>Euphorbia hirta</i> <i>Eclipta prostrata</i> <i>Hydrolea zeylanica</i> <i>Ipomoea aquatica</i> <i>Ludwigia parviflora</i> <i>Ludwigia octovalvis</i> <i>Ludwigia hyssopifolia</i> <i>Marsilea quadrifolia</i> <i>Monochoria vaginalis</i> <i>Mullugo verticillate</i> <i>Physalis minima</i> <i>Phyllanthus niruri</i> <i>Parthenium hysterophorous</i> <i>Solanum retroflexum</i> <i>Solanum nigrum</i> <i>Sphenoclea zeylanica</i> <i>Trianthema portulacastrum</i>

Annexure - II

WEATHER DATA – KHARIF 2024

ADUTHURAI								
Latitude :	11° N		Longitude:	79.3°E			Elevation(m) :	19.47 MSL
Soil type:	Clay		Soil pH :	7.2			Soil texture :	Clay Loam
	July 24	Aug	Sept.	Oct.	Nov.	Dec.24	Total / Range	
No. of Rainy days	1.0	5.0	0.0	9.0	14.0	8.0	37	
Total Rainfall (mm)	12.2	50.8	0	241.4	249.5	350.8	904.7	
Avg. Max. Temp. (°C)	35.4	35.2	36.1	33.5	30.2	29.4	29.4-36.1	
Avg. Mini. Temp. (°C)	25.6	25.0	27.5	24.4	22.8	22.6	22.8-27.5	
Avg. Sunshine hours	3.2	6.5	8.3	6.2	2.2	4.3	5.117	
Avg. wind velocity (kmph)	9.9	5.9	9.1	3.2	4.1	2.3	5.75	

ALMORA								
Latitude :	290.36°N		Longitude:	79° 40 E			Elevation(m) :	1250
Soil type:	Clay loam		Soil pH :	6.5			Soil texture :	Clay
	May	June	July	Aug	Sep	Oct	Total / Range	
No. of Rainy days	4	7	17	14	9	1	52	
Total Rainfall (mm)	29.5	25.0	382.5	148.0	173.5	2.0	760.5	
Avg. Max. Temp. (°C)	33.25	35.2	30.0	27.8	30.6	30.4	35.2-20.5	
Avg. Mini. Temp. (°C)	14.96	17.86	20.5	19.5	18.0	11.7	11.7-20.5	
Avg. Sunshine hours	8.76	7.71	4.72	5.14	5.24	7.78	6.558	

BANKURA							
Latitude :	23.24185		Longitude:	87.05715		Elevation (m):	84 MSL
Soil type:	Red & Lateritic		Soil pH :	4.5 – 6.0		Soil texture	Sandy Loam
	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Total / Range
No. of rainy days	01	09	07	07	05	0	29
Total rainfall (mm)	10.4	176.6	131.4	190.18	112.9	31.3	652.8
Avg. Max Temp. (°C)	37.50	33.27	34.45	34.22	32.41	25.00	37.5-25
Avg. Min.Temp. (°C)	25.90	25.82	25.41	24.22	25.33		24.22-25.9
* Avg. Sunshine hours	13.32	13.23	12.54	12.16	11.35	11.00	12.27
* Avg. wind velocity	1.9	1.3	0.6	1.0	0.6	0.4	0.967

CHATHA							
Latitude:	32º 40'N		Longitude:	74º 48'E		Elevation (m) :	293
Soil type:	-		Soil pH :	-		Soil texture:	Clay loam
	June	July	Aug	Sep	Oct	Nov	Total / Range
No. of Rainy days	03	12	12	6	1	0	34
Total Rainfall (mm)	45	459.6	412.2	261.4	22.4	0	1201
Avg. Max. Temp. (°C)	40.6	35.6	33.4	34.4	32.7	27.3	40.6-27.3
Avg. Mini. Temp. (°C)	24.6	26.2	25.7	24.3	18.1	11.5	11.5-26.2
Avg. Sunshine hours	6.9	5	8.2	7.6	7.1	6.9	6.95

CHINSURAH							
Latitude :	22°52′ N		Longitude	88°24′ E		Elevation:	8.62 m MSL
Soil type:	Clay Loam		Soil pH :	7.3		Soil texture:	Gangetic Alluvial
	June	July	Aug	Sep	Oct	Nov	Total/Range
No. of Rainy days	9	26	25	20	14	1	95
Total Rainfall (mm)	45.4	185.3	465.8	349.4	243.8	1.5	1291
Avg. Max. Temp. (°C)	36.5	34.4	32.4	33.6	32	29.2	29.2-36.5
Avg. Mini. Temp. (°C)	28.1	27.1	26.5	26.5	25	20.7	28.1-20.7

CHIPLIMA							
Latitude :	20°21'N		Longitude:	80°55'E		Elevation (m) :	178.8 m MSL
Soil type:	Mixed Red, Black & Lateritic		Soil pH :	-		Soil texture:	-
	July	Aug	Sep	Oct	Nov	Dec	Total / Range
No. of Rainy days	21	24	12	04	02	02	65
Total Rainfall (mm)	34.17	32.15	32.61	29.47	31.52	27.25	187.2
Avg. Max. Temp. (°C)	26.4	27.4	28.7	26.6	20.4	20.3	20.3-28.7
Avg. Mini. Temp. (°C)	24.1	23.0	25.0	21.3	11.8	8.2	25-8.2

GANGAVATHI							
Latitude:	15°15'40"		Longitude:	76°31'40"		Elevation (m):	406
Soil type:	Medium black		Soil pH:	6.5 to 7.5		Soil texture:	Clay soil
	July	Aug	Sep	Oct	Nov	Dec	Total / Range
No. of Rainy days	3	10	4	8	3	1	29
Total Rainfall (mm)	34.0	242.2	55.5	125.5	14.5	6.0	477.7
Avg. Max. Temp. (°C)	31.50	28.85	31.15	30.98	29.92	29.97	31.5-28.85
Avg. Mini. Temp. (°C)	24.76	24.09	23.63	23.45	18.96	20.63	18.96-24.76

JAGDALPUR							
Latitude:	19.05 °N		Longitude:	82.02°E		Elevation (m):	552
Soil type:	Alfisol		Soil pH:	6.5		Soil texture:	Sandy loam
	June	July	Aug	Sep	Oct	Nov	Total / Range
No. of Rainy days	10	20	16	15	5	0	66
Total Rainfall (mm)	273.6	434.1	331.7	284.1	32.2	0.2	1356
Avg. Max. Temp. (°C)	33.6	28.4	29.9	30.5	32.0	29.7	33.6-28.4
Avg. Mini. Temp. (°C)	23.1	22.4	22.2	22.4	21.0	13.9	13.9-23.1
Avg. Sunshine hours	4.9	0.4	1.8	3.8	6.6	6.8	4.05
Avg. wind velocity	4.4	5.6	3.4	3.5	1.0	1.5	3.233

JEYPORE								
Latitude:	18.6N		Longitude:	82.44E		Elevation (m):		553
Soil type:	acidic		Soil pH:	6.6		Soil texture:		Sandy Loam
	June	July	Aug	Sep	Oct	Nov	Dec	Total / Range
No. of Rainy days	13	25	21	19	13	1	6	98
Total Rainfall (mm)	260	593	373	472	175	1	29	1903
Avg. Max. Temp. (°C)	39	31	33	34	35	33	32	39-31
Avg. Mini. Temp. (°C)	22	22	22	22	20	11	9	9-22

KARJAT							
Latitude:	18° 55' N		Longitude:	73° 18' N		Elevation (m):	51 m
Soil type:	Medium Black		Soil pH:	6.2		Soil texture:	Clay Loam
	June	July	Aug	Sep	Oct	Nov	Total / Range
No. of Rainy days	14.00	30.0	24.00	22.00	12	0.0	102
Total Rainfall (mm)	507.1	2227.8	995.2	682.5	217.7	0.0	4630
Avg. Max. Temp. (°C)	34.1	29.1	31.3	31.1	33.86	34.83	34.83-29.1
Avg. Mini. Temp. (°C)	25.7	23.9	25.1	24.4	22.89	18.45	18.45-25.7
Avg. Sunshine hours	3.3	0.2	2.1	3.0	6.29	6.37	3.543
Avg. wind velocity	4.78	5.1	3.32	1.73	1.34	0.87	2.857

KAUL							
Latitude:	29° 51' 29.5"N		Longitude:	76° 39' 24.3" E		Elevation (m):	230.7
Soil type:	Clay Loam		Soil pH:	8.04		Soil texture:	Clay
	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Total / Range
No. of Rainy days	2	7	8	7	1	0	25
Total Rainfall (mm)	19.1	344.7	173.7	211.4	9.7	0	758.6
Avg. Max. Temp. (°C)	40.9	35.3	33.7	33.0	33.6	27.2	40.9-27.2
Avg. Mini. Temp. (°C)	26.5	27.2	26.2	24.5	19.3	12.8	27.2-12.8
Pan evaporation (mm)	6.9	3.3	1.9	1.5	1.5	0.9	
Avg. Sunshine hours	7.4	4.0	5.5	5.2	7.0	3.4	5.416
Avg. wind velocity	6.4	3.9	2.9	1.9	2.1	1.2	3.066

KHUDWANI								
Latitude:	34°N		Longitude:	73°E		Elevation (m):		1560 m amsl
Soil type:	Clayey loam		Soil pH:	Neutral		Soil texture:		Silty clay loam
	Apr	May	June	July)	Aug	Sep	Oct	Total / Range
No. of Rainy days	14	5	9	3	14	3	2	50
Total Rainfall (mm)	270	32.2	33.8	11.2	159.2	7.5	4	517.9
Avg. Max. Temp. (°C)	18.9	26.9	28.5	32.8	28.9	29.4	26.6	32.8-18.9
Avg. Mini. Temp. (°C)	5.3	9.0	11.8	16.9	16.6	12.2	5.8	5.3-16.9

LUDHIANA							
Latitude:	30° 54'N		Longitude:	75° 48'E		Elevation (m):	247 MSL
Soil type:	Loamy Sand		Soil pH:	7.7		Soil texture:	-
	May	June	July	Aug	Sep	Oct	Total / Range
No. of Rainy days	0	3	9	9	4	0	25
Total Rainfall (mm)	0	48.6	137.2	239.9	98.4	0.4	524.5
Avg. Max. Temp. (°C)	40.3	40.1	35.3	33.4	33.2	33.3	40.3-33.2
Avg. Mini. Temp. (°C)	24.4	27.6	28.3	26.9	25.6	20	20-28.3
Avg. Sunshine hours	10	8	3.9	6.2	6.4	7.6	7.016
Avg. wind velocity	5.1	5.3	3.9	3.7	2.6	2.1	3.783

MALAN							
Latitude :	32° 1' N		Longitude:	76° 20' E		Elevation(m) :	950m
Soil type:	Alfisol		Soil pH :	5.6-5.8		Soil texture	Silty clay loam
	June	July	Aug	Sep	Oct.	Nov	Total / Range
No. of Rainy days	6	17	15	13	-	-	51
Total Rainfall (mm)	120.5	888.7	683.8	220	-	-	1913
Avg. Max. Temp. (°C)	36.1	31.9	23.8	26.2	26.8	24.4	36.1-23.8
Av-g. Mini. Temp. (°C)	18.4	19.1	15.7	17.0	14.5	13.3	13.3-19.1

MANDYA							
Latitude :	12.45-13.57 N		Longitude:	76.48 - 78.24 E		Elevation(m) :	695 M
Soil type:	Sandy loam		Soil pH :	6.5 – 7.1		Soil texture	Sandy loam
	July	Aug	Sep	Oct.	Nov	Dec	Total / Range
No. of Rainy days	9	7	4	8	4	3	35
Total Rainfall (mm)	75.20	62.00	101.00	116.00	37.00	59.00	450.2
Avg. Max. Temp. (°C)	27.94	29.55	30.63	29.61	29.00	28.61	30.63-27.94
Avg. Mini. Temp. (°C)	19.84	21.10	20.33	20.58	18.87	18.55	8.55-21.1
* Avg. Sunshine hours	6.68	6.68	7.02	6.60	6.92	7.00	6.816
*Avg. wind velocity	5.65	5.38	3.06	2.85	2.71	2.44	3.681

MARUTERU							
Latitude :	16.38° N		Longitude:	81.44° E		Elevation (m):	5m
Soil type:	Black alluvial clay		Soil pH :	6.5-7.5		Soil texture	Delta alluvial
	July	Aug	Sep	Oct	Nov	Dec	Total / Range
No. of rainy days	19	12	10	13	2	1	57
Total rainfall (mm)	328.4	215.2	240.6	197.4	11	17.4	1010
Avg. Max Temp. (°C)	30.10	31.42	31.20	30.89	30.80	28.58	31.42-28.58
Avg. Min.Temp. (°C)	26.00	26.55	26.32	25.05	22.97	22.35	22.35-26.55

MONCOMPU							
Latitude :	9°26'15"N		Longitude:	76°25'42"E		Elevation(m) :	1-2.5m below MSL
Soil type:	Alluvial clay		Soil pH :	5.5		Soil texture :	Silty Clay Loam
	June	July	Aug	Sep	Oct	Nov	Total / Range
No. of Rainy days	20	23	11	15	10	8	87
Total Rainfall (mm)	410.5	477.6	327.5	158.1	314.4	262.5	1950.6
Avg. Max. Temp. (°C)	31.3	30.2	31.1	31.9	31.8	32.2	32.2-30.2
Avg. Mini. Temp. (°C)	25.5	24.1	25.0	25.1	24.8	24.8	24.1-25.5

NAGINA							
Latitude :	29° 28'N		Longitude:	78° 32'E		Elevation(m) :	450
Soil type:	Sandy loam		Soil pH :	7.5		Soil texture :	
	June	July	Aug	Sep	Oct	Nov	Total / Range
No. of Rainy days	04	13	12	10	00	00	39
Total Rainfall (mm)	78.6	508.0	191.6	205.2	00	00	983.4
Avg. Max. Temp. (°C)	37.7	33.7	32.5	32.6	32.3	27.3	37.7-27.3
Avg. Mini. Temp. (°C)	24.3	25.2	25.6	24.3	18.5	11.4	11.4-25.6
Avg. Sunshine hours	7.8	5.2	4.4	4.5	6.6	4.6	5.516
Avg. wind velocity	5.9	4.5	4.8	2.5	1.7	1.8	3.533

NAVSARI								
Latitude:	20° 29'		Longitude:	73o 29'		Elevation (m):		105 m
Soil type:	Clayey		Soil pH :	7.5		Soil texture		Loamy
	June	July	Aug	Sep	Oct	Nov	Dec	Total / Range
No. of rainy days	10	21	21	13	6	0	0	71
Total rainfall (mm)	238.0	1281.0	387.0	368.0	120.0	0.0	0.0	2394
Avg. Max Temp. (°C)	34.2	30.5	30.0	31.2	34.4	33.7	29.7	34.4-29.7
Avg. Min.Temp. (°C)	26.0	25.1	24.8	24.1	23.2	17.8	14.7	14.7-26
* Avg. Sunshine hours	5.3	0.9	1.8	3.7	6.5	8.1	5.0	4.471
* Avg. wind velocity	6.3	6.8	5.4	2.5	2.2	2.4	2.7	4.042

NAWAGAM								
Latitude:	22° 48'		Longitude:	71° 3'		Elevation (m):		32.4
Soil type:	Medium Black		Soil pH :	7.8		Soil texture		Sandy Clay loam
	May	June	July	Aug	Sep	Oct	Total / Range	
No. of rainy days	01	06	14	14	11	02	48	
Total rainfall (mm)	1.0	113.80	199.00	538.8	276.20	5.60	1134.4	
Avg. Max Temp. (°C)	42.7	39.1	33.2	31.0	31.6	34.8	42.7-31	
Avg. Min.Temp. (°C)	26.9	27.3	26.0	25.8	25.1	23.5	23.5-27.3	
* Avg. Sunshine hours	9.6	6.9	2.2	3.4	5.6	5.6	5.55	
* Avg. wind velocity	4.8	3.9	1.8	1.9	0.4	8.0	3.466	

NRRRI CUTTACK								
Latitude	20.5N		Longitude:	86.0N		Elevation (m):		23.8M
Soil type:	Clay loam		Soil pH :	6.9		Soil texture		
	July	Aug	Sep	Oct	Nov	DEC	Total / Range	
No. of rainy days	7	21	14	17	7	0	66	
Total rainfall (mm)	215.00	269.10	279.90	277.00	84.00	0	1125	
Avg. Max Temp. (°C)	36.67	31.75	31.95	31.30	32.58	29.94	36.67-29.94	
Avg. Min.Temp. (°C)	26.95	27.15	26.77	26.60	25.68	20.95	20.95-27.15	
* Avg. Sunshine hours	4.60	1.60	1.64	3.18	4.50	4.65	3.3617	

DHANGAIN								
Latitude :	25.30° N		Longitude:	85.15° E		Elevation (m) :		52 m
Soil type:	Recent alluvial		Soil pH :	7.5		Soil texture		Clay loam
	June	July	Aug.	Sep.	Oct.	Nov	Total / Range	
No. of Rainy days	03	09	11	09	02	0	34	
Total Rainfall (mm)	74.7	167	1908	201.9	14.7	0	2366.3	
Avg. Max. Temp. (°C)	39.5	34.7	33.8	33.6	32.6	30.2	39.5-30.2	
Avg. Mini. Temp. (°C)	28.2	28.5	27.2	27.5	25.5	17.8	17.8-28.5	
Avg. Sunshine hours	NR	NR	NR	NR	NR	NR	NR	
Avg. wind velocity	NR	NR	NR	NR	NR	NR	NR	

PATTAMBI								
Latitude:	10.80		Longitude:	76.19		Elevation (m):		63M
Soil type:	LATERITE		Soil pH:			Soil texture:		
	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Total / Range	
No. of Rainy days	20	15	13	13	3	4	68	
Total Rainfall (mm)	787.7	253.2	260	161.5	44.1	104.3	1610.8	
Avg. Max. Temp. (°C)	29.0	30.6	31.5	31.9	32.0	40.3	40.3-29	
Avg. Mini. Temp. (°C)	21.0	21.1	19.2	21.4	20.0	19.0	19-21.4	
Avg. Sunshine hours	36.2/1.1	124/4.2	188.6/6.0	151.7/4.8	178.4/5.9	192.1/6.1		
Avg. wind velocity	100.7/3.2	77/3.2	45/7	70.3/2.2	84.9/2.8	105/3.3		

PUSA								
Latitude:	25.97 N		Longitude:	85.64 E		Elevation (m):		52.0
Soil type:	calcareous		Soil pH:	8.2-8.4		Soil texture:		Sandy-loam
	June	July	Aug	Sep	Oct	Nov	Total / Range	
No. of Rainy days	06	10	16	13	-	-	45	
Total Rainfall (mm)	94.0	158.8	295.2	134.5	-	-	682.5	
Avg. Max. Temp. (°C)	35.8	33.4	33.2	33.0	32.1	29.3	35.8-29.3	
Avg. Mini. Temp. (°C)	26.3	26.8	25.4	25.5	23.2	16.6	16.6-26.8	
Avg. Sunshine hours	5.2	4.4	5.3	5.3	4.6	2.9	4.616	
Avg. wind velocity	7.8	10.4	9.3	9.1	6.4	5.3	8.05	

RAGOLU							
Latitude:	18.24° N		Longitude:	83.84°E		Elevation (m):	27 MSL
Soil type:	Red sandy loam with clay base		Soil pH:	-		Soil texture:	Low organic matter content
	July	Aug	Sep	Oct	Nov	Dec	Total / Range
No. of Rainy days	8	11	7	2	1	7	36
Total Rainfall (mm)	151	139.5	186	27.2	6.10	82.10	591.9
Avg. Max. Temp. (°C)	31.85	32.20	32.50	30.27	29.80	28.77	32.5-28.77
Avg. Mini. Temp. (°C)	26.98	27.14	26.70	24.72	20.80	20.29	20.29-27.14
Avg. Sunshine hours	5.94	5.63	5.40	5.37	5.26	5.24	5.473
Avg. wind velocity	1.18	1.23	1.10	1.12	1.10	1.10	1.138

RAIPUR								
Latitude:	21o16' N			Longitude:	80o 36' E		Elevation (m):	298
Soil type:	Sandy loam			Soil pH:	-		Soil texture:	Clay loam
	June	July	Aug	Sep	Oct	Nov	Dec	Total / Range
No. of Rainy days	7	18	16	8	2	0	0	51
Total Rainfall (mm)	131.0	342.5	356.8	284.4	12.1	0.0	2.6	1129.4
Avg. Max. Temp. (°C)	39.0	31.2	30.5	31.9	33.0	30.3	28.2	39-28.2
Avg. Mini. Temp. (°C)	27.7	25.8	25.4	25.4	24.5	16.0	15.2	15.2-27.7
Avg. Sunshine hours	5.0	2.0	2.6	4.0	6.8	6.1	4.3	4.4
Avg. wind velocity	7.3	7.6	6.8	5.5	3.0	2.3	3.3	5.114

RAGOLU							
Latitude:	18.24 o N		Longitude:	83.84oE		Elevation (m):	27 MSL
Soil type:	Red sandy loam with clay base		Soil pH:	-		Soil texture:	Low organic matter content
	July	Aug	Sep	Oct	Nov	Dec	Total / Range
No. of Rainy days	8	11	7	2	1	7	36
Total Rainfall (mm)	151	139.5	186	27.2	6.10	82.10	591.9
Avg. Max. Temp. (°C)	31.85	32.20	32.50	30.27	29.80	28.77	32.5-28.77
Avg. Mini. Temp. (°C)	26.98	27.14	26.70	24.72	20.80	20.29	20.29-27.14
Avg. Sunshine hours	5.94	5.63	5.40	5.37	5.26	5.24	5.473
Avg. wind velocity	1.18	1.23	1.10	1.12	1.10	1.10	1.138

RANCHI							
Latitude:	27° 17' N		Longitude:	85°19' E		Elevation (m):	625 m
Soil type:	Red Lateritic		Soil pH:	5.6		Soil texture:	Sandy loam
	June	July	Aug	Sep	Oct	Nov	Total / Range
No. of Rainy days	6	18	21	13	4	0	62
Total Rainfall (mm)	81.2	473.0	657.0	407.0	63.0	0.0	1681.2
Avg. Max. Temp. (°C)	36.8	33.4	32.6	31.9	30.8	27.0	36.8-27
Avg. Mini. Temp. (°C)	25.8	23.9	23.8	22.3	19.7	13.2	13.2-25.8
Avg. Sunshine hours	NA	NA	NA	NA	NA	NA	NA
Avg. wind velocity	2.8	2.4	2.2	2.8	2.4	2.2	2.466

REWA							
Latitude:	24° 30' N		Longitude:	81° 2' E		Elevation (m):	360 msl
Soil type:	Clay loam		Soil pH:	7.3		Soil texture:	Silty Clay loam
	Jun	Jul	Aug	Sep	Oct	Nov	Total / Range
No. of Rainy days	06	12	20	13	1	0	52
Total Rainfall (mm)	24.6	195.4	458	238	5.6	0	921.6
Avg. Max. Temp. (°C)	40.5	34.4	33.2	33.2	32.8	30.8	40.5-30.8
Avg. Mini. Temp. (°C)	30.4	27.3	25.5	23.6	21.6	14.2	14.2-30.4

TITABAR							
Latitude:	-		Longitude:	-		Elevation (m):	-
Soil type:	-		Soil pH:	-		Soil texture:	-
	Jun	Jul	Aug	Sep	Oct	Nov	Total / Range
No. of Rainy days	16	18	11	9	8	0	62
Total Rainfall (mm)	248.0	387.2	200.2	78.4	83.8	0	997.6
Avg. Max. Temp. (°C)	32.8	34.0	34.0	34.8	30.0	29.2	34.8-29.2
Avg. Mini. Temp. (°C)	22.4	22.7	21.6	20.9	17.8	13.6	13.6-22.7
Avg. Sunshine hours	2.0	4.3	4.3	5.4	2.1	6.1	4.033

UPPER SHILLONG							
Latitude:	2532'41" N		Longitude:	91 50'35" E		Elevation (m):	1735.80msl
Soil type:	-		Soil pH:	-		Soil texture:	-
	June	July	Aug	Sep	Oct	Nov	Total / Range
No. of Rainy days	26	21	27	15	11	-	100
Total Rainfall (mm)	563	309	396.6	89.2	153	-	1510.8
Avg. Max. Temp. (°C)	23.18	24.19	22.54	24.32	22.6	20.2	24.32-20.2
Avg. Mini. Temp. (°C)	16.68	18.25	17.43	17.35	15.9	12	12-18.25

VADGAON MAVAL									
Latitude:	187-45 North			Longitude:	73 – 41 East			Elevation (m):	677.9 m
Soil type:	Medium			Soil pH:	6.5-7.5			Soil texture:	Clay-loam
	Upto May	June	July	Aug	Sep	Oct	Nov	Dec	Total / Range
No. of Rainy days	135.2	114.6	761.8	546.2	133	96.6	0	0	1787.4
Total Rainfall (mm)	4	9	23	22	14	5	0	0	77
Avg. Max. Temp. (°C)	39.5	39.2	29.7	29	30	32.5	33.1	29.2	39.5-29
Avg. Mini. Temp. (°C)	10.7	21	22.1	22	19.8	16.5	15	12.2	10.7-22.1

WANGBAL							
Latitude:	24-8°N		Longitude:	94°E		Elevation (m):	781m
Soil type:	Clay loam		Soil pH:	5.5		Soil texture:	Fine
	Jun	Jul	Aug	Sep	Oct	Nov	Total / Range
No. of Rainy days	5	19	24	12	14	4	78
Total Rainfall (mm)	19.6	258.4	384.7	72.8	224	23.1	982.6
Avg. Max. Temp. (°C)	35	36	35	36	33	31	36-31
Avg. Mini. Temp. (°C)	19	20	19	20	16	13	13-20

Annexure - III

Details of product/material provided by private company/organization in Rabi- 202-24 and Kharif - 2024

S.No.	Name of the product	Agro-Input-Agency
1	Sampoorna	Agricultural Research Station, Kerala Agricultural University, Trissur - 680656

Annexure - IV**ABBREVIATIONS**

ADT	Aduthurai	MDZ	Medziphema
ALM	Almora (VPKAS)	MNC	Moncompu
ARD	Arundhutinagar	MND	Mandya
BNK	Bankura	MTU	Maruteru
CBT	Coimbatore	NGN	Nagina
CHN	Chinsura	NLR	Nellore
CHP	Chiplima	NVS	Navsari
CHT	Chatha	NWG	Nawagam
CKD	Chakdha	PDG	Phondaghat
CNG	Canning (CSSRI)	PNT	Pantnagar
CTK	Cuttak (NRRI)	PNV	Panvel
DNG	Dhangain	POB	Port Blair (CIARI)
FZB	Faizabad(Masodha)	PSA	Pusa
GER	Gerua (NRRI)	PTB	Pattambi
GGT	Ghaghraghat	PTN	Patna (Dhangain)
GNV	Gangavati	PDC	Puducherry
GRD	Giridih	RCI	Ranchi
HZB	Hazaribagh (NRRI)	REW	Rewa
JDP	Jagadapur	RGL	Ragolu
KHD	Khudwani	RNR	Rajendranagar
KJT	Karjat	RPR	Raipur
KNP	Kanpur	SBR	Sabour
KRK	Karaikal	TLJ	Tuljapur
KRL	Karnal(CSSRI)	TTB	Titabar
KTA	Kota	USG	Upper Shillong
KUL	Kaul	VDG	Vadagaon
LCK	Lucknow	VRN	Varanasi
LDN	Ludhiana	VTL	Vytilla
MLN	Malan	WBL	Wangbal (Imphal)

Annexure – V

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Soil Science

**Progress Report of Soil Science Coordinated Program
(Rabi and Kharif - 2024)**

SOIL SCIENCE

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5. SOIL SCIENCE

Summary

The coordinated multi-location evaluation program in Soil Science addresses the issues related to sustaining the productivity of soil and crop systems on a long-term basis, management of sodic soils using nano Zn formulation; management of acid soils; residue management in rice-based cropping systems; nano-fertilizers for increasing NUE, yield and economic returns in transplanted rice; yield maximization in different rice growing zones; evaluation of organic fertilisers and natural farming practices for enhancing the crop productivity and soil health; assessment of bio-fortified rice genotypes response to Zn application and assessing agronomic bio-fortification potential and assessment of carbon dynamics in rice ecologies and recarbonising rice soils for sustainable production. Nine trials were conducted during *Rabi*-2023-24 and *Kharif*-2024 at 19 locations (11 funded and 8 voluntary centres) representing typical soil and crop systems and important rice-growing regions.

5.1. Long-term soil fertility management in rice-based cropping systems

The 36th-year results of LTFE indicated the superior performance of RDF + FYM in recording maximum grain yield at Maruteru and Titabar in the *Rabi* season. Nutrient omission and reduction of NPK to 50% resulted in yield reduction at all three centres in both seasons. Replacement of 50% NPK using FYM and GM+FYM recorded a decrease in grain yield, i.e. -17, -27, -18 and -7% over RDF in Maruteru; an increased trend (ranging 8-20%) was observed in TTB over RDF. In contrast, 50% NPK replacement with organics exhibited improvement over RDF during *Kharif* at MTU and TTB. The addition of organics improved soil fertility in general, especially organic carbon to a great extent. Considerable reduction of soil available NPK was observed in omission plots compared to RDF at all three locations. Supplementary doses of FYM along with RDF recorded a higher growth rate in productivity with 82, 63 and 52 kg/ha/year at MTU, TTB and MND, respectively, in *Kharif* for 36 years. The higher sustainable yield index (SYI) was maintained with the RDF + FYM added treatment across the years at MTU and TTB; 50% NPK + 25% FYM + 25% GM treatment recorded the highest SYI in the rice-cowpea system at Mandya.

5.2. Management of sodic soils using nano Zn formulation

In a study on “*Management of Sodic soils using nano zinc formulations*”, two genotypes were evaluated with seven different set of nutrient management practices at four different locations. Significant genotypic and location-specific differences in yield parameters and yield were observed at all four locations. At Kanpur, soil application of ZnSO₄ @ 50 kg/ha registered higher grain (4.35 t/ha) and straw (5.36 t/ha) yields whereas at Mandya and Faizabad, foliar application of nano Zn @ 50 ppm recorded significantly higher grain (6.29 t/ha, 4.97 t/ha) and straw yields (6.90 t/ha, 6.65 t/ha) respectively. Foliar spray of silicic acid @ 80 ppm has recorded higher grain yields (3.90 t/ha) straw (5.32 t/ha) yields at Pusa. In case of Varieties, DRR Dhan 48 found superior at Mandya, Pusa and Faizabad and CSR23 performed better at Kanpur. Nutrient uptake also followed similar trend as that of grain and straw yields. The variety DRR Dhan 48 has accumulated higher amount of NPKZn at Mandya, Pusa and Faizabad whereas CSR 23 recorded significantly higher nutrient uptake at Kanpur.

5.3. Management of acid soils

Grain yields increased by 48% in Moncompu and by 11% at Sirsi following combined application of recommended dose of fertilizer along with dolomite (@ 250 Kg/ha 30 days' after transplanting), and potassium silicate solution (four sprays at 15 days' interval starting from 15 DAT), when compared to sole

application of recommended fertilizer dose. The variety Uma recorded 5.5 % higher grain yield than Vasundhara at Moncompu, while at Sirsi, a significantly higher grain yield was observed in Vasundhara (3.73 t/ha) compared to Jyothi (2.63 t/ha) variety.

5.4. Residue management in rice-based cropping systems

The disposal of huge quantities of paddy residues is a big problem, particularly in North-West Indian states, resulting in farmers preferring to burn the residues in situ leading to air pollution, smog and loss of appreciable amounts of plant essential nutrients besides being deleterious to soil microbes. The trial was conducted this year at ten centres. The results showed that the crop residues can be deployed to substitute one-fourth of the recommended nitrogen without yield penalty. The crop residue treatments were at par with each other and lower than RDF in terms of nutrient uptake and also maintained higher nutrient use efficiencies over RDF. Post-harvest soil nutrient status was not influenced much by various residue treatments, which were at par with each other.

5.5. Nano-fertilisers for increasing nutrient use efficiency, yield and economic returns in transplanted rice (*collaborative trial with Agronomy*)

A dual spray of nano urea in addition to 100% RDN showed a yield advantage with a minimum value at Khudwani (0.5%) to a maximum at Rajendranagar (20.6%) over RDF treatment. Similarly, this treatment performed well with the total N uptake at the majority of the locations. Replacement of 25 and 50% of RDN with nano urea spray at two intervals (T3 and T5) recorded a declining trend in the grain yield to the tune of -4 to -38% (T3) and -0.4 to -17.5% (T5), respectively over the recommended dose of practice *i.e.* 100% N and found ineffective for yield attributes, N content etc. across the locations.

5.6. Yield maximization of rice in different zones (*collaborative trial with Agronomy*)

Included in the Agronomy progress report

5.7. Evaluation of Organic fertilisers and Natural farming practices for enhancing the productivity and soil health (*collaborative trial with Agronomy*)

The study on Evaluation of Organic fertilisers and Natural farming practices for enhancing the productivity and soil health, in terms of grain and straw yield, the treatment Integrated Crop Management (need-based pest management) was significantly superior as compared to other treatments at most of the locations. With regards to yield parameters, the treatment integrated crop management (need-based pesticides) recorded significantly higher values as compared to other treatments at CHN, CHP, KUL, MND, MTU, PNT, PUSA, GHT, PTB and RPR locations, but at MNC and CHT, the integrated crop management treatment and AI-NPOF package recorded higher values respectively. Most of the location soil properties improved with Integrated Crop Management (need-based pest management), while at TTB and CHT, soil properties improved with the AI-NPOF package compared to other treatments.

5.8. Assessment of bio-fortified rice genotypes' response to Zn application and assessing agronomic bio-fortification potential

The foliar spray (FS) of 0.5% Zn at active tillering (AT), panicle initiation (PI), and 1 week after flowering (WAF) (T3) consistently led to higher yields with more panicle and spikelet fertility followed by 1 WAF (T2) leading to improvements at across the locations. The T3 and T2 treatments resulting in higher Zn content in grain, particularly at Cuttack, Maruteru, and Varanasi. CR Dhan 315 and Swarna emerged as the highest-yielding varieties. Genotype $\times$ Zn treatment interactions significantly influenced yield, yield

attributes, and Zn content at some locations, highlighting the importance of genotype-specific Zn management strategies.

5.9. Assessment of Carbon dynamics in rice ecologies and recarbonising rice soils for sustainable production

The current study aimed first to know the present status of organic carbon across different rice ecologies of India and further to develop an estimation of stock and Carbon maps in rice soils of India under the All India Coordinated Rice Improvement Programme (AICRIP). This trial was conducted in farmers' fields around a few selected centres – Pantnagar, Kaul, Hazaribagh and Karaikal. The highest Soil Organic carbon status (maximum of 0.97%) was estimated in rice ecologies of Udham Singh Nagar district of Pantnagar and the lowest of 0.15% from Karaikal centre. Very labile carbon varied from 0.03 - 0.90 %, labile carbon varied from 0.02 - 0.26 %, less labile carbon varied from 0.01 - 0.59%, and non-labile carbon varied from 0.03 - 0.76 % across the depths. It is clear from this trial that very labile and labile carbon fractions were very sensitive to changes due to soil management practices adopted and any increase in very labile and labile fractions of organic carbon indicates the superiority of the performance of the various management practices/treatments in operation. The soil organic C stock in the first 0-20cm increased considerably over soil depths such as 20-40 and 40-60 cm depths and an increase of more than 10% was observed. On an average, in all rice ecologies top surface soils recorded 23% and 10% higher soil carbon stocks over lower soil profiles and were on par with each other in different rice ecologies of the same centre/zone.

DETAILED REPORT-2024

5.1 Long-term soil fertility management in rice-based cropping systems (RBCS)

Long-term studies with well-defined nutrient management treatments and cropping systems were initiated in 1989-90 at four selected locations representing major rice growing regions and cropping systems viz., Mandya (MND) in Karnataka (rice-cowpea, Deccan Plateau), Maruteru (MTU) in Andhra Pradesh (rice-rice, Delta system), Titabar (TTB) in Assam (rice-rice, Alluvial soils) and Faizabad (FZB) in Uttar Pradesh (rice-wheat, Indo Gangetic plains) to study the dynamics of soil and crop productivity to management for identifying the constraints that affect the sustainability of a given production system. The trial at Faizabad (Masodha) was discontinued during the year 2007-08 for lack of manpower support and being continued at 3 centres only. Hence, the results of the 36th year of cropping i.e., *Rabi* 2023-24 and *Kharif*-2024 are presented in Tables 5.1.1 to 5.1.11.

Crop productivity and soil fertility during *Rabi* 2023-24

Grain and straw yields of rice at Maruteru (MTU) and Titabar (TTB) are presented in Table 5.1.2. At MTU, grain yield ranged from 2.86 (control) to 6.42 t/ha (RDF+FYM) with a mean of 5.02 t/ha. RDF, RDF + FYM, 50% NPK + 25% GM-N + 25% FYM N and organic inputs alone treatment i.e. FYM @10t/ha + vermicompost + oil cakes treatments were at par and significantly superior to other treatments. At Maruteru, the omission of N, P, K, Zn and S resulted in a yield reduction of 39, 35, 11, 22 and 16% which represents the yield value of 3.80, 4.04, 5.62, 4.86 and 5.26 t/ha in -N, -P, -K, -Zn and -S plots respectively over the recommended dose of fertiliser (RDF). FYM alone treatment was on par with STCR recommendation at both the locations. At Titabar, grain yield ranged from 2.50 t/ha in control to 3.94 t/ha in 100% RDF-Zn which was on par with many other treatments except with FYM alone and 50% PK treatments. Omission plots registered higher yields than RDF treatment in *Rabi* at TTB. Fifty per cent (50%) reduction in RDF resulted in a 17% yield reduction in clay loam soil of MTU over RDF. However, the same treatment recorded a 30% yield improvement which is contradictory to the earlier trends. Replacement of 50% NPK using bio fertiliser, green manure, FYM and GM+FYM recorded a reduction in grain yield i.e. -17, -27, -18 and -7% over RDF in Maruteru. Straw yields followed a similar trend as that of grain yield at Maruteru. While in MND, cowpea was not cultivated due to monsoon floods during the *Rabi* season.

Total nutrient (NPK) uptake showed different trends at both locations. Total N uptake of 100.91 kg/ha was found with 100% RDF followed by K omission plot (93.12 kg/ah) at Maruteru. However, the omission of NPKZn and S registered significantly on-par results for N uptake. For P and K, higher uptake was exhibited in 100% RDF + FYM (43.3 and 174.6 kg/ha) and 100% RDF (40.1 and 151.9 kg/ha), respectively within increments of 3.13 and 2.84 times; 2.90 and 2.47 times, respectively over control. The lowest NPK uptake was observed with the control plot. At

Titabar, non-significant N and P uptake was observed with treatments. However, significantly higher K uptake was noted in the replacement of 50% NPK with 50% FYM (101.3 kg/ha) followed by 100% NK (97.5 kg/ha). Organic replacement treatments recorded improvement over control and STCR recommendations (Table 5.1.3).

Soil fertility status after harvest at MTU showed that soil organic carbon content was significantly higher where organics were added and the highest being FYM alone treatment (1.47%) compared to RDF (1.31%) which was 12% higher than RDF treatment. Similarly, RDF + FYM treatment registered *on-par* results with FYM alone treatment which describes the nutrient sustainability of organic supplements *i.e.*, FYM. No definite trend was observed in other soil parameters though there was an improvement with the addition of organics (Table 5.1.4). At TTB, almost all soil parameters (OC, N, P, Zn) were maximum in RDF+FYM treatment. In nutrient omission plots, there was a significant reduction in all soil fertility parameters compared to plots with RDF and RDF+FYM (Table 5.1.4 a).

Crop productivity and soil fertility status during *Kharif*-2024

At MTU, the treatment, RDF+FYM recorded a maximum yield (6.63 t/ha) that was significantly superior to all treatments followed by 50% NPK + 25% GM-N + 25% FYM N (6.49 t/ha) and 50% NPK + 50% FYM-N (6.49 t/ha) which was at par with RDF+FYM (Table 5.1.5). Also, the omission of all nutrients resulted in significant yield loss (1.11 t/ha in –N, 0.46 t/ha in –P, 0.66 t/ha in –K and 0.74 t/ha in –S plots) compared to RDF. At TTB, the yield trend was not as Maruteru, FYM along with vermicompost added plot registered the highest grain yield (5.65 t/ha) which was on par with other nutrient omission plots and organic inputs added plots. Here yields loss due to the omission of major and micronutrients was not observed. At MND, RDF+FYM recorded a maximum yield (5.68 t/ha) which was significantly superior to all other treatments and on par when 50% NPK was replaced by 25% GM-N+ 25% FYM-N (5.47 t/ha). Significant yield reduction to an extent of 10% in the –S plot to 50% in the –N plot was observed. Regarding FYM alone treatment, it recorded a significantly lower yield compared to RDF at Mandya and on par results at MTU and TTB. With regard to straw yield, the trend was almost similar to the grain yield trend at all locations with higher yields recorded where organics were added. The total nutrients (N and P) uptake by the above-ground biomass was maximum in RDF+FYM closely followed by RDF in the Maruteru location (Table 5.1.6). Next to this treatment, FYM alone treatment recorded 75.4, 47.9 kg/ha of N and P uptake in rice crop. Whereas, FYM alone treatment displayed significantly higher K uptake (173.9 kg/ha). In the case of omission plots, a reduction in the total uptake of the nutrients was observed.

Soil fertility status at the end of *Kharif*-2024 (Tables 5.1.7 and 5.1.8) indicated an improvement in most of the soil properties with the addition of organics and higher values were recorded in RDF+FYM and FYM alone treatments for most of the properties at all 3 locations. At MTU, N content was higher in 50% N replaced with FYM and recorded the N value of 206 kg/ha. Omission plots recorded a reduction in NPK values compared to RDF at all 3 locations. Organic carbon values were significantly higher in RDF+FYM followed by FYM alone treatment than other

treatments, which indicates the organic supplements could support and sustain the soil organic carbon level and control recorded the lowest values at all 3 locations.

Long-term changes in crop productivity and soil fertility over a period of 36 years

The trends in mean grain yields over 36 years (1989-2024) of *Kharif* and *Rabi* rice at MND, MTU and TTB by fitting to linear function using actual yields and the per cent change in important soil properties in some important treatments were analyzed and presented below.

Linear trends in crop productivity

During *Kharif* 2024 (Table 5.1.9), the treatment, RDF+5t FYM/ha recorded maximum mean yield at all 3 locations (MND- 5.32; MTU-5.39 and TTB- 5.06 t/ha) with an average increase of 13.4, 4.4 and 12.6%, respectively, at MND, MTU and TTB over RDF. Linear trends of productivity over the years with current RDF indicated positive growth in the delta soils of MTU and acid alluvial soils of TTB (24 and 42 kg grain/ha/year, respectively) and negative growth in the sandy loam of MND (-22 kg grain/ha/year). Additional dose of FYM @ 5t/ha along with RDF improved the growth rate substantially with 82, 63 and 52 kg/ha/year at MTU, TTB and MND, respectively. Next, FYM alone treatment recorded a more positive growth rate @ 55 and 20 kg /ha/year at TTB and MND. In table (5.1.9) depicted that the appropriate addition of RDF alone and along with FYM input improved the potential yield of the given treatment over the years, which pitched the importance of nutrient application across the locations. Omission plots exhibited a negative trend, a reduction from the potential yield over the years in the acid alluvial soils of Titabar.

During *Rabi* also, RDF+5t FYM recorded maximum mean grain yield both at MTU (6.34 t/ha) and TTB (4.35 t/ha) and this treatment recorded a growth rate of 3 and 29 kg/ha/year followed by FYM alone treatment 43 and 33 kg/ha/yr at MTU and TTB, respectively after 36th year of cultivation. Both locations (MTU and TTB) displayed a positive growth rate over the years with the employed treatments. In contrast to *Kharif*, *Rabi* rice crops recorded more improvement than the potential grain yield with given treatments at both locations (Table 5.1.10). Nutrient use efficiency from omission plots was depicted in the figures 5.1.1a and b.

Changes in soil fertility compared to initial values (Table 5.1.11)

More positive change in organic carbon (OC) content was observed in the treatments with organics at all 3 locations compared to RDF over 36 years. At TTB and MND, -ve change was observed in control. The maximum increase in organic carbon was in FYM alone treatment at MTU and Mandya; RDF+FYM at Titabar. Available N decreased in all treatments at MTU but at MND, it decreased in control with an increase in RDF, RDF+ FYM and FYM alone treatments. About available P, there was a solid buildup in all treatments compared to the initial value at all locations except in control at TTB where the % change was -52.8%. In the case of available K, at MTU, there was a decrease and -ve change in all treatments compared to the initial value in 1989. At MND and TTB, there was a -ve change in control and +ve change (ranging between 7.9 to 114.4%) in other treatments where the increase was to a greater extent at MND and to a lesser extent at TTB.

Sustainable Yield Index (SYI)

Sustainability refers to the maintenance of productivity on a long-term basis through integrated land management. In rice-rice system the SYI of rice ranged from 28.6 – 54.7% and 20.5 – 67.2% during *Kharif* and *Rabi* respectively at Maruteru. While in same rice-rice system at Titabar, the SYI ranged from 22.3- 75.0% and 21.8 – 67.4% during *Kharif* and *Rabi* respectively in silty clay soil. The higher SYI was maintained with the RDF + FYM added treatment across the years in both locations. However, rice – cowpea system at Mandya registered a SYI ranged from 19.5 – 59.8% and the higher index was noted in 50% NPK + 25% FYM + 25% GM treatment across the years. The mean yield of rice in RDF+FYM was incidentally higher due to balanced nutrition followed by RDF and 50% NPK + FYM treatment at Maruteru and Titabar centres. While 50% NPK + 25% FYM + 25% GM, exhibited a higher mean yield followed by RDF+FYM and RDF at Mandya centre.

Summary

In the 36th year of the study on long-term soil fertility management in RBCS, RDF+FYM recorded maximum yield. Still, this treatment was on par with RDF at TTB and MTU in *Rabi* and significantly superior to RDF at TTB and MND in *Kharif*. FYM alone treatment was on par with RDF and RDF + FYM during *Rabi* at TTB and *Kharif* at MND. The omission of major and micro nutrients resulted in yield reductions at all three locations ranging from 10-50% across the seasons. The higher SYI was maintained with the RDF + FYM added treatment across the years at MTU and TTB; 50% NPK + 25% FYM + 25% GM treatment recorded the higher SYI in the rice-cowpea system at Mandya. In general, INM and organics alone treatments improved soil fertility parameters and OC was significantly higher in FYM and RDF+FYM treatments. An additional dose of FYM @ 5 t/ha along with RDF resulted in a higher growth rate than RDF at all three locations. Over 36 years, changes in soil fertility showed significant accumulation of OC and P at all 3 locations and K at TTB in INM and organics alone treatments over RDF.

Table 5.1.1: Long-term soil fertility management in RBCS, 2023-24
Soil and crop characteristics

Cropping system	Maruteru Rice-Rice	Titabar Rice-Rice	Mandya Rice-Cowpea
Variety - <i>Kharif</i>	MTU 1061	Gitesh	Rice- KMP 175
<i>Rabi</i>	MTU 1121	Disang	No crop
Recommended Fertiliser Dose (kg NPK /ha)			
<i>Kharif</i>	90:60:60:50	40:20:20:20	100:50:50:20
<i>Rabi</i>	180:90:60:50	40:20:20	-
STCR-based dose			
<i>Kharif</i>	-	-	-
<i>Rabi</i>	-	-	-
Crop growth: <i>Kharif</i>	-	-	-
<i>Rabi</i>	-	-	-
% Clay	38	42	11.1
% Silt	28	28.5	18.1
% Sand	34	29.5	62.8
Texture	<i>Clay Loam</i>		<i>Silty Clay</i>
pH (1:2)	6.54 (<i>Kharif</i>)	6.43 (<i>Rabi</i>)	5.4
Organic carbon (%)	1.07	1.15	1.1
CEC (cmol (p ⁺)/kg)	48.9	48.6	12.5
EC (dS/m)	1.17	0.89	0.028
Avail. N (kg/ha)	124	154	495
Avail. P ₂ O ₅ (kg/ha)	57.7	54.6	22.4
Avail. K ₂ O (kg/ha)	326	368	112

Table 5.1.2: Long-term soil fertility management in RBCS, *Rabi* 2023-24

Grain and straw yields of rice and cowpea

Treatments	Grain yield (t/ha)			Straw yield (t/ha)	
	Maruteru	Titabar	Mandya (Cowpea-kg/ha)	Maruteru	Titabar
Control	2.86	2.50	No Crop	4.15	3.54
100% PK	3.80	3.53		5.88	3.99
100% NK	4.04	3.82		5.84	5.14
STCR recommendation	5.04	3.14		7.90	3.67
100% NP	5.62	2.95		7.51	3.87
100% NPKZnS	6.28	3.04		8.06	3.39
100% NPKZnS + FYM/PM @ 5t/ha	6.42	3.63		8.33	4.01
100% NPK –Zn	4.86	3.94		6.75	3.56
100% NPK – S	5.26	-		7.70	-
100%NPK-S+1t/ha	-	3.02		-	3.87
100% N+50% PK	4.92	2.76		7.48	3.23
50 % NPK	4.45	3.35		6.82	3.68
50 % NPK + Biofertilizer	5.26	3.63		7.94	4.58
50%NPK+ 50% GM-N	4.62	3.39		7.70	3.80
50% NPK + 50% FYM-N	5.17	3.67		7.52	4.80
50% NPK + 25% GM-N + 25% FYM-N	5.81	3.30		7.66	3.76
FYM @ 10 t/ha	4.67	2.74		8.27	2.88
FYM @ 10 t/ha + VC + Oil Cakes	6.20	3.43		7.71	4.13
Expt. Mean	5.02	3.28		7.25	3.88
CD (0.05)	0.71	1.00		0.71	1.12
CV (%)	8.5	18.4		8.50	17.6

Table 5.1.3: Long-term soil fertility management in RBCS, Rabi 2023-24 Total Nutrient uptake (kg/ha)

Treatments	Maruteru			Titabar		
	N	P	K	N	P	K
Control	44.05	13.8	61.4	39.6	8.64	59.2
100% PK	41.29	25.3	122.6	52.8	11.6	77.8
100% NK	66.57	19.0	120.1	64.5	12.4	97.5
STCR recommendation	62.02	31.1	168.3	47.8	10.6	72.8
100% NP	93.12	35.6	138.9	49.2	10.8	66.7
100% NPKZnS	100.91	40.1	151.9	47.5	11.0	72.1
100% NPKZnS + FYM/PM @ 5t/ha	87.32	43.3	174.6	57.9	13.5	91.8
100% NPK – Zn	85.24	32.0	128.7	58.0	12.2	82.3
100% NPK – S	89.54	35.8	161.4	-	-	-
100%NPK-S+1tlime/ha	-	-	-	53.2	10.9	80.1
100% N+50% PK	68.69	30.5	141.0	49.4	9.2	68.7
50 % NPK	66.94	30.3	117.9	50.4	10.1	80.3
50% NPK + Biofertilizer	55.43	31.5	172.3	58.0	12.5	81.6
50% NPK+ 50% GM-N	65.08	30.5	163.8	55.2	12.8	84.0
50% NPK + 50% FYM-N	87.44	30.8	144.2	61.2	13.3	101.3
50% NPK + 25% GM-N+ 25% FYM-N	84.29	33.4	165.7	52.2	11.6	81.0
FYM @ 10 t/ha	62.06	28.5	154.9	40.4	9.1	63.1
FYM @ 10 t/ha + VC + Oil Cakes	43.84	35.7	177.5	59.9	12.0	89.2
Expt. Mean	70.81	31.0	145.0	52.6	11.3	79.4
CD (0.05)	8.79	3.19	25.7	NS	NS	22.6
CV (%)	7.46	6.18	10.6	16.1	17.4	17.1

**Table 5.1.4: Long-term soil fertility management in RBCS, Rabi 2023-24
Soil fertility status at harvest**

Treatments	Maruteru			
	Org C (%)	Avail. N (kg/ha)	Avail. P ₂ O ₅ (kg/ha)	Avail. K ₂ O (kg/ha)
Control	0.95	116.7	57.7	315.7
100% PK	1.26	121.7	71.6	397.7
100% NK	1.15	154.0	65.8	435.0
STCR recommendation	1.23	155.3	68.5	367.7
100% NP	1.25	158.3	75.4	331.7
100% NPKZnS	1.31	166.0	69.6	372.7
100% NPKZnS + FYM/PM @ 5t/ha	1.42	200.0	84.4	404.7
100% NPK – Zn	1.22	180.7	62.0	432.0
100% NPK – S	1.21	172.7	74.1	375.3
100%NPK-S+1t lime/ha	-	-	-	-
100% N+50% PK	1.25	190.7	70.5	357.3
50 % NPK	1.03	153.0	65.5	340.7
50% NPK + Biofertilizer	1.20	174.7	74.5	357.3
50% NPK+ 50% GM-N	1.28	198.0	65.6	354.7
50% NPK + 50% FYM-N	1.42	207.0	68.5	347.3
50% NPK + 25% GM-N+ 25% FYM-N	1.37	174.3	72.9	415.3
FYM @ 10 t/ha	1.47	151.0	71.4	385.0
FYM@10 t/ha + VC + Oil Cakes	1.35	142.7	72.2	335.7
Expt. Mean	1.25	165.7	70.0	372.1
CD (0.05)	0.15	17.8	3.59	16.4
CV (%)	7.00	6.45	3.08	2.65

Table 5.1.4 a: Long-term soil fertility management in RBCS, Rabi 2023-24
Soil fertility status at harvest

Treatments	Titabar					
	Org C (%)	Avail. N (kg/ha)	Avail. P ₂ O ₅ (kg/ha)	Avail. K ₂ O (kg/ha)	Avail. S (kg/ha)	Avail. Zn (kg/ha)
Control	0.57	139.7	12.9	81.8	11.5	0.57
100% PK	0.93	277.7	23.1	94.1	12.8	0.71
100% NK	1.23	188.0	26.3	112.3	14.9	0.83
STCR recommendation	1.22	280.0	32.6	93.4	17.3	0.85
100% NP	1.04	174.3	34.2	95.5	19.9	0.84
100% NPKZnS	1.59	342.0	38.1	15.9	21.8	1.00
100% NPKZnS + FYM/PM @ 5t/ha	1.79	375.3	40.9	158.8	27.6	1.21
100% NPK – Zn	1.00	286.3	36.5	151.5	26.4	0.82
100% NPK – S	-	-	-	-	-	-
100%NPK-S+1t lime/ha	1.25	342.3	36.3	154.5	24.5	0.93
100% N+50% PK	1.23	361.7	34.3	157.9	25.0	0.87
50 % NPK	1.00	280.7	27.4	159.2	22.9	0.76
50% NPK + Biofertilizer	0.82	235.7	33.1	156.3	27.3	0.81
50% NPK+ 50% GM-N	1.27	340.6	35.5	163.5	31.4	0.76
50% NPK + 50% FYM-N	1.62	376.0	37.4	165.7	33.7	0.92
50% NPK + 25% GM-N+ 25% FYM-N	1.53	347.3	39.9	171.9	29.1	0.85
FYM @ 10 t/ha	1.57	369.7	38.6	169.2	34.4	1.05
FYM@10 t/ha + VC + Oil Cakes	1.53	376.7	37.8	168.5	35.4	1.00
Expt. Mean	1.25	299.6	33.2	141.5	24.4	0.87
CD (0.05)	0.11	32.2	4.12	11.0	4.66	0.10
CV (%)	5.43	6.47	7.46	4.67	11.4	7.10

Table 5.1.5: Long-term soil fertility management in RBCS, Kharif -2024
Grain and straw yields of rice

Treatments	Grain yield (t/ha)			Straw yield (t/ha)		
	Maruteru	Titabar	Mandya	Maruteru	Titabar	Mandya
Control	3.78	2.06	2.12	4.04	3.28	2.64
100% PK	4.98	4.88	2.29	7.42	7.26	2.93
100% NK	5.63	5.19	2.68	6.83	8.41	3.24
STCR recommendation	5.32	5.16	3.44	7.27	7.57	4.18
100% NP	5.43	5.59	2.69	7.16	8.25	3.29
100% NPKZnS	6.09	5.19	4.54	7.06	7.44	5.18
100% NPKZnS + FYM/PM @ 5 t/ha	6.63	5.06	5.68	7.19	7.39	6.38
100% NPK –Zn	6.11	5.58	3.99	7.24	8.65	4.68
100% NPK – S	5.35	-	4.13	7.13	-	4.73
100%NPK-S+ 1timelime/ha	-	5.29	-	-	8.58	-
100% N+50% PK	5.72	4.89	4.37	7.52	6.66	5.13
50 % NPK	5.19	5.09	3.52	7.18	7.93	4.28
50 % NPK + Bio fertilizer	5.53	5.26	3.52	7.11	8.06	4.22
50% NPK+ 50% GM-N	6.01	4.99	4.57	7.39	7.13	5.28
50% NPK + 50% FYM-N	6.49	5.31	4.63	7.12	7.48	5.47
50% NPK + 25% GM-N+25% FYM-N	6.49	5.52	5.47	6.75	7.49	6.28
FYM @ 10 t/ha	6.27	5.55	4.28	7.43	7.38	4.97
FYM@10 t/ha + VC + Oil Cakes	6.04	5.65	4.18	7.16	8.48	4.88
Expt. Mean	5.71	5.10	3.89	7.00	7.50	4.58
CD (0.05)	0.84	0.62	0.28	0.82	1.21	0.28
CV (%)	8.82	7.37	3.41	7.03	9.77	2.90

Table 5.1.6: Long-term soil fertility management in RBCS, Kharif 2024
Total Nutrient uptake(kg/ha)

Treatments	Maruteru			Titabar			Mandya		
	N (kg /ha)	P (kg /ha)	K (kg /ha)	N (kg /ha)	P (kg /ha)	K (kg /ha)	N (kg /ha)	P (kg /ha)	K (kg /ha)
Control	40.3	20.8	78.1	27.3	6.12	43.1	23.8	5.43	32.5
100% PK	64.8	32.5	158.1	68.8	16.5	110.2	30.7	6.76	37.3
100% NK	66.6	20.7	118.4	74.4	15.4	125.6	35.5	7.58	44.1
STCR recommendation	70.3	37.5	133.4	74.9	15.7	116.1	50.8	11.0	57.4
100% NP	69.0	40.7	136.1	80.1	15.9	111.2	42.8	9.66	47.1
100% NPK + Zn + S	74.7	43.1	120.2	75.9	16.4	123.9	75.8	16.8	80.0
100% NPK + Zn + S + FYM/PM @ 5 t/ha	82.9	45.1	147.9	72.9	15.0	125.6	105.4	22.3	104.4
100% NPK –Zn	71.9	34.9	149.8	83.9	17.5	139.4	65.2	13.4	72.4
100% NPK – S	60.8	34.3	144.4	-	-	-	68.3	14.2	71.8
100%NPK-S+ 1timelime/ha	-	-	-	86.1	16.2	134.9	-	-	-
100% N+50% PK	69.7	33.8	154.1	73.5	12.5	105.8	74.4	15.0	75.2
50 % NPK	60.4	33.1	119.6	79.5	14.2	125.6	59.4	11.8	59.2
50 % NPK + Biofertilizer	65.8	35.3	131.9	79.0	15.4	109.9	61.0	12.3	61.4
50% NPK+ 50% GM-N	63.7	33.5	161.4	76.4	15.3	121.2	80.6	17.6	76.5
50% NPK+ 50% FYM-N	81.8	41.3	148.9	74.6	16.6	121.4	85.8	18.8	81.6
50% NPK +25% GM-N +25% FYM-N	67.7	40.6	111.9	78.5	15.6	119.9	101.2	21.2	99.4
FYM @ 10 t/ha	75.4	47.9	173.9	77.0	16.3	125.1	77.8	15.8	69.7
FYM@10t/ha +3.0 t/ha Vermi+200 kg/ha oil cakes	75.9	31.2	149.6	87.4	19.4	144.0	72.8	14.0	67.9
Expt. Mean	68.3	35.6	137.5	74.7	15.3	117.9	65.4	13.7	66.9
CD (0.05)	10.6	8.54	32.2	11.3	3.56	16.1	6.65	1.86	3.37
CV (%)	9.3	14.4	14.1	9.1	14.0	8.24	4.80	6.38	2.38

Table 5.1.7: Long-term soil fertility management in RBCS, Kharif-2024
Soil Parameters (kg/ha)

Treatments	Maruteru				Titabar				Mandya			
	Avail. N (kg /ha)	Avail. P (kg /ha)	Avail. K (kg /ha)	Org. carbon	N (kg /ha)	P (kg /ha)	K (kg /ha)	Org. carbon	N (kg /ha)	P (kg /ha)	K (kg /ha)	Org. carbon
Control	116.3	54.6	335.7	1.05	140.4	10.9	71.5	0.54	213.3	33.3	98.2	0.24
100% PK	119.3	68.5	373.7	1.24	256.0	17.8	83.1	0.94	224.8	42.9	131.8	0.33
100% NK	145.7	62.2	364.3	1.24	177.5	21.2	95.8	1.15	241.6	43.0	140.3	0.34
STCR recommendation	152.0	66.3	332.3	1.26	301.7	26.3	110.8	1.19	257.0	47.7	145.8	0.40
100% NP	150.3	71.5	283.3	1.25	186.3	28.8	90.6	1.00	253.8	47.2	133.7	0.51
100% NPK + Zn + S	163.3	65.5	363.3	1.25	347.2	36.2	157.6	1.53	280.8	49.3	215.3	0.55
100% NPK + Zn + S + FYM/PM @ 5 t/ha	187.7	80.8	346.7	1.45	375.1	35.6	175.4	1.69	279.9	58.3	244.9	0.69
100% NPK -Zn	182.3	59.5	349.0	1.31	295.2	28.0	164.0	1.01	276.0	50.8	237.8	0.34
100% NPK - S	168.0	72.1	344.7	1.28	-	-	-	-	279.3	50.7	241.7	0.36
100%NPK-S+ 1timelime/ha	-	-	-	-	359.3	34.4	154.8	0.96	-	-	-	-
100% N+50% PK	193.7	67.3	332.7	1.37	375.3	31.4	155.2	1.15	274.8	49.7	240.2	0.39
50 % NPK	150.0	92.4	317.7	1.24	274.9	29.0	84.7	1.05	246.3	49.1	247.8	0.53
50 % NPK + Biofertilizer	171.7	71.4	338.0	1.16	236.9	31.1	84.5	0.78	285.9	52.6	227.7	0.56
50% NPK+ 50% GM-N	191.0	62.5	332.7	1.28	340.3	33.7	164.5	1.23	297.9	53.7	233.4	0.60
50% NPK+ 50% FYM-N	206.0	64.7	328.7	1.42	373.1	31.6	150.1	1.58	297.2	51.8	239.4	0.67
50% NPK +25% GM-N +25% FYM-N	174.3	69.8	384.0	1.37	364.0	34.4	162.2	1.53	309.4	56.3	250.8	0.72
FYM @ 10 t/ha	149.0	68.1	366.0	1.49	376.6	33.3	161.9	1.58	306.4	51.8	240.8	0.61
FYM@10t/ha +3.0 t/ha Vermi+200 kg/ha oil cakes	134.7	69.1	342.7	1.48	386.1	36.5	172.8	1.71	303.2	52.1	231.4	0.59
Expt. Mean	165.1	66.8	343.2	1.30	303.9	29.4	131.7	1.21	272.2	49.4	205.9	0.50
CD (0.05)	14.1	2.49	45.1	0.06	44.7	4.9	16.4	0.12	10.8	2.9	18.6	0.04
CV (%)	5.22	2.24	7.90	2.81	8.84	10.0	7.47	5.81	1.87	2.77	4.25	4.19

Table 5.1.8: Long-term soil fertility management in RBCS, Sustainable Yield Index (SYI)

Treatments	Maruteru-Kharif			Maruteru-Rabi			Titabar-Kharif			Titabar-Rabi			Mandya-Kharif		
	SYI (%)	Mean Yield (kg/ha)	SD (kg/ha)	SYI (%)	Mean Yield (kg/ha)	SD (kg/ha)	SYI (%)	Mean Yield (kg/ha)	SD (kg/ha)	SYI (%)	Mean Yield (kg/ha)	SD (kg/ha)	SYI (%)	Mean Yield (kg/ha)	SD (kg/ha)
Control	28.6	2872	683	20.5	2343	787	22.3	1959	675	21.8	1688	445	19.5	2194	765
100% PK	35.8	3620	883	24.5	3110	1250	44.9	3331	745	43.0	3033	579	27.9	2690	640
100% NK	43.2	4176	873	42.3	4120	915	53.1	3643	586	48.3	3282	524	30.2	3334	1118
100% NP	47.1	4550	950	52.2	4978	1023	57.2	3843	545	51.5	3420	481	33.7	3727	1252
100% NPKZnS	54.4	5161	997	63.8	5773	933	61.4	4491	957	59.2	3904	523	53.0	4728	837
100% NPKZnS + FYM	54.7	5391	1205	67.2	6344	1251	75.0	5063	740	67.4	4354	504	54.0	5323	1357
100% NPK-Zn	50.3	4762	917	59.6	5203	688	59.0	4234	834	56.2	3707	497	48.5	4453	890
100% NPK-S	52.0	4806	828	59.4	5326	825	63.8	4189	515	55.6	3561	389	46.9	4373	927
100% NZnS + 50%PK	48.4	4550	844	54.2	5164	1057	55.5	3700	502	50.4	3389	509	39.9	4057	1128
50% NPK	45.6	4408	917	44.9	4294	891	45.6	3254	625	43.3	2842	369	39.4	3718	824
50% NPK + 50% GM-N	47.5	4596	965	52.4	4950	976	55.5	3913	715	51.5	3386	445	52.2	4743	915
50% NPK+ 50% FYM-N	50.3	4880	1034	53.6	5234	1168	59.4	4070	645	52.8	3501	485	52.8	4813	939
50% NPK + + 25%GM-N + + 25% FYM-N	47.5	4694	1061	52.6	5057	1069	59.1	4137	734	52.8	3518	502	59.8	5388	1000
FYM (10 t/ha)	45.3	4572	1104	42.1	4228	1036	60.1	4193	731	48.4	3532	770	45.5	4185	846

SYI = Sustainable Yield Index, SD = Standard Deviation

Table 5.1.9: Long-term soil fertility management in RBCS
Linear trends of changes in *Kharif* rice yields (t/ha) from 1989 to 2024

Treatments	Maruteru			Titabar			Mandya		
	Mean yield (t/ha)	Slope (kg/ha/yr)	Intercept (t/ha)	Mean yield (t/ha)	Slope (kg/ha/yr)	Intercept (t/ha)	Mean yield (t/ha)	Slope (kg/ha/yr)	Intercept (t/ha)
Control	2.87	17	2.49	1.96	-45	2.82	2.19	-47	3.04
100% PK	3.62	47	2.74	3.33	47	2.46	2.69	-35	3.32
100% NK	4.18	13	3.94	3.64	32	3.06	3.33	-70	4.59
100% NP	4.55	2	4.52	3.84	29	3.31	3.73	-79	5.14
100% NPK + Zn + S	5.16	24	4.72	4.49	42	3.71	4.73	-22	5.12
100% NPKZnS + FYM	5.39	82	3.41	5.06	63	3.54	5.32	52	4.08
100% NPK – Zn	4.76	6	4.65	4.23	27	3.74	4.45	-48	5.31
100% NPK – S	4.81	10	4.62	4.19	12	3.97	4.37	-43	5.15
100% N + 50% PK	4.55	16	4.26	3.70	4	3.63	4.06	-49	4.93
50% NPK	4.41	17	4.10	3.25	-15	3.54	3.72	-38	4.40
50% NPK + 50% GM-N	4.60	23	4.16	3.91	32	3.32	4.74	-7	4.87
50% NPK + 50% FYM-N	4.88	29	4.34	4.07	40	3.33	4.81	1	4.79
50% NPK + 25% GM-N + 25%FYM-N	4.69	31	4.11	4.14	40	3.40	5.39	8	5.25
FYM @ 10 t/ha	4.57	26	4.08	4.19	55	3.17	4.19	20	3.82

Table 5.1.10: Long-term soil fertility management in RBCS
Linear trends of changes in *Rabi* rice yields (t/ha) from 1989 to 2024

Treatments	MTU			TTB		
	Mean yield (t/ha)	Slope (kg/ha/yr)	Intercept (t/ha)	Mean yield (t/ha)	Slope (kg/ha/yr)	Intercept (t/ha)
Control	2.34	41	1.43	1.69	-25	2.11
100% PK	3.11	69	1.79	3.03	46	2.25
100% NK	4.12	26	3.62	3.28	24	2.88
100% NP	4.98	8	4.82	3.42	11	3.23
100% NPK + Zn + S	5.77	40	5.01	3.90	26	3.46
100% NPKZnS + FYM/PM	6.34	3	6.28	4.35	29	3.74
100% NPK – Zn	5.20	18	4.86	3.71	20	3.36
100% NPK – S	4.33	23	4.89	3.56	13	3.34
100% N + 50% PK	5.16	15	4.89	3.39	10	3.21
50% NPK	4.29	17	3.97	2.84	2	2.81
50% NPK + 50% GM-N	4.95	9	4.78	3.39	21	3.03
50% NPK + 50% FYM-N	5.23	35	4.56	3.50	31	2.97
50% NPK + 25% GM-N + 25% FYM-N	5.06	17	4.73	3.52	30	3.01
FYM @ 10 t/ha	4.23	43	3.41	3.53	33	2.97

Table: 5.1.11: Long-term soil fertility management in RBCS
Changes (%) in soil fertility parameters from 1989 to 2024

Treatments	Maruteru				Titabar			Mandya			
	OC	N	P	K	OC	P	K	OC	N	P	K
Control	18.0	-61.0	168	-17.3	-43.2	-17.4	-51.0	-31.4	-52.8	69.0	-16.1
100% NPK + Zn + S	40.4	-45.2	221	-10.5	61.1	174.2	7.9	57.1	3.5	150.3	84.0
100% NPK + Zn + S + 5 t/ha FYM	62.9	-37.0	296	-14.6	76.8	169.7	20.1	97.1	17.7	195.9	109.3
50% NPK + 25% GM-N + 25% FYM-N	53.9	-41.5	242	-5.4	61.1	160.6	11.1	91.4	20.6	185.8	114.4
FYM @ 10 t/ha	67.4	-50.0	234	-9.9	66.3	152.3	10.9	105.7	15.8	162.9	105.8

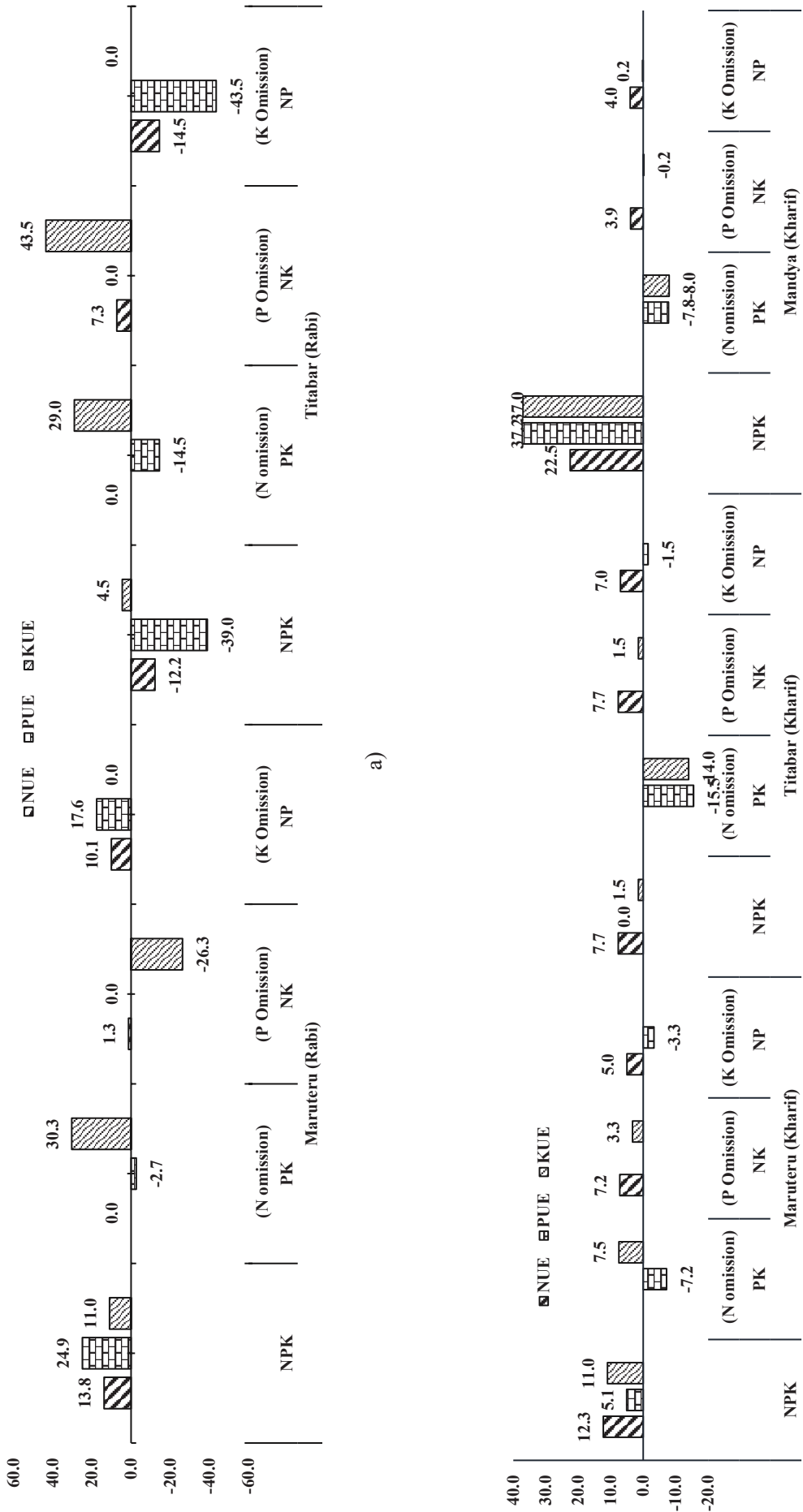


Figure 5.1.1. Nutrient use efficiency in omission plots a) Rabi and b) Kharif

5.2. Management of Sodic Soils Using Nano Zinc Formulation

Sodic soils have high soil pH (8.5 - 11.0) and exchangeable sodium percentage (ESP) of greater or equal to 15, electrical conductivity of less than 4 dS/m, low organic matter and nutrient content and a preponderance of carbonates and bicarbonates of sodium or excess salt content. These soil characteristics strongly modify the availability of micronutrients and thereby crop productivity. These soils can be managed by either growing a crop variety suitable for a particular soil or by applying suitable chemical material to withstand the crop in adverse conditions. Sodic soil is deficient in micronutrients like Zn, Fe, Mn and Cu, among these Zn present in the level less than 0.5 ppm. Keeping these points in view, this trial was conducted with nano Zn material to enhance the Zn availability to the plants with various concentration in sodic soils. This trial has started in *Kharif-2021* with the nano Zn chemicals in a different concentration (20 and 50 ppm). In the current year, this trial was conducted at four different locations viz., *Kanpur, Mandya, Pusa and Faizabad*. The selected genotypes (CSR 23 and DRR Dhan 48) were evaluated under different set of nutrient management practices (Control; ZnSO₄ @ 0.5 % foliar spray; Nano Zn @ 20 ppm foliar spray; Nano Zn @ 50 ppm foliar spray; Soil application of ZnSO₄ @ 50 kg/ha; Silicic acid @ 40 ppm and Silicic acid @ 80 ppm). The experimental results are presented in tables 5.2.1- 5.2.13 and briefly discussed.

Yield Parameters

Yield parameters like tiller number and panicle number per meter square were represented in the table 5.2.2 and 5.2.3. Significant differences in tiller number were observed across all centers due to the treatments, and between varieties at Pusa and Faizabad. Among the treatments, soil application of ZnSO₄ @ 50 kg/ha at Kanpur (422); foliar spray of silicic acid 80 ppm at Pusa (313); whereas foliar application of nano Zn @ 50 ppm at Mandya (429) and Faizabad (329) has produced highest tiller number compared to rest of the treatments. In case of Varieties, DRR Dhan 48 registered higher tiller number at all the locations. Panicles/m² differed significantly among the treatments at all locations and between varieties at Pusa and Faizabad. Among the treatments, soil application of ZnSO₄ @ 50 kg/ha at Kanpur (343); foliar application of nano Zn @ 50 ppm at Mandya (289) and Faizabad (325); foliar spray of silicic acid @80 ppm at Pusa has (291) has recorded significantly higher panicles per square meter. With respect to varieties, DRR Dhan 48 registered higher panicle number at majority of the locations.

Grain and Straw yields

Grain and straw yields showed significant differences between the genotypes and treatments and depicted in table 5.2.4 and 5.2.5. At Kanpur, soil application of ZnSO₄ @ 50 kg/ha registered higher grain (4.35 t/ha) and straw (5.36 t/ha) yields whereas foliar application of nano Zn @ 50 ppm recorded on par grain (4.30 t/ha) and straw yields (5.28 t/ha). Between the varieties, CSR 23 has recorded significantly higher grain (3.80 t/ha) and straw (4.67 t/ha) yields compared to DRR Dhan 48.

In case of Mandya, foliar application of nano Zn @ 50 ppm recorded significantly higher grain (6.29 t/ha) and straw yields (6.90 t/ha) compared to all other treatments. With respect to

varieties, DRR Dhan 48 produced significantly higher grain (5.46 t/ha) and straw yields (6.07 t/ha) than CSR23.

At Pusa, foliar spray of silicic acid spray @ 80 ppm has produced significantly higher grain yield (3.90 t/ha) which was on par with soil application of ZnSO₄ @ 50 kg/ha (3.81 t/ha), foliar spray of nano Zn @ 50 ppm (3.64 t/ha) and silicic acid spray of 40 ppm (3.63 t/ha). Whereas, soil application of ZnSO₄ @ 50 kg/ha has registered higher straw yield (5.32 t/ha) which was on par with all other treatments except ZnSO₄ foliar spray (4.50 t/ha) and control (4.12 t/ha). Between the varieties, DRR Dhan 48 has recorded significantly higher grain (3.71 t/ha) and straw (5.24 t/ha) yields compared to CSR 23.

In Faizabad, foliar spray of nano Zn @ 50 ppm has produced significantly higher grain yield (4.97 t/ha) and straw yield (6.65 t/ha) compared to rest of the treatments. With respect to varieties, DRR Dhan 48 was significantly superior to CSR 23. Interaction between treatments and genotypes was found to be non-significant at most of the locations.

Nutrient uptake

Significant differences in nutrient uptake of NPK and Zn were observed at all the locations (Table 5.2.6 to 5.2.9). At Kanpur, soil application of ZnSO₄ @ 50 kg/ha has recorded higher N (79 kg/ha), P (23.8 kg/ha), K (88 kg/ha), Zn (294 g/ha) uptake; at Mandya foliar spray of nano Zn @ 50 ppm has recorded higher N (127 kg/ha), P (23.8 kg/ha), K (103 kg/ha), Zn (198 g/ha) uptake. In case of Pusa, higher N (77 kg/ha) and P uptake (16.3 kg/ha) was noticed in Silicic acid 80 ppm spray and higher K (82 kg/ha) and Zn (403 g/ha) uptake was recorded with soil application of ZnSO₄ @ 50 kg/ha. Whereas at Faizabad, foliar spray of nano Zn @ 50 ppm has recorded higher N (136 kg/ha) and P uptake (80.2 kg/ha) and maximum K uptake (102 kg/ha) was noticed with soil application of ZnSO₄ @ 50 kg/ha. In case of varieties, DRR Dhan 48 has accumulated higher amount of NPKZn at Mandya, Pusa and Faizabad whereas CSR 23 recorded significantly higher nutrient uptake at Kanpur.

Uptake of Zn in Grain and straw: Zinc accumulation in grain and straw significantly differed among the treatments and varieties at all the locations except Kanpur for varieties. (Table 5.2.10 - 5.2.12). Uptake of Zinc was more in straw compared to grain at all the locations due to higher concentration of Zn and higher straw yields. Soil application of ZnSO₄ @ 50 kg/ha has registered higher grain (126 g/ha, 155 g/ha) and straw Zn (169 g/ha, 248 g/ha) uptake at Kanpur and Pusa. Whereas Nano Zn @ 50 ppm foliar spray accumulated more amount of Zn in grain (94 g/ha) and straw (157 g/ha) at Mandya.

Post-harvest soil Zn status: The available Zn status in soil after harvest was significantly differed among the treatments but not between the varieties (Table 5.2.13). Application of ZnSO₄ @ 50 kg/ha has recorded significantly higher Zn status in Kanpur (0.77 mg/kg), Mandya (2.35 mg/kg) and Pusa (0.75 mg/kg) compared to rest of the treatments.

Summary:

Significant genotypic and location-specific differences in yield parameters and yield were observed at all four locations. At Kanpur, soil application of ZnSO₄ @ 50 kg/ha registered higher grain (4.35 t/ha) and straw (5.36 t/ha) yields whereas at Mandya and Faizabad, foliar application of nano Zn @ 50 ppm recorded significantly higher grain (6.29 t/ha, 4.97 t/ha) and

straw yields (6.90 t/ha, 6.65 t/ha) respectively. Foliar spray of silicic acid @ 80 ppm has recorded higher grain yields (3.90 t/ha) straw (5.32 t/ha) yields at Pusa. In case of Varieties, DRR Dhan 48 found superior at Mandya, Pusa and Faizabad and CSR23 performed better at Kanpur. Nutrient uptake also followed similar trend as that of grain and straw yields. The variety DRR Dhan 48 has accumulated higher amount of NPKZn at Mandya, Pusa and Faizabad whereas CSR 23 recorded significantly higher nutrient uptake at Kanpur.

Table 5.2.1: Management of Sodic soil using nano zinc formulation
(Crop and soil characteristics)

Parameters	Kanpur	Mandya	Pusa	Faizabad
Season	<i>Kharif -2024</i>	<i>Kharif -2024</i>	<i>Kharif -2024</i>	<i>Kharif -2024</i>
Varieties	CSR 23, DRR Dhan 48	CSR 23, DRR Dhan 48	CSR 23 DRR Dhan 48	CSR 23 DRR Dhan 48
Fertilizer dose	150:60:60	120:60:40	120:60:40:50	120:60:60
% Clay	21.1	-	16	
% Silt	26.2	-	24	
% Sand	52.7	-	60	
Texture	Sandy Clay Loam	Sandy Loam	Sandy Loam	Sandy Loam
Soil pH	9.80	8.24	9.65	9.6
Soil EC (dS/m)	0.24	0.24	0.78	2.85
Organic carbon (%)	0.31		0.35	
CEC (cmol (P+) / kg)		0.65		
Available N (kg/ha)	150	250	162	210
Available P (kg/ha)	13.4	21.5	18.5	25
Available K (kg/ha)	212	251	96.2	235
Texture	Sandy Clay Loam	Sandy Loam	Sandy Loam	Sandy Loam
DTPA-Zn (mg/kg)	0.51	0.92	0.46	-

Table 5.2.2: Management of Sodic soils using nano Zn formulation, Tillers /m² of rice at different locations

Treatments/ Varieties	Kanpur			Mandya			Pusa			Faizabad		
	CSR 23	DRR Dhan 48	Mean	CSR 23	DRR Dhan 48	Mean	CSR 23	DRR Dhan 48	Mean	CSR 23	DRR Dhan 48	Mean
Control	304	314	309	321	332	327	236	262	249	269	282	276
ZnSO ₄ @ 0.5 % foliar spray	363	373	368	363	361	362	255	287	271	288	291	289
Nano Zn @ 20 ppm foliar spray	374	389	382	396	405	401	265	296	281	304	311	307
Nano Zn @ 50 ppm foliar spray	410	422	416	424	434	429	276	315	296	319	340	329
Soil application of ZnSO ₄ @ 50 kg/ha	416	428	422	408	413	411	285	327	306	315	330	322
Silicic acid @ 40 ppm	346	371	359	396	398	397	268	311	289	312	323	318
Silicic acid @ 80 ppm	350	378	364	376	371	374	297	329	313	315	324	319
Mean	366	382	374	383	388	386	269	304	286	303	314	309
CD M	39.75			23.49			26.91			4.45		
CD S	NS			NS			15.35			246		
M X S	NS			NS			NS			5.58		
S XM	NS			NS			NS			6.5		
CV (%) M	8.45			4.84			7.47			1.37		
CV (%) S	9.93			1.87			8.1			1.43		

Table 5.2.3: Management of Sodic soils using nano Zn formulation, panicles /m² of rice at different locations

Treatments/ Varieties	Kanpur			Mandya			Pusa			Faizabad		
	CSR 23	DRR Dhan 48	Mean	CSR 23	DRR Dhan 48	Mean	CSR 23	DRR Dhan 48	Mean	CSR 23	DRR Dhan 48	Mean
Control	249	245	247	221	222	221	212	241	226	263	277	270
ZnSO4 @ 0.5 % foliar spray	286	291	289	248	244	246	233	263	248	281	287	284
Nano Zn @ 20 ppm foliar spray	297	314	306	263	259	261	243	271	257	300	305	302
Nano Zn @ 50 ppm foliar spray	328	339	334	287	292	289	256	291	273	315	334	325
Soil application of ZnSO ₄ @ 50 kg/ha	334	352	343	277	271	274	264	300	282	308	323	316
Silicic acid @ 40 ppm	272	289	281	242	243	243	246	288	267	307	318	312
Silicic acid @ 80 ppm	293	298	296	259	257	258	275	306	291	310	315	312
Mean	294	304	299	257	256	256	247	280	264	298	308	303
CD M	33.67			16.46			24.31			4.78		
CD S	NS			NS			12.06			2.27		
M X S	NS			NS			NS			5.44		
S X M	NS			NS			NS			6.02		
CV (%) M	8.95			5.11			7.33			1.5		
CV (%) S	9.85			2.95			6.92			1.35		

Table 5.2.4: Management of Sodic soils using nano Zn formulation, Grain yields (t/ha) of rice at different locations

Treatments/ Varieties	Kanpur			Mandya			Pusa			Faizabad		
	CSR 23	DRR Dhan 48	Mean	CSR 23	DRR Dhan 48	Mean	CSR 23	DRR Dhan 48	Mean	CSR 23	DRR Dhan 48	Mean
Control	2.91	2.75	2.83	4.29	4.36	4.32	2.67	3.18	2.93	3.14	3.97	3.55
ZnSO4 @ 0.5 % foliar spray	3.63	3.37	3.50	5.40	5.52	5.46	2.92	3.47	3.19	3.63	4.76	4.20
Nano Zn @ 20 ppm foliar spray	3.95	3.63	3.79	5.58	5.63	5.60	3.22	3.75	3.48	3.90	5.12	4.51
Nano Zn @ 50 ppm foliar spray	4.40	4.19	4.30	6.25	6.32	6.29	3.43	3.85	3.64	4.37	5.57	4.97
Soil application of ZnSO4 @ 50 kg/ha	4.46	4.24	4.35	5.40	5.55	5.47	3.67	3.95	3.81	4.14	5.33	4.73
Silicic acid @ 40 ppm	3.52	3.28	3.40	5.44	5.53	5.49	3.54	3.73	3.63	4.00	5.29	4.64
Silicic acid @ 80 ppm	3.77	3.52	3.64	5.34	5.32	5.33	3.78	4.02	3.90	4.06	5.34	4.70
Mean	3.80	3.57	3.69	5.39	5.46	5.42	3.32	3.71	3.51	3.89	5.05	4.47
CD M	0.39			0.19			0.39			0.12		
CD S	0.21			0.02			0.21			0.053		
M X S	NS			NS			NS			141.83		
S X M	NS			NS			NS			135.27		
CV (%) M	8.5			2.79			8.86			2.72		
CV (%) S	8.72			0.74			9.46			2.16		

Table 5.2.5: Management of Sodic soils using nano Zn formulation, Straw yields (t/ha) of rice at different locations

Treatments/ Varieties	Kanpur			Mandya			Pusa			Faizabad		
	CSR 23	DRR Dhan 48	Mean	CSR 23	DRR Dhan 48	Mean	CSR 23	DRR Dhan 48	Mean	CSR 23	DRR Dhan 48	Mean
Control	3.53	3.32	3.43	4.74	4.96	4.85	3.75	4.49	4.12	4.41	5.12	4.77
ZnSO4 @ 0.5 % foliar spray	4.43	4.08	4.26	5.81	6.00	5.90	4.10	4.91	4.50	5.06	6.18	5.62
Nano Zn @ 20 ppm foliar spray	4.84	4.43	4.63	6.19	6.34	6.26	4.54	5.34	4.94	5.38	6.65	6.01
Nano Zn @ 50 ppm foliar spray	5.42	5.13	5.28	6.85	6.96	6.90	4.83	5.44	5.14	6.12	7.17	6.65
Soil application of ZnSO4 @ 50 kg/ha	5.51	5.22	5.36	5.86	5.99	5.93	5.07	5.56	5.32	5.77	6.98	6.37
Silicic acid @ 40 ppm	4.29	3.98	4.14	6.02	6.11	6.07	4.98	5.26	5.12	5.54	6.83	6.18
Silicic acid @ 80 ppm	4.63	4.29	4.46	6.03	6.15	6.09	5.33	5.66	5.50	5.67	6.88	6.28
Mean	4.67	4.35	4.51	5.93	6.07	6.00	4.66	5.24	4.95	5.42	6.54	5.98
CD M	0.45			0.22			0.48			0.15		
CD S	0.26			0.02			0.32			0.079		
M X S	NS			166.64			NS			186.52		
S XM	NS			52.18			NS			211.41		
CV (%) M	8.06			3.04			8.82			2.5		
CV (%) S	8.9			0.5			9.77			2.4		

Table 5.2.6: Management of Sodic soils using nano Zn formulation, Total nutrient uptake of rice at Kanpur

Treatments/ Varieties	N uptake (kg/ha)			P uptake (kg/ha)			K uptake (kg/ha)			Zn uptake (g/ha)		
	CSR 23	DRR Dhan 48	Mean	CSR 23	DRR Dhan 48	Mean	CSR 23	DRR Dhan 48	Mean	CSR 23	DRR Dhan 48	Mean
Control	44	43	43	12.9	12.3	12.6	50	48	49	127	124	125
ZnSO ₄ @ 0.5 % foliar spray	59	55	57	18.0	16.9	17.5	68	63	66	203	191	197
Nano Zn @ 20 ppm foliar spray	66	61	64	19.9	18.6	19.3	75	70	73	230	218	224
Nano Zn @ 50 ppm foliar spray	78	75	76	23.2	22.9	23.1	86	84	85	287	279	283
Soil application of ZnSO ₄ @ 50 kg/ha	80	77	79	23.9	23.8	23.8	89	87	88	298	291	294
Silicic acid @ 40 ppm	56	53	54	17.1	16.1	16.6	65	61	63	170	162	166
Silicic acid @ 80 ppm	62	58	60	18.6	17.5	18.0	101	67	84	188	180	184
Mean	64	60	62	19.1	18.3	18.7	76	69	72	215	206	211
CD M	6.81			1.95			21.62			24.86		
CD S	NS			NS			NS			NS		
M X S	NS			NS			NS			NS		
S XM	NS			NS			NS			NS		
CV (%) M	8.76			8.29			23.73			9.39		
CV (%) S	9.52			8.62			21.52			10.86		

Table 5.2.7: Management of Sodic soils using nano Zn formulation, Total nutrient uptake of rice at Mandya

Treatments/ Varieties	N uptake (kg/ha)			P uptake (kg/ha)			K uptake (kg/ha)			Zn uptake (g/ha)		
	CSR 23	DRR Dhan 48	Mean	CSR 23	DRR Dhan 48	Mean	CSR 23	DRR Dhan 48	Mean	CSR 23	DRR Dhan 48	Mean
Control	70	70	70	12.5	13.2	12.8	55	57	56	102	114	108
ZnSO₄ @ 0.5 % foliar spray	94	95	95	17.6	18.4	18.0	73	76	74	178	179	179
Nano Zn @ 20 ppm foliar spray	102	106	104	20.0	20.5	20.2	84	85	84	201	203	202
Nano Zn @ 50 ppm foliar spray	127	127	127	25.1	22.5	23.8	102	103	103	247	255	251
Soil application of ZnSO₄ @ 50 kg/ha	97	100	99	18.9	20.0	19.5	76	79	78	187	196	191
Silicic acid @ 40 ppm	96	96	96	17.3	19.1	18.2	79	79	79	175	176	175
Silicic acid @ 80 ppm	88	89	88	16.7	16.4	16.5	72	77	75	170	170	170
Mean	96	98	97	18.3	18.6	18.4	77	80	78	180	185	182
CD M	27.34			2.09			6.33			18.6		
CD S	NS			NS			NS			3.88		
M X S	NS			NS			NS			NS		
S X M	NS			NS			NS			NS		
CV (%) M	22.45			9.01			6.43			8.13		
CV (%) S	19.23			6.44			2.03			3.22		

Table 5.2.8: Management of Sodic soils using nano Zn formulation, Total nutrient uptake of rice at Pusa

Treatments/ Varieties	N uptake (kg/ha)			P uptake (kg/ha)			K uptake (kg/ha)			Zn uptake (g/ha)		
	CSR 23	DRR Dhan 48	Mean	CSR 23	DRR Dhan 48	Mean	CSR 23	DRR Dhan 48	Mean	CSR 23	DRR Dhan 48	Mean
Control	40	53	46	12.2	13.4	12.8	48	67	58	169	293	231
ZnSO ₄ @ 0.5 % foliar spray	48	61	55	13.0	14.4	13.7	54	74	64	217	330	273
Nano Zn @ 20 ppm foliar spray	58	67	62	14.1	15.3	14.7	61	82	72	269	388	329
Nano Zn @ 50 ppm foliar spray	63	74	69	14.7	15.5	15.1	67	85	76	301	427	364
Soil application of ZnSO ₄ @ 50 kg/ha	71	78	75	15.1	15.2	15.1	74	90	82	343	463	403
Silicic acid @ 40 ppm	65	71	68	15.6	15.6	15.6	65	80	73	230	340	285
Silicic acid @ 80 ppm	75	80	77	16.3	16.3	16.3	72	89	80	251	377	314
Mean	60	69	65	14.4	15.1	14.7	63	81	72	254	374	314
CD M	7.37			1.99			7.29			40.59		
CD S	5.49			NS			5.69			24.95		
M X S	NS			NS			NS			NS		
S XM	NS			NS			NS			NS		
CV (%) M	9.07			10.74			8.05			10.27		
CV (%) S	12.8			12.6			11.93			12		

Table 5.2.9: Management of Sodic soils using nano Zn formulation, Total nutrient uptake of rice at Faizabad

Treatments/ Varieties	N uptake (kg/ha)			P uptake (kg/ha)			K uptake (kg/ha)		
	CSR 23	DRR Dhan 48	Mean	CSR 23	DRR Dhan 48	Mean	CSR 23	DRR Dhan 48	Mean
Control	69	93	81	37.5	51.4	44.4	53	67	60
ZnSO ₄ @ 0.5 % foliar spray	85	124	104	47.7	68.6	58.2	66	87	77
Nano Zn @ 20 ppm foliar spray	98	134	116	56.1	81.2	68.7	74	103	88
Nano Zn @ 50 ppm foliar spray	115	157	136	69.3	91.1	80.2	91	114	102
Soil application of ZnSO ₄ @ 50 kg/ha	104	138	121	59.3	80.6	69.9	79	102	90
Silicic acid @ 40 ppm	102	141	121	60.4	87.6	74.0	79	108	93
Silicic acid @ 80 ppm	106	144	125	62.7	89.9	76.3	82	110	96
Mean	97	133	115	56.1	78.6	67.4	75	99	87
CD M	5.64			3.96			4.19		
CD S	2.54			1.6			1.88		
M X S	6.22			4.1			4.6		
S XM	6.73			4.23			4.96		
CV (%) M	4.68			5.59			4.6		
CV (%) S	3.99			4.27			3.9		

Table 5.2.10: Management of Sodic soils using nano Zn formulation, uptake of Zinc in grain and straw of rice at Kanpur

Treatments/ Varieties	Grain Zn uptake			Straw Zn uptake		
	CSR 23	DRR Dhan 48	Mean	CSR 23	DRR Dhan 48	Mean
Control	51	50	50	76	75	75
ZnSO ₄ @ 0.5 % foliar spray	83	79	81	120	116	116
Nano Zn @ 20 ppm foliar spray	92	90	91	138	129	133
Nano Zn @ 50 ppm foliar spray	122	118	120	166	159	163
Soil application of ZnSO ₄ @ 50 kg/ha	125	126	126	173	124	169
Silicic acid @ 40 ppm	73	70	71	97	120	94
Silicic acid @ 80 ppm	80	76	78	108	117	106
Mean	89	87	88	125	120	122
CD M	11.06			18.24		
CD S	NS			NS		
M X S	NS			NS		
S XM	NS			NS		
CV (%) M	9.98			11.84		
CV (%) S	12.67			10.44		

Table 5.2.11: Management of Sodic soils using nano Zn formulations, uptake of Zinc in grain and straw of rice at Mandya

Treatments/ Varieties	Grain Zn uptake			Straw Zn uptake		
	CSR 23	DRR Dhan 48	Mean	CSR 23	DRR Dhan 48	Mean
Control	39	39	39	64	75	69
ZnSO ₄ @ 0.5 % foliar spray	65	63	64	113	116	115
Nano Zn @ 20 ppm foliar spray	70	74	72	131	129	130
Nano Zn @ 50 ppm foliar spray	93	95	94	154	159	157
Soil application of ZnSO ₄ @ 50kg/ha	68	72	70	119	124	122
Silicic acid @ 40 ppm	59	56	57	116	120	118
Silicic acid @ 80 ppm	56	53	54	114	117	115
Mean	64	65	64	116	120	118
CD M	5.87			17.1		
CD S	NS			3.45		
M X S	NS			NS		
S XM	NS			NS		
CV (%) M	7.24			11.5		
CV (%) S	4.19			4.42		

Table 5.2.12: Management of Sodic soils using nano Zn formulations, uptake of Zinc in grain and straw of rice at Pusa

Treatments/ Varieties	Grain Zn uptake			Straw Zn uptake		
	CSR 23	DRR Dhan 48	Mean	CSR 23	DRR Dhan 48	Mean
Control	65	111	88	104	182	143
ZnSO ₄ @ 0.5 % foliar spray	83	124	104	134	206	170
Nano Zn @ 20 ppm foliar spray	102	147	124	167	241	204
Nano Zn @ 50 ppm foliar spray	114	162	138	187	265	226
Soil application of ZnSO ₄ @ 50 kg/ha	133	177	155	210	287	248
Silicic acid @ 40 ppm	88	127	108	142	213	177
Silicic acid @ 80 ppm	92	144	118	159	233	196
Mean	97	142	119	157	232	195
CD M	14.41			34.48		
CD S	7.79			19.32		
M X S	NS			NS		
S XM	NS			NS		
CV (%) M	9.61			14.06		
CV (%) S	9.87			14.97		

Table 5.2.13: Management of Sodic soils using nano Zn formulations, Postharvest soil zinc status (mg/kg)

Treatments/ Varieties	Kanpur			Mandya			Pusa		
	CSR 23	DRR Dhan 48	Mean	CSR 23	DRR Dhan 48	Mean	CSR 23	DRR Dhan 48	Mean
Control	0.56	0.54	0.55	0.81	0.84	0.83	0.54	0.53	0.54
ZnSO ₄ @ 0.5 % foliar spray	0.61	0.60	0.6	0.93	0.98	0.96	0.56	0.55	0.56
Nano Zn @ 20 ppm foliar spray	0.63	0.62	0.62	1.03	1.04	1.04	0.56	0.56	0.56
Nano Zn @ 50 ppm foliar spray	0.67	0.65	0.66	1.09	1.11	1.10	0.58	0.58	0.58
Soil application of ZnSO ₄ @ 50 kg/ha	0.78	0.76	0.77	2.27	2.42	2.35	0.76	0.74	0.75
Silicic acid @ 40 ppm	0.59	0.57	0.58	0.96	0.95	0.96	0.55	0.53	0.54
Silicic acid @ 80 ppm	0.6	0.59	0.6	0.90	0.90	0.90	0.57	0.55	0.56
Mean	0.63	0.62	0.63	1.14	1.18	1.16	0.59	0.58	0.58
CD M	0.06			0.14			0.04		
CD S	NS			NS			NS		
M X S	NS			NS			NS		
S XM	NS			NS			NS		
CV (%) M	7.89			9.3			5.6		
CV (%) S	8.15			6.33			7.13		

5.3 Management of Acid soils

Acid soils are widespread in Eastern, North Eastern and coastal regions of the Indian Peninsula and are poor in soil fertility and are associated with toxicity of iron in lowlands, aluminium in the uplands, with depletion of Ca, Mg and K, and deficiency of B, Mo and Si. The soils also fix large quantities of soluble P, leading to sub-optimal crop productivity. Management options include liming to correct soil acidity, balanced application of P, K, and silicates and organic manuring besides growing tolerant cultures. In addition, the identification of suitable genotypes with high yield potential helps stabilize rice productivity. The trial was, therefore, conducted at two centres viz., Moncompu (Kuttanad, Kerala, soil pH: 4.66) and Sirsi (Karnataka, soil pH: 4.94) under irrigated conditions during *Kharif* 2024. The genotypes Uma and Vasundhara (Moncompu) and Jyothi and Vasundhara (Sirsi) were evaluated under eight sets of nutrient management treatments viz., i) NPK (RD), ii) NPK (RD)+ Silixol spray (at vegetative, booting and grain filling stage), iii) NPK (RD) + Rice husk ash, 250 kg/ha during land preparation, iv) NPK (RD) + Dolomite 250 kg/ha 30 days after transplanting, v) NPK (RD) + Silixol spray (at vegetative, booting and grain filling stage) + Dolomite 250 kg/ha, 30 days after transplanting, vi) NPK (RD)+ Rice husk ash, 250 kg/ha during land preparation + Dolomite 250 kg/ha, 30 days after transplanting, vii) Potassium Silicate Solution- Four sprays at 15 days interval starting from 15 DAT (days after transplanting) and viii) RDF + Dolomite + Potassium Silicate solution (Four sprays at 15-day intervals starting from 15 DAT). The details of crop, soil, and weather parameters of the experimental sites (Table 5.4.1) show variations in soil characteristics regarding pH, organic carbon content, soil texture and available nutrient status. The experimental results are presented in Tables 5.4.2 – 5.4.7 and briefly discussed.

Yield and yield parameters

At Moncompu (MCP), nutrient management practices significantly influenced the yield parameters and yield. Application of dolomite + potassium silicate spray in combination with RDF produced a significantly higher mean grain yield (7.21 t/ha) than other treatments (Table 5.3.3) and the treatment RDF + Dolomite also recorded on par mean grain yield of 6.81 t/ha. The yields obtained with RDF + Dolomite + RHA (6.47 t/ha), and RDF+ RHA (5.86 t/ha application were on par, while the treatment that received only recommended dose of fertilizer (RDF) recorded the lowest grain yield of 4.88 t/ha. Straw yields followed the same trend as grain yield with dolomite + potassium silicate spray in combination with RDF yielding the highest straw yields of 10.03 t/ha. No significant difference was observed for grain yield and straw yield between the two varieties, Vasundhara (5.79 t/ha, 8.12 t/ha respectively) and Uma (6.11 t/ha, 8.55 t/ha respectively). Similar to grain yield, the application of RDF + dolomite + potassium silicate (Table 5.3.2), resulted in the highest number of tillers/m² (275), panicles/m² (213) and filled grain/ panicle (201). The genotype Uma (25.73 g) was observed to have a significantly higher 1000-grain weight than Vasundhara (23.62 g).

At Sirsi, no significant differences were observed among the nutrient management treatments (Table 5.3.5). The highest grain yield was recorded with RDF + dolomite + silicate (3.65 t/ha). The other treatments recorded yields ranging from 2.94 t/ha to 3.48 t/ha, while the lowest yield was observed in the treatment with RDF+ silixol application (2.90 t/ha). Straw yields followed similar trends as grain yields for nutrient management. Between the varieties, the genotype Vasundhara recorded significantly superior grain and straw yields (3.73 and 6.91 t/ha) compared to Jyothi (2.63 t/ha and 5.70 t/ha respectively). No significant differences in nutrient management practices and varieties were recorded for plant height, panicle length and panicles per sqm (Table 5.3.4).

Total nutrient uptake

Nutrient management treatments significantly influenced total nutrient uptake at Moncompu (Table 5.3.6). Among the treatments, RDF + dolomite + silicate recorded significantly higher nitrogen uptake (141.81 kg/ha), phosphorus uptake (73.33 kg/ha), and potassium uptake (154.48 kg/ha) in comparison with the other treatments. No differences were observed between the two genotypes, Vasundhara and Uma for nutrient uptake.

Post-harvest soil properties

Post-harvest soil characteristics (Soil pH, EC, OC%, soil available NPK) were not influenced by nutrient management treatments and varieties (Table 5.3.7) at Moncompu.

Summary

Application of RDF + dolomite (250 kg/ha) + silicate spray (four sprays at 15 days intervals starting from 15 DAT (days after transplanting) improved grain yields over sole RDF by 48% at Moncompu and 11% at Sirsi. Varietal differences for grain yield were observed at Sirsi as the grain yield of variety Vasundhara (3.73 t/ha) was significantly higher than the Jyothi (2.63 t/ha) variety.

Table 5.3.1: Management of acid soils (Kharif-2024)

Soil and crop characteristics

Parameter	Moncompu	Sirsi
Cropping system	Rice - Rice	Rice
Rice Variety	Vasundhara and Uma	Jyothi and Vasundhara
RDF (kg NPK/ha)	90:45:45	
Crop growth	Good	Good
Soil characteristics		
Clay (%)	-	-
Silt (%)	-	-
Sand (%)	-	-
Soil Texture	-	-
pH (1:2.5)	4.21	4.94
Org. carbon (%)	2.98	1.00
CEC [c mol (p+)/kg]	-	-
EC (ds/m)	0.13	0.24
Avail.N (kg/ha)	347.8	88.4
Avail. P ₂ O ₅ (kg/ha)	71.4	84.4
Avail. K ₂ O (kg/ha)	214.3	49.3
Avail S (mg/kg)	14.8	-
DTPA –Zn (mg/kg)	1.88	-
DTPA –Fe (mg/kg)	276	-
DTPA –Mn (mg/kg)	2.08	-
DTPA –Cu (mg/kg)	1.72	-

Table 5.3.2: Management of acid soils (Kharif-2024)

Yield parameters at Moncompu

Treatments	Tillers (m ⁻²)			Panicles (m ⁻²)			Filled grains/panicle			1000 grain wt. (g)		
Nutrient management (M)												
	Vasundhara	Uma	Mean	Vasundhara	Uma	Mean	Vasundhara	Uma	Mean	Vasundhara	Uma	Mean
RDF	195	191	193	161	152	156	147	155	151	23.17	24.93	24.05
RDF + Silixol	199	193	196	161	150	155	152	152	152	22.83	25.33	24.08
RDF + RHA*	226	228	227	184	177	180	173	186	180	23.43	25.60	24.52
RDF + Dolomite	264	267	266	180	209	194	188	196	192	23.90	26.20	25.05
RDF + Dolomite+ Silixol	223	224	224	181	175	178	153	166	159	23.07	25.27	24.17
RDF + Dolomite + RHA*	251	245	248	197	191	194	183	195	189	23.90	26.03	24.97
RDF + K-Silicate	213	216	215	168	170	169	153	155	154	24.20	26.17	25.18
RDF + Dolomite + Silicate	280	289	285	214	212	213	193	209	201	24.43	26.27	25.35
CD (0.05)	23			31			20			0.76		
CV%	8.03			13.76			9.43			2.54		
Varieties (S)												
Vasundhara												
Uma												
CD (0.05)	NS			NS			NS			0.40		
Experimental Mean	230			180			172			24.67		
Interaction -M X S	NS			NS			NS			NS		
Interaction -S X M	NS			NS			NS			NS		
CV%	9.07			12.04			10.36			2.67		

*Rice husk ash, M – Main plot (Nutrient management), S – Subplot (Varieties)

5.3.3: Management of acid soils (Kharif-2024)

Grain and Straw Yield at Moncompu

Treatments	Grain yield (t/ha)				Straw yield (t/ha)			
Nutrient management (M)								
	Vasundhara	Uma	Mean	Vasundhara	Uma	Mean		
RDF	4.78	4.97	4.88	6.78	6.97	6.88		
RDF + Silixol	5.33	5.39	5.36	7.44	7.56	7.50		
RDF + RHA*	5.33	6.39	5.86	7.39	9.00	8.19		
RDF + Dolomite	6.56	7.06	6.81	9.17	9.81	9.49		
RDF + Dolomite+ Silixol	5.56	5.72	5.64	7.75	8.03	7.89		
RDF + Dolomite + RHA*	6.33	6.61	6.47	9.06	9.22	9.14		
RDF + K-Silicate	5.28	5.47	5.38	7.47	7.69	7.58		
RDF + Dolomite + Silicate	7.17	7.25	7.21	9.92	10.14	10.03		
CD (0.05)	0.71			1.20				
CV%	9.58			11.67				
Vasundhara	5.79				8.12			
Uma	6.11				8.55			
CD (0.05)	NS				NS			
Experimental Mean	5.95				8.34			
Interaction -M X S	NS				NS			
Interaction -S X M	NS				NS			
CV%	10.77				12.22			

*Rice husk ash, M – Main plot (Nutrient management), S – Subplot (Varieties)

5.3.4: Management of acid soils (Kharif-2024)

Yield parameters at Sirsi

Treatments	Plant height (cm)		Panicle length (cm)		Panicles/m ²		
	Jyothi	Vasundhara	Mean	Jyothi	Vasundhara	Mean	Mean
Nutrient management (M)							
RDF	86.87	91.80	89.33	18.80	19.13	18.97	448
RDF + Silixol	87.47	86.60	87.03	18.67	18.53	18.60	460
RDF + RHA *	87.33	93.07	90.20	18.33	19.07	18.70	435
RDF + Dolomite	87.07	93.87	90.47	18.60	18.93	18.77	451
RDF + Dolomite+ Silixol	88.33	92.80	90.57	18.93	19.07	19.00	437
RDF + Dolomite + RHA *	89.60	93.27	91.43	18.33	18.80	18.57	452
RDF + K-Silicate	90.80	96.07	93.43	19.47	19.47	19.47	452
RDF + Dolomite + Silicate	90.27	95.80	93.03	19.47	18.53	19.00	469
CD (0.05)	NS			NS			NS
CV%	3.72			3.39			5.70
Varieties (S)							
Jyothi		88.47			18.83		443
Vasundhara		92.91			18.94		458
CD (0.05)		NS			NS		NS
Experimental Mean		90.69			18.88		450
Interaction -M X S		NS			NS		NS
Interaction -S X M		NS			NS		NS
CV%		10.22			8.01		9.43

Table 5.3.5: Management of acid soils (*Kharif-2024*)
Grain and Straw Yields at Sirsi

Treatments		Grain yield (t/ha)			Straw yield (t/ha)		
Nutrient management (M)							
	Jyothi	Vasundhara	Mean	Jyothi	Vasundhara	Mean	
RDF	3.41	3.15	3.28	6.25	6.64	6.45	
RDF + Silixol	2.37	3.43	2.90	5.31	6.73	6.02	
RDF + RHA*	2.52	3.36	2.94	5.48	6.37	5.93	
RDF + Dolomite	2.55	3.52	3.03	5.52	6.43	5.97	
RDF + Dolomite+ Silixol	2.43	3.61	3.02	5.43	6.81	6.12	
RDF + Dolomite + RHA*	2.47	3.77	3.12	6.29	7.09	6.69	
RDF + K-Silicate	2.85	4.11	3.48	6.03	7.51	6.77	
RDF + Dolomite + Silicate	2.44	4.87	3.65	5.25	7.69	6.47	
CD (0.05)		NS		NS			
CV%		16.15		14.44			
Varieties (S)							
Jyothi	2.63			5.70			
Vasundhara	3.73			6.91			
CD (0.05)		0.42		0.67			
Experimental Mean		3.17		6.30			
Interaction -M X S		NS		NS			
Interaction -S X M		NS		NS			
CV%		21.68		17.30			

*Rice husk ash, M – Main plot (Nutrient management), S – Subplot (Varieties)

5.3.6: Management of acid soils (Kharif-2024)

Nutrient (NPK) uptake at Moncompu

Treatments	N uptake (kg/ha)			P uptake (kg/ha)			K uptake (kg/ha)		
Nutrient management (M)									
	Vasundhara	Uma	Mean	Vasundhara	Uma	Mean	Vasundhara	Uma	Mean
RDF	86.62	90.09	88.36	46.88	48.10	47.49	101.14	103.21	102.17
RDF + Silixol	95.39	95.7	95.54	53.83	51.30	52.56	111.34	110.84	111.09
RDF + RHA*	99.31	115.94	107.62	50.82	60.57	55.70	112.61	135.64	124.13
RDF + Dolomite	126.92	138.91	132.92	69.07	74.07	71.57	136.66	145.43	141.05
RDF + Dolomite + Silixol	105.32	106.62	105.97	58.62	58.19	58.40	115.9	120.59	118.25
RDF + Dolomite + RHA	123.23	124.63	123.93	62.62	61.84	62.23	137.25	142.69	139.97
RDF + K-Silicate	100.32	100.36	100.34	54.01	52.88	53.44	111.93	114.22	113.07
RDF + Dolomite + Silicate	140.90	142.73	141.81	71.71	74.94	73.33	153.03	155.93	154.48
CD (0.05)	16.4			10.56			13.67		
CV%	11.83			14.36			8.79		
Varieties (V)									
Vasundhara	109.75			58.45			122.48		
Uma	114.37			60.24			128.57		
CD (0.05)	NS			NS			NS		
Experimental Mean	112.06			59.34			125.53		
Interaction -M X S	NS			NS			NS		
Interaction -S X M	NS			NS			NS		
CV%	12.67			11.4			13.22		

*Rice husk ash, M – Main plot (Nutrient management), S – Subplot (Varieties)

Table 5.3.7: Management of acid soils (Kharif-2024)

Post-harvest soil characteristics at Moncompu

Treatments	Soil pH (1:2.5)	Soil OC %	Soil EC (dS/m)	Available N (kg/ha)	Available P (kg/ha)	Available K (kg/ha)
Nutrient management (M)						
RDF	4.33	3.20	0.08	323.45	40.95	211.40
RDF + Silixol	4.29	3.13	0.08	324.17	42.27	210.03
RDF + RHA *	4.32	3.14	0.07	312.30	43.02	214.72
RDF + Dolomite	4.43	3.17	0.08	308.73	42.65	206.02
RDF + Dolomite+ Silixol	4.30	3.13	0.08	319.63	40.95	211.00
RDF + Dolomite + RHA	4.34	3.15	0.07	323.38	42.12	214.83
RDF + K-Silicate	4.23	3.20	0.08	322.45	40.90	215.55
RDF + Dolomite + Silicate	4.43	3.09	0.06	320.15	41.83	214.17
CD (0.05)	NS	NS	NS	NS	NS	NS
CV%	3.13	4.01	20.03	8.20	8.34	9.47
Varieties (V)						
Vasundhara	4.33	3.15	0.08	319.18	41.86	213.00
Uma	4.33	3.15	0.07	319.38	41.81	211.43
CD (0.05)	NS	NS	NS	NS	NS	NS
Experimental Mean	4.33	3.15	0.07	319.28	41.82	212.21
Interaction -M X S	NS	NS	NS	NS	NS	NS
Interaction -S X M	NS	NS	NS	NS	NS	NS
CV%	3.22	4.63	25.89	9.31	13.70	9.03

*Rice husk ash, M – Main plot (Nutrient management), S – Subplot (Varieties)

5.4: Residue management in rice based cropping systems

In India, huge quantities of crop residues (about 500 million tons) are produced annually of which paddy residues constitute about one thirds. The disposal of paddy residues has become a big problem, particularly in North-Western states, mainly due to the use of combine harvester and narrow time gap (one to three weeks) between paddy harvesting and planting of wheat in NW India, resulting in farmers preferring to burn the residues in-situ. Burning biomass not only pollutes environment by depleting air quality, emitting greenhouse gases (GHGs), but also causes smog in the environment, results in loss of appreciable amount of plant essential nutrients besides being deleterious to soil microbes. The incineration of crop residues contributes to emissions of harmful air pollutants, which can cause severe impacts on human health too. Thus, proper residue management is of utmost important as it contains plant nutrients and improves the soil-plant-atmospheric continuum. As an alternative strategy, these crop residues can be used for mulching, compost making and *in-situ* incorporation for improving soil fertility.

Keeping this in view, the present trial was initiated, in *Kharif* 2023, to study the influence of crop residues on rice productivity in rice based cropping systems (RBCS). In the current year, the trial was conducted at ten centres viz., Faizabad (FZD), Khudwani (KHD), Kanpur (KPR), Karaikal (KRK), Moncompu (MCU), Maruteru (MTU), Pantnagar (PNT), Pusa (PSA) Chiplima (CHP) and Kaul.

The treatments tested were six combinations consisting of application of recommended dose of fertilizers (RDF), crop residues in combination with chemical fertilizers, green manure (GM)/green leaf manure (GLM) to supply the N requirement on equal basis (50%:50%) with and without the addition of Pusa Decomposer, developed by ICAR-IARI, New Delhi (Table 5.4.1.) along with an absolute control. Pusa Decomposer is a microbial consortium, capable of producing hydrolytic enzymes responsible for the degradation of the polysaccharides in plant cell wall resulting in faster decomposition.

The test varieties were Sarjoo-52 at FZD, Shalimar Rice-4 at KHD, Sarjoo-52 at KNP, ADT 45 at KRK, Uma at MCU, MTU-1061 at MTU, Pant Dhan-18 at PNT, Rajendra Bhagwati at PSA, MTU 1156 at CHP and HKR 127 Kaul. The details of crop and soil parameters of the experimental sites (Table 5.4.2) show variation in soil characteristics with reference to pH, organic carbon content, soil texture and available nutrient status. The data from ten locations are presented in Tables 5.4.3 to 5.4.9.

Rice productivity

Data presented in Tables 5.4.3 & 4 shows that the rice productivity significantly varied with the source of nitrogen. Application of 100% RDF resulted in significantly highest grain yield only at one centre viz., PNT (4.20 t/ha) while at rest of the centers it was on par with residue application combined with microbial culture (*Pusa Decomposer*). Supplementation of recommended N through residues up to 50% along with *Pusa Decomposer* gave yields on par with 100% RDF at four centers studied viz., KNP, MTU and PSA and CHP while supplementation up to 25% at eight (FZD, KHD, KNP, MCU, MTU, PSA, CHP and Kaul) of the ten centres tested. At KRK the treatment differences were not significant for both the seasons. The results prove that the crop residues in combination with Pusa Decomposer can be deployed to substitute up to 25% of the recommended nitrogen without yield penalty. Similar trend was also observed for straw yield as well.

Nutrient uptake and use efficiency

Data presented in Table 5.4.5 & 7 show significant effect of source of N application on nutrient uptake in *Kharif* and *Rabi*. The nutrient uptake values ranged from 17-148 kg N/ha, 2.66-73.8 kg P/ha and 14-165 kg K/ha across centres. Application of RDF maintained significantly highest NPK uptake as compared to other treatments. Among the crop residue treatments, supplementation of 25% RDN with residues and Pusa Decomposer resulted in significantly higher NPK uptake while others or on par and the least uptake was observed in absolute control. Data presented in Table 5.4.6, 5.4.6a and 5.4.7 show lower nutrient use efficiencies in RDF as compared to crop residue treatments which were mostly at par with each other, at most of the centres.

Post-harvest soil nutrient status:

The available nutrient status (N, P and K) of soils are presented in Table 5.4.8 & 9. The data reveals that the soil nitrogen, phosphorus and potassium contents after harvest of the crop were not influenced much by various residue treatments and were at par with each other.

Summary

Supplementing one fourth (25% N) of the recommended N through residues along with microbial consortium, Pusa Decomposer yielded at par with RDF (100% N) in terms of grain yield at eight of the ten centres studied. The results show that the crop residues along with Pusa decomposer can be deployed to substitute 25% of the recommended nitrogen without yield penalty. Application of RDF alone or combined with crop residues/MC/GM to supply the N requirement on equal basis (50%:50%) or (75%:25%) resulted in nutrient uptake values (17-148 kg N/ha, 2.66-73.8 kg P/ha and 14-156 kg K/ha) which were at par with each other and significantly higher than absolute control, across the centres. Nutrient use efficiencies were lower in RDF as compared to crop residue treatments which were mostly at par with each other.

Table: 5.4.1 Residue management in RBCS

Treatments Details

Sl.No	Treatments
1	100% RDF (Recommended Dose Fertilizer)
2	50% Residue + 50% RDF
3	50% Residue + 50% RDF + Pusa decomposer
4	50% Residue + 50% GM/GLM
5	75% RDF + 25% residue + Pusa Decomposer
6	Absolute control

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Table: 5.4.2 Residue management in RBCS
Crop and soil characteristics

Parameter	FZD [1]	KHD [2]	KNP [3]	KRK [4]	MCU [5]	MTU [6]	PNT [7]	PSA [8]	CHP [9]	KUL [10]
Cropping system	Rice-Wheat	Rice-Mustard	Rice-Wheat	Rice-Rice	Rice-Rice	Rice-Rice	Rice-Wheat	Rice-Wheat	Rice-Rice	Rice-wheat
Variety										
Kharif	Sarjoo-52	Shalimar Rice-4	Sarjoo-52	ADT 45	Uma	MTU-1061	Pant Dhan-18	Rajendra Bhagwati	MTU 1156	HKR 127
Rabi	-	-	-	BPT 5204	-	-	-	-	-	-
RFD (Kg NPK/ha)										
Kharif	120:60:60	120:60:30	120: 60: 60	150:60:60	90:45:45	90: 60: 60	120:60:30	120:60:40	80:40:40	150:60:60
Rabi	-	-	-	-	-	-	-	-	-	-
Crop growth										
Kharif	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
Rabi	-	-	Good	Good	-	Good	-	-	-	-
Soil data										
% Clay	23	37	17.83	16.2	29.9	37	25.9	15	21	23.1
% Silt	21	45	22.77	4.5	21.3	29	61.4	26	15	34.6
% Sand	56	18	59.40	72.76	48.8	34	12.9	59	64	42.1
Soil Texture	Sandy loam	Silty clay loam	Sandy loam	Sandy loam	Silty clay	Clay loam	Silty clay loam	Sandy loam	Sandy clay loam	Loam
pH (1:1)	7.6	6.3	7.7	7.4	4.70	6.67	7.4	8.59	6.02	8.28
Org. carbon (%)	0.42	0.71	0.51	0.444	3.12	1.26	0.65	0.51	0.47	0.52
CEC	13.5	-	-	9.2	-	47.5	23.5	-	-	-
EC (ds/m)	1.04	0.22	0.59	0.113	0.42	1.19	0.34	0.19	0.15	0.14
Avail.N (kg/ha)	218	311	221	215	331.4	139	156	239.8	249	152
Avail. P ₂ O ₅ (kg/ha)	25	28.7	23.8	33	38.6	65.8	11.1	19.2	20.1	25
Avail. K ₂ O (kg/ha)	235	245	210	219.8	224.5	324	205	208.2	158	300

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Table: 5.4.3 Residue management in RBCS
Grain yield (Kharif 2024)

Treatments	Grain yield (t/ha)									
	FZD [1]	KHD [2]	KNP [3]	KRK [4]	MCU [5]	MTU [6]	PNT [7]	PSA [8]	CHP [9]	KUL [10]
100% RDF	5.14	7.30	5.21	4.18	7.04	6.46	4.20	5.39	5.29	6.09
50% Residue + 50% RDF	3.73	6.50	4.74	4.73	5.48	5.41	3.30	4.85	5.14	5.19
50% Residue + 50% RDF + Pusa	4.19	6.60	4.96	4.97	5.54	6.08	3.70	4.95	5.06	5.42
50% Residue + 50% GM/GLM	3.33	6.60	4.51	4.85	4.34	6.44	3.50	4.42	4.93	3.50
75% RDF + 25% residue + Pusa	4.65	7.20	5.12	4.89	6.63	6.12	3.80	5.18	5.22	5.77
Absolute control	2.72	5.70	2.22	3.89	4.49	3.61	1.20	2.96	4.29	2.41
Expt. Mean	3.96	6.65	4.46	4.59	5.58	5.68	3.25	4.62	4.99	4.73
CD (0.05)	0.6	0.57	0.42	NS	0.95	0.71	0.09	0.75	0.48	0.39
CV (%)	2.7	5.65	6.19	20.17	11.30	8.33	1.95	10.8	6.41	4.57

Table: 5.4.4 Residue management in RBCS
Straw yield (Kharif 2024)

Treatments	Straw yield (t/ha)									
	FZD [1]	KHD [2]	KNP [3]	KRK [4]	MCU [5]	MTU [6]	PNT [7]	PSA [8]	CHP [9]	KUL [10]
100% RDF	6.13	8.60	6.68	7.15	10.1	6.73	4.60	7.51	6.98	8.58
50% Residue + 50% RDF	5.07	7.40	6.01	6.12	8.00	6.66	4.10	6.81	6.32	7.49
50% Residue + 50% RDF + Pusa decomposer	5.74	7.50	6.29	6.59	7.80	6.96	4.10	6.95	6.25	7.52
50% Residue + 50% GM/GLM	4.56	8.10	5.58	6.15	6.24	6.94	4.10	6.23	6.28	5.06
75% RDF + 25% residue + Pusa Decomposer	5.59	8.60	6.53	5.97	10.00	7.99	4.20	7.26	6.53	8.09
Absolute control	3.84	6.50	2.77	5.45	6.06	5.06	1.40	4.35	5.48	4.03
Expt. Mean	5.16	7.78	5.64	6.24	8.03	6.72	3.75	6.51	6.30	6.79
CD (0.05)	0.22	0.67	0.59	NS	1.34	0.99	0.11	1.00	0.75	0.39
CV (%)	2.82	5.79	6.97	14.21	11.07	9.77	2.11	10.1	7.86	3.19

Table: 5.4.5 Residue management in RBCS
Nutrient uptake (kg/ha) in total dry matter (*Kharif 2024*)

Treatments	FZD [1]			KHD [2]			KNP [3]			KRK [4]			MCU [5]			MTU [6]			PNT [7]			PSA [8]		
	N	P	K	N	P	K	N	P	K	N	P	K	N	P	K	N	P	K	N	P	K	N	P	K
100% RDF	121	51.3	74	147	27.1	120	115	35.0	116	86	33.1	143	148	73.8	156	76	34.9	132	77	13.9	74	119	27.4	123
50% Residue + 50% RDF	76	30.1	48	125	22.4	100	101	28.5	99	91	37.7	146	106	52.6	119	56	26.6	116	55	8.90	35	103	23.0	103
50% Residue + 50% RDF + Pusa decomposer	95	38.7	58	127	23.9	100	107	30.7	105	102	45.8	159	111	53.6	115	66	29.2	119	60	9.73	38	107	24.01	106
50% Residue + 50% GM/GLM	63	22.6	38	132	24.2	109	93	26.3	91	91	58.2	142	83	40.7	92	63	22.5	165	63	10.2	41	89	20.1	91
75% RDF + 25% residue + Pusa Decomposer	100	41.2	61	147	27.2	119	112	33.4	111	92	59.0	140	142	72.7	156	55	33.2	130	65	11.73	51	113	25.9	115
Absolute control	49	16.7	28	104	18.2	84	39	11.3	39	76	51.3	114	83	39.2	87	32	18.6	70	17	2.66	14	57	13.1	60
Expt. Mean	83.9	33.5	50.9	130	23.8	105	94.7	27.5	93	89.7	47.5	140	112	55.4	121	58.2	27.5	122	56.2	9.53	42.1	98	22.3	99.5
CD (0.05)	5.4	2.9	3.4	7.39	2.89	8.63	8.79	3.98	10.52	NS	18.1	40.40	NS	9.63	13.5	8.05	3.4	19.7	5.3	2.0	3.32	16.9	3.9	16.5
CV (%)	4.28	5.9	4.5	3.77	8.07	5.44	6.16	9.58	7.48	25.27	25.2	19.07	10	11.52	7.40	9.18	8.15	10.7	6.22	13.9	5.24	11.4	11.6	11

Table: 5.4.6 Residue management in RBCS
Nutrient use efficiency (kg grain/kg uptake) (Kharif 2024)

Treatment	FZD [1]			KHD [2]			KNP [3]			KRK [4]			MCU [5]		
	N	P	K	N	P	K	N	P	K	N	P	K	N	P	K
100% RDF	43	100	70	49	268	61	45	150	45	51	125	29	48	96	45
50% Residue + 50% RDF	49	125	79	52	292	66	47	166	48	52	130	33	52	104	46
50% Residue + 50% RDF + Pusa decomposer	44	108	73	52	278	66	46	162	47	49	117	31	50	104	48
50% Residue + 50% GM/GLM	53	148	89	50	274	61	49	171	50	53	89	34	53	107	48
75% RDF + 25% residue + Pusa Decomposer	47	113	77	49	267	61	46	154	46	53	86	36	46	91	43
Absolute control	56	164	97	55	314	67	56	195	57	51	75.	34	54	114	52
Expt. Mean	49	126	81	51.3	282	63.6	48.1	166	49	51.7	104	33	50.4	103	47.0
CD (0.05)	1.7	7.9	3.5	3.09	NS	5.53	1.44	15.4	3.54	NS	39.9	NS	NS	NS	NS
CV (%)	2.3	4.19	2.9	4.0	8.74	5.77	1.99	6.3	4.81	18.73	25.4	15	9.5	11.3	12.8

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Table: 5.4.6a Residue management in RBCS
Nutrient use efficiency (kg grain/kg uptake) (Kharif 2024)

Treatment	MTU [6]			PNT [7]			PSA [8]		
	N	P	K	N	P	K	N	P	K
100% RDF	85	186	49	55	307	57	45	197	44
50% Residue + 50% RDF	99	203	47	59	367	92	47	211	47
50% Residue + 50% RDF + Pusa decomposer	92	208	52	61	382	95	46	206	47
50% Residue + 50% GM/GLM	104	291	40	55	340	85	50	220	49
75% RDF + 25% residue + Pusa Decomposer	112	185	48	58	335	75	46	200	45
Absolute control	115	196	55	68	445	88	52	225	50
Expt. Mean	101.18	212	48.5	59.4	363	82.1	47.7	210	46.9
CD (0.05)	15.81	34.25	NS	5.5	64.5	6.98	3.2	12.6	NS
CV (%)	10.36	10.7	14.6	6.1	11.8	5.64	4.43	3.98	5.90

Table: 5.4.7 Residue management in RBCS
Grain and straw yields, Nutrient uptake and Use efficiency (Rabi 2023-24)

Treatment	Grain yield (t/ha)		Straw yield (t/ha)		Total Nutrient uptake (kg/ha)						Nutrient use efficiency (Kg grain/kg uptake)					
					KRK			MTU			KRK			MTU		
	KRK	MTU	KRK	MTU	N	P	K	N	P	K	N	P	K	N	P	K
100% RDF	3.28	6.72	7.88	8.43	94	27.9	145	124	42.2	138	36	118	23	54	160	49
50% Residue + 50% RDF	3.57	6.06	8.05	8.63	105	42.3	159	96	33.7	139	34	106	23	63	180	44
50% Residue + 50% RDF + Pusa	3.68	6.69	7.07	9.07	86	23.2	137	119	39.7	159	48	186	29	56	168	42
50% Residue + 50% GM/GLM	3.56	6.11	8.08	8.38	97	39.0	153	101	35.3	131	37	97	23	61	173	46
75% RDF + 25% residue + Pusa	-	6.20	-	8.93	-	-	-	114	39.9	149	-	-	-	54	155	42
Absolute control	3.11	4.33	8.66	6.50	82	33.9	144	62	21.8	99	39	103	22	70	198	44
Expt. Mean	3.44	6.01	8.0	8.32	93	33.3	147	102.8	35.4	136	38.7	122	24	59.6	172	44.5
CD (0.05)	NS	0.94	NS	1.02	NS	NS	NS	9.24	3.00	14.8	NS	NS	NS	5.34	17.5	NS
CV (%)	16.2	10.37	22.7	8.19	25.1	51	22.8	5.96	5.63	7.24	23	42.4	21.7	5.95	6.75	12.01

Table: 5.4.8 Residue management in RBCS
Post-harvest nutrient status of soil (kg/ha) (Kharif 2024)

Treatment	KHD			KNP			KRK			MCU			MTU			PNT		
	N	P	K	N	P	K	N	P	K	N	P	K	N	P	K	N	P	K
100% RDF	301	15.1	236	225	25.7	219	211	30.5	227	341	36.2	206	146	87.1	328	174	13.0	188
50% Residue + 50% RDF	287	14.4	213	221	24.4	212	207	40.5	279	306	30.4	231	131	83.4	316	165	11.6	156
50% Residue + 50% RDF + Pusa decomposer	291	14.3	223	224	25.1	216	225	38.3	323	299	24.5	222	129	80.7	344	164	11.1	166
50% Residue + 50% GM/GLM	293	14.0	216	220	24.3	211	239	35.1	416	258	22.9	212	128	83.5	333	162	11.5	158
75% RDF + 25% residue + Pusa Decomposer	302	14.9	223	223	25.0	215	207	39.1	294	324	34.6	209	131	88.5	351	171	10.4	170
Absolute control	266	13.1	174	197	19.8	204	199	34.2	238	263	23.7	181	113	84.3	291	131	8.60	157
Expt. Mean	29.0	14.3	214	218	24.0	213	215	36.3	296	298.5	28.8	210	129.8	84.6	327.0	161.1	11.1	165
CD (0.05)	NS	NS	17.6	17.1	1.77	NS	NS	NS	NS	45.7	5.20	29.6	10.4	NS	10.08	12.72	0.99	10.7
CV (%)	5.3	6.4	5.45	5.20	4.89	5.08	8.96	22.8	33.63	10.2	12.01	9.36	5.31	6.52	2.04	5.23	5.96	4.3

Table: 5.4.8a Residue management in RBCS
Post-harvest nutrient status of soil (kg/ha) (Kharif 2024)

Treatment	PSA			CHP			KUL		
	N	P	K	N	P	K	N	P	K
100% RDF	271	28.0	237	262	27.0	186	150	18.6	259
50% Residue + 50% RDF	262	25.1	229	261	21.7	167	154	14.9	234
50% Residue + 50% RDF + Pusa decomposer	269	24.9	227	257	21.0	176	156	16.5	230
50% Residue + 50% GM/GLM	254	22.3	218	255	21.8	163	160	15.1	215
75% RDF + 25% residue + Pusa Decomposer	270	27.2	232	252	24.0	179	155	18.3	255
Absolute control	232	19.3	208	233	18.7	152	134	12.0	206
Expt. Mean	260	24.4	225.3	253	22.4	170	152	15.9	233
CD (0.05)	24.3	4.9	NS	10.2	3.25	11.5	8.13	2.7	11.3
CV (%)	6.2	13.2	8.21	2.67	9.62	4.5	2.94	9.3	2.7

Table: 5.4.9 Residue management in RBCS
Post-harvest nutrient status of soils (kg/ha) (Rabi 2023-24)

Treatment	KRK			MTU		
	N	P	K	N	P	K
100% RDF	138	32.5	116	182	90.5	389
50% Residue + 50% RDF	138	43.7	169	165	91.2	384
50% Residue + 50% RDF + Pusa decomposer	137	32.6	169	165	92.6	414
50% Residue + 50% GM/GLM	148	28.2	183	153	92.0	391
75% RDF + 25% residue + Pusa Decomposer	-	-	-	166	92.7	412
Absolute control	137	32.0	158	137	87.8	354
Expt. Mean	140	33.8	159	161	91.1	390
CD (0.05)	NS	NS	NS	6.2	NS	15.8
CV (%)	5.5	26.5	25.5	2.6	2.7	2.68

5.5. Nano-fertilizers for increasing nutrient use efficiency, yield, and economic returns in transplanted rice

The nitrogen use efficiency (NUE) in agricultural systems remains low, with more than 50% of the nitrogen applied to agricultural soils potentially lost to the environment on a global scale. To improve the current NUE, it is essential to enhance the efficiency of farming systems, adopt environmentally sound agronomic practices, and explore disruptive technologies. Nano-fertilizers offer distinct advantages that improve plant performance, including enhanced absorption, increased production, higher photosynthesis rates, and a significant expansion of the leaf surface area. Utilizing nano-fertilizers for specific crops, like rice, could help reduce the negative impacts of excessive chemical input use while maintaining production levels and nutritional benefits. In this background and based on a one-year field study with objectives 1. *To study the efficiency of nano-fertilizers in increasing the growth and yield of rice crops* and 2. *To find out the nutrient use efficiency of nano-fertilizers in rice crops*. A total of six treatments namely, T1: *Recommended dose of nitrogen (RDN) through urea (recommended P and K)* T2: *T1+ Two foliar sprays Nano-Urea @ 2% at active tillering and panicle initiation stages*, T3: *50 % of RDN + Two foliar sprays Nano-urea @ 2% (AT and PI)* T4: *75 % RDN* T5: *75% of RDN + Two foliar sprays Nano-urea @ 2% (AT and PI)* and T6: *Control (no application of fertilizer)*. The trial was laid out in randomized block design (RBD) with three replications. The trial was conducted in collaboration with Agronomy in a total of 25 locations (BNK-Bankura, CHT-Chatha, CHP-Chiplima, CBT-Coimbatore, FZB-Faizabad, GNV-Gangavati, JDP-Jagdalpur, KHD-Khudwani, KNP-Kanpur, KRK-Karaikal, KUL-Kaul, LDH-Ludhiana, MND-Mandya, MTU-Maruteru, MNC-Moncompu, NGI-Nagina, NVS-Navsari, NLR-Nellore, PDU-Puducherry, PNR-Pantnagar, PTB-Pattambi, PSA-Pusa, RCI- Ranchi, RNR-Rajendranagar, WGL- Warangal and NRRI Cuttack). The results of the third-year study were summarized and presented in Tables 5.5.2 to 5.5.7 and the salient findings are as follows.

Yield parameters like tiller number and panicle number per meter square were documented and represented in Table 5.5.2. Significant differences were observed in the yield parameters due to variations with treatments at all the locations except Karaikal, Nellore and Warangal. Application of 100 % RDN along with two sprays of nano urea at active tillering and panicle initiation stage registered the significantly higher tiller and panicle numbers (per m²) at Bankura (386,290), Coimbatore (375, 375), Chatha (250, 228), Faizabad (373, 317), Jagadalpur (370, 362), Khudwani (498, 421), Kanpur (483, 402), Moncompu (515, 469), Mandya (415, 403), Nagina (279, 237), Rajendranagar (315, 289), Chiplima (305, 272) which was on par with the recommended dose of N treated plots. At Pattambi, 75% RDN and administration of two sprays of nano urea recorded higher tiller and panicle numbers (388, 376). Whereas, the application of 50% RDN combined with two sprays (T3) and 75% RDN alone also improved the tiller numbers in all centres over absolute control but not to the level of T1 treatment. In general, the order of improvement was observed as T2>T1=T5>T4>T3>T6 at majority of the locations.

Grain and straw yields at all the locations showed significant differences with the addition of nano urea treatments (Table 5.5.3). Similar to yield attributes, the application of 100% RDN and two sprays of nano urea at two critical stages of rice crop recorded the highest grain and straw yields at a majority of the locations *i.e.*, Bankura (5170 and 7186 kg/ha), Coimbatore (6583 and 8450 kg/ha), Chatha (3147 and 7080 kg/ha), Faizabad (5945 and 7145 kg/ha), Gangavati (4497 and 4167 kg/ha), Khudwani (8023 and 8999 kg/ha), Kanpur (5592 and 7200 kg/ha), Moncompu (5444 and 7333 kg/ha), Mandya (6280 and 7625 kg/ha), Maruteru (6566 and 8221 kg/ha), Nellore (4867 and 7097 kg/ha), Navasari (4376 and 6554 kg/ha), Pusa (4685 and 6210 kg/ha), Ranchi (5417 and 8407 kg/ha), Chiplima (5044 and 5909 kg/ha), Kaul (6880 and 8897 kg/ha), Ludhiana (3439 and 4539 kg/ha) and Mandya (6280 and 7627 kg/ha), respectively which was on par with the RDF. However, the application of 75% RDN along with two sprays of nano urea exhibited a higher grain and straw yield at Pattambi (6433 and 10583 kg/ha), Karaikal (1994 and 8433 kg/ha) and Warangal (4529 and 6051 kg/ha) locations.

A combination of 50% RDF + 2 sprays of nano urea application registered on par results in 3/4th of RDN application (75% RDN only) at the majority of the centres (21 centres). The percentage variation with the different treatments over the locations was depicted in Figures 1a and 1b. A dual spray of nano urea in addition to 100% RDN showed a yield advantage with a minimum value at Khudwani (0.5%) to a maximum at Rajendranagar (20.6%) over RDF treatment. The second highest advantage was recorded with 75% RDN+ 2 sprays urea at Faizabad (8%), Gangavati (1%), Kanpur (2.5%), Moncompu (5.3%), Ranchi (4.6%) and Karaikal (7.5%), respectively. Replacement of 25 and 50% of RDN with nano urea spray at two intervals (T3 and T5) recorded a declining trend in the grain yield to the tune of -4 to -38% (T3) and -0.4 to -17.5% (T5), respectively over the recommended dose of practice *i.e.* 100% N.

The total N uptake of rice plants was documented and represented in Table 5.5.4. Additional two sprays of nano urea along with RDN (T2) registered the highest N uptake in rice plants grown at Coimbatore (130.0 kg/ha), Chatha (46.4 kg/ha), Khudwani (153.0 kg/ha), Kanpur (122.6 kg/ha), Navasari (85.5 kg/ha), Ranchi (105.3 kg/ha), Chiplima (87.9 kg/ha), Kaul (136.5 kg/ha), Mandya (128.8 kg/ha), Faizabad (144.0 kg/ha) and Maruteru (114.8 kg/ha), respectively which was on par with the 75% RDN + two sprays of nano urea treatment. Surprisingly, Moncompu (141.7 kg/ha) and Karaikal (116.7 kg/ha) showed positive and highest uptake with the T5 (75% RDN + two sprays of nano urea) (four sprays). The lowest N uptake was observed with control treatment followed by 50% RDN treatment with additional nano urea spray across the locations. The effect of nitrogen application through conventional fertilizer and nano urea significantly improved the soil available N in rice (Table 5.5.5). Either application of 100 % RDN or 100% RDN + foliar sprays of urea positively improved the soil available N over absolute N control across the locations. Treatments namely, T4 (75% RDN) and T5 (75% RDN + 2 sprays of nano urea) recorded on par value across the locations, which can be considered that additional spray of nano urea in the plant did not have a beneficial role in the improvement of soil N.

The use of nano urea in rice crops did not significantly improve the BC ratio (economic returns) across the locations (Table 5.5.6). The highest benefit and returns were observed with T2 at Chatha (1.71), Gangavati (1.51), Jagadapur (2.31), Khudwani (2.40), Kanpur (2.20), Mandya (2.37), Maruteru (2.29), Pusa (2.06), Ranchi (2.71) and Warangal (2.77). Whereas, the next best economic return was recorded with 100% RDN treatment and other treatments registered a lower BC ratio than T2. While at Moncompu and Navasari, T1 (RDN) treatment registered the highest BC ratio i.e. 2.28 and 1.51, respectively over other treatments. In general, an additional application of nano urea along with 100% RDN was on par with the 100% RDN treatments and did not fetch much monetary benefit in irrigated rice crops.

The application of nano urea has increased the NUE (Physiological and recovery efficiency) at a few locations (Figures. 2a & 2b). The highest physiological efficiency was exhibited in T1 (100% RDN) at Jagdalpur (153.3), Khudwani (59.4) Navasari (45.3) followed by other treatments. Whereas, T2 (100% RDN + 2 sprays of nano urea) registered higher PE at Pusa (64.9), Mandya (37.3) and Maruteru (53.1). However, Karaikal centre registered negative PE values with all the treatments except 75% RDN+ dual spray of nano urea. In case of recovery efficiency (RE), higher efficiency was observed with RDN treatment at Khudwani, Kanpur, Navasari, Ranchi and Coimbatore. Additional nano urea spray with 100% RDN is registered more RE at Jagadapur and Pusa.

Summary:

Application of nano urea improved the tiller, panicle numbers, and grain yield of rice crops over the absolute N control. A dual spray of nano urea in addition to 100% RDN showed a yield advantage with a minimum value at Khudwani (0.5%) to a maximum at Rajendranagar (20.6%) over RDF treatment. Similarly, this treatment performed well with the total N uptake at the majority of the locations. Replacement of 25 and 50% of RDN with nano urea spray at two intervals (T3 and T5) recorded a declining trend in the grain yield to the tune of -4 to -38% (T3) and -0.4 to -17.5% (T5), respectively over the recommended dose of practice i.e. 100% N and found ineffective for yield attributes, N content, etc across the locations.

Table 5.5.1: List of centres with trial details

S. No	Centre name	Variety	Soil Type	Soil values (Initial)	Fertiliser Dose
1	ARI, Rajendranagar	JGL 24423	Clay loam		120:60:40
2	Bankura		Red and Lateritic soil		70:35:35
3	Chatha	Basmati 370	Sandy loam	245:14:146	30:20:10
4	Chiplima	MTU 1156		333:26:183	80:40:40
5	Coimbatore	Co 55	Clay loam	224:17.5:421	150:50:50
6	Faizabad			75.4:17.5:225	120:60:40
7	Gangavati	Gangavati Sona	Clay loam		150:75:75
8	Jagdapur	Samlesh Vari	Red Soil	227:19:380	100:60:30
9	Jagtial				
10	Kanpur		Sandy loam		120:60:60
11	Karaikal	ADT 45	Sandy loam	325:40.5:267	150:50:50
12	Kaul			160:12:320	
13	Khudwani	Shalimar Rice 4		323:17: 247	120:60:30
14	Ludhiana		Sandy Loam	270:15:185	105:30:30
15	Mandya	93 R	Red Sandy Loam soil	284:60:264	100:50:50
16	Maruteru		Clay loam	184:53.9:348	180:90:60
17	Moncompu		Clay loam	195:70:70	90:45:45
18	Nagina	Pusa Basmati 1637			120:60:40
19	Navsari	GNR 3	Clay	282:38:0	100:30:0
20	Nellore	BPT 5204	Sandy Clay loam	163:128:507	120:60:40
21	Pantnagar				
22	Pattambi				
23	Puducherry	RP Bio 226	Clay Loam	156.8:35:106	120:40:40
24	Pusa	Rajendra Saraswati	Sandy Loam	214:15:114	120:60:40
25	Ranchi		Clay loam	322:36.4:167	120:60:40
26	Warangal	WGL 962	Clay loam	129:42:396	120:60:40
27	Sabour		Silty Loam	161:27:198	100:40:20
28	NRRI		Clay loam		100:40:40

Table 5.5.2: Effect of nano urea application growth parameters of Rice (Tiller (T) and Panicle (P) Numbers per m²)

Treatments	BNK		CBT		CHT		FZB		JDP		KHD		KNP	
	T	P	T	P	T	P	T	P	T	P	T	P	T	P
T1: Recommended dose of N (RDN)	380	283	353	353	225	204	347	279	348	344	487	411	455	377
T2: T1+ Two sprays of Nano-Urea	386	290	375	375	250	228	373	317	370	362	498	421	483	402
T3: 50% RDN+ Two sprays Nano-Urea	340	249	331	331	198	175	343	283	268	261	471	384	428	352
T4: 75% RDN	343	257	348	348	201	179	297	250	303	297	479	398	442	366
T5: 75% RDN + Two sprays Nano-Urea	374	278	363	363	217	194	366	317	330	321	495	417	451	372
T6: Control (no N)	259	183	219	219	159	136	202	154	145	138	466	386	322	236
	Mean	347	332	332	208	186	321	267	294	287	483	403	430	351
	CD (p=0.05)	15.3	8.9	11.4	6.4	6.9	18.4	14.3	39.0	38.9	18.8	21.9	52.4	41.0
	CV (%)	2.4	1.9	1.9	1.7	2.0	3.1	2.9	7.3	7.4	2.2	3.1	6.7	6.4

T= Tiller numbers per m², P = Panicle number per m²

Treatments	MNC		MND		MTU		NGN		NLR		NVS		PSA	
	T	P	T	P	T	P	T	P	T	P	T	P	T	P
T1: Recommended dose of N (RDN)	449	423	379	335	247	222	310	299	160	146	334	323	285	282
T2: T1+ Two sprays of Nano-Urea	515	469	415	403	279	237	331	319	150	152	317	309	294	293
T3: 50% RDN+ Two sprays Nano-Urea	360	424	324	298	219	189	252	239	150	147	292	284	256	250
T4: 75% RDN	449	417	351	327	228	196	282	271	143	152	302	294	270	268
T5: 75% RDN + Two sprays Nano-Urea	448	414	384	359	231	210	291	280	137	152	302	293	281	279
T6: Control (no N)	379	407	291	264	215	176	193	184	127	148	269	259	301	297
	Mean	433	357	331	236	205	276	265	144	149	303	293	281	278
	CD (p=0.05)	49.2	32.6	29.9	33.8	NS	13.0	12.5	1.9	NS	37.0	37.4	21.4	20.6
	CV (%)	6.2	4.2	4.6	5.6	7.8	2.6	2.6	7.3	7.5	6.7	7.0	4.4	4.3

T= Tiller numbers per m², P = Panicle number per m²

Contd..

Treatments	PTB		RNR		WGL		CHP		KRK		NRR1	
	T	P	T	P	T	P	T	P	T	P	T	P
T1: Recommended dose of N (RDN)	328	319	297	276	349	349	306	269	209	175	266	264
T2: T1+ Two sprays of Nano-Urea	350	343	315	289	353	353	305	272	206	172	269	268
T3: 50% RDN+ Two sprays Nano-Urea	276	268	269	251	349	349	289	239	173	136	261	261
T4: 75% RDN	316	307	291	260	344	344	263	229	183	140	261	262
T5: 75% RDN + Two sprays Nano-Urea	388	376	294	262	340	340	245	212	163	127	265	263
T6: Control (no N)	251	242	259	230	322	322	234	212	161	153	246	241
Mean	318	309	287	261	343	343	274	239	183	151	261	259
CD (p=0.05)	22.0	24.9	19.9	20.6	NS	NS	40.5	27.2	NS	NS	NS	NS
CV (%)	4.0	4.6	3.9	7.3	4.3	4.3	8.1	6.3	11.1	6.3	1.3	1.1

T= Tiller numbers per m², P = Panicle number per m²

Table 5.5.3: Effect of nano urea application growth parameters of Rice (Grain (kg/ha) and straw yield (kg/ha))

Treatments	BNK		CBT		CHT		Masodha		GNV		JDP	
	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw
T1: Recommended dose of N (RDN)	5084	7009	6147	8130	2903	6533	5100	5867	4111	5000	4657	12363
T2: T1+ Two sprays of Nano-Urea	5170	7186	6583	8450	3147	7080	5945	7145	4497	4167	5060	11340
T3: 50% RDN+ Two sprays Nano-Urea	4598	6437	5330	7163	2753	5920	4398	5523	3945	4583	4333	13623
T4: 75% RDN	4773	6683	5550	7167	2800	6300	3770	4185	3654	5417	4423	12260
T5: 75% RDN + Two sprays Nano-Urea	4904	6866	6123	7860	2833	6375	5507	6505	4153	5000	4583	12010
T6: Control (no N)	3383	4774	2653	3283	2153	7307	2108	3058	2892	3750	2373	10333
Mean	4651	6492	5397	7008	2764	6085	4471	5380	3875	4652	4238	11988
CD (p=0.05)	111	121	98	134	42	92	177	464	662	NS	873	NS
CV (%)	1.3	1.0	1.0	1.0	0.8	0.8	2.2	4.7	9.4	19.4	11.3	10.6

Treatments	KHD		KNP		MNC		MND		MTU		NLR	
	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw
T1: Recommended dose of N (RDN)	7980	8986	5250	6742	5056	6444	5823	7307	5400	7451	4733	6980
T2: T1+ Two sprays of Nano-Urea	8023	8999	5592	7200	5444	7333	6280	7625	6566	8221	4867	7097
T3: 50% RDN+ Two sprays Nano-Urea	7050	7889	4833	5992	4278	5667	4409	5470	4933	6766	4233	5708
T4: 75% RDN	7750	8492	5100	6217	4778	6333	4711	6475	5100	7049	4517	5797
T5: 75% RDN + Two sprays Nano-Urea	7833	9106	5383	6942	5322	7000	5503	6890	5300	7031	4717	5867
T6: Control (no N)	5543	5890	2833	3258	4222	5778	3929	4713	4166	5074	4033	5040
Mean	7557	8467	4831	6058	4849	6425	5109	6413	5244	6932	4516	6076
CD (p=0.05)	1198	1227	591	721	659	527	905	1476	824	1052	549	538
CV (%)	9.3	8.5	6.7	6.5	7.5	4.5	9.7	12.6	8.6	8.3	6.7	4.9

Continued..

Treatments	NVS		PSA		PTB		RCI		RNR		WGL	
	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw
T1: Recommended dose of N (RDN)	4350	6582	3815	4855	4300	10600	5020	7420	6528	7834	4529	6449
T2: T1+ Two sprays of Nano-Urea	4376	6554	4685	6210	4633	10350	5417	8407	7870	9444	4402	7156
T3: 50% RDN+ Two sprays Nano-Urea	3611	5388	2361	3032	3633	9067	4080	6700	5592	6710	4076	6848
T4: 75% RDN	3651	5447	3098	4008	4467	10583	4823	7400	6278	7534	4167	6630
T5: 75% RDN + Two sprays Nano-Urea	4109	6147	3507	4435	6433	10583	5250	7763	6296	7555	4529	6051
T6: Control (no N)	3375	5045	1415	1947	3500	9417	2220	2780	3238	3886	2754	4873
Mean	3912	5860	3146	4081	4494	10100	4468	6475	5967	7160	4076	6334
CD (p=0.05)	610	893	1027	1316	637	NS	774.3	1046	500	600	671	1137
CV (%)	8.6	8.4	17.2	17.2	8.2	8.7	10.0	9.2	4.6	4.6	9.0	9.9

Treatments	CHP		KRK		KUL		LUD		MND		NRRI	
	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw
T1: Recommended dose of N (RDN)	5075	6009	1855	7311	6691	8741	3088	4177	5823	7307	5100	5290
T2: T1+ Two sprays of Nano-Urea	5044	5909	1844	7133	6880	8897	3439	4539	6280	7627	5190	5380
T3: 50% RDN+ Two sprays Nano-Urea	4672	5186	1589	5505	5041	7193	3086	4288	4410	5470	4420	5090
T4: 75% RDN	4725	5050	1695	6156	5730	7362	3222	4482	4710	6477	4680	5190
T5: 75% RDN + Two sprays Nano-Urea	4186	5313	1994	8433	6280	7915	3018	4239	5503	6890	4960	5240
T6: Control (no N)	3913	4157	1394	7700	3614	5783	2136	3227	3930	4713	3470	4390
Mean	4602	5270	1728	7039	5705	7648	2998	4158	5109	6413	4640	5096
CD (p=0.05)	612	695	NS	NS	1646	383	450	339	908	1478	246	174
CV (%)	7.3	7.3	22.1	23.5	15.9	2.7	8.3	4.5	9.8	12.7	2.9	1.8

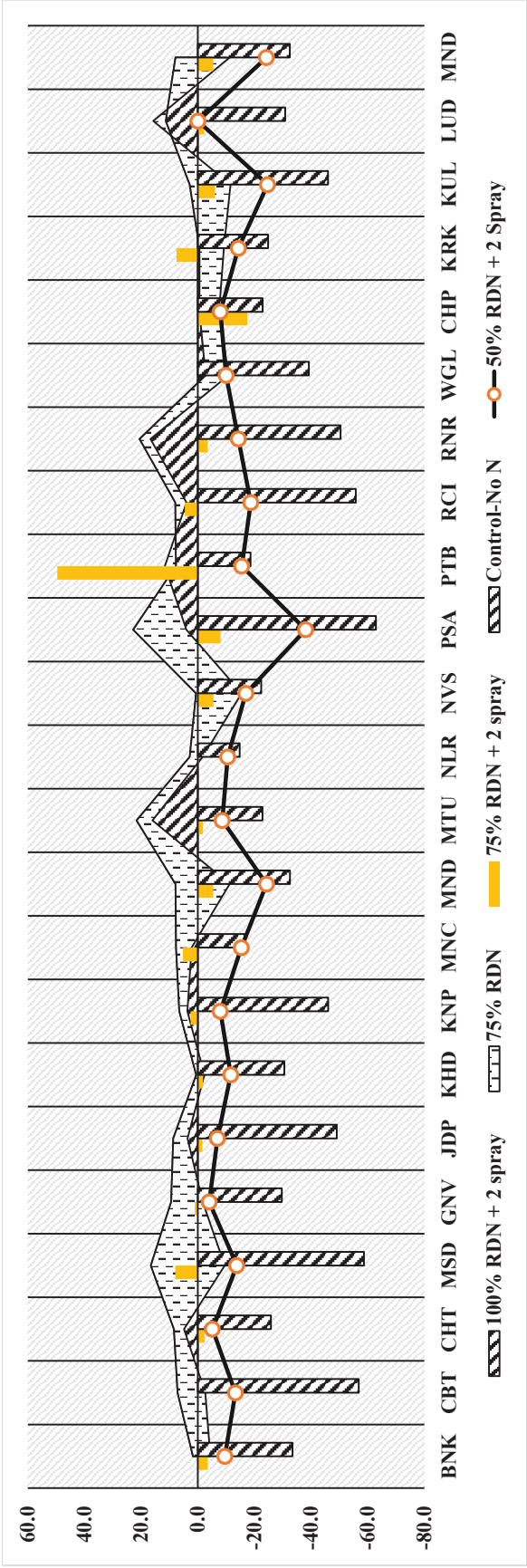


Figure 1. Percent change over recommended dose of nitrogen (RDN) treatment

Table 5.5.4: Effect of nano urea application on Total N uptake (kg/ha) in rice

Treatments	CBT	CHT	JDP	KHD	KNP	MNC	NVS	PSA	RCI	CHP	KRK	KUL	MND	MSD	MTU
T1: Recommended dose of N (RDN)	120.8	45.7	70.2	148.1	112.0	128.7	75.4	75.1	90.1	75.5	80.5	131.1	122.0	111.9	97.04
T2: T1+ Two sprays of Nano-Urea	130.0	46.4	73.1	153.0	122.6	120.7	85.5	81.8	105.3	87.9	90.4	136.5	128.8	144.0	114.89
T3: 50% RDN+ Two sprays Nano-Urea	105.4	39.7	88.3	135.2	96.8	115.3	68.7	62.2	71.6	51.3	69.8	91.2	81.9	92.4	86.1
T4: 75% RDN	112.0	40.1	70.9	147.8	103.8	116.7	63.2	73.9	84.8	61.2	72.0	104.3	92.9	68.9	94.2
T5: 75% RDN + Two sprays Nano-Urea	124.6	42.2	82.1	153.4	114.7	141.7	81.5	85.4	97.8	54.1	116.7	116.9	99.0	125.1	87.8
T6: Control (no N)	81.5	35.4	55.3	107.1	41.1	116.7	53.9	31.4	34.2	38.6	85.4	66.9	65.8	41.5	69.7
Mean	112.4	41.6	73.3	140.8	98.5	123.3	71.4	68.3	80.6	61.4	85.8	107.8	98.5	97.3	91.6
CD (p=0.05)	5.9	0.11	12.0	20.2	11.1	NS	18.2	16.1	20.3	4.8	NS	27.1	21.7	7.1	18.3
CV (%)	2.9	0.14	9.0	7.9	6.2	10.8	13.9	12.4	14.8	4.3	20.1	13.8	12.1	4.0	10.9

Table 5.5.5: Effect of nano urea application on available N (kg/ha) in soil

Treatments	CBT	CHP	CHT	JDP	KHD	MNC	NVS	PSA	RCI	KRK	KUL	MND	MTU	NRRI
T1: Recommended dose of N (RDN)	214.1	343.5	234.4	222.9	327.3	191.7	245.5	200.3	275.3	209.1	178.7	263.9	150.3	373.6
T2: T1+ Two sprays of Nano-Urea	222.7	385.3	238.6	231.9	325.3	205.7	242.1	197.3	255.3	221.6	181.7	251.9	162.3	377.6
T3: 50% RDN+ Two sprays Nano-Urea	205.4	345.6	265.4	223.7	338.7	207.7	238.3	193.3	284.7	206.9	167.3	239.3	148.0	354.6
T4: 75% RDN	211.8	328.0	227.3	222.1	329.6	201.3	247.3	213.3	280.3	202.8	171.3	239.3	158.3	360.5
T5: 75% RDN + Two sprays Nano-Urea	217.4	364.0	231.1	223.0	326.9	201.7	249.1	211.0	286.6	177.7	175.3	232.9	137.0	370.2
T6: Control (no N)	190.9	237.2	222.9	227.2	311.2	265.3	249.5	159.0	288.3	209.1	154.3	224.3	114.6	278.9
Mean	210.4	333.9	236.6	225.1	326.1	212.3	245.3	199.4	276.9	204.5	171.4	241.9	145.1	352.6
CD (p=0.05)	5.16	33.7	NS	5.9	NS	NS	NS	25.7	29.1	NS	16.9	10.7	9.7	6.6
CV (%)	1.3	5.5	10.1	1.4	5.2	27.9	4.7	7.3	5.9	9.0	5.4	4.7	3.7	1.0

Table 5.5.6: Effect of nano urea application on Benefit: Cost Ratio (B:C) in rice

Treatments	CHT	GNV	JDP	KHD	KNP	MNC	MND	MTU	NVS	PSA	RCI	WGL
T1: Recommended dose of N (RDN)	1.51	1.40	2.19	2.47	2.07	2.28	2.32	1.95	1.51	1.73	2.66	2.53
T2: T1+ Two sprays of Nano-Urea	1.71	1.51	2.31	2.40	2.20	2.23	2.37	2.29	1.41	2.06	2.71	2.77
T3: 50% RDN+ Two sprays Nano-Urea	1.43	1.33	2.14	2.02	1.89	1.75	1.75	1.86	1.23	1.06	2.09	2.80
T4: 75% RDN	1.45	1.40	2.17	2.38	1.96	2.15	1.95	1.90	1.31	1.38	2.60	2.63
T5: 75% RDN + Two sprays Nano-Urea	1.47	1.40	2.15	2.34	2.02	2.18	2.13	1.93	1.29	1.53	2.61	2.43
T6: Control (no N)	0.96	1.13	1.20	1.46	1.21	1.63	1.65	1.72	1.24	0.70	1.22	2.00

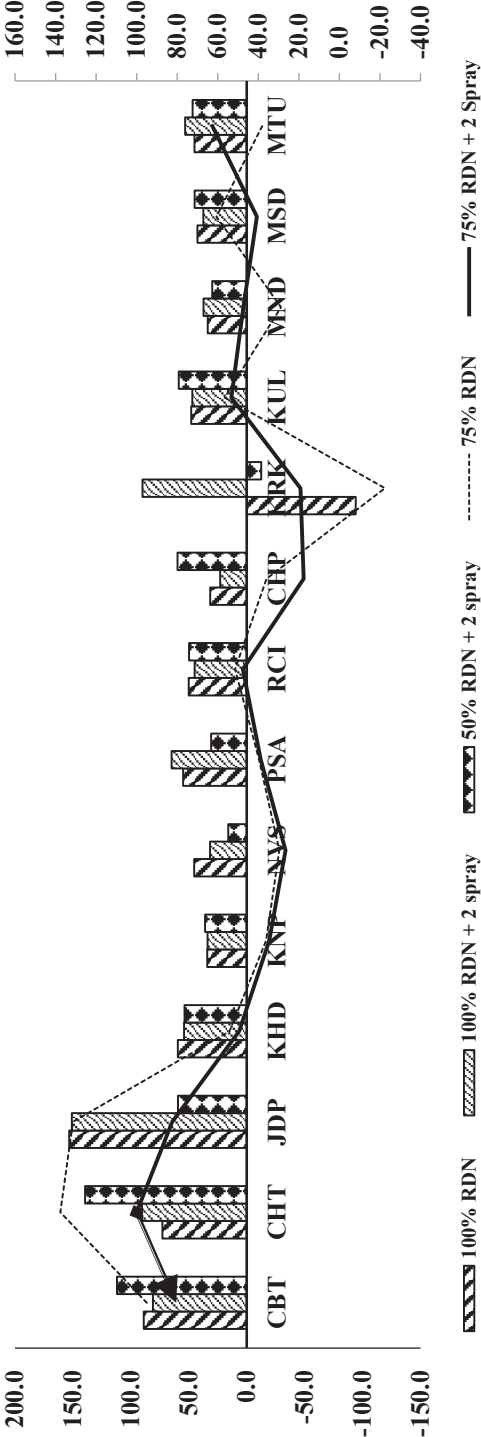


Figure 2: Effect of nano urea application on Physiological Use Efficiency (NUE-Physiological use efficiency) in rice

5.7. Evaluation of Organic fertilisers and Natural farming practices for enhancing Productivity and soil health

The trial was conducted during *Rabi* 2023-24 and *Kharif*-2024 in collaboration with Agronomy to “Evaluate the organic fertilisers and natural farming practices for enhancing the productivity and soil health” and its influence on productivity, grain quality, soil health and environmental sustainability. Currently, organic produce including organic rice is in huge demand owing to its potential to fetch premium prices in the global market. There were mainly five treatments viz T₁: Control (No addition of any inputs except labour for operations including weeding) T₂: Complete Natural Farming (NF), T₃: AI-NPOF package (All India Network Programme on Organic Farming), T₄: Integrated Crop Management (50% nutrient through organic and 50% nutrient through inorganic source) and T₅: Integrated Crop Management (50% nutrient through organic and 50% nutrient through inorganic source with application of need based pest management). All farming practices starting from seed treatment to harvest were practiced as per the technical programme; observations were recorded on grain yields, straw yields and other yield parameters. Soil samples were collected before start of an experiment and after harvest and were analysed for important soil properties. The trial was conducted at seventeen locations viz., (Chinsurah-CHN, Chiplima-CHP, Khudwani-KHD, Kaul- KUL, Moncompu-MNC, Mandya-MND, Maruteru-MTU, Pantnagar-PNT, Pusa-PUSA, Pudhuchery-PUD, Titabar-TTB, Chatha-CHT, Gangavathi-GNV, Ghaghraghat-GHT, Pattambi-PTB, and Raipur-RPR) during *Kharif*- 2024 and at Karaikal-KRK, Chinsurah-CHN, and Pattambi-PTB during *Rabi* 2023-24. The results are presented in Tables 5.7.1 to 5.7.19.

***Kharif*-2024**

Grain, straw yield and yield parameters

Among the sixteen locations, grain yield during *Kharif*-2024 (Table 5.7.2) was significantly superior in (T₅) Integrated Crop Management (need based pesticides) [5.95, 5.49, 7.01, 2.56, 2.87, 5.87, 3.66, 3.34, 3.96, 4.37, 5.48, 3.08 t/ha] treatment as compared to other treatments recording 51.4, 24, 17, 34, 46.3, 30, 20, 8.1, 25.3, 52.9, 21.9 and 26.3 % higher yield over complete natural farming, at CHN, CHP, KHD, KUL, MND, MTU, PUSA, PUD, TTB, GNV, PTB and RPR respectively. Whereas at MNC (5.79 t/ha), PNT (2.05 t/ha) and GHT (4.53 t/ha) recorded higher grain yield, which was 3.8, 39.5 and 20.7 % higher in T₄: Integrated Crop Management compared to complete natural farming. At CHT (3.22 t/ha), T₃: AI-NPOF package recorded a higher grain yield, which was 19.2 % higher as compared to complete natural farming.

Straw yield followed an almost similar trend as that of grain yield at most of the locations (Table 7.3) recording 49.6, 31.9, 22.6, 36.9, 0.6, 39.6, 29.7, 17.9, 22.3, 71.9, 32.7 and 23.7 % higher yields in T₅: Integrated crop management (need-based pesticides) over complete natural farming at CHN, CHP, KHD, KUL, MNC, MND, MTU, PUSA, TTB, GNV, PTB, and RPR respectively. Whereas at PNT, PUD, and GHT T₄: Integrated Crop Management recorded 31.7, 9.4 and 13.5 % higher over complete natural farming. The T₃: AI-NPOF package recorded higher grain yield at CHT (7.22 t/ha), which was 19.25% higher as compared to complete natural farming.

With regard to yield parameters (tillers/m², panicles/m², 1000 grain weight), the treatment integrated crop management (need based pesticides) recorded significantly higher values as compared to other treatments CHN, CHP, KHD, KUL, MND, MTU, PNT, PUSA, PUD, TTB, GNV, GHT, PTB and RPR. But at MNC the integrated crop management treatment recorded significantly higher as compared to other treatments. Whereas, at CHT, (tillers/m², panicles/m², 1000 grain weight) AI-NPOF package recorded higher as compared to complete natural farming (Table 5.7.4 to 5.7.16).

Integrated crop management (need based pesticides) treatment recorded significantly higher uptake values as compared to other treatments at CHP, KHD, KRK, KUL, MND, PNT, PUSA, PUD, TTB, and CHT. But at MNC the complete natural farming treatment recorded significantly higher as compared to other treatments (Table 5.7.4 to 5.7.16).

Rabi 2023-24

At KRK, CHN, and PTB locations, during Rabi 2023-24 (Table 7.17- 7.19) grain yield (4.85, 6.02 and 5.43 t/ha) and straw yields (8.54, 6.44 and 7.20 t/ha) were significantly superior in integrated crop management (need based pesticides) as compared to other treatments with an improvement of 14.2, 43 and 38.3 % in grain yields and 19.3, 43 % and 39.2 % in straw yields over complete NF treatment respectively.

With regard to yield attributes, recorded significantly higher values and the highest number of tillers/m² (406), panicle/m² (348), and 1000-grain weight (27.8) in T4: Integrated crop management treatment at KRK. At CHN and PTB tillers/m² (460) and (367), panicles/m² (431), and (345) and 1000-grain weight (20.96 and 21.20 g) significantly improved in T5: Integrated crop management (need-based pesticides) as compared to other treatments.

Soil properties after harvest

At CHN, CHP, KHD, KUL, MND, MTU, PNT, PUSA, PUD, and KRK, most of the soil properties improved with Integrated Crop Management (need-based pest management), at MNC (N & P uptake) with Integrated Crop Management and at TTB and CHT improved with AINPOF package, as compared to other treatments. The important soil properties from thirteen locations (CHN, CHP, KHD, KUL, MNC, MND, MTU, PNT, PUSA, PUD, TTB, CHT, and KRK) are presented in Table (5.7.4 to 5.7.15), respectively.

Summary:

In the third year of study (except CHP, KUL and MTU, first year) on “Evaluation of Organic fertilizers and Natural farming practices for enhancing the productivity and soil health”, out of five treatments, Integrated Crop Management (need base pest management) was significantly superior as compared to other treatments at CHN, CHP, KHD, KUL, MND, MTU, PUSA, PUD, TTB, GNV, PTB and RPR in terms of grain yield. With regards to yield parameters the treatment integrated crop management (need based pesticides) recorded significantly higher values as compared to other treatments at CHN, CHP, KUL, MND, MTU, PNT, PUSA, GHT, PTB and

RPR locations. But at MNC and CHT the integrated crop management treatment and AI-NPOF package recorded higher as compared to complete natural farming treatments respectively. At CHN, CHP, KHD, KUL, MND, MTU, PNT, PUSA, PUD, and KKK most of the soil properties improved with Integrated Crop Management (need base pest management) while at TTB and CHT soil properties improved with AI-NPOF package compared to other treatments.

Table 5.7.1 Evaluation of Organic fertilizers and Natural farming practices for enhancing the productivity and soil health-
Soil and crop characteristics

Parameters	CHN	CHP	MNC	MND	KHD	PNT	PSA	PUD	MTU
Cropping system	Rice	Rice	Rice - Rice	Rice	Rice-Mustard	Rice-Wheat	Rice-wheat	Rice – Rice	Rice
Variety – <i>Kharif</i>	Sukumar	Pratikshya	Pournami	KMP-175	Shalimar Rice-4	Pant Dhan-24	Rajendra Nilam	ADT 54	
RDF (kg NPK/ha)	80:40:40	80:40:40	90:45:45	100:50:50	120:60:30	120:60:30	120:60:40	150:50:50	90:60:60
Crop growth:	-		-	-	-		-	-	
Soil characteristics									
Clay (%)	-	21	-	-	37	25.90	15	-	-
Silt (%)	-	15	-	-	45	61.40	29	-	-
Sand (%)	-	64	-	-	18	12.90	56	-	--
Texture	Clay Loam	Sandy clay loam	-	-	Silty clay loam	Silty clay loam	Sandy loam	Clay loam	
pH (1:2)	7.51	5.87	4.96	7.47	6.50	7.5	8.3	6.80	-
Organic carbon (%)	1.20	0.51	3.24	0.50	0.73	0.61	0.52	0.31	-
CEC (cmol (p ⁺)/kg)			-	-		23.9	-	-	-
EC (dS/m)	0.4		0.08	0.12	0.08	0.32	0.29	0.27	-
Avail. N (kg/ha)	525	339	302.3	228.5	309	142	254	156	147
Avail. P ₂ O ₅ (kg/ha)	120		71.7	17.7	17.6	9.85	31.5	41	11.5

**Table 5.7.1. Evaluation of Organic fertilizers and Natural farming practices for enhancing the productivity and soil health -
Soil and crop characteristics**

Parameters	CHT	GNV	GHT	PTB	RPR	TTB	KRK (Rabi)	KUL
Cropping system	Rice	Rice - Rice	Rice	Rice	Rice	Rice -Fallow	-	Rice
Variety – <i>Kharif</i>	Basmati 370	RNR 15048	-	-	CG Devbhog	Bokul Joha	KKLR 2	HKR 15-488
RDF (kg NPK/ha)	30:20:10	150:75:75	120:60:60	90:45:45	80:50:30	-		150:60:60
Crop growth:	-	-	-	-		-	Good	Good
Soil characteristics								
Clay (%)	-	-	-	-	-	35	12.6	23.15
Silt (%)	-	-	-	-	-	34	9.2	34.67
Sand (%)	-	-	-	-	-	27	75.4	42.18
Texture	-	Black soil	Sandy loam	-	Vertisols	Silty Clay	Sandy loam	Loam
pH (1:2)	-	-	-	-	-	5.3	6.6	8.28
Organic carbon (%)	0.50	-	-	-	-	0.58	0.81	0.52
CEC (cmol (p ⁺)/kg)		-	-		-	10.1	12.9	-
EC (dS/m)	-	-	-	-	-	0.13	0.061	0.14
Avail. N (kg/ha)	233	-	-	-	-	284	163	152
Avail. P ₂ O ₅ (kg/ha)		-	-	-	-	22.5	34.7	25

Table 5.7.2 Evaluation of Organic fertilizers and Natural farming practices for enhancing the productivity and soil health
Grain yield of Kharif

Treatments	Grain yield (t/ha)														
	CHN	CHP	KHD	KUL	MNC	MND	MTU	PNT	PSA	PUD	TTB	CHT	GNV	GHT	RPR
Control	2.61	3.58	5.67	1.39	3.59	1.15	3.84	8.16	2.66	1.51	2.41	2.16	1.77	2.64	1.55
Complete Natural Farming	2.89	4.17	5.82	1.69	5.57	1.54	4.13	1.24	2.94	3.07	2.96	2.60	2.06	3.59	2.27
AI-NPOF package	3.84	4.77	6.23	1.99	5.49	1.92	4.47	1.35	3.27	2.87	3.18	3.22	3.74	4.35	2.37
Integrated Crop Management	5.18	5.21	6.92	2.46	5.79	2.71	4.93	2.05	3.59	3.25	3.51	2.94	4.19	4.53	2.89
Integrated Crop Management (need-based pesticides)	5.95	5.49	7.01	2.56	5.71	2.87	5.87	2.01	3.66	3.34	3.96	3.11	4.37	4.42	3.08
Exp. mean	4.08	4.62	6.33	2.02	5.23	2.04	4.65	1.49	3.22	2.81	3.19	2.81	3.23	3.91	2.43
CD (5%)	0.19	0.84	0.58	0.53	1.13	0.14	0.71	0.069	0.35	0.39	0.24	0.08	1.04	0.73	0.45
CV (%)	3.14	11.62	5.93	13.76	13.94	4.27	8.04	2.97	7	7.26	4.8	1.43	21.01	12.21	11.99

1) Control 2) Complete Natural Farming (NF), 3) AI-NPOF package (All India Network Programme on Organic Farming)

4) Integrated Crop Management (with organic pest management practices) and 5) Integrated Crop Management (need-based pesticides)

Table 5.7.4 Evaluation of Organic fertilizers and Natural farming practices for enhancing the productivity and soil health
Yield parameters and nutrients uptake of Kharif (Location: CHN)

Treatments	Tiller number/m ²	Panicle number/m ²	1000 grain wt (g)	Soil EC(dS/m)	Soil OC (%)	Soil N (kg/ha)	Soil P (kg/ha)	Soil K (kg/ha)	Soil Zn (mg/kg)
Control	312	284	20.08	0.22	1.2	429.50	92.25	282.65	17.60
Complete Natural Farming	333	283	20.28	0.22	1.19	431.25	89.50	288.60	17.13
AI-NPOF package	351	318	20.3	0.2	1.21	501.75	93.25	295.15	17.15
Integrated Crop Management	440	370	20.53	0.21	1.12	446.25	96.25	291.93	17.25
Integrated Crop Management (need-based pesticides)	444	409	20.68	0.22	1.24	497.75	96.25	295.15	17.15
Exp. mean	376	333	20.374	0.21	1.19	461.30	93.50	290.69	17.25
CD (5%)	26.42	28.47	NS	NS	0.04	17.93	NS	8.77	NS
CV (%)	4.56	5.55	1.78	6.97	1.93	2.52	5.47	1.96	1.67

Table 5.7.5 Evaluation of Organic fertilizers and Natural farming practices for enhancing the productivity and soil health
Yield parameters and nutrients uptake of Kharif (Location: CHP)

Treatments	Panicle number/m ²	Tiller number/m ²	1000 grain wt (g)	Soil OC (%)	Soil N (kg/ha)	Soil P (kg/ha)	Soil K (kg/ha)	Total N uptake (kg/ha)	Total P uptake (kg/ha)	Total K uptake (kg/ha)
Control	189	219	21.08	0.48	327.38	17.2	130.82	51.05	5.43	51.38
Complete Natural Farming	191	215	21.63	0.51	329.01	18.26	131.19	62.05	8.38	77.88
AI-NPOF package	209	233	21.08	0.55	338.61	17.32	128.77	84.48	13.5	109.88
Integrated Crop Management	218	241	23.66	0.49	346.29	19.12	133.57	93.95	14.78	111.93
Integrated Crop Management (need-based pesticides)	237	274	25.02	0.52	353.08	20.85	138.93	103.6	16.45	123.3
Exp. mean	209	236	22.494	0.51	338.87	18.55	132.65	79.03	11.71	94.87
CD (5%)	NS	37.22	0.91	NS	13.09	1.96	4.33	9.66	1.35	11.26
CV (%)	11.32	10.2	2.62	6.37	2.51	6.85	2.12	7.94	7.48	7.7

Table 5.7.6 Evaluation of Organic fertilizers and Natural farming practices for enhancing the productivity and soil health
Yield parameters and nutrients uptake of Kharif (Location: KHD)

Treatments	Tiller number/m ²	Panicle number/m ²	1000 grain wt (g)	Soil EC (dS/m)	Soil OC (%)	Soil N (kg/ha)	Soil P (kg/ha)	Soil K (kg/ha)	Total N uptake (kg/ha)	Total P uptake (kg/ha)	Total K uptake (kg/ha)
Control	314	264	25.25	0.25	0.64	288.50	12.43	137.43	88.98	18.68	99.18
Complete Natural Farming	320	266	25.45	0.25	0.70	294.25	14.18	152.05	94.28	20.00	100.80
AI-NPOF package	348	290	26.08	0.26	0.84	342.00	15.5	173.35	100.35	22.05	105.93
Integrated Crop Management	371	319	26.6	0.27	0.78	316.50	16.8	180.23	121.43	25.53	136.78
Integrated Crop Management (need-based pesticides)	375	321	26.68	0.25	0.79	318.00	16.23	179.38	121.98	26.73	137.58
Exp. mean	345	292	26.01	0.26	0.75	311.85	15.03	164.49	105.41	22.60	116.06
CD (5%)	36	40	NS	NS	0.07	24.21	1.38	12.87	8.16	2.89	12.21
CV (%)	6.8	8.93	3.49	10.97	5.88	5.04	5.94	5.08	5.03	8.30	6.83

**Table 5.7.7 Evaluation of Organic fertilizers and Natural farming practices for enhancing the productivity and soil health
Yield parameters and nutrients uptake of *Kharif* (Location: KUL)**

Treatments	Panicle number/ m ²	1000 grain wt (g)	Soil EC (dS/m)	Soil OC (%)	Soil N (kg/ha)	Soil P (kg/ha)	Soil K (kg/ha)	Total N uptake (kg/ha)	Total P uptake (kg/ha)	Total K uptake (kg/ha)
Control	176	24.34	0.17	0.52	172.67	13.06	269.00	33.46	5.97	37.51
Complete Natural Farming	202	24.46	0.20	0.54	171.33	14.00	279.00	44.06	8.60	45.33
AI-NPOF package	207	24.65	0.16	0.56	176.33	15.62	286.33	55.01	10.78	57.31
Integrated Crop Management	227	24.72	0.19	0.53	180.00	17.44	291.33	71.97	16.05	77.86
Integrated Crop Management (need-based pesticides)	231	24.71	0.22	0.54	179.33	18.19	293.33	77.29	17.80	85.50
Exp. mean	208	24.57	0.19	0.54	175.93	15.66	283.79	56.35	11.84	60.70
CD (5%)	24.03	NS	NS	NS	NS	NS	NS	12.77	5.05	8.51
CV (%)	6.11	1.25	16.55	2.81	2.39	13.39	3.59	12.03	22.64	7.45

Table 5.7.8 Evaluation of Organic fertilizers and Natural farming practices for enhancing the productivity and soil health
Yield parameters and nutrients uptake of *Kharif* (Location: MNC)

Treatments	Tiller number/ m ²	Panicle number/ m ²	1000 grain wt (g)	Soil EC (dS/m)	Soil OC (%)	Soil N (kg/ha)	Soil P (kg/ha)	Soil K (kg/ha)	Total N uptake (kg/ha)	Total P uptake (kg/ha)	Total K uptake (kg/ha)
Control	159	143	25.2	0.32	3.19	262.75	35.55	158.18	81.75	30.10	73.65
Complete Natural Farming	198	172	26.48	0.33	3.29	341.75	55.03	189.93	139.13	54.25	112.38
AI-NPOF package	190	162	27.05	0.3	3.21	348.08	57.15	186.08	141.05	52.35	113.08
Integrated Crop Management	208	181	26.2	0.32	3.17	305.60	45.85	215.53	133.25	56.80	125.78
Integrated Crop Management (need-based pesticides)	203	176	25.95	0.30	3.27	308.05	45.50	219.13	133.65	50.98	120.83
Exp. mean	192	167	26.176	0.32	3.23	313.25	47.82	193.77	125.77	48.89	109.15
CD (5%)	30.8	23.06	NS	NS	NS	32.43	8.79	25.44	26.39	11.88	19.94
CV (%)	10.41	8.95	5.16	14	9.2	6.72	11.93	8.52	13.62	15.76	11.86

Table 5.7.9 Evaluation of Organic fertilizers and Natural farming practices for enhancing the productivity and soil health
Yield parameters and nutrients uptake of *Kharif* (Location: MND)

Treatments	Tiller number/ m ²	Panicle number/ m ²	1000 grain wt (g)	Soil EC (dS/m)	Soil OC (%)	Soil N (kg/ha)	Soil P (kg/ha)	Soil K (kg/ha)	Total N uptake (kg/ha)	Total P uptake (kg/ha)	Total K uptake (kg/ha)	Total Zn uptake (mg/kg)
Control	155	133	17.52	0.12	0.52	214.75	20.14	154.80	18.82	2.05	9.48	15.05
Complete Natural Farming	156	140	18.57	0.12	0.56	221.50	21.71	158.18	23.45	2.10	13.11	21.11
AI-NPOF package	157	142	18.71	0.13	0.56	226.63	20.34	152.95	29.80	3.22	16.92	27.04
Integrated Crop Management	180	151	19.16	0.13	0.55	240.40	24.65	172.90	45.00	6.18	30.02	47.20
Integrated Crop Management (need-based pesticides)	180	158	19.81	0.13	0.54	246.39	24.96	174.43	48.29	7.26	30.61	54.46
Exp. mean	165	145	18.754	0.13	0.55	229.94	22.36	162.65	33.07	4.16	20.03	32.97
CD (5%)	17.48	7.45	1.21	NS	0.02	9.30	2.14	11.84	2.35	0.59	1.91	2.27
CV (%)	6.84	3.33	4.2	5.93	2.87	2.62	6.22	4.72	4.62	9.14	6.18	4.48

Table 5.7.10 Evaluation of Organic fertilizers and Natural farming practices for enhancing the productivity and soil health
Yield parameters and nutrients uptake of Kharif (Location: MTU)

Treatments	Tiller number/m ²	Panicle number/m ²	1000 grain wt (g)	Soil OC	Soil N (kg/ha)	Soil P (kg/ha)	Soil K (kg/ha)	Total N uptake (kg/ha)
Control	366	291	18.77	0.94	126.00	51.03	243.00	0.07
Complete Natural Farming	393	326	20.48	1.23	137.67	55.60	207.67	0.09
AI-NPOF package	403	335	19.28	1.19	141.00	55.23	193.00	0.07
Integrated Crop Management	468	386	20.40	1.29	135.00	60.63	224.67	0.08
Integrated Crop Management (need-based pesticides)	517	427	20.73	1.28	133.33	59.50	224.00	0.12
Exp. mean	429	353	19.93	1.19	134.6	56.40	218.47	0.09
CD (5%)	67.92	61.29	1.31	0.07	8.37	3.36	8.57	0.02
CV (%)	10.26	11.24	4.29	3.04	3.30	3.17	2.08	12.83

Table 5.7.11 Evaluation of Organic fertilizers and Natural farming practices for enhancing the productivity and soil health
Yield parameters and nutrients uptake of Kharif (Location: PNT)

Treatments	Tiller number/m ²	Panicle number/m ²	1000 grain wt (g)	Soil EC (dS/m)	Soil OC %	Soil N (kg/ha)	Soil P (kg/ha)	Soil K (kg/ha)	Soil Zn (mg/kg)	Total N uptake (kg/ha)	Total P uptake (kg/ha)	Total K uptake (kg/ha)	Total Zn uptake (mg/kg)
Control	90	80	16.48	0.26	0.23	121.25	7.43	122.50	8.35	11.48	2.15	10.45	14.18
Complete Natural Farming	115	98	19.35	0.24	0.43	147.25	9.48	119.75	9.65	18.38	3.20	18.23	24.48
AI-NPOF package	117	110	19.08	0.41	0.69	158.50	11.13	146.75	9.88	23.62	6.70	22.08	31.43
Integrated Crop Management	127	116	20.05	0.44	0.70	173.00	13.58	142.75	11.65	34.90	8.23	36.78	52.68
Integrated Crop Management (need-based pesticides)	400	110	19.95	0.48	0.52	172.50	13.48	519.00	12.80	36.20	8.33	33.43	56.58
Exp. mean	170	102	18.982	0.36	0.51	154.50	11.02	210.15	10.47	24.92	5.72	24.19	35.87
CD (5%)	NS	8.27	0.91	0.06	0.07	11.83	0.94	NS	0.60	2.16	0.68	2.10	3.46
CV (%)	141.99	5.22	3.12	9.92	8.44	4.97	5.51	159.93	3.72	5.62	7.71	5.64	6.26

Table 5.7.12 Evaluation of Organic fertilizers and Natural farming practices for enhancing the productivity and soil health
Yield parameters and nutrients uptake of Kharif (Location: PSA)

Treatments	Tiller number/m ²	Panicle number/m ²	1000 grain wt (g)	Soil EC(dS/m)	Soil OC (%)	Soil N (kg/ha)	Soil P (kg/ha)	Soil K (kg/ha)	Total N uptake (kg/ha)	Total P uptake (kg/ha)	Total K uptake (kg/ha)
Control	203	185	27.28	0.33	0.44	217.25	26.18	120.15	47.50	11.03	7.45
Complete Natural Farming	230	211	27.58	0.28	0.48	232.25	28.33	128.03	53.70	12.65	8.78
AI-NPOF package	235	217	28.08	0.26	0.55	244.25	29.33	130.28	60.65	14.28	9.98
Integrated Crop Management	261	240	28.48	0.31	0.51	260.50	33.73	144.83	72.60	16.60	11.9
Integrated Crop Management (need-based pesticides)	266	247	28.3	0.30	0.52	262.00	34.00	147.63	74.45	17.13	12.3
Exp. mean	239	220	27.944	0.296	0.50	243.25	30.31	134.18	61.78	14.34	10.08
CD (5%)	22.32	21.34	NS	NS	0.06	NS	4.54	11.97	7.98	3.00	1.54
CV (%)	6.06	6.29	6.2	19.46	7.97	9.39	9.72	5.79	8.38	13.59	9.94

Table 5.7.13 Evaluation of Organic fertilizers and Natural farming practices for enhancing the productivity and soil health
Yield parameters and nutrients uptake of Kharif (Location: PUD)

Treatments	Tiller number/m ²	Panicle number/m ²	Soil EC (dS/m)	Soil OC (%)	Soil N (kg/ha)	Soil P (kg/ha)	Soil K (kg/ha)	Total N uptake (kg/ha)	Total P uptake (kg/ha)	Total K uptake (kg/ha)
Control	105	81	0.25	0.27	156.80	33.30	119.00	20.70	5.90	22.20
Complete Natural Farming	195	173	0.27	0.40	182.93	37.87	134.67	55.57	14.83	60.50
AI-NPOF package	192	166	0.28	0.38	175.47	38.63	142.00	53.10	14.53	57.27
Integrated Crop Management	217	196	0.31	0.38	186.67	39.83	126.67	63.67	18.33	69.93
Integrated Crop Management (need-based pesticides)	225	208	0.28	0.39	216.53	43.53	147.33	63.80	19.03	69.13
Exp. mean	187	165	0.27	0.36	183.68	38.63	133.93	51.37	14.52	55.81
CD (5%)	41.57	32.29	NS	NS	34.54	NS	NS	10.07	2.47	8.76
CV (%)	11.8	10.39	16.82	13.6	9.99	12.77	9.57	10.41	9.02	8.34

Table 5.7.14 Evaluation of Organic fertilizers and Natural farming practices for enhancing the productivity and soil health
Yield parameters and nutrients uptake of Kharif (Location: TTB)

Treatments	Tiller number/m ²	Panicle number/m ²	Soil N (kg/ha)	Soil P (kg/ha)	Soil K (kg/ha)	Soil OC (%)	Total N uptake (kg/ha)	Total P uptake (kg/ha)	Total K uptake (kg/ha)
Control	237	221	235.8	18.60	104.70	0.52	51.48	11.96	52.53
Complete Natural Farming	258	233	239.43	17.98	101.73	0.53	67.27	17.33	79.05
AI-NPOF package	278	253	249.08	18.55	109.10	0.50	75.06	18.25	81.68
Integrated Crop Management	285	265	244.98	19.28	104.65	0.48	93.93	20.65	92.16
Integrated Crop Management (need-based pesticides)	300	278	239.4	17.68	108.65	0.50	93.97	22.63	101.45
Exp. mean	271	250	241.74	18.42	105.77	0.51	76.34	18.16	81.37
CD (5%)	18.4	20.11	8.48	NS	NS	0.03	7.94	1.52	8.36
CV (%)	4.39	5.21	2.28	4.42	5.59	3.71	6.75	5.43	6.67

Table 5.7.15 Evaluation of Organic fertilizers and Natural farming practices for enhancing the productivity and soil health
Yield, yield parameters, nutrients uptake and soil properties of *Kharif* (Locations: CHT)

Treatments	Tillers number/m ²	Panicle number/m ²	1000 grain wt (g)	Soil OC (%)	Soil available N (kg/ha)	Soil available P (kg/ha)	Soil available K (kg/ha)	Total N uptake (kg/ha)	Total P uptake (kg/ha)	Total K uptake (kg/ha)
Control	173	138	41.00	0.48	221.23	12.67	128.40	34.00	9.16	51.20
Complete Natural Farming	207	189	56.67	0.52	228.23	13.03	132.60	37.58	10.58	58.66
AI-NPOF package	241	232	66.33	0.51	242.27	14.11	136.77	47.82	13.04	74.18
Integrated Crop Management	223	207	59.00	0.51	233.97	13.40	134.17	42.00	11.55	61.29
Integrated Crop Management (need- based pesticides)	233	219	64.00	0.50	237.40	13.91	135.23	44.27	12.25	63.94
Exp. mean	215	197	57.40	0.50	232.62	13.42	133.43	41.13	11.31	61.85
CD (5%)	3.98	2.66	3.02	0.01	1.48	9.96	0.89	41.13	11.32	61.85
CV (%)	0.98	0.72	2.79	1.06	0.34	39.41	0.36	0.62	0.17	0.36

Table 5.7.16 Evaluation of Organic fertilizers and Natural farming practices for enhancing the productivity and soil health
Yield parameters of Kharif (Locations: GNV, GHT, PTB and RPR)

Treatment	GNV			GHT			PTB			RPR		
	Panicle number/m ²	1000 grain wt (g)	Tillers number/m ²	Panicle number/m ²	1000 grain wt (g)	Tillers number /m ²	Panicle number/m ²	1000 grain wt (g)	Tillers number /m ²	Panicle number/m ²	1000 grain wt (g)	Tillers number /m ²
Control	263	1.25	150	98	22.67	216	169	21.58	198	163	18.13	
Complete Natural Farming	297	1.25	177	114	23.75	263	181	21.38	248	214	18.43	
AI-NPOF package	343	1.28	186	125	25.26	312	224	21.28	250	219	19	
Integrated Crop Management	398	1.28	200	133	25.67	328	242	21.13	294	258	19.3	
Integrated Crop Management (need-based pesticides)	394	1.31	215	141	28.02	345	251	19.58	311	266	19.8	
Exp. mean	339	1.27	185	122	25.07	293	213	20.99	260	224	18.932	
CD (5%)	75.76	0.03	10.1	4.72	14.71	23.8	30.27	1.38	41.43	35.2	0.79	
CV (%)	14.5	1.35	3.53	2.51	38.09	5.27	9.19	4.27	10.31	10.2	2.71	

Table 5.7.17 Evaluation of Organic fertilizers and Natural farming practices for enhancing the productivity and soil health
Yield, yield parameters, nutrients uptake and soil properties of *Rabi* (Location: KRK)

Treatments	Grain yield (t/ha)	Straw yield (t/ha)	Tiller number/m ²	Panicle number /m ²	1000 grain wt (g)	Soil EC (dS/m)	Soil OC (%)	Soil N (kg/ha)	Soil P (kg/ha)	Soil K (kg/ha)	Total N uptake (kg/ha)	Total P uptake (kg/ha)	Total K uptake (kg/ha)
Control	3.10	5.22	301	273	27.48	0.06	0.74	188.95	76.64	169.70	66.01	14.23	129.88
Complete Natural Farming	4.16	6.89	343	328	27.31	0.05	0.61	171.7	76.78	161.21	84.48	12.00	182.85
AI-NPOF package	4.49	7.66	343	324	27.78	0.05	0.59	205.41	80.77	169.70	94.36	14.65	211.68
Integrated Crop Management	4.49	7.94	405	348	27.8	0.05	0.63	168.56	86.68	164.04	95.67	15.78	213.43
Integrated Crop Management (need-based pesticides)	4.85	8.54	369	333	27.72	0.05	0.69	277.54	83.92	161.21	109.66	13.85	236.50
Exp. mean	4.21	7.25	352	321	27.62	0.05	0.65	202.43	80.95	165.17	90.03	14.10	194.86
CD (5%)	0.61	1.92	65	NS	NS	NS	NS	NS	NS	12.02	22.95	NS	47.88
CV (%)	9.42	17.17	11.96	12.23	1.72	21.71	20.38	42.87	13.23	4.72	16.55	36.64	15.95

Table 5.7.18 Evaluation of Organic fertilizers and Natural farming practices for enhancing the productivity and soil health
Yield, yield parameters, and soil properties of Boro {Locations: CHN}

Treatment	Grain yield (t/ha)	Straw yield (t/ha)	Tillers number/m ²	Panicle number/m ²	1000 grain wt (g)	Soil Organic carbon %	Soil available N (kg/ha)	Soil available P (kg/ha)	Soil available K (kg/ha)
Control	3.08	3.30	300	293	20.22	1.17	422.25	90.70	284.24
Complete Natural Farming	3.43	3.67	325	304	20.34	1.20	427.75	91.25	286.78
AI-NPOF package	4.11	4.40	364	341	20.37	1.20	484.50	95.65	293.71
Integrated Crop Management	5.50	5.88	424	396	20.63	1.22	476.00	97.08	294.72
Integrated Crop Management (need-based pesticides)	6.02	6.44	460	431	20.96	1.22	491.25	98.50	299.89
Exp. mean	4.43	4.74	375	353	20.50	1.20	460.35	94.64	291.87
CD (5%)	0.24	0.26	37.85	33.26	0.58	0.05	16.01	9.64	11.03
CV (%)	3.49	3.61	6.56	6.12	1.84	2.73	2.26	6.61	2.45

Table 5.7.19 Evaluation of Organic fertilizers and Natural farming practices for enhancing the productivity and soil health
Yield, yield parameters of *Rabi* (Location: PTB)

Treatment	Grain yield (t/ha)	Straw yield (t/ha)	Tillers number/m ²	Panicle number/m ²	1000 grain wt (g)
Control	1.54	2.65	115	110	21.58
Complete Natural Farming	3.35	5.53	252	234	21.08
AI-NPOF package	3.63	8.93	297	274	21.10
Integrated Crop Management	4.73	9.10	315	298	21.23
Integrated Crop Management (need-based pesticides)	5.43	7.20	367	345	21.20
Exp. mean	3.74	6.68	269	252	21.24
CD (5%)	0.54	1.19	37.25	51.25	2.4
CV (%)	9.38	11.6	8.99	13.2	7.34

5.8. Assessment of biofortified rice genotypes response to Zn application and assessing agronomic biofortification potential

Biofortification, also known as biological fortification, involves the development and cultivation of nutritionally enriched food crops using modern biotechnology methods, traditional plant breeding, and agricultural techniques to enhance their bioavailability and address nutritional deficiencies in the human population. It is a burgeoning and cost-effective method, addressing the inadequacy of micronutrients in staple crops like rice, a consequence of agricultural systems prioritizing yield over human health, by enhancing the nutrient content to alleviate micronutrient deficiencies in populations with limited dietary diversity. Recent zinc-enriched varieties and newly developed genotypes necessitate evaluation of their reaction to applied zinc fertilisers to devise nutrient management strategies and determine their potential for agronomic biofortification.

Keeping this in view, the trial was conducted during *Rabi*-2023-2024 and *Kharif*-2024 with objectives: 1) To evaluate the response of the fortified rice genotypes/varieties to the zinc application, 2) To study the agronomic biofortification potential of the rice varieties. The experiments were laid out in factorial RBD, consisting of two factors viz., I) Rice genotypes/varieties (5); II) Zn doses (3). The treatment details are represented in table 5.8.1. From the beginning of farming until harvest, all practices were carried out in accordance with the technical programme; observations regarding grain and straw yields as well as other yield metrics were noted. Prior to starting the experiment and during harvest, soil samples were collected and significant soil characteristics were examined. Following harvesting, plant samples were also obtained, and their zinc accumulation was evaluated. The trial was conducted at two locations viz., Cuttack, Maruteru during *Rabi*- 2024, and during *Kharif*- 2024, it was conducted at eight locations viz., Cuttack, Maruteru, Pusa, Titabar, Varanasi, Ludhiana, Kaul and Karaikal during. The results are presented in Table 5.8.2 to 5.8.12.

Yields

Grain and straw yields showed significant differences between the genotypes and treatments and depicted in table 5.8.3 to 5.8.5. At Cuttack, application of T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF treatment registered higher grain (5.05 t/ha and 4.96 t/ha) and straw (6.69 t/ha and 6.43 t/ha) yields as compared to control grain (4.77 t/ha and 3.82 t/ha) and straw (6.22 t/ha and 5.73 t/ha) yields during both *Rabi* and *Kharif* season 2024 respectively. Between the varieties, V2: CR Dhan 315 has recorded higher grain yield (5.59 t/ha and 5.12 t/ha) which is significantly at par with V1: Swarna during *Kharif* season 2024 whereas V2: CR Dhan 315 registered maximum straw yield (7.63 t/ha and 7.28 t/ha) whereas CG Zinc Rice-1 recorded minimum grain (3.84 t/ha and 3.29 t/ha) and straw (5.07 t/ha and 4.59 t/ha) yields during both *Rabi* and *Kharif* season 2024 respectively. Application of T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF treatment recorded significantly higher harvest index (43.9 and 43.6) as compared to control (41.5 and 39.9) during both *Rabi* and *Kharif* season 2024 respectively. In case of Varieties, V1: Swarna recorded significantly higher harvest index (45.9 and 47.1) as compared to all other varieties whereas V4: DRR Dhan 48 registered minimum harvest index (40.1 and 38.6) during both *Rabi* and *Kharif* season 2024 respectively. Interaction between treatments and genotypes was found to be significant in case of grain yield during *Rabi* season

2024, straw yield during *Kharif* season 2024 and harvest index of *Rabi* season 2024. The higher grain and straw yields (5.96 t/ha and 7.98 t/ha) were observed in interaction between V2: CR Dhan 315 and T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF treatment during both *Rabi* and *Kharif* season 2024 respectively.

In case of Maruteru, there was no significant difference found between Zn treatments in grain yield during *Kharif* season 2024 and straw yield in *Rabi* season 2024. Application of T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF treatment resulted in higher grain yield (6.73 t/ha) during *Rabi* season 2024 and straw yield (7.79 t/ha) in *Kharif* season 2024. However, there was significant variation in grain and straw yields with respect to interaction of both Zn treatments and rice varieties only in *Rabi* season 2024. The grain yield was found to be higher (8.46 t/ha) in interaction between V1: Swarna and T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF treatment, whereas higher straw yield (9.42 t/ha) was observed in interaction of V2: CR Dhan 315 and T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF treatment. In terms of varieties, V1: Swarna recorded significantly higher grain yield (7.92 t/ha and 8.06 t/ha), whereas higher straw yield (8.99 t/ha and 8.31 t/ha) was produced by V2: CR Dhan 315 as compared to all other varieties during both *Rabi* and *Kharif* season 2024 respectively, Harvest index was found to be non- significant whereas V1: Swarna showed higher (43.3 and 51.1, respectively) harvest index between the varieties in both *Rabi* and *Kharif* season 2024.

During *Kharif* season 2024, at Pusa, the grain and straw yields was significantly higher (4.60 t/ha and 5.79 t/ha) under application of T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF. However, there was no significant difference among the treatments in case of harvest index. Between the varieties, V1: Swarna produced higher grain yield (4.68 t/ha) which is statistically at par with V3: DR Dhan 45 (4.34 t/ha) and V4: DR Dhan 48 (4.30 t/ha) respectively whereas the significantly higher straw yield was produced by V1: Swarna (6.09 t/ha). The harvest index was significantly influenced by the varieties. Among the varieties, V5: CG Zinc Rice-1 produced higher (45.3) harvest index which is significantly higher among other varieties. There was no significant difference between interaction of Zn treatments and genotypes in case of grain and straw yields. The harvest index was found higher in interaction of V5: CG Zinc Rice-1 and T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF treatment.

In Titabar, there was no significant difference found between treatments in case of grain and straw yields and harvest index during *Kharif* season 2024. There is no significant difference among the varieties in terms of straw yield, however the grain yield and harvest index were significantly influenced by varieties. V1: Swarna produced higher grain yield (4.72 t/ha) and harvest index (25.3) which is significantly higher among other varieties. Interaction between treatments and genotypes was found to be significant in case of both grain and straw yields. The grain yield was found to be higher in interaction between V1: Swarna and T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF treatment (4.80 t/ha), conversely the straw yield was higher (15.17 t/ha) with interaction of V1: Swarna and T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF treatment.

In case of Varanasi, among the Zn treatments, the application of T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF treatment registered significantly higher grain yield (2.21 t/ha) and higher straw yield (3.75 t/ha) which is significantly at par with T3: FS of 0.5% Zn at AT stage, PI

stage and 1 WAF treatment (3.40 t/ha). Among the varieties, significantly higher grain yield was produced by V2: CR Dhan 315 (2.47 t/ha) whereas the straw yield was higher in case of V2: CR Dhan 315 which is statistically at par with V4: DR Dhan 48. Harvest index was found to be non-significant in case of both treatments and varieties. There was no significance difference found between interaction of treatments and genotypes.

At Ludhiana, significantly higher grain yield (2.21 t/ha) was found with application of T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF treatment and higher straw yield (3.75 t/ha) which is significantly at par with T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF treatment (3.40 t/ha). Among the varieties, significantly higher grain yield was produced by V2: CR Dhan 315 (2.42 t/ha) whereas the straw yield was higher in case of V2: CR Dhan 315 which is statistically at par with V4: DR Dhan 48. Harvest index was found to be non-significant in case of both treatments and varieties. There was no significance difference found between interaction of treatments and genotypes.

In Kaul, both grain and straw yields was found higher (3.76 t/ha and 4.88 t/ha, respectively) in application of T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF treatment. There was no significant difference found between treatments for harvest index. In case of varieties, V1: Swarna produced higher grain and straw yields (4.01 t/ha and 5.02 t/ha, respectively). The harvest index was found higher (45.8) in V4: DR Dhan 48. The interaction of treatments and genotypes has showed significant difference in case of both grain and straw yields.

In case of Karaikal, there was no significant difference found between treatments in terms of both grain and straw yields. The harvest index was found higher (45.4) in the application of T2: STBZ+ FS of 0.5% Zn at the PI stage and 1 WAF treatment. Among varieties, V5: CG Zinc Rice-1 produced a higher straw yield (7.26 t/ha) whereas V1: Swarna achieved higher harvest index (53.7). The grain yield was also found non-significant among varieties. There was no significant difference found between the interaction of treatments and genotypes.

Yield Attributes

Yield parameters like tiller number and panicle number per m², spikelet fertility and thousand-grain weight were represented in table 5.8.6 to 5.8.9. Tiller numbers per m² varied non-significantly across different treatments at all centres, with the exception of Cuttack during *Rabi* season 2024 and in Kaul during *Kharif* season of 2024. Among the treatments, T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF, resulted in the higher tiller number per m² at Cuttack (497.9), however at Kaul, it was found higher (371.0) in T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF treatment.

There were significant differences in the number of panicles/sq. meter among the Zn treatments at Cuttack during *Rabi* season 2024 and in *Kharif* season 2024, at Cuttack and Kaul. Within the treatments, T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF produced higher number of panicles per m² at Cuttack (378.7 and 338.9, respectively) during both *Rabi* and *Kharif* seasons, except at Kaul, application of T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF produced higher (312.0) panicle number per m² respectively. Regarding varieties, V2: CR Dhan 315, exhibited a higher tiller number per square meter and panicle number per square meter at Maruteru during *Rabi* season 2024, and Cuttack during *Kharif* season 2024. However,

V1: Swarna showed a higher tiller number per square meter at Maruteru, Pusa, Kaul and Karaikal. Interaction between treatments and varieties was found to be non-significant in case of tiller number per square meter and panicle number per square meter across all the centres. Spikelet fertility also varied significantly across different treatments at Pusa, Varanasi and Ludhiana. Conversely, varietal difference was only found at Cuttack and Varanasi. Within the treatments, application of T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF treatment recorded higher spikelet fertility at Pusa (92 %), Varanasi and Ludhiana (80.6 %). In case of varieties, V5: CG Zinc Rice-1 registered higher (90.9%) spikelet fertility at Pusa, whereas it was recorded higher in V1: Swarna (82.9 %) at Varanasi and Ludhiana and V2: CR Dhan 315 achieved higher spikelet fertility (80.9% and 83%, respectively) at Cuttack during both *Rabi* and *Kharif* season 2024. Interaction between treatments and genotypes was found to be significant at Pusa, Titabar, Varanasi and Ludhiana.

There were significant differences found in thousand grain weight at Cuttack, Varanasi, Ludhiana, and Kaul in terms of Zn treatments, however varietal differences were found at all locations except Titabar. Among the treatments, application of T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF treatment showed higher thousand grain weight at Varanasi and Ludhiana (23 g) and Kaul (26.7) whereas application of T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF registered higher thousand grain weight at Cuttack (23.3 g). In case of varieties, V2: CR Dhan 315 recorded higher (25.2 and 25.4 g) thousand grain weight over other varieties at Cuttack during both the seasons in 2024, whereas V1: Swarna produced in Pusa (33.1g), Varanasi and Ludhiana (23.2 g), and V5: CG Zinc Rice-1 exhibited higher thousand grain weight at Kaul (27.2 g) and Karaikal (23.5 g). Interaction between treatments and genotypes was found to be non-significant at all locations except for Varanasi and Ludhiana.

Plant Zinc Content

Significant differences in grain Zn content were observed at all the locations with respect to Zn treatments except Titabar (Table 5.8.10). Among the treatments, the application of T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF, resulted in higher grain Zn content at Cuttack (36.1 mg/kg and 34.2 mg/kg, respectively) which is on par with application of T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF and Maruteru (33.0 mg/kg and 31.9 mg/kg) during both *Rabi* and *Kharif* season 2024, Varanasi (35.5 mg/kg) and Kaul (33.0 mg/kg). Conversely, at Pusa and Karaikal, the significantly higher grain Zn content (36.8 mg/kg and 35.1 mg/kg, respectively) was observed with the application of T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF treatment. Varietal difference was observed in grain Zn content at all the locations. Between varieties, V5: CG Zinc Rice-1 exhibited higher grain Zn content at Cuttack (38.4 mg/kg and 36.4 mg/kg), Maruteru (37.8 mg/kg and 37.9 mg/kg), during both *Rabi* and *Kharif* season 2024 respectively, Titabar (41.1 mg/kg), Varanasi (39.4 mg/kg) and Kaul (35.5 mg/kg). In case of Pusa, higher grain Zn content was found in V4: DR Dhan 48 (36.3 mg/kg) which was significantly at par with both V3: DR Dhan 45, V2: CR Dhan 315 and V5: CG Zinc Rice-1. At Karaikal, higher grain Zn content was observed in V2: CR Dhan 315 (36.4 mg/kg) which is on par with V5: CG Zinc Rice-1. Interaction between treatments and varieties was found to be non-significant across all locations.

The Zn content in the straw was significantly impacted by the zinc treatments at all locations except Maruteru, conversely, varietal differences were observed across all locations except Maruteru and Titabar (Table 5.8.11). Application of T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF registered higher straw Zn content at Cuttack (50.1 mg/kg and 52.2 mg/kg) during both *Rabi* and *Kharif* season 2024 and Varanasi (71.5 mg/kg), Kaul (47.1 mg/kg) and Karaikal (49.0 mg/kg). Conversely, at Cuttack it was significantly at par with application of T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF during *Rabi* season 2024. In case of Pusa, the higher straw Zn content was recorded under the application of T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF treatment (45.7 mg/kg). Regarding varieties, V5: CG Zinc Rice-1 displayed higher straw Zn content at Cuttack (49.7 mg/kg) during *Rabi* season 2024, Maruteru (37.9 mg/kg), Titabar (66.9 mg/kg). In case of both Varanasi and Kaul, V3: DR Dhan 45 exhibited higher straw Zn content. The varietal difference is found to be non-significant at Cuttack during *Kharif* season of 2024 and at Pusa and Karaikal. Interaction between treatments and varieties was found to be non-significant across all locations.

Post-harvest soil zinc status

Following harvest, the available Zn status in soil significantly varied among the treatments at all locations (Table 5.8.12). The application of T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF treatment exhibited highest Zn status in soil at Cuttack (1.29 mg/kg and 1.24 mg/kg), Maruteru (1.41 mg/kg and 1.48 mg/kg) during both *Rabi* and *Kharif* season 2024 respectively, Pusa (0.69 mg/kg), Titabar (1.50 mg/kg), Kaul (0.60 mg/kg) and Karaikal (0.95 mg/kg). However, at Varanasi, it was found higher in T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF treatment.

Summary:

Significant variations in yields were observed among genotypes and Zn treatments. The foliar spray (FS) of 0.5% Zn at active tillering (AT), panicle initiation (PI), and 1 week after flowering (WAF) (T3) consistently led to higher yields. CR Dhan 315 and Swarna emerged as the highest-yielding varieties. Panicle number and spikelet fertility showed location-specific responses to Zn application, with T3 and seed treatment-based Zn (STBZ) + FS at PI and 1 WAF (T2) leading to improvements at select locations. The T3 and T2 treatments resulting in higher Zn content in grain, particularly at Cuttack, Maruteru, and Varanasi. Genotype $\times$ Zn treatment interactions significantly influenced yield, yield attributes, and Zn content at some locations, highlighting the importance of genotype-specific Zn management strategies.

Table 5.8.1 Assessment of biofortified rice genotypes response to Zn application and assessing agronomic biofortification potential

Treatments Details			
Rice Varieties Name		Zn Application	
V1	Swarna/ Naveen	T1	Control with no Zinc
V2	CR Dhan 315	T2	Soil test-based Zinc application (STBZ)+ Foliar spray of 0.5% Zinc at PI stage and 1 week after flowering
V3	DR Dhan 45		
V4	DR Dhan 48	T3	Foliar spray of 0.5% Zinc at active tillering (AT) stage, panicle initiation (PI) stage and 1 week after flowering
V5	CG Zinc Rice-1		

Table 5.8.2 Assessment of biofortified rice genotypes response to Zn application and assessing agronomic biofortification potential
Soil and crop characteristics

Parameters	Cuttack		Maruteru		Pusa	Titabar	Varanasi	Ludhiana	Kaul	Karaikal
	Rice	Rice	Rice	Rice	Rice	Rice	Rice	Rice	Rice	Rice
Cropping system	Rice	Rice	Rice	Rice	Rice	Rice	Rice	Rice	Rice	Rice
Season	Rabi	Kharif	Rabi	Kharif	Kharif	Kharif	Kharif	Kharif	Kharif	Kharif
RDF (kg NPK/ha)	100:50:50	80:40:40	180:90:90	90:60:60	120:60:40	60:20:40	150:60:40	105:30:30	150:60:60	150:50:50
Soil characteristic										
% Clay	28.1	32.2	38	37	14	40.5	23.66	15.1	21.58	14.4
% Silt	55.4	50.7	28	27	31	29.5	26.13	20.2	32.45	4.0
% Sand	16.5	17.1	34	36	55	30	50.21	64.7	45.97	80.16
Texture	Sandy clay loam	Sandy clay loam	Clay loam	Clay loam	Sandy loam	Silty clay	Sandy clay loam	Sandy loam	Loam	Sandy loam
CEC (cmol (P+) / kg	15.6	16.7	48.9	48.9	-	11.5	-	14.0	-	10.2
pH (1:2.5)	5.5	5.6	6.63	6.45	8.24	5.2	7.13	7.3	8.24	5.86
EC (dS/m)	0.63	0.52	0.89	0.89	0.28	0.11	0.19	0.18	0.17	0.071
Organic carbon (%)	0.54	0.65	1.18	1.12	0.48	0.85	0.28	0.50	0.54	0.21
Avail. N (kg/ha)	305.4	275.5	184	164	232	237	190.0	234	158	325
Avail. P ₂ O ₅ (kg/ha)	34.6	37.4	53.9	43.9	32.6	20.1	40.3	23.2	26	40.5
Avail. K ₂ O (kg/ha)	230.7	252.5	348	328	140.5	157	240.0	153	322	267.7
DTPA -Zn (mg/kg)	0.85	0.83	1.16	1.18	0.54	0.76	0.60	0.60	0.48	0.91

Table 5.8.3.1 Effect of biofortified rice genotypes response to Zn application on Grain yield (t/ha) of rice at different locations during Rabi 2024

Treatments/ Varieties	Cutback				Maruteru			
	T1	T2	T3	Mean	T1	T2	T3	Mean
V1: Naveen	4.77	4.93	5.05	4.91	7.77	7.54	8.46	7.92
V2: CR Dhan 315	5.08	5.72	5.96	5.59	7.18	7.35	7.37	7.30
V3: DR Dhan 45	4.94	5.11	5.85	5.30	4.73	5.64	5.70	5.36
V4: DR Dhan 48	3.89	4.32	5.01	4.41	5.24	6.13	6.48	5.95
V5: CG Zinc Rice-1	3.42	3.85	4.25	3.84	3.01	5.74	5.63	4.80
Mean	4.77	4.93	5.05		5.59	6.48	6.73	
CD (0.05) T	0.12				0.48			
CD (0.05) V	0.15				0.61			
T*V	0.26				1.06			

[T1: Control with no Zn; T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF; T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF]

Table 5.8.3.2 Effect of biofortified rice genotypes response to Zn application on Grain yield (t/ha) of rice at different locations during Kharif 2024

Treatments/ Varieties	Cutback				Maruteru				Pusa				Titabar			
	T1	T2	T3	Mean	T1	T2	T3	Mean	T1	T2	T3	Mean	T1	T2	T3	Mean
V1: Swarna	4.49	5.22	5.60	5.10	7.82	8.31	8.04	8.06	4.06	5.45	4.53	4.68	4.68	4.69	4.80	4.72
V2: CR Dhan 315	4.34	5.35	5.67	5.12	5.09	5.13	5.52	5.25	3.65	4.29	4.19	4.04	2.47	2.68	1.79	2.32
V3: DR Dhan 45	4.29	4.70	5.37	4.78	4.27	4.48	4.38	4.38	3.68	5.12	4.21	4.34	2.32	1.77	1.46	1.85
V4: DR Dhan 48	3.24	3.85	4.42	3.84	5.01	5.65	5.44	5.37	3.86	4.69	4.34	4.30	2.42	2.48	2.72	2.54
V5: CG Zinc Rice-1	2.77	3.38	3.72	3.29	2.36	2.74	2.69	2.60	3.01	3.43	3.19	3.21	1.27	2.05	1.55	1.62
Mean	3.82	4.50	4.96		4.91	5.26	5.21		3.65	4.60	4.09		2.63	2.74	2.46	
CD (0.05) T	0.16				NS				0.31				NS			
CD (0.05) V	0.20				0.43				0.40				0.35			
T*V	NS				NS				NS				0.61			

[T1: Control with no Zn; T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF; T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF]

Table 5.8.3.3 Effect of biofortified rice genotypes response to Zn application on Grain yield (t/ha) of rice at different locations during *Kharif* 2024

Treatments/ Varieties	Varanasi				Ludhiana				Kaul				Karaikal			
	T1	T2	T3	Mean	T1	T2	T3	Mean	T1	T2	T3	Mean	T1	T2	T3	Mean
V1: Swarna	1.07	1.58	1.39	1.35	1.07	1.51	1.30	1.30	3.41	4.37	4.26	4.01	3.28	3.34	3.38	3.33
V2: CR Dhan 315	2.42	2.52	2.48	2.47	2.33	2.60	2.33	2.42	3.37	3.60	3.59	3.52	3.20	2.97	3.23	3.13
V3: DR Dhan 45	1.30	2.35	2.07	1.91	1.35	2.27	2.19	1.94	3.28	4.10	4.00	3.79	3.33	3.23	3.58	3.38
V4: DR Dhan 48	1.92	2.38	2.07	2.12	1.72	2.37	2.11	2.07	3.31	4.28	4.15	3.91	2.91	3.08	3.10	3.03
V5: CG Zinc Rice-1	1.67	2.22	2.01	1.96	1.58	2.30	1.85	1.91	2.35	2.48	2.51	2.45	3.38	3.27	3.71	3.45
Mean	1.68	2.21	2.00		1.61	2.21	1.96		3.14	3.76	3.70		3.22	3.18	3.40	
CD (0.05) T	0.16				0.24				0.18				NS			
CD (0.05) V	0.21				0.31				0.24				NS			
T*V	NS				NS				0.41				NS			

[T1: Control with no Zn; T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF; T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF]

Table 5.8.4.1 Effect of biofortified rice genotypes response to Zn application on Straw yield (t/ha) of rice at different locations during *Rabi* 2024

Treatments/ Varieties	Cuttack				Treatments/ Varieties	Maruteru			
	T1	T2	T3	Mean		T1	T2	T3	Mean
V1: Naveen	5.54	5.77	6.11	5.80	V1: Swarna	8.02	6.97	5.55	6.85
V2: CR Dhan 315	7.26	7.57	8.04	7.63	V2: CR Dhan 315	8.40	9.15	9.42	8.99
V3: DR Dhan 45	6.92	7.21	7.22	7.12	V3: DR Dhan 45	7.35	8.55	8.20	8.03
V4: DR Dhan 48	6.40	6.40	6.86	6.55	V4: DR Dhan 48	6.58	6.37	7.25	6.73
V5: CG Zinc Rice-1	4.97	4.99	5.24	5.07	V5: CG Zinc Rice-1	6.16	4.02	4.94	5.04
Mean	6.22	6.39	6.69		Mean	7.30	7.01	7.07	
CD (0.05) T	0.12				CD (0.05) T	NS			
CD (0.05) V	0.16				CD (0.05) V	0.46			
T*V	NS				T*V	0.79			

[T1: Control with no Zn; T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF; T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF]

Table 5.8.4.2 Effect of biofortified rice genotypes response to Zn application on Straw yield (t/ha) of rice at different locations during Kharif 2024

Treatments/ Varieties	Cuttack			Maruteru			Pusa			Titabar		
	T1	T2	T3	Mean	T1	T2	T3	Mean	T1	T2	T3	Mean
V1: Swarna	5.38	5.78	5.96	5.71	7.64	7.87	7.61	7.70	5.30	7.04	5.92	6.09
V2: CR Dhan 315	6.67	7.18	7.98	7.28	7.75	7.85	9.32	8.31	4.60	5.44	5.26	5.10
V3: DR Dhan 45	6.43	6.85	6.84	6.71	7.16	8.44	9.17	8.26	4.64	6.42	5.27	5.45
V4: DR Dhan 48	5.81	5.95	6.48	6.08	7.16	7.80	7.80	7.59	4.87	5.90	5.48	5.42
V5: CG Zinc Rice- I	4.35	4.53	4.89	4.59	3.42	3.59	5.03	4.01	3.64	4.14	3.85	3.88
Mean	5.73	6.06	6.43		6.62	7.11	7.79		4.61	5.79	5.16	
CD (0.05) T	0.15				0.59				0.39			NS
CD (0.05) V	0.19				0.77				0.51			NS
T*V	0.33				NS				NS			3.00

[T1: Control with no Zn; T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF; T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF]

Table 5.8.4.3 Effect of biofortified rice genotypes response to Zn application on Straw yield (t/ha) of rice at different locations during Kharif 2024

Treatments/ Varieties	Varanasi			Ludhiana			Kaul			Karaikal		
	T1	T2	T3	Mean	T1	T2	T3	Mean	T1	T2	T3	Mean
V1: Swarna	1.99	2.52	2.15	2.22	1.99	2.52	2.15	2.22	4.14	5.56	5.36	5.02
V2: CR Dhan 315	4.12	4.24	3.90	4.08	4.12	4.24	3.90	4.08	4.19	5.77	5.00	4.98
V3: DR Dhan 45	2.41	3.98	3.69	3.36	2.41	3.98	3.69	3.36	3.82	5.08	4.68	4.53
V4: DR Dhan 48	2.97	4.01	3.62	3.53	2.97	4.01	3.62	3.53	3.83	5.24	4.87	4.64
V5: CG Zinc Rice- I	2.64	3.98	3.62	3.41	2.64	3.98	3.62	3.41	2.68	2.76	2.72	2.72
Mean	2.82	3.75	3.40		2.82	3.75	3.40		3.73	4.88	4.53	
CD (0.05) T	0.54				0.54				0.14			NS
CD (0.05) V	0.69				0.69				0.18			2.24
T*V	NS				NS				0.31			NS

[T1: Control with no Zn; T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF; T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF]

Table 5.8.5.1 Effect of biofortified rice genotypes response to Zn application on Harvest index of rice at different locations during Rabi 2024

Treatments/ Varieties	Cuttack				Treatments/ Varieties	Maruteru			
	T1	T2	T3	Mean		T1	T2	T3	Mean
V1: Naveen	46.3	46.1	45.3	45.9	V1: Swarna	45.7	41.7	42.5	43.3
V2: CR Dhan 315	41.1	43.0	42.6	42.3	V2: CR Dhan 315	44.1	42.1	41.4	42.6
V3: DR Dhan 45	41.7	41.4	44.8	42.6	V3: DR Dhan 45	35.3	38.2	37.1	36.9
V4: DR Dhan 48	37.8	40.3	42.2	40.1	V4: DR Dhan 48	37.3	39.1	38.7	38.4
V5: CG Zinc Rice-1	40.8	43.5	44.8	43.0	V5: CG Zinc Rice-1	27.8	38.3	37.4	34.5
Mean	41.5	42.9	43.9		Mean	38.1	39.9	39.4	
CD (0.05) T	0.7				CD (0.05) T	NS			
CD (0.05) V	0.9				CD (0.05) V	2.8			
T*V	1.5				T*V	4.9			

[T1: Control with no Zn; T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF; T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF]

Table 5.8.5.2 Effect of biofortified rice genotypes response to Zn application on Harvest index of rice at different locations during Kharif 2024

Treatments/ Varieties	Cuttack				Maruteru				Pusa				Titabar			
	T1	T2	T3	Mean	T1	T2	T3	Mean	T1	T2	T3	Mean	T1	T2	T3	Mean
V1: Swarna	45.5	47.4	48.4	47.1	50.6	51.3	51.4	51.1	43.4	43.6	43.3	43.4	23.7	23.7	28.5	25.3
V2: CR Dhan 315	39.4	42.7	41.5	41.2	39.8	39.9	37.2	39.0	44.3	44.1	44.3	44.2	15.1	16.7	11.3	14.4
V3: DR Dhan 45	40.0	40.7	44.0	41.5	37.2	35.0	32.6	34.9	44.2	44.4	44.4	44.3	14.4	16.8	8.0	13.1
V4: DR Dhan 48	35.8	39.3	40.6	38.6	41.2	42.1	41.0	41.4	44.2	44.3	44.2	44.2	17.5	14.6	16.0	16.0
V5: CG Zinc Rice-1	38.9	42.7	43.2	41.6	41.1	43.3	35.0	39.8	45.3	45.3	45.3	45.3	9.4	13.6	9.7	10.9
Mean	39.9	42.6	43.6		42.0	42.3	39.5		44.3	44.3	44.3		16.0	17.1	14.7	
CD (0.05) T	0.9				NS				NS				NS			
CD (0.05) V	1.1				3.2				0.1				3.8			
T*V	NS				NS				0.2				NS			

[T1: Control with no Zn; T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF; T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF]

Table 5.8.5.3 Effect of biofortified rice genotypes response to Zn application on Harvest index of rice at different locations during *Kharif* 2024

Treatments/ Varieties	Varanasi				Ludhiana				Kaul				Karaikal			
	T1	T2	T3	Mean	T1	T2	T3	Mean	T1	T2	T3	Mean	T1	T2	T3	Mean
V1: Swarna	35.4	38.8	39.8	38.0	35.2	37.5	37.9	36.9	45.1	43.9	44.3	44.5	52.9	65.0	43.1	53.7
V2: CR Dhan 315	37.5	37.5	39.1	38.0	36.4	38.0	37.4	37.3	44.5	38.3	41.8	41.5	34.6	56.1	42.5	44.4
V3: DR Dhan 45	35.4	37.5	36.3	36.4	36.2	36.6	37.4	36.7	46.2	44.6	46.0	45.6	44.7	36.9	34.7	38.8
V4: DR Dhan 48	40.6	37.3	37.0	38.3	37.1	37.2	37.2	37.2	46.4	44.9	46.0	45.8	32.6	32.3	29.5	31.4
V5: CG Zinc Rice-1	39.2	36.0	36.3	37.2	37.8	36.7	33.9	36.1	46.8	47.3	48.1	47.4	30.5	36.7	32.6	33.3
Mean	37.6	37.4	37.7		36.5	37.2	36.8		45.8	43.8	45.2		39.1	45.4	36.5	
CD (0.05) T	NS				NS				NS				6.9			
CD (0.05) V	NS				NS				2.1				8.9			
T*V	NS				NS				NS				NS			

[T1: Control with no Zn; T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF; T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF]

Table 5.8.6.1 Effect of biofortified rice genotypes response to Zn application on Tiller Number/m² of rice at different locations during Rabi 2024

Treatments/ Varieties	Cutback				Treatments/ Varieties	Maruteru			
	T1	T2	T3	Mean		T1	T2	T3	Mean
V1: Naveen	432.7	462.0	469.3	454.7	V1: Swarna	410.7	416.0	386.7	404.4
V2: CR Dhan 315	480.3	462.0	542.7	495.0	V2: CR Dhan 315	422.7	462.7	470.7	452.0
V3: DR Dhan 45	447.3	476.7	487.7	470.6	V3: DR Dhan 45	389.3	429.3	412.0	410.2
V4: DR Dhan 48	447.3	454.7	462.0	454.7	V4: DR Dhan 48	346.7	364.0	366.7	359.1
V5: CG Zinc Rice-1	436.3	458.3	528.0	474.2	V5: CG Zinc Rice-1	400.0	393.3	450.7	414.7
Mean	448.8	462.7	497.9		Mean	393.9	413.1	417.3	
CD (0.05) T	26.1				CD (0.05) T	NS			
CD (0.05) V	NS				CD (0.05) V	32.8			
T*V	NS				T*V	NS			

[T1: Control with no Zn; T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF; T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF]

Table 5.8.6.2 Effect of biofortified rice genotypes response to Zn application on Tiller Number/m² of rice at different locations during Kharif 2024

Treatments/ Varieties	Cutback				Maruteru				Pusa				Titabar			
	T1	T2	T3	Mean	T1	T2	T3	Mean	T1	T2	T3	Mean	T1	T2	T3	Mean
V1: Swarna	432.7	454.7	458.3	448.6	357.0	346.0	370.0	357.7	318.3	362.0	329.7	336.7	331.3	297.7	311.0	313.3
V2: CR Dhan 315	480.3	465.7	520.7	488.9	311.0	350.0	340.0	333.7	273.0	333.0	286.0	297.3	281.0	325.0	333.0	313.0
V3: DR Dhan 45	440.0	440.0	469.3	449.8	333.0	321.0	339.0	331.0	282.0	311.0	307.3	300.1	339.0	286.0	307.0	310.7
V4: DR Dhan 48	432.7	425.3	436.3	431.4	339.0	332.0	341.0	337.3	301.7	327.3	287.3	305.4	328.0	311.7	273.7	304.4
V5: CG Zinc Rice-1	403.3	447.3	506.0	452.2	295.0	307.0	324.0	308.7	216.3	260.7	239.7	238.9	292.3	308.0	300.3	300.2
Mean	437.8	446.6	478.1		327.0	331.2	342.8		278.3	318.8	290.0		314.3	305.7	305.0	
CD (0.05) T	NS				NS				NS				NS			
CD (0.05) V	32.8				19.2				46.2				NS			
T*V	NS				NS				NS				NS			

[T1: Control with no Zn; T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF; T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF]

Table 5.8.6.3 Effect of biofortified rice genotypes response to Zn application on Tiller Number/m² of rice at different locations during Kharif 2024

Treatments/ Varieties	Varanasi			Ludhiana			Kaul			Karaikal		
	T1	T2	T3	Mean	T1	T2	T3	Mean	T1	T2	T3	Mean
V1: Swarna	304.4	320.0	297.8	307.4	304.4	320.0	297.8	307.4	356.7	386.3	381.7	374.9
V2: CR Dhan 315	295.6	306.7	297.8	300.0	295.6	306.7	297.8	300.0	359.3	373.7	371.7	368.2
V3: DR Dhan 45	306.7	315.6	306.7	309.6	306.7	315.6	306.7	309.6	352.7	376.7	369.7	366.3
V4: DR Dhan 48	328.9	302.2	293.3	308.1	328.9	302.2	293.3	308.1	362.0	383.7	376.0	373.9
V5: CG Zinc Rice-1	284.4	308.9	308.9	300.7	284.4	308.9	308.9	300.7	316.7	334.7	326.3	325.9
Mean	304.0	310.7	300.9		304.0	310.7	300.9		349.5	371.0	365.1	
CD (0.05) T	NS				NS				9.7			NS
CD (0.05) V	NS				NS				12.6			99.7
T*V	NS				NS				NS			NS

[T1: Control with no Zn; T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF; T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF]

Table 5.8.7.1 Effect of biofortified rice genotypes response to Zn application on Panicle number/m² of rice at different locations during Rabi 2024

Treatments/ Varieties	Cuttack			Treatments/ Varieties	Maruteru		
	T1	T2	T3		T1	T2	T3
V1: Naveen	320.3	338.7	354.3	V1: Swarna	344.0	360.0	364.0
V2: CR Dhan 315	335.7	352.7	364.0	V2: CR Dhan 315	396.0	421.3	430.7
V3: DR Dhan 45	298.0	337.7	345.7	V3: DR Dhan 45	389.3	388.0	373.3
V4: DR Dhan 48	279.3	291.7	321.3	V4: DR Dhan 48	304.0	329.3	332.0
V5: CG Zinc Rice-1	291.3	332.7	358.0	V5: CG Zinc Rice-1	362.7	354.7	410.7
Mean	304.9	330.7	348.7	Mean	359.2	370.7	382.1
CD (0.05) T	10.2			CD (0.05) T	NS		
CD (0.05) V	13.1			CD (0.05) V	25.8		
T*V	NS			T*V	NS		

[T1: Control with no Zn; T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF; T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF]

Table 5.8.7.2 Effect of biofortified rice genotypes response to Zn application on Panicle number/m² of rice at different locations during Kharif 2024

Treatments/ Varieties	Cuttack			Maruteru			Pusa			Titabar		
	T1	T2	T3	Mean	T1	T2	T3	Mean	T1	T2	T3	Mean
V1: Swarna	305.0	328.7	345.7	326.4	326.0	315.0	334.0	325.0	295.7	337.0	305.7	312.8
V2: CR Dhan 315	325.0	342.7	355.0	340.9	288.0	316.0	309.0	304.3	251.7	309.3	262.3	274.4
V3: DR Dhan 45	291.3	319.3	335.7	315.4	303.0	290.0	309.0	300.7	261.3	288.0	283.3	277.6
V4: DR Dhan 48	264.7	279.3	309.7	284.6	308.0	299.0	308.0	305.0	278.3	303.7	264.7	282.2
V5: CG Zinc Rice-1	277.7	324.0	348.3	316.7	267.0	276.0	294.0	279.0	195.7	239.3	217.7	217.6
Mean	292.7	318.8	338.9		298.4	299.2	310.8		256.5	295.5	266.7	
CD (0.05) T	9.6				NS				NS			
CD (0.05) V	12.4				16.5				45.2			
T*V	NS				NS				NS			

[T1: Control with no Zn; T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF; T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF]

Table 5.8.7.3 Effect of biofortified rice genotypes response to Zn application on Panicle number/m² of rice at different locations during Kharif 2024

Treatments/ Varieties	Ludhiana				Kaul				Karaikal			
	T1	T2	T3	Mean	T1	T2	T3	Mean	T1	T2	T3	Mean
V1: Swarna	275.0	288.3	268.3	277.2	291.7	327.0	334.7	317.8	459.3	492.0	483.3	478.2
V2: CR Dhan 315	270.0	276.7	268.3	271.7	293.7	316.7	318.3	309.6	362.0	469.3	498.7	443.3
V3: DR Dhan 45	275.0	280.0	280.0	278.3	281.3	328.7	311.7	307.2	556.0	598.7	558.7	571.1
V4: DR Dhan 48	301.7	275.0	260.0	278.9	284.0	320.7	319.7	308.1	535.3	533.3	511.3	526.7
V5: CG Zinc Rice-1	253.3	281.7	283.3	272.8	217.7	267.0	257.0	247.2	358.7	300.0	349.3	336.0
Mean	275.0	280.3	272.0		273.7	312.0	308.3		454.3	478.7	480.3	
CD (0.05) T	NS				14.9				NS			
CD (0.05) V	NS				19.2				91.8			
T*V	NS				NS				NS			

[T1: Control with no Zn; T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF; T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF]

Table 5.8.8.1 Effect of biofortified rice genotypes response to Zn application on Spikelet Fertility (%) of rice at different locations during Rabi 2024

Treatments/ Varieties	Cuttack			
	T1	T2	T3	Mean
V1: Naveen	72.5	74.8	76.2	74.5
V2: CR Dhan 315	81.6	79.6	81.4	80.9
V3: DR Dhan 45	78.7	77.8	77.6	78.0
V4: DR Dhan 48	76.6	79.3	79.3	78.4
V5: CG Zinc Rice-1	77.4	79.4	79.7	78.9
Mean	77.4	78.2	78.8	
CD (0.05) T	NS			
CD (0.05) V	2.2			
T*V	NS			

[T1: Control with no Zn; T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF; T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF]

Table 5.9.8.2 Effect of biofortified rice genotypes response to Zn application on Spikelet Fertility (%) of rice at different locations during Kharif 2024

Treatments/ Varieties	Cuttack			Pusa			Titabar		
	T1	T2	T3	Mean	T1	T2	T3	Mean	
V1: Swarna	75.0	76.3	78.0	76.4	86.5	92.0	89.5	89.3	63.8
V2: CR Dhan 315	81.0	83.5	84.4	83.0	85.6	91.5	90.4	89.2	71.9
V3: DR Dhan 45	81.9	81.0	80.0	81.0	83.9	91.9	91.8	89.2	60.3
V4: DR Dhan 48	78.1	82.1	84.0	81.4	86.9	91.7	91.3	90.0	88.1
V5: CG Zinc Rice-1	80.5	83.0	80.8	81.4	88.2	93.0	91.4	90.9	47.6
Mean	79.3	81.2	81.4		86.2	92.0	90.9		66.3
CD (0.05) T	NS				0.8				NS
CD (0.05) V	2.4				1.0				NS
T*V	NS				1.8				21.0

[T1: Control with no Zn; T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF; T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF]

Table 5.8.8.3 Effect of biofortified rice genotypes response to Zn application on Spikelet Fertility (%) of rice at different locations during Kharif 2024

Treatments/ Varieties	Varanasi				Ludhiana				Karaikal			
	T1	T2	T3	Mean	T1	T2	T3	Mean	T1	T2	T3	Mean
V1: Swarna	85.3	85.7	77.5	82.9	85.3	85.7	77.5	82.9	86.1	85.8	89.7	87.2
V2: CR Dhan 315	80.1	78.5	82.7	80.4	80.1	78.5	82.7	80.4	76.5	82.4	79.1	79.3
V3: DR Dhan 45	86.3	78.8	79.1	81.4	86.3	78.8	79.1	81.4	84.5	84.9	84.7	84.7
V4: DR Dhan 48	80.6	79.3	77.3	79.1	80.6	79.3	77.3	79.1	87.8	86.3	86.6	86.9
V5: CG Zinc Rice-1	83.4	80.4	81.4	81.7	83.4	80.4	81.4	81.7	84.3	81.4	83.5	83.1
Mean	83.2	80.6	79.6		83.2	80.6	79.6		83.8	84.1	84.7	
CD (0.05) T	0.3				0.3				NS			
CD (0.05) V	0.3				0.3				5.5			
T*V	0.6				0.6				NS			

[T1: Control with no Zn; T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF; T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF]

Table 5.8.9.1 Effect of biofortified rice genotypes response to Zn application on Thousand grain weight (g) of rice at different locations during Rabi 2024

Treatments/ Varieties	Cuttack			
	T1	T2	T3	Mean
V1: Naveen	21.0	21.1	21.7	21.3
V2: CR Dhan 315	23.6	25.8	26.1	25.2
V3: DR Dhan 45	24.1	24.8	24.3	24.4
V4: DR Dhan 48	20.9	21.3	21.6	21.3
V5: CG Zinc Rice-1	23.7	23.8	23.9	23.8
Mean	22.7	23.4	23.5	
CD (0.05) T	NS			
CD (0.05) V	0.9			
T*V	NS			

[T1: Control with no Zn; T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF; T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF]

Table 5.8.9.2 Effect of biofortified rice genotypes response to Zn application on Thousand grain weight (g) of rice at different locations during Kharif 2024

Treatments/ Varieties	Cuttack				Pusa				Titabar			
	T1	T2	T3	Mean	T1	T2	T3	Mean	T1	T2	T3	Mean
V1: Swarna	19.2	20.0	21.2	20.2	32.7	33.6	33.0	33.1	21.8	21.2	20.8	21.3
V2: CR Dhan 315	23.7	25.3	27.2	25.4	26.5	28.4	27.2	27.4	21.2	19.2	20.5	20.3
V3: DR Dhan 45	22.8	23.9	23.6	23.4	28.9	31.5	29.7	30.0	21.5	24.2	21.8	22.5
V4: DR Dhan 48	19.9	19.2	20.9	20.0	30.0	31.5	30.6	30.7	20.9	22.0	21.4	21.4
V5: CG Zinc Rice-1	22.5	22.9	23.5	22.9	32.6	33.5	32.6	32.9	22.3	22.4	21.8	22.2
Mean	21.6	22.3	23.3		30.1	31.7	30.6		21.5	21.8	21.3	
CD (0.05) T	0.6				NS				NS			
CD (0.05) V	0.8				2.2				NS			
T*V	NS				NS				NS			

[T1: Control with no Zn; T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF; T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF]

Table 5.8.9.3 Effect of biofortified rice genotypes response to Zn application on Thousand grain weight (g) of rice at different locations during Kharif 2024

Treatments/ Varieties	Varanasi				Ludhiana				Kaul				Karaikal			
	T1	T2	T3	Mean	T1	T2	T3	Mean	T1	T2	T3	Mean	T1	T2	T3	Mean
V1: Swarna	22.0	23.9	23.6	23.2	22.0	23.9	23.6	23.2	24.4	25.7	25.5	25.2	16.2	17.5	15.7	16.5
V2: CR Dhan 315	20.6	23.2	18.7	20.8	20.6	23.2	18.7	20.8	25.2	26.2	25.8	25.7	19.9	18.3	20.7	19.6
V3: DR Dhan 45	21.7	23.2	17.6	20.8	21.7	23.2	17.6	20.8	25.9	27.1	27.9	27.0	23.0	20.9	22.9	22.3
V4: DR Dhan 48	19.1	22.1	20.2	20.5	19.1	22.1	20.2	20.5	25.0	27.1	26.9	26.3	14.1	13.5	14.3	14.0
V5: CG Zinc Rice-1	19.6	22.5	18.9	20.3	19.6	22.5	18.9	20.3	26.6	27.6	27.5	27.2	23.9	22.8	23.8	23.5
Mean	20.6	23.0	19.8		20.6	23.0	19.8		25.4	26.7	26.7		19.4	18.6	19.5	
CD (0.05) T	0.7				0.7				0.6				NS			
CD (0.05) V	0.9				0.9				0.8				2.3			
T*V	1.6				1.6				NS				NS			

[T1: Control with no Zn; T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF; T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF]

Table 5.8.10.1 Effect of biofortified rice genotypes response to Zn application on Grain Zn Content (mg/kg) of rice at different locations during Rabi 2024

Treatments/ Varieties	Cutback				Treatments/ Varieties	Maruteru			
	T1	T2	T3	Mean		T1	T2	T3	Mean
V1: Naveen	28.7	32.6	33.3	31.5	V1: Swarna	23.4	25.1	29.0	25.8
V2: CR Dhan 315	32.7	35.9	36.8	35.1	V2: CR Dhan 315	28.4	28.7	31.7	29.6
V3: DR Dhan 45	30.9	34.0	35.0	33.3	V3: DR Dhan 45	27.1	24.8	31.5	27.8
V4: DR Dhan 48	28.3	32.2	34.6	31.7	V4: DR Dhan 48	32.9	32.8	32.7	32.8
V5: CG Zinc Rice-1	35.4	39.0	40.7	38.4	V5: CG Zinc Rice-1	36.8	36.5	40.1	37.8
Mean	31.2	34.7	36.1		Mean	29.7	29.6	33.0	
CD (0.05) T	1.9				CD (0.05) T	2.9			
CD (0.05) V	2.5				CD (0.05) V	3.7			
T*V	NS				T*V	NS			

[T1: Control with no Zn; T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF; T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF]

Table 5.8.10.2 Effect of biofortified rice genotypes response to Zn application on Grain Zn Content (mg/kg) of rice at different locations during Kharif 2024

Treatments/ Varieties	Cutback				Treatments/ Varieties	Pusa				Treatments/ Varieties	Titabar			
	T1	T2	T3	Mean		T1	T2	T3	Mean		T1	T2	T3	Mean
V1: Swarna	27.9	28.8	33.0	29.9	V1: Swarna	22.6	22.6	26.8	22.6	V1: Swarna	33.2	32.4	34.5	33.3
V2: CR Dhan 315	29.4	32.6	33.6	31.9	V2: CR Dhan 315	27.9	27.9	31.4	28.4	V2: CR Dhan 315	34.8	34.6	38.2	35.9
V3: DR Dhan 45	27.7	30.9	36.1	31.6	V3: DR Dhan 45	30.0	30.0	24.7	29.8	V3: DR Dhan 45	35.2	34.8	39.8	36.6
V4: DR Dhan 48	25.6	28.5	30.6	28.2	V4: DR Dhan 48	35.1	35.1	30.5	31.1	V4: DR Dhan 48	35.9	39.7	39.9	38.5
V5: CG Zinc Rice-1	31.9	39.6	37.8	36.4	V5: CG Zinc Rice-1	36.5	36.5	37.1	40.2	V5: CG Zinc Rice-1	38.0	44.8	40.5	41.1
Mean	28.5	32.1	34.2		Mean	30.4	27.3	31.9		Mean	35.4	37.2	38.6	
CD (0.05) T	2.1				CD (0.05) T	3.6				CD (0.05) T	NS			
CD (0.05) V	2.7				CD (0.05) V	4.7				CD (0.05) V	4.0			
T*V	NS				T*V	NS				T*V	NS			

[T1: Control with no Zn; T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF; T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF]

Table 5.8.10.2 Effect of biofortified rice genotypes response to Zn application on Grain Zn Content (mg/kg) of rice at different locations during Kharif 2024

Treatments/ Varieties	Varanasi				Kaul				Karaikal			
	T1	T2	T3	Mean	T1	T2	T3	Mean	T1	T2	T3	Mean
V1: Swarna	24.5	33.4	33.6	30.5	19.7	27.1	27.1	24.6	28.7	35.7	33.9	32.8
V2: CR Dhan 315	28.6	34.6	36.9	33.4	22.1	29.3	33.5	28.3	31.6	38.9	38.6	36.4
V3: DR Dhan 45	29.6	30.2	34.3	31.4	25.7	29.5	35.6	30.3	30.0	35.1	29.8	31.7
V4: DR Dhan 48	26.9	32.3	31.0	30.1	21.1	27.9	32.9	27.3	31.2	31.2	31.1	31.2
V5: CG Zinc Rice-1	38.6	38.2	41.5	39.4	31.1	39.3	36.1	35.5	33.7	34.5	38.9	35.7
Mean	29.6	33.7	35.5		24.0	30.6	33.0		31.0	35.1	34.5	
CD (0.05) T	2.5				3.2				2.6			
CD (0.05) V	3.2				4.2				3.4			
T*V	NS				NS				NS			

[T1: Control with no Zn; T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF; T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF]

Table 5.8.11.1 Effect of biofortified rice genotypes response to Zn application on Straw Zn Content (mg/kg) of rice at different locations during Rabi 2024

Treatments/ Varieties	Cuttack				Treatments/ Varieties	Maruteru			
	T1	T2	T3	Mean		T1	T2	T3	Mean
V1: Naveen	35.2	42.7	47.3	41.8	V1: Swarna	27.6	36.5	34.3	32.8
V2: CR Dhan 315	42.0	48.2	51.3	47.2	V2: CR Dhan 315	30.4	33.8	30.7	31.6
V3: DR Dhan 45	42.4	52.5	49.8	48.2	V3: DR Dhan 45	31.8	36.0	31.8	33.2
V4: DR Dhan 48	39.3	48.9	48.7	45.6	V4: DR Dhan 48	34.6	35.3	41.1	37.0
V5: CG Zinc Rice-1	43.8	52.0	53.2	49.7	V5: CG Zinc Rice-1	35.2	36.5	39.9	37.2
Mean	40.5	48.9	50.1		Mean	31.9	35.6	35.5	
CD (0.05) T	1.8					NS			
CD (0.05) V	2.3					NS			
T*V	NS					NS			

[T1: Control with no Zn; T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF; T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF]

Table 5.8.11.2 Effect of biofortified rice genotypes response to Zn application on Straw Zn Content (mg/kg) of rice at different locations during Kharif 2024

Treatments/ Varieties	Cuttack			Maruteru			Pusa			Titabar		
	T1	T2	T3	Mean	T1	T2	T3	Mean	T1	T2	T3	Mean
V1: Swarna	31.7	40.9	45.3	39.3	23.7	33.4	37.0	31.4	37.9	44.0	40.5	40.8
V2: CR Dhan 315	43.9	58.0	57.3	53.0	26.7	31.1	25.6	27.8	43.0	45.5	42.5	43.7
V3: DR Dhan 45	36.1	47.1	50.7	44.6	31.5	36.2	31.0	32.9	41.1	47.2	41.4	43.2
V4: DR Dhan 48	34.2	45.3	50.5	43.3	35.7	36.1	39.3	37.0	40.3	46.6	43.8	43.6
V5: CG Zinc Rice-1	37.6	56.6	57.4	50.5	38.5	34.9	40.3	37.9	39.5	45.3	42.0	42.3
Mean	36.7	49.6	52.2		31.2	34.3	34.7		40.4	45.7	42.0	
CD (0.05) T	7.6				NS				2.5			
CD (0.05) V	NS				5.3				NS			
T*V	NS				NS				NS			

[T1: Control with no Zn; T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF; T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF]

Table 5.8.11.3 Effect of biofortified rice genotypes response to Zn application on Straw Zn Content (mg/kg) of rice at different locations during Kharif 2024

Treatments/ Varieties	Varanasi				Kaul				Karaikal			
	T1	T2	T3	Mean	T1	T2	T3	Mean	T1	T2	T3	Mean
V1: Swarna	49.6	63.4	70.7	61.2	32.8	40.9	45.7	39.8	41.9	49.8	46.3	46.0
V2: CR Dhan 315	53.4	61.2	68.1	60.9	40.5	43.0	46.9	43.5	43.8	51.5	57.6	51.0
V3: DR Dhan 45	61.4	61.9	69.7	64.3	42.5	49.4	49.1	47.0	46.9	45.6	45.7	46.1
V4: DR Dhan 48	65.4	70.1	76.3	70.6	39.6	47.4	45.7	44.2	44.0	43.8	45.6	44.4
V5: CG Zinc Rice-1	67.3	64.0	72.8	68.0	43.5	48.9	48.1	46.8	41.9	46.6	49.6	46.0
Mean	59.4	64.1	71.5		39.8	45.9	47.1		43.7	47.5	49.0	
CD (0.05) T	3.6				2.3				3.6			
CD (0.05) V	4.6				3.0				NS			
T*V	NS				NS				NS			

[T1: Control with no Zn; T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF; T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF]

Table 5.8.12.1 Effect of biofortified rice genotypes response to Zn application on post-harvest soil zinc status (mg/kg) of rice at different locations during Rabi 2024

Treatments/ Varieties	Cutback				Treatments/ Varieties	Maruteru			
	T1	T2	T3	Mean		T1	T2	T3	Mean
V1: Naveen	0.83	1.24	1.11	1.06	V1: Swarna	1.10	1.30	1.33	1.24
V2: CR Dhan 315	1.01	1.26	1.13	1.14	V2: CR Dhan 315	1.18	1.43	1.35	1.32
V3: DR Dhan 45	1.03	1.30	1.19	1.17	V3: DR Dhan 45	1.30	1.43	1.32	1.35
V4: DR Dhan 48	0.97	1.30	1.05	1.11	V4: DR Dhan 48	1.21	1.53	1.20	1.31
V5: CG Zinc Rice-1	1.08	1.33	1.09	1.16	V5: CG Zinc Rice-1	1.14	1.37	1.23	1.25
Mean	0.98	1.29	1.11		Mean	1.19	1.41	1.29	
CD (0.05) T	0.07				CD (0.05) T	0.09			
CD (0.05) V	NS				CD (0.05) V	NS			
T*V	NS				T*V	NS			

[T1: Control with no Zn; T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF; T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF]

Table 5.8.12.2 Effect of biofortified rice genotypes response to Zn application on post-harvest soil zinc status (mg/kg) of rice at different locations during Kharif 2024

Treatments/ Varieties	Cutback				Maruteru				Pusa				Titabar			
	T1	T2	T3	Mean	T1	T2	T3	Mean	T1	T2	T3	Mean	T1	T2	T3	Mean
V1: Swarna	0.78	1.06	1.35	1.06	1.18	1.43	1.44	1.35	0.44	0.67	0.48	0.53	1.13	1.48	1.43	1.35
V2: CR Dhan 315	1.31	1.11	1.17	1.20	1.29	1.45	1.41	1.38	0.45	0.68	0.50	0.54	1.20	1.67	1.25	1.38
V3: DR Dhan 45	0.81	1.47	1.33	1.20	1.33	1.44	1.19	1.32	0.45	0.70	0.50	0.55	1.17	1.60	1.33	1.37
V4: DR Dhan 48	0.90	1.29	0.95	1.05	1.15	1.67	1.20	1.34	0.44	0.69	0.49	0.54	1.20	1.31	0.99	1.17
V5: CG Zinc Rice-1	1.06	1.25	1.11	1.14	1.15	1.39	1.29	1.28	0.44	0.70	0.49	0.54	1.13	1.46	1.14	1.24
Mean	0.97	1.24	1.18		1.22	1.48	1.31		0.44	0.69	0.49		1.17	1.50	1.23	
CD (0.05) T	0.12				0.10				0.02				0.20			
CD (0.05) V	NS				NS				NS				NS			
T*V	0.27				NS				NS				NS			

[T1: Control with no Zn; T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF; T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF]

Table 5.8.12.3 Effect of biofortified rice genotypes response to Zn application on post-harvest soil zinc status (mg/kg) of rice at different locations during Kharif 2024

Treatments/ Varieties	Varanasi				Kaul				Karaikal			
	T1	T2	T3	Mean	T1	T2	T3	Mean	T1	T2	T3	Mean
V1: Swarna	0.66	0.82	0.86	0.78	0.53	0.60	0.57	0.57	0.75	1.13	0.91	0.93
V2: CR Dhan 315	0.66	0.69	0.82	0.72	0.53	0.60	0.58	0.57	0.82	0.81	0.94	0.86
V3: DR Dhan 45	0.87	0.80	0.81	0.83	0.54	0.61	0.58	0.57	0.84	1.02	0.95	0.94
V4: DR Dhan 48	0.83	0.83	0.85	0.84	0.53	0.61	0.59	0.58	0.97	0.86	0.81	0.88
V5: CG Zinc Rice-1	0.79	0.71	0.90	0.80	0.54	0.61	0.59	0.58	0.77	0.92	0.90	0.86
Mean	0.76	0.77	0.85		0.53	0.60	0.58		0.83	0.95	0.90	
CD (0.05) T	0.07				0.03				0.09			
CD (0.05) V	NS				NS				NS			
T*V	NS				NS				0.20			

[T1: Control with no Zn; T2: STBZ+ FS of 0.5% Zn at PI stage and 1 WAF; T3: FS of 0.5% Zn at AT stage, PI stage and 1 WAF]

5.9. Assessment of Carbon dynamics in rice ecologies and recarbonising rice soils for sustainable production (New trial)

Rice is an important livelihood for millions in India. The diversity in the rice growing environments viz., waterlogged to rainfed uplands, *jhums* to deep water, high humid to arid temperatures and flood-prone to drylands, wherein, irrigated ecology accounting for the largest area (24.5 m ha) and highest production (70.5 m t) and productivity (2.87 t/ha) closely followed by rainfed shallow lowlands. The differential paddy productivity across different rice-growing environments in India is a potential threat to its sustainability. The intensity and extent of nutrient stress concomitant with the loss of soil organic carbon in intensively rice and rice-based cropping systems areas makes it necessary, that the deficiencies and status of soil organic carbon of different soils are to be identified. Accurate baselines are still missing for all the rice ecologies of India, and estimates about the role of soils in the carbon cycle are still only based on rough estimates with large uncertainties.

Labile or active C pools fuel the soil food web and hence influence nutrient cycling and many other biologically related soil properties. Labile C fractions serve as early and sensitive indicators of management-induced change in SOC and hence soil quality and sustainability. The amount of organic carbon stored in soil results from the net balance between the rate of soil organic carbon inputs and the rate of mineralization in each of the organic carbon pools described above. A better understanding of the dynamics and responses in SOC content is vital for detecting and forecasting changes in response to rice yield and productivity. The carbon management index (CMI) is based on changes in total carbon in the soil and its ability to measure whether a system or a new management practice is sustainable in comparison to a more stable system. Cultivation of soil can decline both total and labile organic C.

The current study aims first to know the present status of organic carbon across different rice ecologies of India, and further to develop estimation of stock and Carbon maps in rice soils of India under the All India Coordinated Rice Improvement Programme (AICRIP). This trial was, therefore, conducted in farmers' fields around a few selected centres viz., Pantnagar, Kaul, Hazaribagh and Karaikal. The *Kharif* 2024 data received representing the irrigated, shallow lowland and upland rice ecosystems are presented in Tables 9.1 to 9.3. The data are summarized into following categories, namely, Soils samples collected from 2 depths viz. from 0-20 and 20-40 cm depths from Rice-Wheat, Rice-Mustard and Rice-Fallow at Hazaribagh, from 3 depths viz. from 0-20, 20-40 and 40-60 cm from Rice-fallow, Rice - Pulse, Rice - Cotton and Rice-rice at Karaikal, from 3 depths viz. from 0-20, 20-40 and 40-60 cm from Rice-Wheat, Rice - Pulse, Rice - Maize and Rice-Oilseed in two different districts of Kaul, from 3 depths viz. from 0-0-20, 20-40 and 40-60 cm depths from Rice-Wheat, Rice - Pulse, Rice - Maize and Rice-Oilseed in two different districts of Pantnagar.

The methodology involved as conduction of a survey in nearby villages during *Kharif* 2024 and involved data collection from various farmers' fields at different locations across different rice ecologies. Carbon stock and pool estimation in rice soils of India has an ultimate objective that

better soil carbon management practices have the potential to correct the existing differential paddy production pattern visible across different rice ecologies of India. Traditionally, organic carbon (Walkley and Black method) or TOC was used in the studies on SOM dynamics. However, changes in TOC as a result of management practices or land use are small in a short period of a few cropping seasons and hence seldom detectable because of high background levels and natural soil variability. In contrast, labile C fractions (readily decomposable; susceptible to microbial breakdown; easily oxidizable pool) generally have high turnover rates (short turnover time) and are sensitive to management-induced changes in SOC. Table 9.1 gives information on the Depth-wise distribution of soil parameters in different Rice-based cropping systems and shows variations in soil characteristics about pH, organic carbon content, soil texture and available nutrient status. The data on SOC concentration at all four sites and their rice-based cropping systems, Mean depth-wise distribution of soil organic carbon and stock status in different Rice-based cropping systems is shown in Table 9.2. Organic carbon in soil profile depth-wise varied widely and ranged from 0.27% - 0.97 %, 0.29 - 0.86%, and 0.15 - 0.65% in 0 -20, 20-40 and 40-60 cm depth respectively. Across the rice ecosystems and rice-based cropping systems, the status of organic carbon was found to be in decreasing order *i.e.*, highest in the 0-20cm depth and lowest in the 40-60cm depth. Most of the samples were found to be lower in soil organic carbon content in both the districts of Kaul Centre. Soil management practices adopted on a long-term basis resulted in changes in the soil organic carbon content in the profile. The surface layer (0-20 cm depth) recorded significantly higher organic carbon compared to down the profile such as 20-40 and 40-60cm depths. The higher soil organic carbon content under 0-20cm depth could be due mixing of the soil thereby reducing the oxidation of the of carbon compared. Similarly, the application of residues resulted in significant improvement in soil organic carbon content in the surface layers. The results of studies on the spatial distribution of carbon liability pools *viz*, very labile carbon, labile carbon, less labile carbon and non-labile carbon are shown in Table 9.3. Very labile carbon varies from 0.03 - 0.90 %, labile carbon varies from 0.02 - 0.26 %, less labile carbon varies from 0.01 - 0.59%, and non-labile carbon varies from 0.03 - 0.76 % across the depths. Soils were extremely acidic in Hazaribagh rice growing regions and highly alkaline in the Kaul region where soil pH varied from more than 7.0 and reaching to a level of more than 8.5.

Spatial distribution of carbon stocks in soil profiles across different rice-based cropping systems.

Carbon stock

The highest Soil Organic carbon status (maximum of 0.97%) was estimated in rice ecologies of Udham Singh Nagar district of Pantnagar and the lowest of 0.15% from Karaikal centre. The soil organic C stock ranged from 6.0 - 43.1, 11.2 - 45.4, and 8.0 - 54.5 t/ha in the first 0-20, 20- 40, and 40- 60 cm respectively and increased considerably over soil depth such as 20-40 and 40-60cm depths and an increase of more than 10% was observed. In the soil depth of 0-20 cm, maximum SOC stocks have been recorded. On average, in all rice ecologies top surface soils recorded 23% and 10% higher soil carbon stocks over lower soil profiles and were on par with each other in

different rice ecologies of the same centre/zone. These practices together promoted SOC build-up and C dynamics in cropping systems

Besides application of organic materials, the net increase has been attributed to the contribution from belowground biomass (roots of the previous crop). The roots may contribute considerable amounts of carbon on decomposition. Moreover, tillage management also influences soil carbon stock. Minimum tillage plots contain significantly higher carbon stock compared to conventional tillage and it was attributed to the fact that the tillage operations may result in soil aggregate disturbance and exposure of the stored organic matter to microbial decomposition leading to an increase in soil organic matter losses and CO₂ flux to the atmosphere. Where rice-pulse and Rice fallow systems were maintained, higher soil carbon stocks were recorded.

Spatial distribution of carbon fractions /pools in the rice ecologies:

The carbon pools of the selected area and locations were calculated and was seen that the higher contents of carbon pools were observed with 0-20cm depth of the soil profile to 20-40cm and 40-60cm depths. Depth-wise and rice cropping systems followed in the soil management practices adopted across centres significantly influenced the contents of carbon fractions viz., very labile, labile and less labile. In this study, very labile carbon was found to be in the lowest followed by labile followed by less labile and then lastly the highest content was found to be of the nonlabile fraction. Rice-based cropping systems followed across different rice ecologies significantly influenced and found higher amounts of very labile and labile C in Hazaribagh, Pantnagar and Karaikal. However, the values were very low for the fractions in both districts and in all the rice-based cropping systems followed at the Kaul centre. A significant influence of soil management treatments on the carbon fractions was observed across different rice ecologies. These studies reported that very labile and labile carbon fractions were very sensitive to changes due to soil management practices adopted and any increase in very labile and labile fractions of organic carbon indicates the superiority of the performance of the various management practices/treatments in operation. Several studies reported that labile carbon fractions change rapidly with different soil management treatments and could be used as a suitable indicator for agriculture management-induced changes in the soil.

Summary:

The evidence from the first-year studies of experimental findings from different rice ecological regions indicates a general trend of decline in SOC from the conversion of FL into different Rice based cropping systems. These studies reported that very labile and labile carbon fractions were very sensitive to changes due to soil management practices adopted and any increase in very labile and labile fractions of organic carbon indicates the superiority of the performance of the various management practices/treatments in operation. Several studies reported that labile carbon fractions changes rapidly with different soil management treatments and could be used as a suitable indicator for agriculture management-induced changes in soil. The highest Soil Organic carbon status (maximum of 0.97%) was estimated in rice ecologies of Udham Singh Nagar district of Pantnagar and the lowest of 0.17% from Karnal district of Kaul centre. The soil organic C stock

in first 0-20 cm increased considerably over soil depths such as 20-40 and 40-60 cm depths and an increase of more than 10% was observed. In the soil depth 0-20 cm, maximum SOC stocks have been recorded. On average, in all rice ecologies top surface soils recorded 23 % and 10% higher soil carbon stocks over lower soil profile and were on par with each other in different rice ecologies of the same centre/zone.

Table 5.9.1: Depth-wise distribution of soil parameters in different Rice based cropping systems

Centers and cropping systems	pH (Depth-cm)			Avail. N (kg/ha) (Depth-cm)			Avail. P (kg/ha) (Depth-cm)			Avail. K (kg/ha) (Depth-cm)		
	0-20	20-40	40-60	0-20	20-40	40-60	0-20	20-40	40-60	0-20	20-40	40-60
HAZARIBAGH												
Rice-Wheat	5.27	5.27	-	-	-	-	13.16	11.62	-	-	-	-
Rice-Mustard	6.1	6	-	-	-	-	21.95	20.42	-	-	-	-
Rice-Fallow	5.9	5.86	-	-	-	-	15.3	14.2	-	-	-	-
KAUL (Kaithal)												
Rice-Wheat	8.15	8.17	8.2	157	136	139	15.5	14.52	10.77	264	219	184
Rice-Maize	8.08	8.19	8.15	154	137	132	14.17	12.67	12.97	296	292	295
Rice-Pulse	7.95	8.01	8.1	136	172.6	149.3	11.3	16.63	14.93	184	284	232
Rice-Oilseed	7.88	8.01	8.1	172.6	149.3	135	16.6	14.9	10.9	284	232.6	165.0
KAUL(Karnal)												
Rice-Wheat	8.18	8.2	8.21	162	158	132	15.5	13.2	11.6	245	219	178
Rice-Maize	7.98	8.08	8.12	168	145	130	15.4	139	11.5	258	225	204
Rice-Pulse	7.96	7.99	8.08	185	172	145	17.1	14.2	11.8	283	212	171
Rice-Oilseed												
PANTNAGAR (UDHAMSGH NAGAR)												
Rice-Wheat	7.5	7.7	7.8	269.1	218.5	209.5	23.5	21.5	19.5	166.2	183.8	185.8
Rice-Maize	7.4	7.4	7.8	168.9	166.4	163.3	27.7	23.9	28.3	182.5	184.4	186.6
Rice-Pulse	7.4	7.4	7.6	170.7	168.7	166.7	19.4	22.7	25.5	187.5	185.5	183.2
Rice-Oilseed	7.3	7.2	7.0	206.8	204.8	202.8	18.7	21.5	22.5	187.8	199.5	180.5
PANTNAGAR (NAINITAL)												
Rice-Wheat	7.4	7.2	7.7	211.5	204.5	195.5	22.6	20.8	18.9	166.2	150.2	130.5
Rice-Maize	7.2	7.5	7.7	212.4	210.2	207.6	25.5	21.5	19.7	107.5	150	95.7
Rice-Pulse	7.4	7.5	7.5	212.4	210.1	207.6	22.6	20.8	18.9	113.5	118.2	98.6
Rice-Oilseed	7.3	7.4	7.5	206.8	204.5	201.6	23.7	22.5	19.1	141.5	109.5	95.7
KARAIKAL												
Rice-Fallow	6.34	6.87	7.33	125.4	131.7	100.4	23.4	37.2	33	113.2	124.6	113.2
Rice-Pulse	7.3	7.97	7.98	185	188	197	25.9	44.9	35.1	169.9	260.4	290.4
Rice-Cotton	7.89	8.14	7.9	188.2	216.4	225.8	10.6	5.7	7.3	226.5	215.1	203.8
Rice-Rice	8.22	7.9	7.95	210.1	147.4	165.1	19.5	31.5	42.2	169	158	203

Table 5.9.2: Mean depth-wise distribution of soil organic carbon and stocks status in different Rice based cropping systems

Centers and their cropping systems	Bulk Density(g/cm3) (Depth-cm)			Soil Organic Carbon (%) (Depth-cm)			Total SOC (%) (Depth-cm)			Total SOC stock(t/ha) (Depth-cm)		
	0-20	20-40	40-60	0-20	20-40	40-60	0-20	20-40	40-60	0-20	20-40	40-60
	0-20	20-40	40-60	0-20	20-40	40-60	0-20	20-40	40-60	0-20	20-40	40-60
HAZARIBAGH												
Rice-Wheat	1.4	1.45	1.49	0.74	0.71	0.61	-	-	-	20.7	41.2	54.5
Rice-Mustard	1.43	1.55	1.59	0.57	0.52	0.51	-	-	-	16.3	32.2	48.7
Rice-Fallow	1.48	1.52	1.59	0.55	0.52	0.51	-	-	-	16.3	31.6	48.7
KAUL (District -Kaithal)												
Rice-Wheat	1.44	1.47	1.49	0.45	0.38	0.27	0.59	0.45	0.27	13.0	11.2	8.0
Rice-Maize	1.41	1.44	1.45	0.47	0.33	0.2	0.61	0.43	0.26	26.5	19.0	11.6
Rice-Pulse	1.38	1.42	1.46	0.52	0.37	0.23	0.6	0.49	0.81	43.1	31.5	20.1
Rice-Oilseed	1.41	1.42	1.45	0.5	0.33	0.2	0.6	0.4	0.27	14.1	18.7	17.4
KAUL(District -Karnal)												
Rice-Wheat	1.45	1.48	1.51	0.45	0.29	0.35	0.62	0.38	0.22	13.1	17.2	31.7
Rice-Maize	1.39	1.45	1.47	0.47	0.29	0.17	0.6	0.39	0.26	13.1	16.8	15.0
Rice-Pulse	1.37	1.41	1.44	0.33	0.39	0.23	0.7	0.5	0.3	9.0	22.0	19.9
Rice-Oilseed	1.4	1.45	1.48	0.5	0.36	0.21	0.6	0.43	0.31	14.0	20.9	18.6
Pantnagar (Udham Singh Nagar)												
Rice-Wheat	1.25	1.32	1.37	0.97	0.86	0.57	0.99	0.87	0.86	24.3	45.4	46.9
Rice-Maize	1.25	1.31	1.33	0.81	0.71	0.59	1.13	1.29	0.94	20.3	37.2	47.1
Rice-Pulse	1.28	1.32	1.35	0.87	0.81	0.65	1.12	1.04	0.9	22.3	42.8	52.7
Rice-Oilseed	1.3	1.31	1.32	0.91	0.8	0.60	1.27	1.13	1.05	23.7	41.9	47.5
Pantnagar (Nainital)												
Rice-Wheat	1.26	1.33	1.33	0.82	0.71	0.61	0.99	0.81	0.86	20.7	37.8	48.7
Rice-Maize	1.26	1.31	1.33	0.86	0.72	0.56	1.12	0.99	0.96	21.7	37.7	44.7
Rice-Pulse	1.28	1.32	1.35	0.84	0.74	0.57	1.15	1.04	1.03	21.5	39.1	46.2
Rice-Oilseed	1.31	1.29	1.33	0.96	0.79	0.55	1.26	1.1	0.96	25.2	40.8	43.9
KARAIKAL												
Rice-Fallow	1.25	1.20	1.11	0.38	0.30	0.15	0.5	0.39	0.20	9.5	14.4	10.0
Rice-Pulse	1.11	1.07	1.11	0.27	0.70	0.33	0.35	0.43	0.92	6.0	30.0	22.0
Rice-Cotton	1.09	1.11	1.17	0.44	0.33	0.25	0.54	0.77	0.40	9.6	14.7	17.6
Rice-Rice	1.11	1.17	1.09	0.69	0.38	0.48	0.30	0.63	0.50	15.3	17.8	31.4

Table 9.3 Depth-wise distribution of pools of soil organic carbon (%) in different Rice based cropping systems

Centers and their cropping systems	V labile pool (Depth-cm)			labile pool (Depth-cm)			Less labile pool (Depth-cm)			Non Labile pool (Depth-cm)		
	0-20	20-40	40-60	0-20	20-40	40-60	0-20	20-40	40-60	0-20	20-40	40-60
HAZARIBAGH												
Rice-Wheat	0.23	0.18	-	0.14	0.15	-	0.1	0.08	-	0.22	0.20	-
Rice-Mustard	0.18	0.20	-	0.14	0.11	-	0.11	0.10	-	0.15	0.2	-
Rice-Fallow	0.17	0.14	-	0.12	0.14	-	0.1	0.07	-	0.26	0.16	-
KAUL (District -Kaithal)												
Rice-Wheat	0.16	0.12	0.76	0.09	0.07	0.03	0.18	0.14	0.08	0.15	0.12	0.08
Rice-Maize	0.17	0.13	0.08	0.08	0.05	0.03	0.18	0.12	0.07	0.17	0.13	0.07
Rice-Pulse	0.18	0.13	0.08	0.07	0.04	0.04	0.2	0.12	0.06	0.18	0.12	0.07
Rice-Oilseed	0.2	0.09	0.09	0.09	0.05	0.04	0.2	0.14	0.08	0.14	0.08	0.12
KAUL (District -Karnal)												
Rice-Wheat	0.16	0.78	0.06	0.05	0.03	0.02	0.18	0.01	0.06	0.18	0.11	0.07
Rice-Maize	0.18	0.11	0.06	0.05	0.02	0.02	0.19	0.12	0.06	0.19	0.12	0.07
Rice-Pulse	0.2	0.014	0.03	0.09	0.04	0.03	0.2	0.13	0.07	0.2	0.14	0.07
Rice-Oilseed	0.19	0.15	0.09	0.07	0.03	0.04	0.2	0.12	0.07	0.19	0.13	0.1
Pantnagar (Udham Singh Nagar)												
Rice-Wheat	0.3	0.25	0.35	0.18	0.15	0.15	0.05	0.03	0.03	0.45	0.43	0.43
Rice-Maize	0.39	0.32	0.32	0.2	0.17	0.17	0.06	0.04	0.04	0.47	0.43	0.42
Rice-Pulse	0.35	0.30	0.30	0.2	0.18	0.19	0.07	0.06	0.04	0.54	0.5	0.56
Rice-Oilseed	0.43	0.37	0.32	0.22	0.21	0.19	0.07	0.06	0.04	0.54	0.5	0.5
Pantnagar (Nainital)												
Rice-Wheat	0.31	0.26	0.9	0.18	0.16	0.15	0.04	0.03	0.03	0.45	0.42	0.4
Rice-Maize	0.3	0.3	0.3	0.21	0.18	0.17	0.06	0.04	0.04	0.51	0.46	0.46
Rice-Pulse	0.39	0.32	0.31	0.21	0.18	0.17	0.06	0.04	0.04	0.51	0.45	0.43
Rice-Oilseed	0.43	0.36	0.35	0.26	0.2	0.2	0.07	0.05	0.05	0.54	0.48	0.48
KARAIKAL												
Rice-Fallow	0.04	0.05	0.04	0.03	0.07	0.04	0.12	0.08	0.08	0.29	0.17	0.032
Rice-Pulse	0.08	0.04	0.04	0.05	0.07	0.05	0.06	0.04	0.07	0.12	0.76	0.03
Rice-Cotton	0.04	0.05	0.06	0.24	0.12	0.08	0.11	0.18	0.59	0.13	0.04	0.04
Rice-Rice	0.09	0.05	0.05	0.15	0.25	0.43	0.35	0.08	0.09	0.29	0.15	0.09

Appendix-I
List of cooperating centres of Soil Science and allotment of trials: 2023-24

Sl. No	Locations	Trial 1		Trial 2		Trial 3		Trial 4		Trial 5		Trial 6		Trial 7		Trial 8		Trial 9		Intended	Conducted	Percentage
		K	R	K	R	K	R	K	R	K	R	K	R	K	R	K	R	K	R			
1	Chiplima (F)					x		x		x		x		x						07	04	57
2	Kanpur (F)		x		x			x	x			x								09	06	67
3	Karaikal (F)					x	x	x	x			x		x		x		x		07	07	100
4	Kaul (F)							x		x			x			x				05	05	100
5	Ludhiana (F)									x			x			x				05	03	60
6	Mandya (F)	x		x	x					x		x		x						08	06	75
7	Maruteru (F)	x	x					x	x	x		x	x	x		x	x			10	10	100
8	Moncompu (F)					x		x	x	x		x		x						07	05	71
9	Pantnagar (F)							x	x					x				x		04	04	100
10	Pusa (F)			x				x				x		x		x				05	05	100
11.	Titabar (F)	x	x									x		x		x				06	05	83
12	Chinsurah (V)											x		x	x					06	03	50
13	Faizabad (V)			x				x			x	x								05	04	80
14	Hazaribagh (V)																	x		01	01	100
15	Khudwani (V)							x		x		x		x						04	04	100
16	NRRI, Cuttack															x	x			03	03	100
17	Puducherry (V)												x							02	01	50
18	Sirsi (V)					x														01	01	100
19	Varanasi (V)															x				02	01	50
20	Vyttila (V)																	x		01	01	100
Total trials allotted		3	2	4	2	2	0	10	3	12	0	11	2	11	2	8	2	4	1	98	79	80.6

K – Kharif; R- Rabi; F- Funded Centre, V= Voluntary Centre

Trial No.1: Long-term soil fertility management in rice-based cropping systems (RBCS): 03 (Mandya, Maruteru, Titabar)

Trial No.2: Management of sodic soils using nano Zn formulation: 04 (Kanpur, Mandya, Pusa, Masodha)

Trial No.3: Management of acid soils: 02 (Moncompu, Sirsi)

Trial No.4: Residue management in rice-based cropping systems: 10 (Chiplima, Faizabad, Kanpur, Karaikal, Kaul, Maruteru, Moncompu, Pantnagar, Pusa, Khudwani)

Trial No.5: Nano-fertilizers for increasing nutrient use efficiency, yield and economic returns in transplanted rice: 12 (Chiplima, Faizabad, Kanpur, Karaikal, Kaul, Ludhiana, Mandya, Maruteru, Moncompu, Pantnagar, Khudwani, NRRI)

Trial No.6: Yield maximization of rice in different Zones: 12 (Chinsurah, Chiplima, Faizabad, Kanpur, Karaikal, Ludhiana, Maruteru, Mandya, Moncompu, Pusa, Titabar, Khudwani)

Trial No.7: Enhancing the productivity of Organic Rice cultivation & Natural farming: 12 (Chiplima, Karaikal, Kaul, Mandya, Maruteru, Moncompu, Pantnagar, Pusa, Titabar, Khudwani, Chinsurah, Puducherry)

Trial No.8: Assessment of bio-fortified rice genotypes response to Zn application and assessing agronomic bio-fortification potential: 08 (Karaikal, Kaul, Ludhiana, Maruteru, Pusa, Titabar, Varanasi, NRRI)

Trial No.9: Assessment of Carbon dynamics in rice ecologies and recarbonising rice soils for sustainable production: 5 (Karaikal, Kaul, Pantnagar, Hazaribagh, Vyttila)

List of Soil Science Cooperators -2024-25

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PLANT PHYSIOLOGY

6. PLANT PHYSIOLOGY

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6. Plant Physiology

Summary

Physiological studies under All India Co-ordinated Rice Improvement Program were conducted at nine funded centres in Plant Physiology, (Coimbatore, Maruteru, Pantnagar, Pattambi, Rewa, Raipur, Karjat, Kaul and Titabar), two ICAR institutions (IIRR Hyderabad and CRRI Cuttack) and four voluntary centres (RARS Chinsurah, NDUAT Faizabad, PJNAR Karaikal and BAU Ranchi). The trials conducted during *Kharif* 2024 are given as below.

Star Chart of Plant Physiology Coordinated Studies for the Year *Kharif* 2024

Locations	Trials						Allotted	Conducted	Conducted (%)
	Silicon	RFU	Heat Tolerance	MAS	SUB	LLS			
CHN	-	√	-	-	√	√	3	3	100
CBT	√	-	-	√	√	-	3	3	100
CRRI	-	√	-	√	√	√	4	4	100
IIRR	√	-	√	-	-	√	3	3	100
FZB	-	√	-	√	-	-	1	1	100
KJT	√	-	-	√	-	√	3	3	100
KRK	√	-	-	√	√	-	3	3	100
MTU	√	-	√	√	-	√	4	4	100
PNR	√	-	√	√	-	√	4	4	100
PTB	√	√	√	√	√	√	5	5	100
REWA	√	√	√	-	-	-	3	3	100
TTB	√	√	√	√	√	√	6	6	100
RPUR	-	√	-	-	-	√	2	1	50
RANCHI	√	√	-	-	-	-	2	2	100
KAUL	-	-	√	√	-	-	2	2	100
Total	10	8	7	10	6	9	50	49	

The salient findings of the experimental research are presented below:

6.1 Role of Silicon in inducing abiotic stress tolerance in rice genotypes

Considering the ability of applied silicon in imparting stress tolerance, eight entries were tested for physiological parameters at 10 locations with four treatments- control (T1), 0.08% ortho silicic acid (T2), 0.08% ortho silicic acid + water stress (T3) and water stress (T4). Silicon application (T2) was significant for eight parameters (plant height, tiller number, panicle number, panicle weight, grain number per panicle, spikelet number per panicle, thousand grain weight and grain yield) and lead to increased grain yield than T1. Silicon application increased the grain yield by 6.5% over control. Water stress reduced the grain yield by 13% over control while inclusion of silicon under water stress has ameliorated the negative effect of the water stress and improved the grain yield by 7% over water stress alone. The interaction between Location x Silicon, Location x Variety and Location x Silicon x Variety was found significant

for all the seventeen parameters. While the interaction between Silicon x Variety was significant for only grain number/m². Most of the measured parameters were better in T3 over T4 across most of the varieties and locations which indicates that the inclusion of silicon can reduce the negative impact of water stress on rice crop.

6.2 Phenotyping of elite rice genotypes for Drought Tolerance

Mean grain yield (mean of all entries and locations) was reduced by show 23% under rainfed condition in comparison with irrigated control. D-163-3 followed by RP 6469-88 exhibited least reduction in grain yield and could be used as donors for rainfed upland situations. Based on drought indices computed from grain yield recorded under both irrigated as well as rainfed conditions, the results revealed that D-163-3, D-163-6, D-163-19, D-163-15 and D-163-4 may be considered as relatively drought tolerant. Parametric model for simultaneous selection in yield and stability across locations and YSi values identified D-163-3, D-163-4, D-163-6, D-163-15, D-163-19, RP 6469-88 and RP 6469-95 as stable genotypes under rainfed condition. Multiple correlation analysis between yield obtained under rainfed condition and the computed yield indices revealed a strong positive association between for DI, GMP, MP, DTI, K1STI, K2STI and YI and negative relation was observed for SDI and DSI and, these indices are useful for identification drought tolerant genotypes.

6.3 Screening for high temperature tolerance in rice genotypes

Changing climate scenario lead to global warming that resulted in elevated atmospheric temperature which in-turn increased events of high temperatures stress to crops at various growth stages. IET 31512 recorded the least reduction in grain yield under heat stress over control which can be utilized as promising donor in breeding programmes. Significant variation was observed amongst the genotypes for most of the heat indices. Based on the overall rank IET 30555, IET 29694, IET 31512, IET 29700 and IET 30561 were identified as relatively heat tolerant genotypes. Multiple correlation and regression analysis indicate highly significant positive association between grain yield under heat stress and the heat indices- HTI (Heat Tolerance Index), GMP (Geometric Mean Production), MP (Mean Production), HI (Heat Resistance Index), K2STI (Modified Stress Tolerance Index) and Yield index (YI) which are useful in selecting suitable genotypes for heat tolerance. Based on the performance across locations and YSi values under elevated temperature conditions, genotypes IET 29694, IET 29700, IET 30555, IET 30561, IET 30656, IET 31433, IET 31440, IET 31444, IET 31510, IET

31512, IET 31533, MTU-1296 and US-314 were selected as promising entries as they have relatively higher yield with greater stability under heat stress condition.

6.4 Physiological characterization of selected rice genotypes for multiple abiotic stress tolerance

Thirty-five rice lines were screened for multiple abiotic stresses including anaerobic germination, salinity stress (12 dS m⁻¹), and osmotic stress (1 and 2% mannitol) at early seedling stage across different AICRIP centres. The different abiotic stresses have an impact on rice lines which resulted in decline in the key physiological parameters i.e., germination percentage, epicotyl length, shoot and root dry weight, shoot and root length, leaf chlorophyll content and shoot Na⁺/K⁺ ratio. As per the result obtained from multilocation trial it was found that the entries Rashpanjor, Ratnagiri-8, NICRA 20, VANDANA, CRRG6(AUS 171), AC 34245 were highly tolerant to AG stress. Three genotypes AC 443, AC 34280 and NICRA 16 were moderately tolerant to AG stress. These genotypes can be used as potential donor to improve the anaerobic germination potential in rice genotypes. Whereas, the rice lines CRAC-4423-10, FL 478, CRAC-4424-122, AC 34280, CR 3439-E-5-2-1-1-B-1, CBMAS22042 found to be highly tolerant to seedling stage salinity stress with lesser SES score and shoot Na⁺/K⁺ ratio. whereas, the lines NICRA-19, Ratnagiri-8, AC 34245, NICRA 16, CR 3477-1-M-1-B-SU-78-S-2-B, Rashpanjor, CR 3483-1-M-4-B-SU-1-5-S-1-B, and CRRG7(JHUL DIGA) were moderately tolerant to salt stress with lower SES score. Out of 35 lines, CR 3460-E-2-2-B-1 (IET 31074), CRAC-4423-49, and VANDANA reported be highly tolerant to osmotic stress with high shoot biomass. CR 3483-29-M-4-B-SU-61-1-S-1-B, CR 3477-1-M-1-B-SU-78-S-2-B, AC 443, NICRA-19, CRRG6 (AUS 171) showed moderate level of tolerance to osmotic stress. Out of 35 lines, Rashpanjor, Ratnagiri-8, AC 34245, NICRA 16, AC 34280 reported tolerance to both anaerobic germination stress and salinity stress. Two lines, AC 443 and CRRG6(AUS 171) reported tolerance to both anaerobic germination stress and osmotic stress. CR 3483-1-M-4-B-SU-1-5-S-1-B, CR 3477-1-M-1-B-SU-78-S-2-B reported tolerance to both salinity stress and osmotic stress.

6.5 Screening of Rice Genotypes for Submergence Tolerance

The submergence trial was carried across different locations (CBT, CHN, CRRI, KRK, PTB, and TTB) using 27 rice genotypes. After submergence stress the tolerant check FR 13A reported highest survival rate of 83.86%. Whereas, lowest survival rate was found in the susceptible checks Swarna (8.90%) and Naveen (25.46%). The mean survival rate of genotypes

was 54.15% across the locations where highest survival rate was noted in CHN (62.42%) and lowest was noted in CBT (40.59%). The tolerant check FR 13A reported the highest survival rate of 83.86%. Based on the result obtained from different locations it was observed that, the entry CBMAS22061 was highly tolerant to submergence with survival ability of 77.39% which was even higher than the tolerant check Swarna Sub1. Apart from this, six more lines (M-4-SU-2-S-1, AC 34280, CRAC-4423-10, CBMAS22062, AC 85, and CBMAS22041) with survival ability >60% were considered to be tolerant to complete submergence stress. Additionally, eight lines (CRAC-4423-3, CRAC-4423-111, CBMAS22042, CRAC-4423-5, CRRG4(NARIKEL BADI), CRRG5(KORTIK KAIKA), CR 4111-1-2-1-B-SU-1-SU-B, and CRAC-4423-14) recorded survival ability around 50-60% and found to be moderately tolerant to submergence stress. From the observations recorded from the multilocation trial it was found that most of the genotypes with low internode elongation ability also showed high survival ability and highly tolerant to submergence stress. Moreover, one genotype AC 34280 was identified with both high elongation ability (51.26%) and high survival ability (72.25%). These genotypes can be used as potential donor to improve the submergence tolerance in high-yielding rice genotypes.

6.6 Screening of rice varieties for tolerance to low light stress

Reduced rice yield was observed during the kharif (wet) season in eastern and north eastern regions of India due to cloudy days with low or sub-optimal light. Hence, in the 51st ARGM, this trial was constituted to screen AVT-2 material to identify donors having low light stress tolerance. Low light was imposed immediately after transplantation by enclosing the plants in shade net having 50% transmittance supported by metal rods/bamboo poles. A total of 18 parameters were noted in both control and low light stress conditions. Low light stress was significant for 11 parameters (days to maturity, TDM at flowering as well as maturity, shoot weight, panicle weight, panicle number/m², grain number/ m², spikelet number/ m², grain yield (g/m²), ETR and qP). Low light stress has led to reduction in yield ranging from 20% to 60% among the 33 tested varieties with a mean reduction of 43% over control. IET-31246 (R), IET-32147, IET-33262, IET-32134, IET-33264 and IET-32176 noted least reduction in grain yield under low light stress over control and can be utilized as donors for low light breeding.

Detailed results

6.1 Role of Silicon in inducing abiotic stress tolerance in rice genotypes

Locations: CBT, IIRR, KJT, KRK, MTU, PNR, PTB, REWA, TTB & RANCHI

Silicon (Si) is one of the most abundant elements in soil. It is recognized as a quasi-essential element. It is involved in various plant growth and development processes such as photosynthesis, fertilization, biotic and abiotic stress resistance, tolerance against mineral toxicity, etc., in various crops. Si has been reported to enhance tolerance to multiple abiotic stresses. Its deficiency reduces the metabolic processes as well as the plant's ability to withstand various stresses. Plants take up Si in the form of monosilicic acid and accumulate over the upper surface of the tissues especially on the epidermis layer making a polymer of amorphous silica. The Si content of plant sample may vary between 0.1 and 10% on dry weight basis. Rice accumulates $\geq 10\%$ Si on dry weight basis and is mostly transported inside the plant through aquaporins. The leaves of rice plants grown in the presence of Si shows an erect growth thereby improving the light distribution within the canopy. Silicon can lower the electrolyte leakage from rice leaves and therefore, promote greater photosynthetic activity in plant grown under water deficit or heat stress. Several studies have shown that Si increases the accumulation of polysaccharide in rice leaves. It plays a very important role in water use efficiency in rice thereby enhancing the tolerance to drought stress. Si is also involved in maintaining the thermal stability of lipids in cell membranes. The foliar application of Si enhances the grain quality and the yield of the crop. External application of Si has been reported to benefit agriculturally important crops such as wheat, rice, and maize by improving biomass and carbon assimilation. Various forms of Si have been demonstrated to relieve stress in various crops. Si is also reported in regulation of the accumulation of secondary metabolites in various plants.

With this background an experiment was conducted at 10 locations, with eight entries with RBD/split plot design having four replications and led out with four silicon treatments. T1: control, T2: silisilic acid (0.08% Ortho silicic acid) @ 40ppm silicon at 15 DAP, 30 DAP, 45 DAP and 60 DAP, total 4 sprays, T3: silisilic acid (0.08% Ortho silicic acid) @ 40ppm silicon at 15 DAP, 30DAP, 45DAP and 60DAP, total 4 sprays + water stress (Water stress was imposed by withholding irrigation 12 days before flowering and again 10 days after anthesis (total duration of stress will be 22 days) and T4: water stress only.

Si application had non-significant effect on days to 50% flowering (Tables 6.1.1) while interaction between Location x Silicon was significant indicating the importance of

environment on days to 50% flowering. Significant variation was noticed among the varieties for days to 50% flowering and interaction between Location x Variety as well as Location x Silicon x Variety was also noted to be significant. However, interaction between Silicon x Variety was non-significant. Similarly, Si application had non-significant effect on days to maturity (Tables 6.1.2) while the interaction between Location x Silicon was significant. Further, significant variation among the varieties was observed and noted significant interaction between Location x Variety as well as Location x Silicon x Variety. However, interaction between Silicon x Variety was non-significant.

Leaf area index (LAI) was measured at tillering (Table 6.1.3), panicle initiation (Table 6.1.4) and flowering (Table 6.1.5) stages. The effect of Si application on LAI was non-significant at tillering stage while significant at flowering as well as panicle initiation stages. Whereas the interaction between Location x Silicon was significant at all the three stages. Besides, significant variation was noted among the varieties for flowering stage only. At all the three stages, although the interaction between Silicon x Variety was non-significant, interaction was significant between Location x Variety and Location x Silicon x Variety.

The effect of Si application was significant on plant height (Table 6.1.6) and the interaction between Location x Silicon was significant. In addition, the variation was non-significant among the varieties, however, interaction between Location x Variety and Location x Silicon x Variety was significant. While the interaction was non-significant between Silicon x Variety. Si application showed significant effect on tiller number per m^2 (Table 6.1.7) and the interaction between Location x Silicon was significant. Besides, the variation was non-significant among the varieties, however, interaction between Location x Variety and Location x Silicon x Variety was significant. While the interaction was non-significant between Silicon x Variety. Si application noted non-significant effect on shoot weight g/m^2 (Tables 6.1.8) and the interaction between Location x Silicon was significant. Further, significant variation among the varieties was observed and interaction between Location x Variety and Location x Silicon x Variety was significant. However, interaction between Silicon x Variety was non-significant.

The effect of Si application was significant on panicle number per m^2 (Table 6.1.9) and the interaction between Location x Silicon was significant. In addition, the variation was non-significant among the varieties, however, interaction between Location x Variety and Location x Silicon x Variety was significant. While the interaction was non-significant between Silicon x Variety. Similarly, Si application was significant on panicle weight g/m^2 (Table 6.1.10) and

the interaction between Location x Silicon was significant. Despite the variation was non-significant among the varieties, interaction between Location x Variety and Location x Silicon x Variety was significant. While the interaction was non-significant between Silicon x Variety.

Likewise, Si application noted significant effect on grain number per panicle (Table 6.1.11) and the interaction between Location x Silicon was significant. Further, significant variation was noted among the varieties and interaction between Location x Variety and Location x Silicon x Variety was significant. However, interaction between Silicon x Variety was non-significant. Six of the eight varieties (Fig 6.1.1 A) noted better mean grain number per panicle over control (T1) by Si application (T2). Whereas in both T3 and T4, the mean grain number panicle was lower than control in all the varieties. Hence, among the treatments, the mean grain number per panicle across varieties and locations was above control in only T2 (Fig 6.1.1 B). Among T3 and T4, the mean grain number per panicle was better in T3 in most of the varieties as well as locations which indicates that the presence of silicon can provide tolerance to water stress. The mean grain number per panicle across the locations was highest for 27P37 and least for SB. Dhan varieties in T2. In terms of location, the mean grain number per panicle across the varieties was either similar or above control at all locations except Titabar (Fig 6.1.2) in T2. Whereas in T3 and T4, it was lower than control in most of the locations.

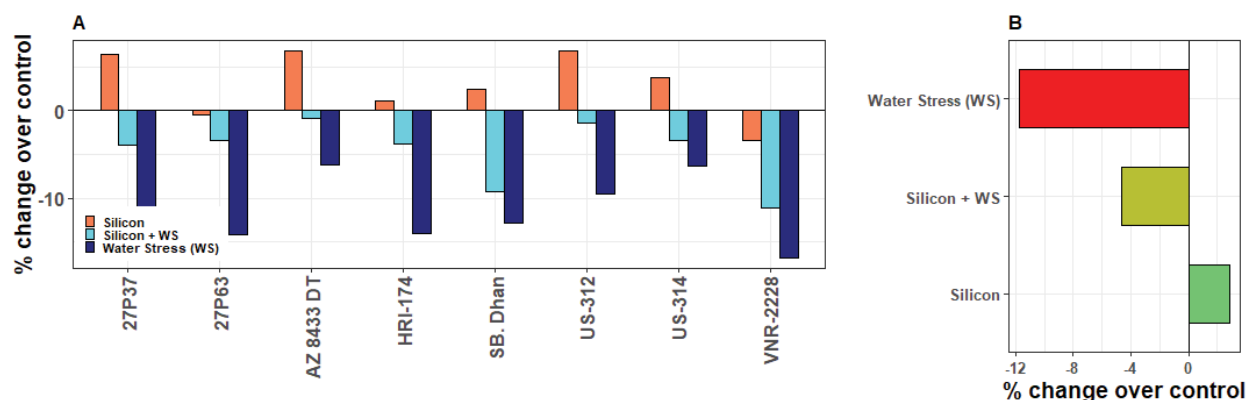


Fig 6.1.1 Percentage change in grain number per panicle with respect to control. (A) Mean of all locations (B) Mean of all varieties and locations.

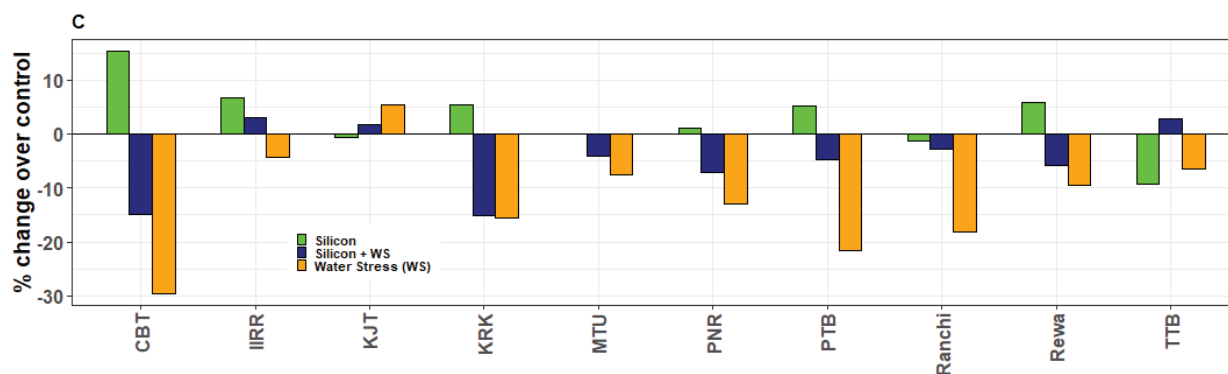


Fig 6.1.2 Percentage change in grain number per panicle with respect to control. Each value represents mean of all varieties.

Si application noted significant effect on spikelet number per panicle (Table 6.1.12) and the interaction between Location x Silicon was significant. Besides, significant variation was noted among the varieties and interaction between Location x Variety and Location x Silicon x Variety was significant. However, interaction between Silicon x Variety was non-significant. Si application noted significant effect on grain number/m² (Table 6.1.13) and the interaction between Location x Silicon was significant. Besides, non-significant variation was noted among the varieties and interaction between Silicon x Variety, Location x Variety and Location x Silicon x Variety was significant.

Si application noted non-significant effect on thousand grain weight (TGW) and the interaction between Location x Silicon was significant (Table 6.1.14). In addition, significant variation was noted among the varieties and interaction between Location x Variety and Location x Silicon x Variety was significant. However, interaction between Silicon x Variety was non-significant. Three of the eight varieties (Fig 6.1.3 A) noted better mean TGW over control (T1) by Si application (T2). Whereas two varieties noted marginally higher mean TGW over control in T3 and mean TGW was lower than control in all the varieties in T4. Hence, among the treatments, marginal decrease in mean TGW across varieties and locations was noted in comparison with control in only T2 (Fig 6.1.3 B). The mean TGW across the locations was highest for 27P37 and least for 27P63 varieties in T2. In terms of location, the mean TGW across the varieties was lower than control in most of the locations (Fig 6.1.4) in T2 and T3 and all locations in T4.

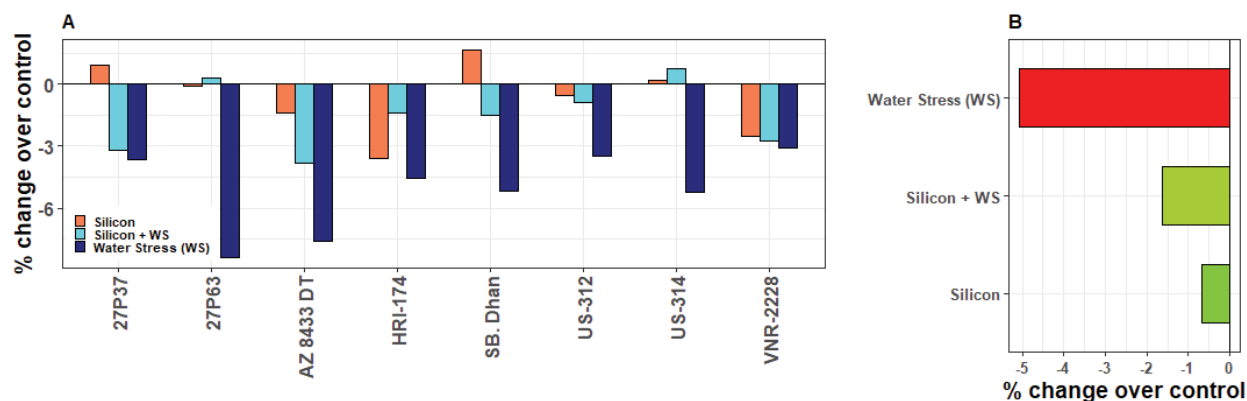


Fig 6.1.3 Percentage change in 1000 grain weight with respect to control. (A) Mean of all locations (B) Mean of all varieties and locations.

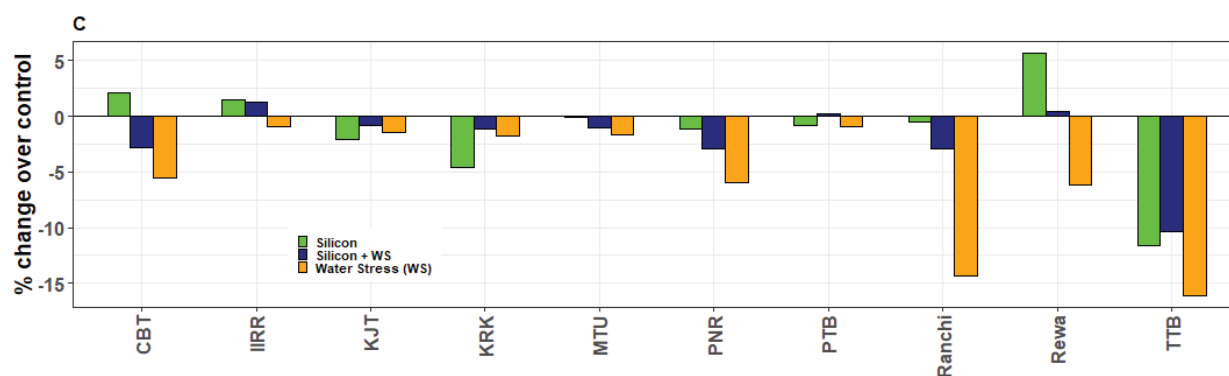


Fig 6.1.4 Percentage change in 1000 grain weight with respect to control. Each value represents mean of all varieties.

Si application noted non-significant effect on total dry matter (TDM) and the interaction between Location x Silicon was significant (Table 6.1.15). Further, significant variation was noted among the varieties and interaction between Location x Variety and Location x Silicon x Variety was significant. However, interaction between Silicon x Variety was non-significant. All the eight varieties (Fig 6.1.5 A) noted better mean TDM over control (T1) by Si application (T2). Whereas two varieties noted marginally higher mean TDM over control in T3 and it was lower than control in all the varieties in T4. Hence, among the treatments, mean TDM across varieties and locations was above control in only T2 (Fig 6.1.5 B). The mean TDM across the locations was highest for US312 and least for SB. Dhan varieties in T2. In terms of location, the mean TDM across the varieties was marginally similar or above control in most of the locations (Fig 6.1.6) except in Karjat in T2. It was above control at Titabar and marginally similar to control at Karaikal, Maruteru, Pantnagar, Pattambi and Ranchi in T2, T3 and T4. In other locations, it was lower than control in both T3 and T4.

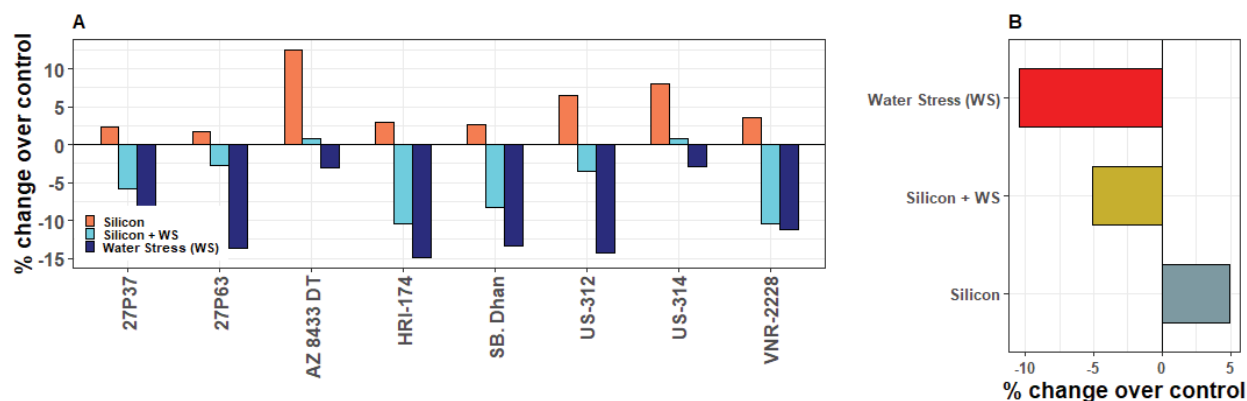


Fig 6.1.5 Percentage change in total dry matter (g/m²) at maturity with respect to control. (A) Mean of all locations (B) Mean of all varieties and locations.

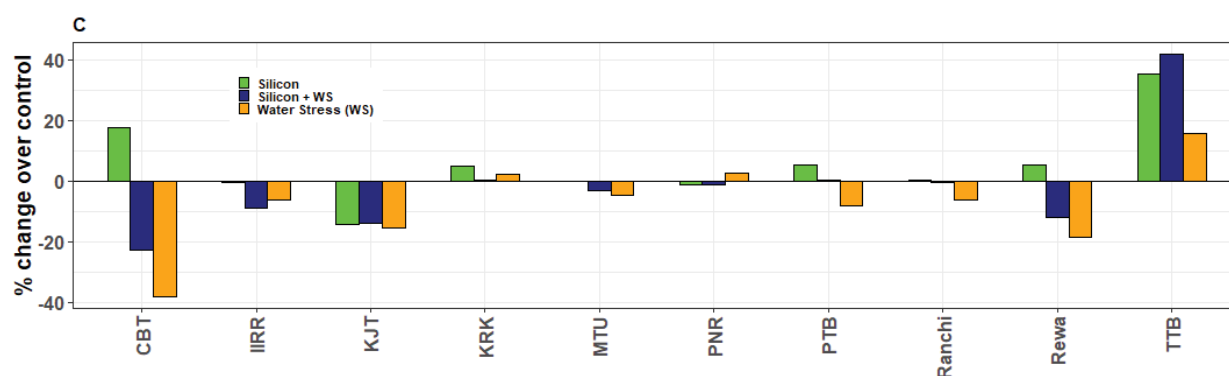


Fig 6.1.6 Percentage change in total dry matter (g/m²) at maturity with respect to control. Each value represents mean of all varieties.

Grain yield is also important for physiological studies since enhancement of grain yield is the main objective of agriculture research. Si application noted significant effect on grain yield and the interaction between Location x Silicon was significant (Table 6.1.16). Further, significant variation was noted among the varieties and interaction between Location x Variety and Location x Silicon x Variety was significant. However, interaction between Silicon x Variety was non-significant. Seven of the eight varieties (Fig 6.1.7 A) noted better mean grain yield over control (T1) by Si application (T2). Whereas it was lower than control in T3 (except VNR-2228) and T4. Among the treatments (Fig 6.1.7 B), mean grain yield across varieties and locations was above control in only T2 (6.5%). Besides, the percent change in mean grain yield across varieties and locations over control was twofold (-13%) in T4 compared with T3 (-6%). These results indicate that Si application can increase the grain yield and can reduce the negative impact of water stress. The mean grain yield across the locations was highest for VNR-2228 and least for 27P63 varieties in T2. In terms of location, the mean grain yield across the varieties was marginally similar or above control in most of the locations (Fig 6.1.8) in T2. It

was above control at Titabar and marginally similar to control at Pantnagar in T2, T3 and T4. In other locations, it was lower than control in both T3 and T4.

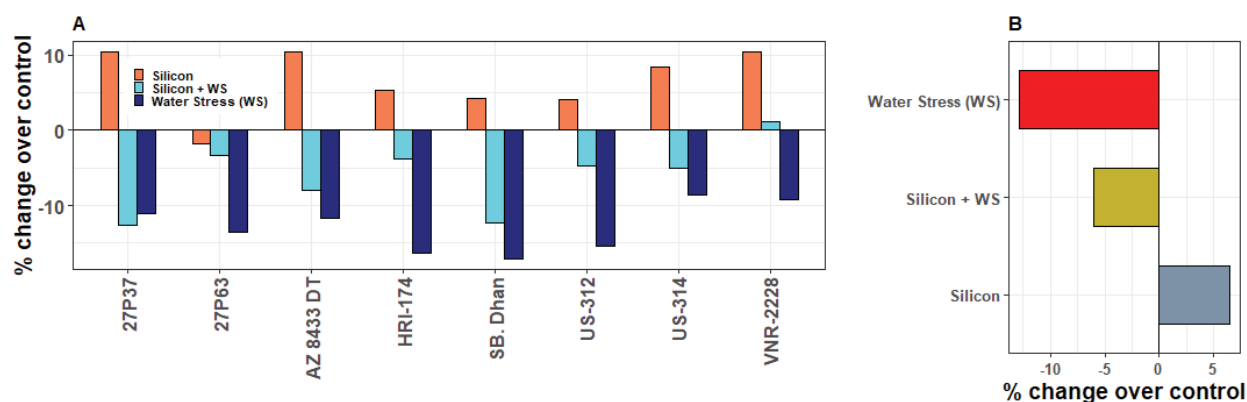


Fig 6.1.7 Percentage change in grain yield with respect to control. (A) Mean of all locations (B) Mean of all varieties and locations.

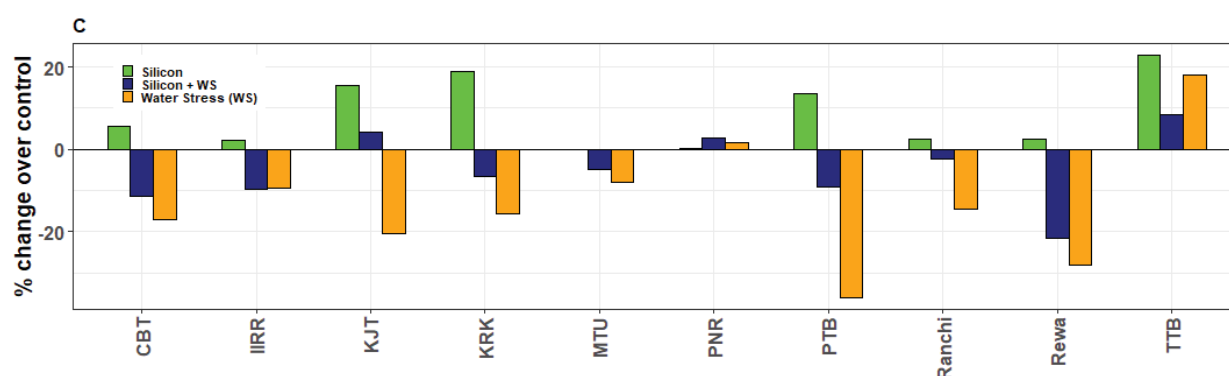


Fig 6.1.8 Percentage change in grain yield with respect to control. Each value represents mean of all varieties.

Si application noted non-significant effect on harvest index (HI) and the interaction between Location x Silicon was significant (Table 6.1.17). Further, significant variation was noted among the varieties and interaction between Location x Variety and Location x Silicon x Variety was significant. However, interaction between Silicon x Variety was non-significant. Seven of the eight varieties (Fig 6.1.9 A) noted better mean HI over control (T1) by Si application (T2). Similarly, in T3 and T4, mean HI was better than control in two varieties each and in other varieties, it was lower than control. Hence, among the treatments, mean HI across varieties and locations was above control in only T2 (Fig 6.1.9 B). The mean HI across the locations was highest for 27P63 and least for US-314 varieties in T2. In terms of location, the mean HI across the varieties was marginally similar or above control in most of the locations

(Fig 6.1.10) in T2. It was similar or lower than control in six locations of T3 and seven locations in T4.

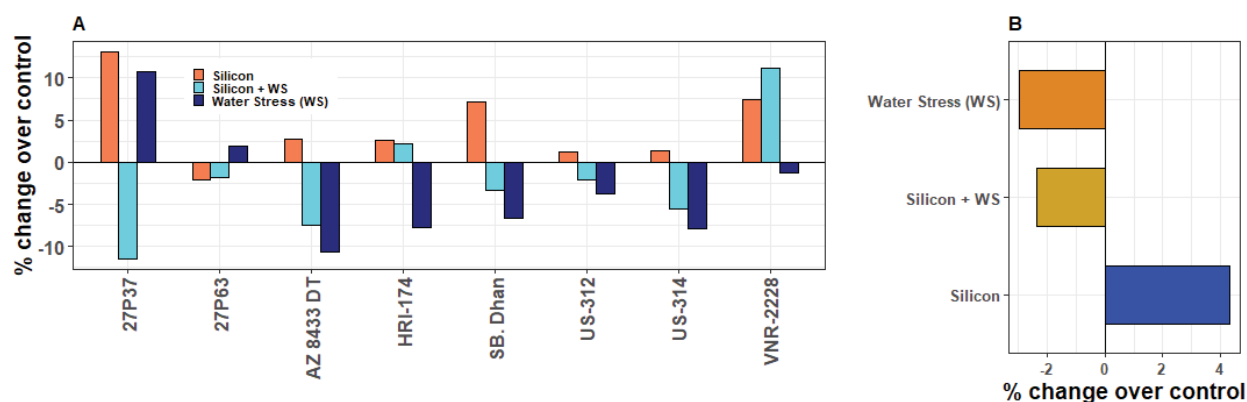


Fig 6.1.9 Percentage change in harvest index with respect to control. (A) Mean of all locations (B) Mean of all varieties and locations.

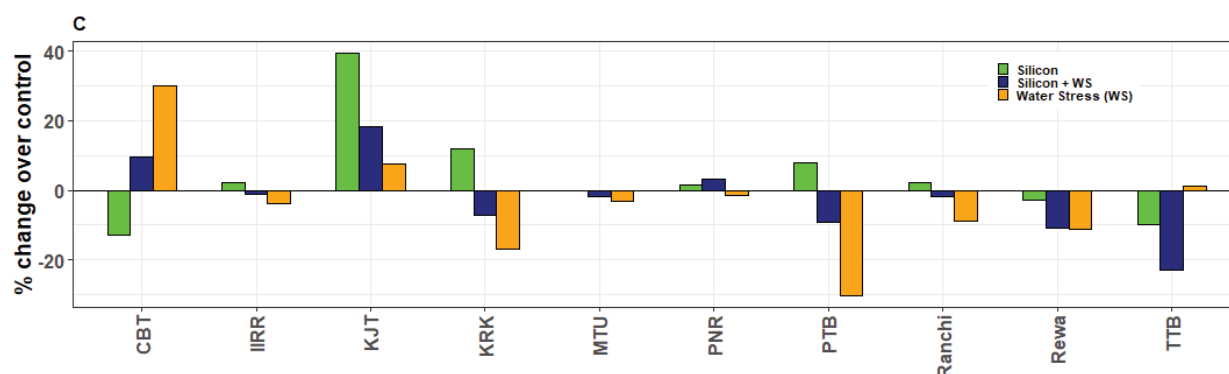


Fig 6.1.10 Percentage change in harvest index with respect to control. Each value represents mean of all varieties.

Summary and conclusions:

- Considering the ability of applied silicon in imparting tolerance, eight entries were tested for physiological parameters at 10 locations with four treatments- control (T1), 0.08% ortho silicic acid (T2), 0.08% ortho silicic acid + water stress (T3) and water stress (T4).
- Silicon application (T2) was significant for eight parameters (plant height, tiller number, panicle number, panicle weight, grain number per panicle, spikelet number per panicle, thousand grain weight and grain yield) and lead to increased grain yield than T1.

- Silicon application increased the grain yield by 6.5% over control. Water stress reduced the grain yield by 13% over control while inclusion of silicon under water stress has ameliorated the negative effect of the water stress and improved the grain yield by 7% over water stress alone.
- The interaction between Location x Silicon, Location x Variety and Location x Silicon x Variety was found significant for all the seventeen parameters. While the interaction between Silicon x Variety was significant for only grain number/m².
- Most of the measured parameters were better in T3 across most of the varieties and locations which indicates that the inclusion of silicon in T3 can reduce the negative impact of water stress (T4) on rice crop.

Table: 6.1.1 Influence of Silica Application on days to flowering at different locations in Kharif 2024

Treat	S.No.	Genotypes	Location									Grand Mean
			CBT	KJT	KRK	MTU	PNR	PTB	Ranchi	Rewa	TTB	
T1 (Control)	1	27P37	76	94	86	88	96	94	116	94	85	92
	2	27P63	78	95	94	95	109	103	112	86	89	96
	3	AZ 8433 DT	93	94	96	94	105	103	111	89	92	97
	4	HRI-174	88	95	81	96	108	104	114	86	89	96
	5	SB. Dhan	89	94	74	82	90	81	111	86	77	87
	6	US-312	88	93	91	86	94	91	114	87	85	92
	7	US-314	79	83	94	89	92	82	112	90	82	89
	8	VNR-2228	68	91	89	88	101	90	110	90	88	91
		T1 Mean	82	92	88	90	99	94	113	88	86	92
T2 (0.08% Ortho silicic acid)	1	27P37	75	93	89	87	95	91	119	93	85	92
	2	27P63	77	97	91	98	109	102	112	87	89	96
	3	AZ 8433 DT	90	93	96	93	105	94	112	93	93	96
	4	HRI-174	88	96	81	95	108	101	112	87	89	95
	5	SB. Dhan	91	93	71	83	91	79	112	87	77	87
	6	US-312	88	93	89	87	96	92	110	88	85	92
	7	US-314	77	85	91	88	91	82	111	89	82	88
	8	VNR-2228	69	91	86	86	102	92	112	90	87	91
		T2 Mean	82	93	87	90	100	92	112	89	86	92
T3 (Silicon + Water stress)	1	27P37	75	94	86	89	94	94	119	93	96	93
	2	27P63	73	95	96	97	110	100	112	87	101	97
	3	AZ 8433 DT	91	98	94	95	106	99	112	92	99	98
	4	HRI-174	88	97	81	95	108	97	112	86	99	96
	5	SB. Dhan	91	93	71	83	90	70	111	86	88	87
	6	US-312	88	92	89	87	95	90	111	88	96	93
	7	US-314	78	83	94	88	93	85	111	90	95	91
	8	VNR-2228	69	92	84	89	102	92	112	90	93	91
		T3 Mean	82	93	87	90	100	91	113	89	96	93
T4 (Water stress)	1	27P37	72	94	86	88	95	96	119	94	96	93
	2	27P63	73	94	96	96	111	105	113	86	102	97
	3	AZ 8433 DT	93	95	94	93	107	100	110	95	99	98
	4	HRI-174	88	97	81	97	109	101	110	86	99	97
	5	SB. Dhan	92	94	71	82	91	68	112	87	88	87
	6	US-312	79	92	91	86	95	94	113	87	96	93
	7	US-314	78	84	94	87	93	86	112	89	91	90
	8	VNR-2228	69	91	86	88	102	93	111	89	93	92
		T4 Mean	81	93	87	90	100	93	113	89	95	93
		Grand Mean	82	93	87	90	100	92	113	89	91	93
		LSD (Silicon)	ns				LSD (Silicon x Variety)					ns
		LSD (Location x Silicon)	1.14**				LSD (Location x Silicon x Variety)					3.16**
		LSD (Variety)	0.52**				CV(Silicon) %					1.55
		LSD (Location x Variety)	1.58**				CV (Residual) %					1.61

Table: 6.1.2 Influence of Silica Application on days to maturity at different locations in *Kharif* 2024

Treat	S.No.	Genotypes	Location									Grand Mean
			CBT	KJT	KRK	MTU	PNR	PTB	Ranchi	Rewa	TTB	
T1 (Control)	1	27P37	103	122	119	117	131	133	151	128	118	125
	2	27P63	114	125	119	125	135	132	148	117	122	126
	3	AZ 8433 DT	114	123	119	123	138	134	147	119	125	127
	4	HRI-174	114	123	119	125	137	135	149	119	122	127
	5	SB. Dhan	114	123	103	115	122	118	147	117	110	119
	6	US-312	114	120	119	117	129	125	150	120	118	124
	7	US-314	125	112	119	120	127	119	147	121	115	123
	8	VNR-2228	103	120	119	116	134	119	147	122	121	122
		T1 Mean	113	121	117	120	132	127	148	120	119	124
T2 (0.08% Ortho silicic acid)	1	27P37	103	121	119	116	130	130	154	128	118	124
	2	27P63	114	126	119	126	136	131	148	119	122	127
	3	AZ 8433 DT	114	122	119	121	138	131	146	129	126	127
	4	HRI-174	114	125	119	127	137	131	147	120	122	127
	5	SB. Dhan	114	123	103	114	123	125	148	119	110	120
	6	US-312	114	122	119	118	131	125	146	120	118	124
	7	US-314	125	115	119	118	126	125	147	119	115	123
	8	VNR-2228	103	120	119	115	135	125	147	119	120	123
		T2 Mean	113	122	117	120	132	128	148	122	119	124
T3 (Silicon + Water stress)	1	27P37	103	123	119	118	129	139	154	129	129	127
	2	27P63	114	123	119	125	137	139	147	117	134	128
	3	AZ 8433 DT	114	126	119	123	139	139	148	126	132	129
	4	HRI-174	114	125	119	127	137	139	147	117	132	129
	5	SB. Dhan	114	121	103	114	122	122	147	115	121	120
	6	US-312	114	121	119	117	130	139	147	119	129	126
	7	US-314	125	111	119	118	128	122	147	118	128	124
	8	VNR-2228	103	121	119	117	135	127	147	120	126	124
		T3 Mean	113	122	117	120	132	133	148	120	129	126
T4 (Water stress)	1	27P37	103	124	119	118	130	139	154	127	129	127
	2	27P63	114	124	119	125	138	139	148	116	135	128
	3	AZ 8433 DT	114	125	119	123	140	139	146	126	132	129
	4	HRI-174	114	127	119	126	138	139	146	120	132	129
	5	SB. Dhan	114	121	103	113	123	122	147	116	121	120
	6	US-312	114	119	119	118	130	132	148	119	129	125
	7	US-314	125	113	119	117	128	122	148	119	124	124
	8	VNR-2228	103	120	119	117	135	127	147	120	126	124
		T4 Mean	113	122	117	120	133	132	148	120	128	126
		Grand Mean	113	122	117	120	132	130	148	121	124	125
		LSD (Silicon)			ns		LSD (Silicon x Variety)				ns	
		LSD (Location x Silicon)			0.99**		LSD (Location x Silicon x Variety)				2.38**	
		LSD (Variety)			0.39**		CV(Silicon) %				1.03	
		LSD (Location x Variety)			1.19**		CV (Residual) %				0.9	

Table: 6.1.3 Influence of Silica Application on Leaf area index at tillering at different locations in Kharif 2024

Treat	S.No.	Genotypes	Location							Grand Mean
			CBT	IIRR	KJT	KRK	PNR	PTB	Rewa	
T1 (Control)	1	27P37	4.44	2.69	2.63	1.21	1.72	1.23	5.38	2.76
	2	27P63	3.85	2.40	3.56	1.22	1.54	1.80	5.97	2.91
	3	AZ 8433 DT	4.77	2.92	3.59	1.14	1.70	1.58	5.98	3.10
	4	HRI-174	4.47	3.08	4.06	1.25	1.72	1.46	4.85	2.99
	5	SB. Dhan	2.66	3.30	2.64	1.29	1.22	1.70	5.80	2.66
	6	US-312	4.17	3.00	3.82	1.54	1.93	2.15	5.08	3.10
	7	US-314	3.35	4.22	2.91	1.66	1.87	2.01	6.07	3.16
	8	VNR-2228	4.33	3.59	2.78	0.83	1.48	1.95	5.03	2.86
		T1 Mean	4.01	3.15	3.25	1.27	1.65	1.73	5.52	2.94
T2 (0.08% Ortho silicic acid)	1	27P37	4.57	3.10	3.42	1.26	1.89	1.37	5.22	2.98
	2	27P63	4.19	3.43	4.21	1.12	1.73	1.80	6.09	3.22
	3	AZ 8433 DT	4.84	3.29	4.53	1.78	1.73	1.48	5.10	3.25
	4	HRI-174	4.70	3.45	3.73	1.16	2.29	1.85	6.25	3.35
	5	SB. Dhan	2.72	3.28	3.55	1.52	1.90	1.94	5.43	2.91
	6	US-312	4.35	3.82	3.51	1.38	2.40	2.39	5.83	3.38
	7	US-314	3.53	4.00	3.55	1.19	1.29	2.72	6.82	3.30
	8	VNR-2228	4.47	2.77	4.11	1.22	1.68	2.42	5.24	3.13
		T2 Mean	4.17	3.39	3.83	1.33	1.86	2.00	5.75	3.19
T3 (Silicon + Water stress)	1	27P37	3.15	3.55	3.60	0.89	1.91	2.80	5.03	2.99
	2	27P63	2.75	3.39	3.73	1.06	1.57	3.36	5.42	3.04
	3	AZ 8433 DT	3.60	3.12	2.67	1.39	2.05	2.42	5.15	2.91
	4	HRI-174	3.34	3.08	2.52	0.67	1.52	4.12	5.65	2.99
	5	SB. Dhan	2.17	2.36	3.59	1.24	1.63	3.79	5.84	2.95
	6	US-312	3.14	3.34	2.87	1.60	1.79	3.39	5.33	3.07
	7	US-314	2.77	2.99	2.78	1.23	1.69	2.33	5.14	2.71
	8	VNR-2228	3.78	3.05	3.78	1.49	1.88	2.59	5.25	3.12
		T3 Mean	3.09	3.11	3.19	1.20	1.76	3.10	5.35	2.97
T4 (Water stress)	1	27P37	2.67	3.86	3.00	0.80	1.93	2.01	4.30	2.65
	2	27P63	2.60	3.59	2.84	0.74	1.82	2.49	4.92	2.72
	3	AZ 8433 DT	3.32	3.37	2.67	1.08	2.27	2.35	5.69	2.97
	4	HRI-174	3.13	3.03	2.89	0.71	1.83	1.98	5.00	2.65
	5	SB. Dhan	2.01	2.72	3.03	0.67	1.91	1.92	4.94	2.46
	6	US-312	2.72	3.92	3.10	0.79	2.01	2.76	4.80	2.87
	7	US-314	2.55	3.57	2.78	0.94	2.12	2.76	5.14	2.84
	8	VNR-2228	3.40	3.14	2.66	0.71	1.79	2.53	4.72	2.71
		T4 Mean	2.80	3.40	2.87	0.81	1.96	2.35	4.94	2.73
		Grand Mean	3.52	3.26	3.28	1.15	1.81	2.30	5.39	2.96
		LSD (Silicon)			ns	LSD (Silicon x Variety)				ns
		LSD (Location x Silicon)			0.38**	LSD (Location x Silicon x Variety)				0.73**
		LSD (Variety)			ns	CV(Silicon) %				16.9
		LSD (Location x Variety)			0.36**	CV (Residual) %				11.79

Table: 6.1.4 Influence of Silica Application on Leaf area index at panicle initiation at different locations *Kharif 2024*

Treat	S.No.	Genotypes	Location						Grand Mean
			CBT	KJT	KRK	PNR	PTB	Rewa	
T1 (Control)	1	27P37	4.93	3.03	1.90	3.32	2.29	4.56	3.34
	2	27P63	4.42	4.02	2.43	4.89	2.50	5.20	3.91
	3	AZ 8433 DT	5.43	4.56	1.63	3.53	3.34	5.21	3.95
	4	HRI-174	5.38	4.36	2.77	2.73	3.86	4.13	3.87
	5	SB. Dhan	3.65	2.94	2.37	2.21	3.71	4.98	3.31
	6	US-312	5.12	4.59	1.99	4.09	3.82	4.43	4.01
	7	US-314	4.74	3.41	2.17	4.38	2.81	5.45	3.83
	8	VNR-2228	5.17	3.51	2.04	2.89	2.68	4.18	3.41
		T1 Mean	4.86	3.80	2.16	3.50	3.13	4.77	3.70
T2 (0.08% Ortho silicic acid)	1	27P37	5.50	4.52	2.23	4.09	3.13	4.40	3.98
	2	27P63	4.88	5.24	3.32	4.57	4.09	5.34	4.57
	3	AZ 8433 DT	5.77	5.39	2.25	4.14	4.40	4.32	4.38
	4	HRI-174	5.86	5.06	3.18	3.26	4.17	5.55	4.51
	5	SB. Dhan	4.06	4.41	2.19	2.39	3.32	4.61	3.50
	6	US-312	5.43	4.48	2.73	3.32	4.39	5.17	4.25
	7	US-314	5.05	4.29	2.48	4.06	2.94	6.19	4.17
	8	VNR-2228	5.50	4.95	2.38	3.16	2.85	4.35	3.86
		T2 Mean	5.25	4.79	2.59	3.63	3.66	4.99	4.15
T3 (Silicon + Water stress)	1	27P37	3.65	4.43	1.84	4.17	3.68	4.25	3.67
	2	27P63	4.10	5.03	1.79	4.55	3.90	4.69	4.01
	3	AZ 8433 DT	3.50	3.80	2.21	4.50	3.61	4.36	3.66
	4	HRI-174	4.01	3.66	2.40	2.81	3.98	4.97	3.64
	5	SB. Dhan	3.15	3.49	1.64	2.20	3.13	5.05	3.11
	6	US-312	4.18	3.80	1.43	4.22	3.28	4.64	3.59
	7	US-314	4.37	3.38	1.40	2.99	1.95	4.48	3.09
	8	VNR-2228	4.64	4.75	1.87	3.21	3.37	4.35	3.70
		T3 Mean	3.95	4.04	1.82	3.58	3.36	4.60	3.56
T4 (Water stress)	1	27P37	3.29	3.87	2.66	4.27	2.44	3.52	3.34
	2	27P63	3.84	3.67	1.85	4.19	2.89	4.17	3.43
	3	AZ 8433 DT	3.13	3.17	2.55	4.50	1.95	4.94	3.37
	4	HRI-174	3.71	3.72	2.46	2.72	3.22	4.27	3.35
	5	SB. Dhan	2.97	3.89	1.45	2.39	3.12	4.17	3.00
	6	US-312	3.55	4.00	2.24	4.24	3.50	4.10	3.60
	7	US-314	4.08	4.45	2.41	2.99	2.44	4.49	3.48
	8	VNR-2228	4.37	3.43	2.06	3.41	2.09	3.86	3.20
		T4 Mean	3.62	3.77	2.21	3.59	2.71	4.19	3.35
		Grand Mean	4.42	4.10	2.20	3.57	3.21	4.64	3.69
	LSD (Silicon)			0.12**	LSD (Silicon x Variety)				ns
	LSD (Location x Silicon)			0.31**	LSD (Location x Silicon x Variety)				0.89**
	LSD (Variety)			ns	CV(Silicon) %				10.88
	LSD (Location x Variety)			0.44**	CV (Residual) %				11.48

Table: 6.1.5 Influence of Silica Application on Leaf area index at flowering at different locations in *Kharif* 2024

Treat	S.No.	Genotypes	Location							Grand Mean
			CBT	IIRR	KJT	KRK	PNR	PTB	Rewa	
T1 (Control)	1	27P37	5.52	4.48	3.36	3.78	4.43	2.76	4.80	4.16
	2	27P63	4.97	5.15	4.39	3.18	5.45	4.68	5.49	4.76
	3	AZ 8433 DT	5.70	5.11	4.66	2.80	4.50	4.32	5.49	4.65
	4	HRI-174	6.01	7.46	4.46	3.80	5.40	4.07	4.47	5.10
	5	SB. Dhan	4.12	3.85	3.41	2.68	3.28	4.29	5.24	3.84
	6	US-312	5.46	5.03	4.69	3.09	4.31	4.66	4.81	4.58
	7	US-314	5.17	4.22	3.51	3.89	4.68	5.97	5.87	4.76
	8	VNR-2228	5.64	5.50	3.65	3.37	4.36	4.08	4.36	4.42
		T1 Mean	5.32	5.10	4.02	3.32	4.55	4.35	5.07	4.53
T2 (0.08% Ortho silicic acid)	1	27P37	5.74	3.70	4.72	4.51	4.33	3.73	4.64	4.48
	2	27P63	5.23	5.41	5.68	3.99	5.39	5.02	5.63	5.19
	3	AZ 8433 DT	5.86	4.82	5.36	4.24	5.19	5.48	4.60	5.08
	4	HRI-174	6.23	4.92	5.19	4.09	4.24	4.87	5.89	5.06
	5	SB. Dhan	4.28	2.51	4.88	3.46	3.35	4.58	4.87	3.99
	6	US-312	5.64	5.21	4.08	5.06	3.68	4.08	5.55	4.76
	7	US-314	5.37	4.50	5.12	4.28	4.35	4.21	6.61	4.92
	8	VNR-2228	5.80	4.65	5.55	4.33	4.63	3.22	4.53	4.67
		T2 Mean	5.52	4.46	5.07	4.24	4.40	4.40	5.29	4.77
T3 (Silicon + Water stress)	1	27P37	4.72	5.31	4.70	3.42	4.68	3.44	4.49	4.39
	2	27P63	4.08	6.22	4.56	3.33	6.59	4.36	4.98	4.87
	3	AZ 8433 DT	4.08	5.50	3.93	3.58	6.49	4.34	4.64	4.65
	4	HRI-174	4.22	4.90	3.52	3.21	5.73	4.28	5.31	4.45
	5	SB. Dhan	3.67	3.60	4.05	2.57	3.59	4.60	5.31	3.91
	6	US-312	4.32	5.06	3.97	3.72	4.43	4.61	5.02	4.45
	7	US-314	4.41	5.29	3.31	3.14	3.53	3.48	4.90	4.01
	8	VNR-2228	4.42	4.94	5.21	3.52	4.54	3.99	4.53	4.45
		T3 Mean	4.24	5.10	4.16	3.31	4.95	4.14	4.90	4.40
T4 (Water stress)	1	27P37	3.26	4.40	3.74	3.24	4.73	3.14	3.76	3.75
	2	27P63	3.84	7.86	3.54	3.07	4.58	4.76	4.47	4.59
	3	AZ 8433 DT	3.21	5.24	3.50	2.79	5.51	2.98	5.22	4.06
	4	HRI-174	3.73	5.60	3.42	3.17	5.53	3.48	4.62	4.22
	5	SB. Dhan	3.17	4.66	4.19	1.98	2.47	4.82	4.43	3.68
	6	US-312	3.91	4.96	3.64	2.85	5.00	4.05	4.49	4.13
	7	US-314	3.84	5.03	3.68	2.96	3.28	4.10	4.83	3.96
	8	VNR-2228	4.14	4.58	2.86	2.89	4.36	2.70	4.07	3.66
		T4 Mean	3.64	5.29	3.57	2.87	4.43	3.75	4.49	4.01
		Grand Mean	4.68	4.99	4.20	3.44	4.58	4.16	4.93	4.43
		LSD (Silicon)			0.14*	LSD (Silicon x Variety)				ns
		LSD (Location x Silicon)			0.50**	LSD (Location x Silicon x Variety)				1.23**
		LSD (Variety)			0.23**	CV(Silicon) %				14.55
		LSD (Location x Variety)			0.61**	CV (Residual) %				13.17

Table: 6.1.6 Influence of Silica Application on Plant height (cm) at flowering at different locations in *Kharif* 2024

Treat	S.No.	Genotypes	Location										Grand Mean
			CBT	IIRR	KJT	KRK	MTU	PNR	PTB	Ranchi	Rewa	TTB	
T1 (Control)	1	27P37	96	112	116	109	134	121	111	57	113	129	110
	2	27P63	96	111	114	106	137	111	111	57	115	119	108
	3	AZ 8433 DT	98	110	115	106	144	106	111	58	135	124	111
	4	HRI-174	100	110	117	101	140	106	108	61	124	127	109
	5	SB. Dhan	96	106	122	105	142	106	113	73	114	114	109
	6	US-312	96	109	117	116	129	110	113	79	123	131	112
	7	US-314	96	102	116	115	133	108	109	73	115	129	110
	8	VNR-2228	103	110	118	110	126	112	104	72	129	129	111
		T1 Mean	98	109	117	109	136	110	110	66	121	125	110
T2 (0.08% Ortho silicic acid)	1	27P37	98	107	113	106	137	106	111	58	122	132	109
	2	27P63	98	103	113	114	136	127	117	54	117	126	111
	3	AZ 8433 DT	100	111	116	110	141	113	110	60	144	125	113
	4	HRI-174	104	109	115	105	139	110	111	60	116	130	110
	5	SB. Dhan	103	101	117	103	145	105	108	70	120	117	109
	6	US-312	96	109	112	115	131	114	115	73	128	132	113
	7	US-314	98	105	115	111	136	108	111	71	136	128	112
	8	VNR-2228	106	110	121	105	123	108	110	68	131	132	111
		T2 Mean	100	107	115	109	136	111	112	64	127	128	111
T3 (Silicon + Water stress)	1	27P37	89	114	115	106	136	115	97	56	110	115	105
	2	27P63	88	115	117	112	136	121	96	49	105	111	105
	3	AZ 8433 DT	95	119	111	107	141	106	107	55	131	116	109
	4	HRI-174	98	114	115	100	144	109	109	58	117	117	108
	5	SB. Dhan	94	95	115	110	145	107	113	71	108	110	107
	6	US-312	94	111	115	108	129	107	107	76	114	113	107
	7	US-314	94	105	121	110	132	109	107	72	114	110	107
	8	VNR-2228	101	119	120	103	126	114	109	72	124	117	110
		T3 Mean	94	112	116	107	136	111	105	64	115	114	107
T4 (Water stress)	1	27P37	86	110	115	108	134	114	94	54	108	117	104
	2	27P63	86	110	113	108	138	111	96	52	103	113	103
	3	AZ 8433 DT	89	112	120	109	146	109	107	51	128	117	109
	4	HRI-174	92	113	114	100	143	109	102	52	113	119	106
	5	SB. Dhan	93	103	119	107	142	106	110	67	113	112	107
	6	US-312	92	106	115	113	133	106	98	64	113	119	106
	7	US-314	92	102	118	112	133	110	106	64	103	115	105
	8	VNR-2228	99	108	122	107	127	111	108	64	119	121	109
		T4 Mean	91	108	117	108	137	109	103	58	113	117	106
		Grand Mean	96	109	116	108	136	110	107	63	119	121	109
		LSD (Silicon)				1.09**		LSD (Silicon x Variety)					ns
		LSD (Location x Silicon)				3.45**		LSD (Location x Silicon x Variety)					7.70**
		LSD (Variety)				ns		CV(Silicon) %					4.14
		LSD (Location x Variety)				3.85**		CV (Residual) %					3.36

Table: 6.1.7 Influence of Silica Application on Tiller number/m² at flowering at different locations in *Kharif* 2024

Treat	S.No.	Genotypes	Location										Grand Mean
			CBT	IIRR	KJT	KRK	MTU	PNR	PTB	Ranchi	Rewa	TTB	
T1 (Control)	1	27P37	550	325	420	250	374	333	410	148	339	200	335
	2	27P63	683	292	375	258	407	367	470	145	359	222	358
	3	AZ 8433 DT	700	308	405	242	407	450	370	146	326	207	356
	4	HRI-174	567	367	360	267	407	500	523	148	340	219	370
	5	SB. Dhan	617	317	330	233	407	367	420	153	340	236	342
	6	US-312	583	383	354	300	396	367	547	160	345	233	367
	7	US-314	617	358	345	267	396	350	470	157	346	209	351
	8	VNR-2228	583	350	426	233	429	417	553	158	323	227	370
		T1 Mean	613	338	377	256	403	394	470	152	340	219	356
T2 (0.08% Ortho silicic acid)	1	27P37	600	292	480	342	396	333	447	146	341	236	361
	2	27P63	683	350	435	300	396	383	476	146	355	240	376
	3	AZ 8433 DT	717	283	450	317	396	433	513	145	333	231	382
	4	HRI-174	617	300	438	333	429	450	470	149	346	240	377
	5	SB. Dhan	633	267	375	275	418	367	513	160	323	251	358
	6	US-312	617	333	375	325	385	317	540	161	359	252	366
	7	US-314	667	392	390	300	396	417	460	160	339	212	373
	8	VNR-2228	633	325	420	300	418	383	507	156	334	231	371
		T2 Mean	646	318	420	311	404	385	491	153	341	236	371
T3 (Silicon + Water stress)	1	27P37	483	333	441	250	385	350	420	147	310	204	332
	2	27P63	567	283	414	275	407	333	470	149	323	201	342
	3	AZ 8433 DT	633	325	471	308	385	500	383	144	273	192	362
	4	HRI-174	500	300	396	242	407	500	443	143	321	191	344
	5	SB. Dhan	550	350	309	200	407	417	447	159	290	182	331
	6	US-312	500	392	447	333	385	367	473	159	340	197	359
	7	US-314	467	383	390	275	385	383	438	158	310	216	341
	8	VNR-2228	533	375	423	267	418	367	493	158	306	206	355
		T3 Mean	529	343	411	269	397	402	446	152	309	198	346
T4 (Water stress)	1	27P37	467	350	426	217	363	300	368	140	297	177	310
	2	27P63	533	425	369	250	407	350	400	139	261	206	334
	3	AZ 8433 DT	500	283	336	183	385	467	347	139	251	203	309
	4	HRI-174	500	342	366	183	396	500	343	137	281	225	327
	5	SB. Dhan	533	375	348	167	396	350	483	145	256	242	330
	6	US-312	483	350	318	225	385	400	445	148	290	207	325
	7	US-314	400	383	303	217	385	367	423	148	223	204	305
	8	VNR-2228	500	383	387	200	407	367	460	148	247	206	330
		T4 Mean	490	361	357	205	391	388	409	143	263	209	321
		Grand Mean	569	340	391	260	399	392	454	150	313	216	348
		LSD (Silicon)				9.14*		LSD (Silicon x Variety)					ns
		LSD (Location x Silicon)				28.92		LSD (Location x Silicon x Variety)					75.53*
		LSD (Variety)				ns		CV(Silicon) %					10.81
		LSD (Location x Variety)				37.76		CV (Residual) %					10.27

Table: 6.1.8 Influence of Silica Application on Shoot weight (g/m²) at different locations in *Kharif* 2024

Treat	S.No.	Genotypes	Location										Grand Mean
			CBT	IIRR	KJT	KRK	MTU	PNR	PTB	Ranchi	Rewa	TTB	
T1 (Control)	1	27P37	758	718	649	507	745	944	1252	536	440	377	693
	2	27P63	853	742	847	679	755	888	1221	532	481	388	739
	3	AZ 8433 DT	460	796	595	496	848	1156	1057	530	728	540	721
	4	HRI-174	1208	740	777	587	821	991	1272	539	534	441	791
	5	SB. Dhan	1140	533	588	384	866	778	923	580	588	399	678
	6	US-312	1124	757	630	521	824	875	1285	578	558	469	762
	7	US-314	662	584	532	431	737	914	960	575	785	629	681
	8	VNR-2228	986	621	665	476	769	1136	1083	576	538	420	727
		T1 Mean	899	686	660	510	795	960	1132	556	582	458	724
T2 (0.08% Ortho silicic acid)	1	27P37	816	790	378	583	729	865	1233	529	517	687	713
	2	27P63	962	757	567	705	744	1042	1194	538	537	777	782
	3	AZ 8433 DT	1582	721	665	641	847	1165	1194	540	727	527	861
	4	HRI-174	1273	721	553	503	834	1119	1239	540	622	625	803
	5	SB. Dhan	1165	582	259	466	854	791	937	576	601	653	688
	6	US-312	1235	669	616	575	841	1164	1240	583	615	557	810
	7	US-314	864	566	693	464	769	1119	961	580	841	601	746
	8	VNR-2228	1072	599	644	442	758	834	1311	577	680	897	781
		T2 Mean	1121	676	547	547	797	1012	1164	558	643	665	773
T3 (Silicon + Water stress)	1	27P37	655	689	728	726	706	793	1073	529	435	769	710
	2	27P63	759	753	679	662	725	1141	1193	538	444	832	773
	3	AZ 8433 DT	987	631	700	726	809	1014	1179	535	652	681	791
	4	HRI-174	744	713	567	641	838	1166	1034	526	568	787	758
	5	SB. Dhan	683	574	357	455	844	875	963	575	566	792	668
	6	US-312	812	716	532	711	826	933	1368	579	517	672	767
	7	US-314	610	536	609	646	751	1121	1289	576	768	629	753
	8	VNR-2228	727	585	560	440	712	908	1204	584	459	587	677
		T3 Mean	747	650	592	626	776	994	1163	555	551	719	737
T4 (Water stress)	1	27P37	594	668	406	623	737	1046	1123	520	420	695	683
	2	27P63	689	772	357	727	714	1041	1170	527	376	566	694
	3	AZ 8433 DT	853	809	406	693	801	843	1023	519	529	710	719
	4	HRI-174	645	793	385	495	832	1270	1100	518	461	702	720
	5	SB. Dhan	577	532	560	478	809	1101	885	540	550	458	649
	6	US-312	643	671	392	832	839	879	967	543	472	489	673
	7	US-314	558	582	427	646	734	1195	822	542	765	490	676
	8	VNR-2228	586	614	637	661	724	811	1165	548	418	576	674
		T4 Mean	643	680	446	644	774	1023	1032	532	499	586	686
		Grand Mean	853	673	561	582	786	997	1123	550	569	607	730
		LSD (Silicon)				ns		LSD (Silicon x Variety)					ns
		LSD (Location x Silicon)				102.06**		LSD (Location x Silicon x Variety)					222.28**
		LSD (Variety)				26.7*		CV(Silicon) %					18.2
		LSD (Location x Variety)				111.14**		CV (Residual) %					14.42

Table: 6.1.9 Influence of Silica Application on Panicle number/m² at different locations in *Kharif* 2024

Treat	S.No.	Genotypes	Location										Grand Mean
			CBT	IIRR	KJT	KRK	MTU	PNR	PTB	Ranchi	Rewa	TTB	
T1 (Control)	1	27P37	683	377	150	200	374	283	381	206	334	140	313
	2	27P63	683	353	127	267	407	283	406	210	358	167	326
	3	AZ 8433 DT	600	370	144	250	396	417	285	209	320	189	318
	4	HRI-174	567	443	144	233	440	450	463	207	319	171	344
	5	SB. Dhan	717	383	136	217	418	300	406	222	338	161	330
	6	US-312	583	443	159	258	429	317	410	219	327	176	332
	7	US-314	550	367	147	258	407	333	428	217	337	159	320
	8	VNR-2228	533	373	143	233	418	350	462	217	322	185	324
		T1 Mean	615	389	144	240	411	342	405	213	332	168	326
T2 (0.08% Ortho silicic acid)	1	27P37	800	333	147	267	374	317	433	209	340	186	341
	2	27P63	783	387	145	250	407	333	392	207	334	180	342
	3	AZ 8433 DT	650	403	181	267	385	367	456	211	327	219	347
	4	HRI-174	683	377	134	233	418	400	449	209	342	183	343
	5	SB. Dhan	817	323	136	333	418	333	481	221	325	170	356
	6	US-312	617	410	149	300	407	283	501	224	359	165	342
	7	US-314	583	343	143	275	407	333	418	221	340	164	323
	8	VNR-2228	617	340	137	242	418	300	425	217	336	159	319
		T2 Mean	694	365	147	271	404	333	444	215	338	178	339
T3 (Silicon + Water stress)	1	27P37	567	303	140	225	374	300	397	210	303	152	297
	2	27P63	600	327	133	258	385	317	367	208	312	162	307
	3	AZ 8433 DT	467	313	130	167	385	400	317	206	251	180	282
	4	HRI-174	550	407	138	258	418	450	408	208	291	140	327
	5	SB. Dhan	558	377	135	225	407	367	411	215	263	129	309
	6	US-312	467	413	141	242	385	333	432	219	335	146	311
	7	US-314	467	297	146	267	396	367	370	222	284	194	301
	8	VNR-2228	467	283	149	192	407	350	414	217	296	171	295
		T3 Mean	518	340	139	229	395	360	389	213	292	159	303
T4 (Water stress)	1	27P37	517	290	105	217	352	283	349	188	259	161	272
	2	27P63	500	407	122	175	374	333	340	188	250	179	287
	3	AZ 8433 DT	450	350	132	225	385	417	297	190	238	186	287
	4	HRI-174	467	443	137	217	407	450	316	191	262	171	306
	5	SB. Dhan	467	370	142	208	396	283	337	197	232	164	280
	6	US-312	400	407	129	200	374	383	352	201	281	155	288
	7	US-314	417	353	131	258	374	333	393	198	213	161	283
	8	VNR-2228	467	350	98	267	407	333	356	202	226	188	289
		T4 Mean	460	371	125	221	384	352	342	194	245	170	286
		Grand Mean	572	366	138	240	398	347	395	209	302	169	314
		LSD (Silicon)				10.03**		LSD (Silicon x Variety)					ns
		LSD (Location x Silicon)				31.73**		LSD (Location x Silicon x Variety)					61.50**
		LSD (Variety)				ns		CV(Silicon) %					13.17
		LSD (Location x Variety)				30.75**		CV (Residual) %					9.29

Table: 6.1.10 Influence of Silica Application on Panicle weight (g/m²) at maturity at different locations in *Kharif* 2024

Treat	S.No.	Genotypes	Location										Grand Mean
			CBT	IIRR	KJT	KRK	MTU	PNR	PTB	Ranchi	Rewa	TTB	
T1 (Control)	1	27P37	1449	1434	646	745	553	968	590	521	862	419	819
	2	27P63	1423	1232	847	666	569	665	563	531	833	427	776
	3	AZ 8433 DT	1033	1471	595	654	621	757	757	528	833	464	771
	4	HRI-174	1891	1365	777	662	626	813	580	526	864	386	849
	5	SB. Dhan	1333	1289	588	572	651	664	667	545	916	452	768
	6	US-312	1691	1397	630	596	630	879	667	544	936	465	844
	7	US-314	1844	1002	532	749	559	737	723	544	886	490	807
	8	VNR-2228	2001	1303	665	618	580	991	723	543	904	464	879
		T1 Mean	1583	1312	660	658	598	809	659	535	879	446	814
T2 (0.08% Ortho silicic acid)	1	27P37	1643	1445	371	759	527	973	627	532	877	585	834
	2	27P63	1611	1064	560	670	549	541	617	528	873	558	757
	3	AZ 8433 DT	1364	1500	609	673	610	750	763	530	867	503	817
	4	HRI-174	2053	1384	728	618	629	754	660	527	906	589	885
	5	SB. Dhan	1537	1086	574	684	665	684	713	547	900	565	796
	6	US-312	1957	1509	546	731	645	850	750	549	938	528	900
	7	US-314	2077	1084	728	731	580	566	840	544	901	550	860
	8	VNR-2228	2121	1412	553	547	576	777	780	539	918	591	881
		T2 Mean	1796	1310	584	677	598	737	719	537	897	558	841
T3 (Silicon + Water stress)	1	27P37	1209	1196	378	561	520	961	509	527	716	562	714
	2	27P63	995	1139	567	644	528	681	643	521	673	607	700
	3	AZ 8433 DT	744	1090	665	507	583	827	756	520	810	611	711
	4	HRI-174	1064	1200	553	575	599	775	511	519	727	574	710
	5	SB. Dhan	1126	1239	259	433	632	624	484	542	708	519	657
	6	US-312	1261	1383	616	578	605	737	718	541	792	600	783
	7	US-314	1579	901	693	603	556	654	714	543	726	493	746
	8	VNR-2228	1420	1240	644	454	547	763	750	538	736	527	762
		T3 Mean	1175	1174	547	544	571	753	636	531	736	561	723
T4 (Water stress)	1	27P37	904	1224	497	589	516	922	545	486	712	502	690
	2	27P63	666	945	637	456	517	806	514	483	667	441	613
	3	AZ 8433 DT	588	1353	875	604	553	857	684	482	707	566	727
	4	HRI-174	828	1280	595	490	589	764	561	486	690	469	675
	5	SB. Dhan	741	1096	420	452	586	633	506	495	670	423	602
	6	US-312	723	1369	742	574	589	650	744	492	696	450	703
	7	US-314	1459	1021	987	616	543	725	744	495	675	417	768
	8	VNR-2228	1267	1271	609	622	523	978	624	494	701	422	751
		T4 Mean	897	1195	670	550	552	792	615	489	690	461	691
		Grand Mean	1363	1248	615	607	580	773	657	523	801	507	767
		LSD (Silicon)				28.6*		LSD (Silicon x Variety)					ns
		LSD (Location x Silicon)				120.39**		LSD (Location x Silicon x Variety)					227.71**
		LSD (Variety)				ns		CV(Silicon) %					20.43
		LSD (Location x Variety)				113.85**		CV (Residual) %					14.06

Table: 6.1.11 Influence of Silica Application on Grain number/panicle at different locations in *Kharif* 2024

Treat	S.No.	Genotypes	Location										Grand Mean
			CBT	IIRR	KJT	KRK	MTU	PNR	PTB	Ranchi	Rewa	TTB	
T1 (Control)	1	27P37	159	121	194	157	144	168	194	111	157	129	154
	2	27P63	114	187	160	142	147	199	169	111	157	142	153
	3	AZ 8433 DT	146	164	150	118	129	169	166	111	162	132	145
	4	HRI-174	111	120	190	114	130	194	163	112	164	137	143
	5	SB. Dhan	124	130	158	66	135	142	159	123	186	93	132
	6	US-312	134	138	155	122	133	184	178	120	168	148	148
	7	US-314	143	105	157	129	134	164	197	120	161	116	143
	8	VNR-2228	164	134	183	122	136	168	173	118	182	168	155
		T1 Mean	137	137	169	121	136	174	175	116	167	133	146
T2 (0.08% Ortho silicic acid)	1	27P37	176	148	174	154	145	215	197	112	166	147	163
	2	27P63	122	140	163	142	146	203	201	108	174	120	152
	3	AZ 8433 DT	164	159	160	158	131	175	191	111	168	128	154
	4	HRI-174	136	145	170	112	125	178	200	112	174	98	145
	5	SB. Dhan	135	135	170	86	139	140	158	117	196	72	135
	6	US-312	154	149	168	132	135	204	185	123	178	153	158
	7	US-314	187	129	164	118	135	155	175	118	168	131	148
	8	VNR-2228	187	167	169	122	132	132	165	113	189	117	149
		T2 Mean	158	147	167	128	136	175	184	114	177	121	151
T3 (Silicon + Water stress)	1	27P37	131	128	198	141	136	199	150	109	140	144	148
	2	27P63	104	184	158	116	144	193	172	104	139	160	147
	3	AZ 8433 DT	131	143	161	125	127	161	170	110	158	146	143
	4	HRI-174	106	113	157	125	122	183	180	107	154	132	138
	5	SB. Dhan	106	127	166	51	133	120	118	117	178	80	119
	6	US-312	122	147	177	87	127	156	209	118	160	154	146
	7	US-314	118	118	182	107	133	127	183	117	158	136	138
	8	VNR-2228	113	171	171	71	123	149	148	118	170	141	138
		T3 Mean	116	141	171	103	131	161	166	112	157	137	140
T4 (Water stress)	1	27P37	106	140	201	96	135	164	124	92	137	136	133
	2	27P63	71	127	176	144	140	193	140	89	140	91	131
	3	AZ 8433 DT	106	157	161	110	120	163	154	92	150	144	136
	4	HRI-174	96	106	152	86	120	136	140	93	153	152	123
	5	SB. Dhan	98	117	196	50	128	117	106	98	172	66	115
	6	US-312	114	140	174	109	121	136	161	98	153	133	134
	7	US-314	95	121	193	117	128	139	164	99	144	137	134
	8	VNR-2228	86	144	168	108	115	161	109	98	163	136	129
		T4 Mean	96	131	178	102	126	151	137	95	151	124	129
		Grand Mean	127	139	171	114	132	165	166	109	163	129	141
		<i>LSD (Silicon)</i>				4.13**		<i>LSD (Silicon x Variety)</i>					ns
		<i>LSD (Location x Silicon)</i>				13.06**		<i>LSD (Location x Silicon x Variety)</i>					28.58**
		<i>LSD (Variety)</i>				3.43*		<i>CV(Silicon) %</i>					12.02
		<i>LSD (Location x Variety)</i>				14.29**		<i>CV (Residual) %</i>					9.57

Table: 6.1.12 Influence of Silica Application on Spikelet number/panicle at different locations in *Kharif* 2024

Treat	S.No.	Genotypes	Location										Grand Mean
			CBT	IIRR	KJT	KRK	MTU	PNR	PTB	Ranchi	Rewa	TTB	
T1 (Control)	1	27P37	193	166	252	203	158	192	215	124	164	181	185
	2	27P63	153	240	269	173	161	249	204	123	170	185	193
	3	AZ 8433 DT	228	193	264	176	140	215	215	123	173	195	192
	4	HRI-174	141	156	237	130	142	220	208	120	173	182	171
	5	SB. Dhan	169	160	283	92	148	173	179	131	195	134	166
	6	US-312	196	187	278	155	145	216	222	133	178	198	191
	7	US-314	167	124	263	153	150	238	220	132	170	181	180
	8	VNR-2228	207	179	279	151	148	243	204	131	191	208	194
		T1 Mean	182	175	266	154	149	218	208	127	177	183	184
T2 (0.08% Ortho silicic acid)	1	27P37	215	187	277	192	159	267	219	123	171	167	198
	2	27P63	163	195	247	169	164	234	232	122	179	153	186
	3	AZ 8433 DT	252	190	271	198	144	255	237	122	177	152	200
	4	HRI-174	169	177	258	138	139	204	225	126	182	134	175
	5	SB. Dhan	192	144	258	103	153	156	175	130	202	134	165
	6	US-312	223	188	252	149	148	232	217	135	187	176	191
	7	US-314	208	145	279	151	157	189	233	131	180	168	184
	8	VNR-2228	223	207	298	135	145	194	196	127	197	143	186
		T2 Mean	206	179	267	154	151	216	217	127	184	153	186
T3 (Silicon + Water stress)	1	27P37	174	177	276	181	153	228	179	121	150	178	182
	2	27P63	162	225	217	138	160	248	206	116	153	191	182
	3	AZ 8433 DT	195	173	254	165	142	206	216	122	170	172	182
	4	HRI-174	149	140	262	254	137	203	222	120	169	157	181
	5	SB. Dhan	164	157	232	68	152	144	134	129	187	117	148
	6	US-312	147	190	264	103	147	203	229	131	173	193	178
	7	US-314	150	151	272	127	156	135	206	129	170	189	169
	8	VNR-2228	165	209	240	79	140	188	195	130	180	181	171
		T3 Mean	163	178	252	139	148	194	198	125	169	172	174
T4 (Water stress)	1	27P37	164	190	276	116	150	222	183	106	153	166	173
	2	27P63	143	220	298	168	162	237	173	103	157	113	177
	3	AZ 8433 DT	203	223	231	158	142	205	178	105	165	169	178
	4	HRI-174	129	144	307	103	141	166	160	105	167	173	159
	5	SB. Dhan	165	131	262	69	151	153	124	111	187	97	145
	6	US-312	160	192	279	131	144	169	181	111	171	161	170
	7	US-314	132	145	245	133	150	153	202	112	163	168	160
	8	VNR-2228	147	182	233	124	137	223	150	111	177	169	165
		T4 Mean	155	178	266	125	147	191	169	108	167	152	166
		Grand Mean	176	178	263	143	149	205	198	122	174	165	177
		LSD (Silicon)				4.34**		LSD (Silicon x Variety)					ns
		LSD (Location x Silicon)				13.74**		LSD (Location x Silicon x Variety)					42.11**
		LSD (Variety)				6.65**		CV(Silicon) %					10.08
		LSD (Location x Variety)				21.05**		CV (Residual) %					11.25

Table: 6.1.13 Influence of Silica Application on Grain number/m² at different locations in *Kharif 2024*

Treat	S.No.	Genotypes	Location										Grand Mean
			CBT	IIRR	KJT	KRK	MTU	PNR	PTB	Ranchi	Rewa	TTB	
T1 (Control)	1	27P37	109600	45310	29086	32483	53878	47600	74023	22826	52508	18021	48533
	2	27P63	78117	65710	20303	38542	59994	56383	68785	23278	56166	23448	49073
	3	AZ 8433 DT	88500	60696	21651	29083	50952	70300	47094	23129	51697	24931	46803
	4	HRI-174	63267	53030	27224	27100	57332	87150	75703	23280	52278	23370	48973
	5	SB. Dhan	89283	49844	21558	14767	56562	42850	64295	27384	62850	14887	44428
	6	US-312	78767	60980	24600	32008	56782	58383	72661	26352	54810	25923	49127
	7	US-314	79283	38719	23193	33583	54747	54867	84303	26014	54538	18420	46767
	8	VNR-2228	87300	49548	26357	30267	56760	58933	79944	25480	58613	30981	50418
		T1 Mean	84265	52980	24246	29729	55876	59558	70851	24718	55432	22498	48015
T2 (0.08% Ortho silicic acid)	1	27P37	155017	48939	25345	41950	54032	68100	85047	23370	56552	27298	58565
	2	27P63	96267	54126	23652	35417	59466	67567	78867	22391	58067	21600	51742
	3	AZ 8433 DT	107800	64158	29069	41825	50402	64117	86772	23473	54799	28084	55050
	4	HRI-174	93500	54406	22807	26342	52316	71417	89529	23425	59202	17873	51082
	5	SB. Dhan	111350	43462	23189	28600	57904	46783	75821	25747	63500	12092	48845
	6	US-312	95600	60649	25003	39592	54868	57833	92754	27476	64095	25148	54302
	7	US-314	109533	43621	23528	32325	55022	51817	73355	26149	57144	21364	49386
	8	VNR-2228	115750	57076	23037	28883	55176	39733	70202	24593	63460	18561	49647
		T2 Mean	110602	53305	24454	34367	54898	58421	81543	24578	59602	21502	52327
T3 (Silicon + Water stress)	1	27P37	74440	38844	27611	29500	50831	59900	59277	22865	42201	21815	42728
	2	27P63	63103	59897	21025	30392	55704	61300	63463	21589	43424	25921	44582
	3	AZ 8433 DT	61733	44373	20896	20642	48708	64400	53897	22703	39648	26128	40313
	4	HRI-174	58250	45422	21659	31783	51304	82200	73543	22210	44715	18464	44955
	5	SB. Dhan	59350	47708	22389	12067	54043	44183	48474	25123	46867	10260	37046
	6	US-312	57433	60882	25216	23075	48994	52000	90324	25804	54101	22457	46029
	7	US-314	55233	34970	26596	29142	52668	46450	67903	25874	44878	26259	40997
	8	VNR-2228	52883	47447	25452	15075	49918	52133	60827	25719	50187	24087	40373
		T3 Mean	60303	47443	23855	23959	51521	57821	64714	23986	45753	21924	42128
T4 (Water stress)	1	27P37	54867	40601	20980	21442	47443	46467	42982	17201	35262	21770	34902
	2	27P63	35750	50555	21222	25200	52283	64317	47691	16649	35008	16121	36480
	3	AZ 8433 DT	47867	54883	21236	25058	46552	67717	45654	17444	35680	26704	38880
	4	HRI-174	44850	47135	20824	18275	48708	60900	44163	17697	40051	26066	36867
	5	SB. Dhan	45867	43159	28040	10500	50468	33133	35582	19408	39828	10712	31670
	6	US-312	45650	56738	22336	21333	45386	52117	56409	19732	43106	20616	38342
	7	US-314	39833	42487	25199	29950	47674	46467	64431	19530	30656	22041	36827
	8	VNR-2228	40083	50211	16483	28767	46717	53750	38626	19682	36781	25657	35676
		T4 Mean	44346	48221	22040	22566	48154	53108	46942	18418	37047	21211	36205
		Grand Mean	74879	50487	23649	27655	52612	57227	66013	22925	49459	21784	44669
		LSD (Silicon)					2232**		LSD (Silicon x Variety)				2855*
		LSD (Location x Silicon)					7058**		LSD (Location x Silicon x Variety)				11882**
		LSD (Variety)					ns		CV(Silicon) %				20.57
		LSD (Location x Variety)					5941**		CV (Residual) %				12.6

Table: 6.1.14 Influence of Silica Application on 1000 grain weight (g) at different locations in Kharif 2024

Treat	S.No.	Genotypes	Location										Grand Mean
			CBT	IIRR	KJT	KRK	MTU	PNR	PTB	Ranchi	Rewa	TTB	
T1 (Control)	1	27P37	26.2	26.8	25.3	24.0	25.0	27.4	24.7	23.0	24.0	10.1	23.7
	2	27P63	26.4	16.9	16.1	15.0	16.6	14.9	17.6	23.3	20.3	12.3	17.9
	3	AZ 8433 DT	24.7	22.0	21.3	20.4	18.3	21.6	23.9	22.9	17.9	14.8	20.8
	4	HRI-174	24.5	22.7	23.9	21.3	20.8	23.3	23.5	22.8	23.6	12.5	21.9
	5	SB. Dhan	21.8	23.0	24.1	20.5	21.6	22.5	23.5	23.7	22.8	8.6	21.2
	6	US-312	19.8	20.0	20.5	18.5	18.1	19.1	20.7	22.8	19.9	13.9	19.3
	7	US-314	21.3	22.4	22.9	21.9	22.1	23.6	24.8	22.7	18.8	11.4	21.2
	8	VNR-2228	21.6	23.2	23.5	22.4	22.1	20.5	25.5	23.4	21.1	15.3	21.9
		T1 Mean	23.3	22.1	22.2	20.5	20.6	21.6	23.0	23.1	21.0	12.3	21.0
T2 (0.08% Ortho silicic acid)	1	27P37	26.8	26.9	25.1	23.7	24.8	24.4	26.6	23.2	24.9	12.4	23.9
	2	27P63	26.9	17.4	16.1	12.4	16.8	14.9	19.4	23.1	21.1	11.0	17.9
	3	AZ 8433 DT	25.4	21.4	20.1	20.5	18.1	21.5	22.3	22.8	19.4	13.3	20.5
	4	HRI-174	25.0	23.4	22.3	17.5	21.0	20.8	22.6	22.8	25.9	9.8	21.1
	5	SB. Dhan	22.1	23.8	24.1	22.2	21.6	22.8	23.6	22.8	23.6	9.0	21.6
	6	US-312	20.4	20.8	20.8	16.2	18.0	19.4	21.6	23.3	20.2	11.6	19.2
	7	US-314	21.7	22.4	22.2	21.9	22.2	24.7	22.9	23.2	20.0	11.0	21.2
	8	VNR-2228	21.9	23.6	23.2	22.0	22.0	22.6	23.7	22.5	22.7	9.1	21.3
		T2 Mean	23.8	22.5	21.7	19.6	20.6	21.4	22.8	23.0	22.2	10.9	20.8
T3 (Silicon + Water stress)	1	27P37	25.7	26.8	25.3	22.4	24.4	22.9	24.8	21.9	24.0	10.8	22.9
	2	27P63	25.6	17.2	16.2	16.1	16.3	15.1	18.1	22.6	20.2	12.4	18.0
	3	AZ 8433 DT	24.7	21.6	21.3	18.4	18.0	21.1	22.2	22.7	17.2	12.3	20.0
	4	HRI-174	23.6	23.4	22.6	24.8	20.9	21.6	24.5	22.6	23.0	8.8	21.6
	5	SB. Dhan	21.3	23.5	23.7	20.7	21.4	22.3	23.3	22.9	23.9	6.0	20.9
	6	US-312	19.2	20.0	21.4	18.7	18.3	19.8	22.1	22.3	18.6	11.3	19.2
	7	US-314	20.2	23.1	22.0	21.0	21.8	24.7	22.7	22.1	21.3	14.6	21.4
	8	VNR-2228	20.9	23.6	23.7	20.1	21.7	20.4	26.7	22.0	21.0	12.4	21.2
		T3 Mean	22.6	22.4	22.0	20.3	20.4	21.0	23.1	22.4	21.1	11.1	20.6
T4 (Water stress)	1	27P37	25.1	26.2	25.0	24.0	24.4	24.5	26.1	19.5	22.5	10.7	22.8
	2	27P63	25.0	15.9	16.9	15.6	16.2	13.7	15.5	19.6	17.8	8.0	16.4
	3	AZ 8433 DT	23.2	21.4	21.0	17.9	18.2	19.4	23.1	19.6	15.6	12.5	19.2
	4	HRI-174	23.2	23.4	22.3	21.2	20.6	21.3	22.8	19.5	22.8	11.8	20.9
	5	SB. Dhan	20.8	23.4	23.1	19.3	21.3	21.4	24.3	20.2	21.2	6.4	20.1
	6	US-312	18.9	20.3	21.3	20.0	18.2	18.0	21.6	19.7	18.6	10.0	18.7
	7	US-314	19.8	22.0	21.6	21.1	21.5	20.7	24.0	20.3	19.1	10.8	20.1
	8	VNR-2228	19.9	22.9	23.8	22.1	21.5	23.8	25.0	19.7	20.3	12.7	21.2
		T4 Mean	22.0	21.9	21.9	20.1	20.2	20.3	22.8	19.8	19.7	10.4	19.9
		Grand Mean	22.9	22.2	22.0	20.1	20.4	21.1	22.9	22.1	21.0	11.2	20.6
		LSD (Silicon)				0.32**			LSD (Silicon x Variety)				ns
		LSD (Location x Silicon)				1.03**			LSD (Location x Silicon x Variety)				2.29**
		LSD (Variety)				0.36**			CV(Silicon) %				6.55
		LSD (Location x Variety)				1.14**			CV (Residual) %				5.27

Table: 6.1.15 Influence of Silica Application on Total dry matter (g/m²) at maturity at different locations in Kharif 2024

Treat	S.No.	Genotypes	Location										Grand Mean
			CBT	IIRR	KJT	KRK	MTU	PNR	PTB	Ranchi	Rewa	TTB	
T1 (Control)	1	27P37	2207	2151	1295	1252	1298	1912	1842	1057	1302	796	1511
	2	27P63	2276	1973	1694	1345	1324	1554	1785	1063	1314	815	1514
	3	AZ 8433 DT	1493	2267	1190	1151	1469	1914	1813	1058	1561	1004	1492
	4	HRI-174	3099	2105	1554	1249	1446	1804	1852	1065	1398	827	1640
	5	SB. Dhan	2474	1823	1176	955	1517	1442	1590	1126	1504	851	1446
	6	US-312	2814	2154	1260	1117	1454	1754	1952	1122	1494	934	1606
	7	US-314	2506	1587	1064	1180	1296	1651	1683	1119	1671	1119	1488
	8	VNR-2228	2988	1924	1330	1094	1348	2127	1807	1119	1442	884	1606
		T1 Mean	2482	1998	1320	1168	1394	1770	1790	1091	1461	904	1538
T2 (0.08% Ortho silicic acid)	1	27P37	2459	2234	749	1343	1256	1838	1860	1062	1393	1271	1546
	2	27P63	2573	1822	1127	1376	1293	1583	1810	1066	1410	1334	1539
	3	AZ 8433 DT	2946	2221	1274	1314	1458	1915	1958	1070	1594	1030	1678
	4	HRI-174	3327	2105	1281	1121	1463	1873	1899	1066	1528	1213	1688
	5	SB. Dhan	2702	1668	833	1150	1519	1475	1650	1123	1501	1218	1484
	6	US-312	3193	2179	1162	1306	1486	2014	1990	1132	1553	1085	1710
	7	US-314	2941	1650	1421	1195	1349	1684	1801	1124	1742	1151	1606
	8	VNR-2228	3193	2011	1197	988	1334	1611	2091	1116	1598	1487	1663
		T2 Mean	2917	1986	1131	1224	1395	1749	1882	1095	1540	1224	1614
T3 (Silicon + Water stress)	1	27P37	1864	1885	1106	1286	1227	1754	1582	1056	1150	1331	1424
	2	27P63	1754	1892	1246	1306	1253	1821	1836	1059	1117	1439	1472
	3	AZ 8433 DT	1731	1721	1365	1233	1392	1841	1934	1055	1462	1292	1503
	4	HRI-174	1808	1913	1120	1216	1437	1941	1546	1045	1295	1361	1468
	5	SB. Dhan	1809	1813	616	889	1476	1498	1447	1117	1274	1311	1325
	6	US-312	2073	2099	1148	1289	1431	1670	2086	1120	1310	1271	1550
	7	US-314	2188	1437	1302	1249	1306	1775	2003	1120	1494	1121	1500
	8	VNR-2228	2147	1824	1204	894	1259	1671	1954	1122	1196	1114	1438
		T3 Mean	1922	1823	1138	1170	1348	1746	1799	1087	1287	1280	1460
T4 (Water stress)	1	27P37	1498	1891	903	1212	1253	1968	1668	1006	1132	1197	1373
	2	27P63	1355	1716	994	1183	1232	1847	1684	1010	1042	1007	1307
	3	AZ 8433 DT	1441	2162	1281	1297	1354	1699	1707	1001	1235	1276	1446
	4	HRI-174	1473	2072	980	986	1421	2033	1661	1003	1152	1171	1395
	5	SB. Dhan	1318	1628	980	930	1396	1735	1391	1035	1221	881	1251
	6	US-312	1367	2040	1134	1406	1428	1529	1711	1035	1169	939	1376
	7	US-314	2017	1602	1414	1262	1277	1921	1566	1037	1439	907	1444
	8	VNR-2228	1853	1884	1246	1283	1248	1789	1789	1042	1120	998	1425
		T4 Mean	1540	1875	1117	1195	1326	1815	1647	1021	1189	1047	1377
		Grand Mean	2215	1920	1176	1189	1366	1770	1780	1073	1369	1114	1497
		<i>LSD (Silicon)</i>				ns		<i>LSD (Silicon x Variety)</i>				ns	
		<i>LSD (Location x Silicon)</i>				165.73**		<i>LSD (Location x Silicon x Variety)</i>				355.32**	
		<i>LSD (Variety)</i>				42.69*		<i>CV(Silicon) %</i>				14.41	
		<i>LSD (Location x Variety)</i>				177.66**		<i>CV (Residual) %</i>				11.24	

Table: 6.1.16 Influence of Silica Application on Grain yield (g/m²) at different locations in Kharif 2024

Treat	S.No.	Genotypes	Location										Grand Mean
			CBT	IIRR	KJT	KRK	MTU	PNR	PTB	Ranchi	Rewa	TTB	
T1 (Control)	1	27P37	749	1216	573	351	535	844	344	427	727	596	636
	2	27P63	665	1109	700	367	552	726	366	432	732	353	600
	3	AZ 8433 DT	503	1334	713	284	603	717	475	428	751	421	623
	4	HRI-174	531	1206	605	334	607	761	421	430	759	385	604
	5	SB. Dhan	777	1146	507	153	632	637	369	433	790	300	574
	6	US-312	612	1216	638	300	612	663	395	430	780	446	609
	7	US-314	626	872	579	331	542	671	400	435	762	341	556
	8	VNR-2228	829	1149	626	295	563	711	522	434	784	466	638
		T1 Mean	662	1156	618	302	581	716	411	431	761	414	605
T2 (0.08% Ortho silicic acid)	1	27P37	795	1314	861	424	511	833	437	438	763	650	703
	2	27P63	713	939	555	389	533	732	445	438	760	394	590
	3	AZ 8433 DT	585	1376	786	411	593	768	519	435	762	643	688
	4	HRI-174	562	1272	590	384	611	719	459	433	798	538	637
	5	SB. Dhan	819	1034	660	209	645	569	407	449	784	415	599
	6	US-312	626	1257	825	322	626	550	426	447	790	470	634
	7	US-314	636	975	713	358	563	689	476	446	788	385	603
	8	VNR-2228	850	1281	718	375	558	876	571	447	798	568	704
		T2 Mean	698	1181	714	359	580	717	467	442	780	508	645
T3 (Silicon + Water stress)	1	27P37	531	1041	613	348	504	785	301	416	550	470	556
	2	27P63	617	1029	643	340	511	813	387	414	538	513	580
	3	AZ 8433 DT	472	959	629	273	564	761	437	421	648	563	573
	4	HRI-174	503	1064	647	309	580	747	380	415	650	519	581
	5	SB. Dhan	710	1124	379	146	612	555	305	426	536	248	504
	6	US-312	575	1217	715	291	585	615	359	423	643	385	581
	7	US-314	560	810	732	280	538	694	361	426	565	314	528
	8	VNR-2228	722	1116	790	269	529	924	464	428	632	575	645
		T3 Mean	586	1045	644	282	553	737	374	421	595	448	569
T4 (Water stress)	1	27P37	490	1062	755	337	500	846	274	363	534	496	566
	2	27P63	584	800	607	329	502	726	193	368	520	559	519
	3	AZ 8433 DT	444	1173	393	260	536	745	435	363	574	580	550
	4	HRI-174	420	1103	329	244	571	713	187	365	587	531	505
	5	SB. Dhan	704	1011	237	109	569	623	277	375	522	333	476
	6	US-312	525	1150	391	237	570	663	272	371	538	441	516
	7	US-314	520	934	599	267	526	758	203	370	529	371	508
	8	VNR-2228	698	1151	615	253	507	758	267	369	571	600	579
		T4 Mean	548	1048	491	255	535	729	264	368	547	489	527
		Grand Mean	624	1108	616	299	562	725	379	415	671	465	586
		LSD (Silicon)				15.47**		LSD (Silicon x Variety)					ns
		LSD (Location x Silicon)				48.92**		LSD (Location x Silicon x Variety)					140.18**
		LSD (Variety)				16.8*		CV(Silicon) %					10.86
		LSD (Location x Variety)				70.09**		CV (Residual) %					11.32

Table: 6.1.17 Influence of Silica Application on Harvest index (%) at different locations in *Kharif* 2024

Treat	S.No.	Genotypes	Location										Grand Mean
			CBT	IIRR	KJT	KRK	MTU	PNR	PTB	Ranchi	Rewa	TTB	
T1 (Control)	1	27P37	34.0	56.9	46.0	29.1	41.1	44.1	18.7	40.4	55.8	79.0	44.5
	2	27P63	29.3	56.2	41.3	29.2	41.7	46.9	20.5	40.6	55.7	43.4	40.5
	3	AZ 8433 DT	37.4	58.8	64.9	25.2	40.8	37.5	26.2	40.4	48.2	42.4	42.2
	4	HRI-174	17.2	57.4	39.4	27.0	42.0	42.2	22.8	40.3	54.3	49.4	39.2
	5	SB. Dhan	31.5	63.8	50.4	16.2	41.7	44.2	23.2	38.5	52.5	35.8	39.8
	6	US-312	21.8	56.5	52.3	25.8	42.0	37.8	20.3	38.3	52.3	47.9	39.5
	7	US-314	25.0	55.5	54.7	29.5	41.5	40.6	23.9	38.8	45.6	31.0	38.6
	8	VNR-2228	27.8	59.8	56.1	29.3	41.6	33.4	28.9	38.8	54.3	53.2	42.3
		T1 Mean	28.0	58.1	50.7	26.4	41.5	40.8	23.0	39.5	52.3	47.8	40.8
T2 (0.08% Ortho silicic acid)	1	27P37	32.4	58.9	123.0	31.9	40.6	45.3	23.5	41.3	54.8	51.7	50.3
	2	27P63	27.8	51.4	50.3	28.2	41.1	46.3	24.6	41.1	53.9	31.9	39.7
	3	AZ 8433 DT	19.9	62.0	62.4	31.3	40.6	40.2	26.5	40.7	47.8	62.5	43.4
	4	HRI-174	16.9	60.6	48.5	34.5	41.4	38.4	24.2	40.6	52.2	44.7	40.2
	5	SB. Dhan	30.4	62.2	82.8	18.1	42.4	38.6	24.7	40.0	52.2	34.9	42.6
	6	US-312	19.6	57.8	71.2	24.7	42.1	27.3	21.4	39.5	50.8	45.0	39.9
	7	US-314	21.7	59.1	53.2	30.0	41.7	40.9	26.5	39.7	45.2	33.6	39.1
	8	VNR-2228	26.6	63.8	73.0	37.7	41.7	54.4	27.7	40.0	49.9	39.4	45.4
		T2 Mean	24.4	59.5	70.5	29.5	41.4	41.4	24.9	40.4	50.9	43.0	42.6
T3 (Silicon + Water stress)	1	27P37	28.5	55.3	56.2	26.7	41.0	44.8	19.0	39.4	47.8	35.4	39.4
	2	27P63	35.2	54.4	52.0	25.9	40.5	44.7	21.1	39.1	48.2	36.6	39.8
	3	AZ 8433 DT	27.3	55.6	50.1	21.6	40.6	41.3	22.6	39.9	44.3	46.8	39.0
	4	HRI-174	27.8	55.8	59.0	25.7	40.2	38.5	24.6	39.7	50.5	38.7	40.1
	5	SB. Dhan	39.3	62.2	67.5	16.2	41.4	37.0	21.2	38.2	42.1	19.3	38.4
	6	US-312	27.8	58.0	63.3	24.1	40.8	36.8	17.2	37.8	49.2	31.6	38.6
	7	US-314	25.7	56.2	57.4	22.3	40.9	39.1	18.1	38.0	37.9	29.1	36.5
	8	VNR-2228	33.7	61.4	73.4	33.3	41.2	55.3	23.8	38.2	53.1	56.8	47.0
		T3 Mean	30.7	57.4	59.9	24.5	40.8	42.2	20.9	38.8	46.6	36.8	39.9
T4 (Water stress)	1	27P37	32.8	56.1	149.2	30.9	39.7	43.0	16.4	36.1	47.2	41.4	49.3
	2	27P63	43.1	46.6	61.3	27.8	40.8	39.3	11.5	36.4	50.1	55.7	41.3
	3	AZ 8433 DT	30.9	54.3	30.5	22.0	39.5	43.8	25.5	36.3	46.5	47.7	37.7
	4	HRI-174	28.5	53.2	33.9	24.1	40.0	35.1	11.3	36.4	51.0	48.1	36.2
	5	SB. Dhan	53.4	61.9	27.3	12.0	40.6	35.9	20.1	36.3	42.8	41.1	37.1
	6	US-312	38.6	56.2	37.8	17.0	39.7	43.3	15.9	35.8	46.3	49.1	38.0
	7	US-314	25.8	58.4	42.3	20.9	40.8	39.5	13.0	35.7	36.8	42.8	35.6
	8	VNR-2228	37.7	61.0	53.3	20.7	40.8	42.4	15.0	35.4	51.0	60.7	41.8
		T4 Mean	36.4	55.9	54.5	21.9	40.2	40.3	16.1	36.0	46.5	48.3	39.6
		Grand Mean	29.9	57.7	58.9	25.6	41.0	41.2	21.2	38.7	49.1	44.0	40.7
		LSD (Silicon)				ns		LSD (Silicon x Variety)					ns
		LSD (Location x Silicon)				8.11**		LSD (Location x Silicon x Variety)					23.54**
		LSD (Variety)				2.82*		CV(Silicon) %					25.95
		LSD (Location x Variety)				11.77**		CV (Residual) %					27.4

6.2 Phenotyping of elite rice genotypes for Drought Tolerance

Locations: CHN, CRRI, FZB, PTB, REWA, RPUR & RANCHI

Rapidly changing climatic patterns have affected normal agricultural productivity and threatened global food security. In fact, according to FAO, in last 40 years the percentage of people affected by drought has doubled and it has affected more people worldwide than any other natural hazard. Among all the abiotic factors, drought is the most detrimental, limiting almost 50% of rice productivity yearly. Drought can lead to direct socio-economic and environmental impacts, famines, migration and natural resource degradation. About 57% area of the agricultural land of India accounts for rainfed area and therefore it is very significant in terms of ecology and livelihood of millions. About 61 per cent of India's farmers rely on rain-fed agriculture and 55 per cent of the gross cropped area is under rain-fed farming. Thus, it is of utmost importance to study and understand the mechanism involved in the drought stress tolerance for development of drought tolerant rice varieties.

With this objective, a trial to study the drought tolerance traits of rice cultures with respect to yield and other attributes under dry spells was conducted with 15 genotypes. The treatments consist of two irrigation regimes a) irrigated as per recommended schedule and b) totally rainfed conditions without any supplementary irrigation. The data was analysed as Factorial RCBD with irrigation regimes as first factor and genotypes as second factor.

Fig 6.2.1 shows the data for rainfall pattern from June, 2024 to November, 2024 at Chinsurah, Pattambi, Ranchi, Rewa and Raipur centres. At Chinsurah, centre 1280.5 cm rainfall was received. During the crop growth period, Chinsurah received rainfall for 87 days, which was well distributed. Until the end of flowering and start of grain filling, it rained almost every other day. After flowering, however, there was no rains until the end of season. Pattambi has received the highest rainfall of 2031.4 cm among all the centres. It has received 114 days of rainfall during the crop growth season. It rained almost every other day until flowering, after that it receded until the end of the trial. Ranchi centre received a rainfall of 1681.2 cm, which was second highest among all the centres. During crop growth period, 69 days were rainy days in Ranchi; however, it was well distributed right from seedling establishment to flowering. During grain filling and physiological maturity stage there was no rains. Rewa centre has received the rainfall of 916.4 cm and it was the least among all the centres. However, it was well distributed right from seedling establishment to flowering. Thereafter it receded and there

was no rainfall during the grain filling stage. Raipur centre has received the rainfall of 1126.8 cm. For 105 days, starting from June 20, 2024 to October 2, 2024, Raipur centre has received an average rainfall of 10.41 cm. From seedling establishment to flowering it was a well-distributed rainfall. Therefore, it can be concluded that, from seedling establishment to flowering stage the rainfall was well distributed and it receded thereafter at all the centres barring few instances of dry spells at Ranchi, Rewa and Raipur.

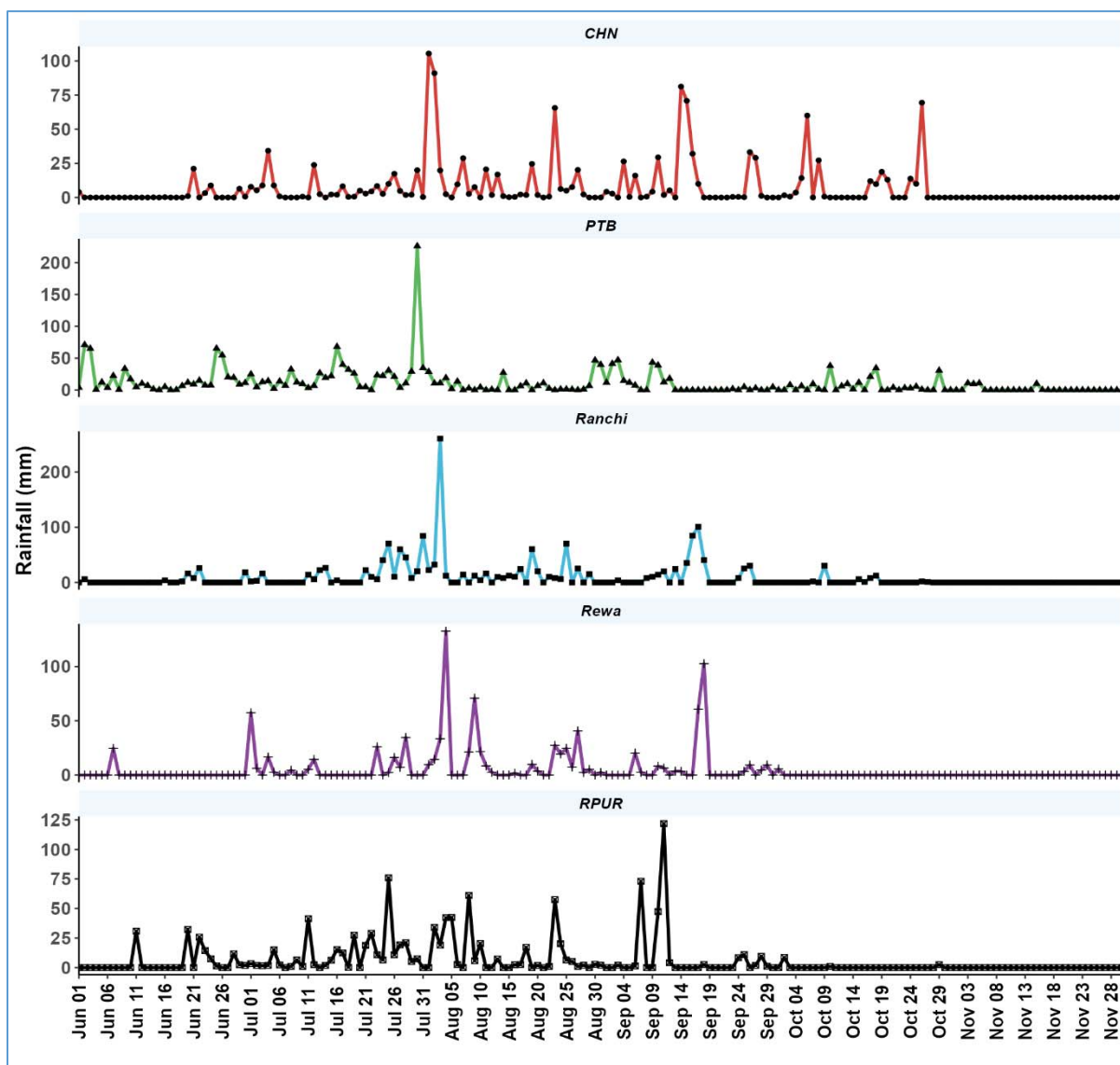


Fig 6.2.1 Rainfall pattern under rainfed upland situation (drought) at different locations during Kharif 2024.

Mean tiller number per plant ranged from 7 (Chinsurah and Cuttack) to 23 (Pattambi) with a grand mean of 14 in control whereas in drought it ranged from 6 (Chinsurah) to 19 (Pattambi) with a grand mean of 12 (Table 6.2.1). Drought significantly affected the tiller

number per plant, the interaction effects between Location x Treat, Location x Variety and Location x Treat x Variety also found to be statistically significant. Among entries, RP 6469-88 (Pattambi) reported the highest tiller number plant (26) in control whereas in drought, D-163-19 and RP 6469-95 recorded the highest tiller number plant (22). RP 6469-151a has recorded highest reduction (-20%) in tiller number with drought over the control closely followed by D-163-19 and RP-6469-80 has recorded the lowest reduction (-12.23%) (Fig 6.2.2a). Among centres, Ranchi has recorded highest reduction (-25.8%) in tiller number with drought over the control, whereas CRRI has recorded the lowest reduction (-6%) (Fig 6.2.2b).

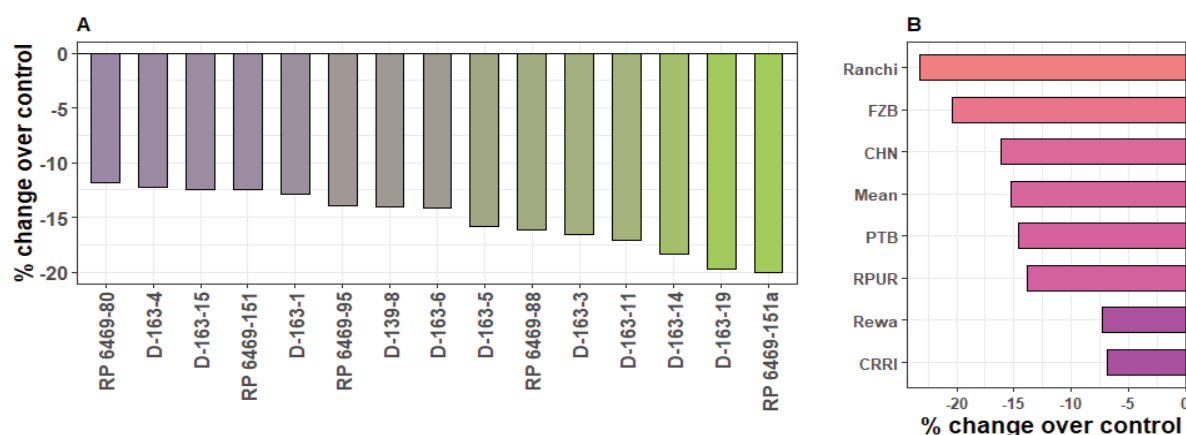


Fig 6.2.2 Influence of irrigation regimes on Tiller Number/Plant recorded at maturity in different rice genotypes at different AICRIP centres during kharif-2024. [A] Mean of all locations [B] Mean of all genotypes. Each value represents % change under rainfed treatment in comparison with irrigated control.

Shoot weight (g/m^2) was significantly affected by drought and significant variation was noticed among the varieties, the interaction effects between Location x Treat, Location x Variety and Location x Treat x Variety also found to be statistically significant (Table 6.2.2). In control mean shoot weight ranged from 486 g/m^2 (Chinsurah) to 588 g/m^2 (CRRI) with a grand mean of 552 g/m^2 whereas in drought it ranged from 434 g/m^2 (Chinsurah) to 519 g/m^2 (Rewa) with a grand mean of 473 g/m^2 . Among entries in control, RP 6469-88 (Chinsurah) has recorded the lowest shoot weight of 377 g/m^2 whereas D-163-19 (Pattambi) has recorded the highest shoot weight of 730 g/m^2 . In drought, RP 6469-151a (Pattambi) has recorded the lowest shoot weight of 328 g/m^2 followed by D-163-4 (Pattambi) 358 g/m^2 and D-163-15 (Rewa) has recorded the highest shoot weight 629 g/m^2 followed by D-163-19 (Pattambi) with 604 g/m^2 .

Drought significantly affected the panicle weight (g/m^2), the interaction effects between Location x Treat, Location x Variety and Location x Treat x Variety were found to be

statistically significant. Mean panicle weight (Table 6.2.3) varied from 343 g/m² (CRRI) to 668 g/m² (Rewa) with a grand mean of 465 g/m² in control whereas in drought, it ranged from 263 g/m² (CRRI) to 548 g/m² (Rewa) with a grand mean of 384 g/m². Considering the overall effect, drought treatment reduced the panicle weight by 17.42% compared with the control. In control, among entries, RP 6469-95 (Raipur) has recorded the lowest panicle weight 241 g/m² followed by RP 6469-151a at CRRI (256 g/m²) whereas the entry D-163-15 has recorded the highest panicle weight 789 g/m² followed by RP 6469-88 625 g/m² both at Rewa. In drought, D-139-8 (CRRI) has recorded the lowest panicle weight of 174 g/m² followed by RP 6469-95 (Pattambi) with 182 g/m² and D-163-15 (Rewa) has recorded the highest panicle weight of 679 g/m² followed by RP 6469-88 (Rewa) with 625 g/m². Among entries, D-163-15 has recorded the lowest reduction (-6.2%) in panicle weight with drought over control followed by D-163-14 (-11%) whereas the RP 6469-151a has recorded the highest reduction (-27%) followed by D-163-1 (-22.5%) (Fig 6.2.3a). Among centres, Ranchi has recorded the lowest reduction (-6.5%) in panicle weight with drought over control followed by Raipur (-7.0%) whereas the Pattambi has recorded the highest reduction (-35%) followed by CRRI (-23.8%) (Fig 6.2.3b).

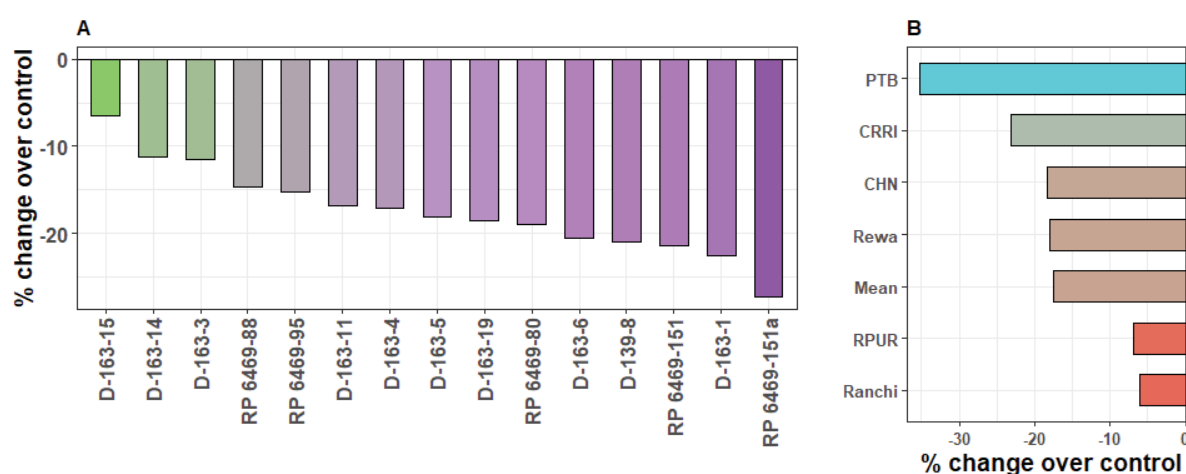


Fig 6.2.3 Influence of irrigation regimes on panicle weight/m² recorded at maturity in different rice genotypes at different AICRIP centres during kharif-2024. [A] Mean of all locations [B] Mean of all genotypes. Each value represents % change under rainfed treatment in comparison with irrigated control.

Mean panicle number per sq.mt. ranged from 210 (Ranchi) to 323 (Pattambi) with a grand mean of 268 in control, whereas it ranged from 197 (Ranchi) to 272 (Rewa) with a grand mean of 240 in drought (Table 6.2.4). Drought significantly affected the panicle number per sq.mt. and varieties also differed significantly, the interaction between Location x Treat, Location x Variety and Location x Treat x Variety were also found to be statistically significant. Among

entries, RP 6469-80 has recorded the lowest panicle number per sq.mt. (151) followed by RP-6469-88 (164) both at Raipur and D-163-5 has recorded the highest panicle number per sq.mt. (408) at Pattambi in control. In drought, RP 6469-95 has recorded the lowest panicle number per sq.mt. (168) at Raipur and D-163-4 has recorded the highest panicle number per sq.mt. (331) at Rewa.

Mean grain number per panicle ranged from 81 (CRRI) to 204 (Raipur) with a grand mean of 127 in control whereas it ranged from 57 (Pattambi) to 126 (Raipur) with a grand mean of 96 in drought (Table 6.2.5). Drought significantly affected the grain number per panicle and the interaction effects between Location x Treat, Location x Variety and Location x Treat x Variety were also found to be statistically significant. Among entries, D-163-6 recorded the lowest grain number per panicle (59) closely followed by D-139-8 (60) both at Pattambi whereas, D-163-19 (Raipur) has recorded the highest grain number per panicle (253) followed by RP 6469-151a (245) at Faizabad in control. In drought, D-139-8 (Pattambi) has recorded the lowest grain number per panicle (39) and RP 6469-151a has recorded the highest grain number per panicle (157 and 156) at Raipur and Faizabad, respectively. In terms of percent change with drought over control, D-163-5 has recorded the least reduction (-14.3%) followed by RP 6469-88 (-16%) whereas, D163-19 has recorded the highest reduction (-33.4%) followed by RP 6469-80 (-30%) (Fig 6.2.4a). Among centres, Raipur recorded the highest reduction (-37.5%) followed by Pattambi (-34%) and the least reduction in Chinsurah (-5%) followed by Ranchi (-16.3%) (Fig 6.2.4b).

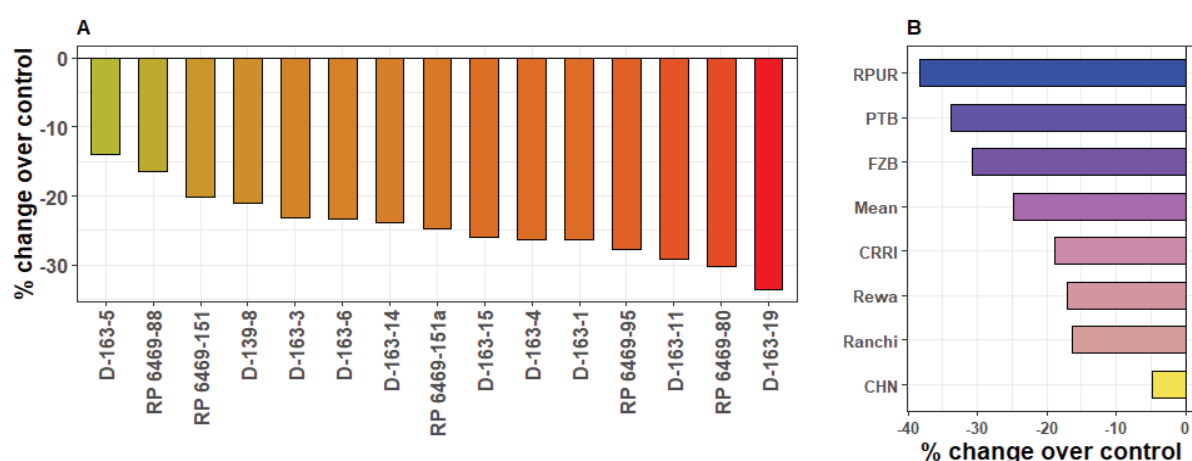


Fig 6.2.4 Influence of irrigation regimes on Grain number/Panicle in different rice genotypes at different AICRIP centres during kharif-2024. [A] Mean of all locations [B] Mean of all genotypes. Each value represents % change under rainfed treatment in comparison with irrigated control.

Drought significantly affected the spikelet number per panicle and the interaction effects between Location x Treat and Location x Variety were also found to be statistically significant (Table 6.2.6). Spikelet number per panicle was reduced by 12.3% with drought over control. Among entries, D-163-5 recorded the lowest spikelet number per panicle (122) whereas, RP 6469-95 has recorded the highest spikelet number per panicle (152) in control. In drought, D-163-5 has recorded the lowest spikelet number per panicle (110) whereas, RP 6469-95 and RP 6469-151a has recorded the highest spikelet number per panicle (131).

Grain number per sq.mt. significantly influenced with drought and the interaction effects between Location x Treat, Location x Variety and Location x Treat x Variety were also found to be statistically significant (Table 6.2.7). Grain number per sq.mt. was reduced by 31.3% with drought over control. Among entries, RP 6469-88 recorded the lowest grain number per sq.mt. (26605) whereas, D-163-19 has recorded the highest grain number per sq.mt (40166). in control. In drought, RP 6469-95 has recorded the lowest grain number per sq.mt. (19719) whereas, D-163-5 has recorded the highest grain number per sq.mt. (23983).

Drought significantly affected the spikelet number per sq.mt. and the interaction effects between Location x Treat, Location x Variety and Location x Treat x Variety were also found to be statistically significant (Table 6.2.8). Spikelet number per sq.mt. was reduced by 20.9% with drought over control. Among entries, RP 6469-151a recorded the lowest spikelet number per sq.mt. (34936) whereas, D-163-4 has recorded the highest spikelet number per sq.mt. (41735) in control. In drought, D-139-8 has recorded the lowest spikelet number per sq.mt. (26944) whereas, D-163-19 has recorded the highest spikelet number per sq.mt. (32940).

Drought significantly affected the grain yield (g/m^2) of the entries and the interaction effects between Location x Treat, Location x Variety and Location x Treat x Variety were also found to be statistically significant (Table 6.2.9). Mean grain yield ranged from 236 g/m^2 at CRRRI to 623 g/m^2 at Rewa with a grand mean of 395 g/m^2 in control. In drought, it ranged from 183 g/m^2 at Pattambi to 501 g/m^2 at Rewa with a grand mean of 304 g/m^2 . Among entries in control, RP 6469-88 at Chinsurah has recorded the lowest grain yield (146 g/m^2) followed by D-163-14 at Pattambi (166 g/m^2), whereas D-163-15 and RP 6469-88 has recorded highest grain yield i.e. 744 g/m^2 and 678 g/m^2 , respectively both at Rewa. In drought, D-139-8 at CRRRI has recorded the lowest grain yield of 102 g/m^2 followed by RP 6469-151a at Pattambi recorded 130 g/m^2 and D-163-15 and D-163-3 both at Rewa recorded the highest grain yield of 628 g/m^2 and 576 g/m^2 , respectively. Among entries, D-163-15 has recorded the lowest reduction in

grain yield with drought over control (-10.5%) followed by D-163-14 (-14%) and highest reduction was recorded by RP-6469-151a (-20%) followed by D-163-1 (-19%) (Fig 6.2.5a). Among centres, Pattambi centre has recorded the highest reduction in grain yield with drought over control (-25.5%) followed by CRRI (-23.8%) and lowest reduction was recorded by Ranchi (-8.7%) followed by Rewa (-16%) (Fig 6.2.5b).

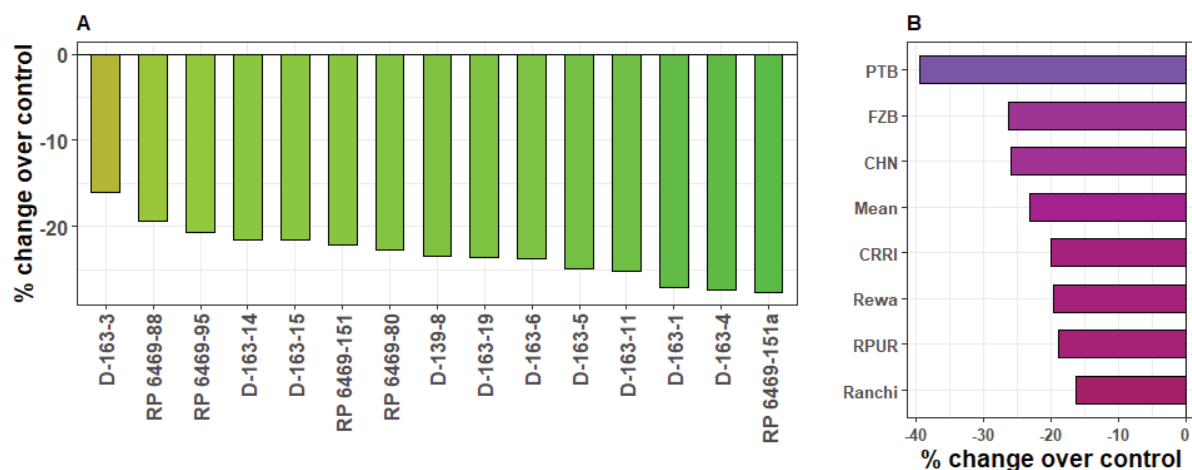


Fig 6.2.5 Influence of irrigation regimes on Grain Yield (g/m^2) in different rice genotypes at different AICRIP centres during kharif-2024. [A] Mean of all locations [B] Mean of all genotypes. Each value represents % change under rainfed treatment in comparison with irrigated control.

Mean 1000 grain weight (g) ranged from 16.3 g at CRRI to 22.8 g at Ranchi with a grand mean of 19.5 g in control. In drought, it ranged from 16.1 g at CRRI to 20.2 g at Rewa with a grand mean of 18.3 g. Drought did not significantly affected the 1000 grain weight but significant variation was noticed among the entries (Table 6.2.10), however the interaction effects of Location x Treat, Location x Variety and Location x Treat x Variety were statistically significant. Among entries, D-163-11 at Raipur recorded the lowest 1000 grain weight (13.3 g) followed by same entry at Chinsurah (13.8 g) and RP 6469-80 at Pattambi recorded the highest 1000 grain weight (24.8 g) followed by D-163-1 at Rewa (24.6 g) in control. In drought, D-163-14 at Chinsurah recorded the lowest 1000-grain weight (13.3 g) and D-163-1 at Rewa recorded the highest 1000-grain weight (24.0 g). In terms of percent change in 1000-grain weight with drought over control, D-163-11 has noted marginal increase whereas, D-163-14 has recorded the highest reduction (-14.7%) followed by D-163-6 (-12%) (Fig 6.2.6a). Among centres, Raipur recorded increase in 1000-grain weight (6.7%) and Pattambi has recorded highest reduction (-14.5%) followed by Ranchi (-13.6%) (Fig 6.2.6b).

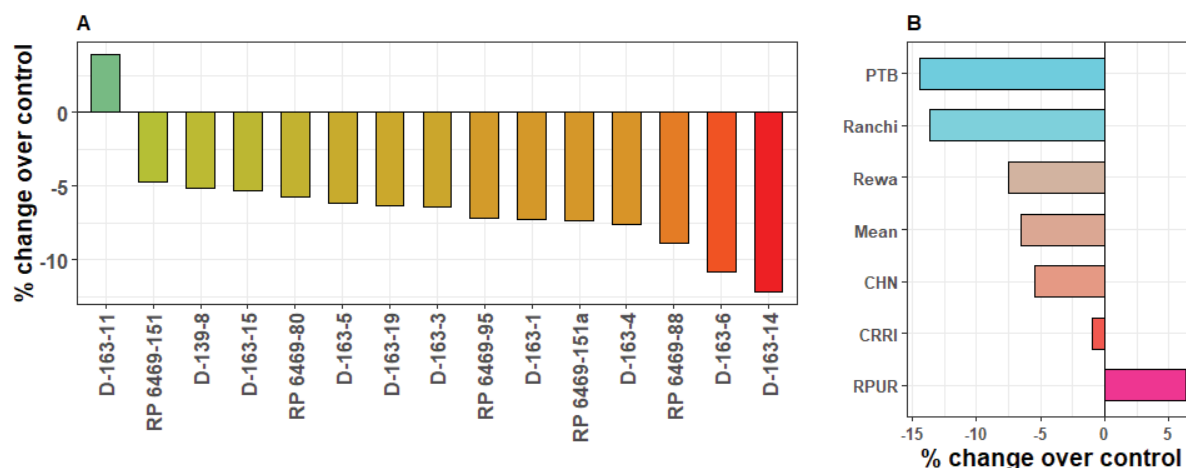


Fig 6.2.6 Influence of irrigation regimes on 1000-grain weight (g) in different rice genotypes at different AICRIP centres during kharif-2024. [A] Mean of all locations [B] Mean of all genotypes. Each value represents % change under rainfed treatment in comparison with irrigated control.

Drought significantly affected the total dry matter (TDM) of the entries (Table 6.2.11). The interaction effects of Location x Treat, Location x Variety and Location x Treat x Variety were statistically significant. Mean TDM ranged from 877 g/m² at Chinsurah to 1223 g/m² at Rewa with a grand mean of 1018 g/m² in control whereas in drought it ranged from 718 g/m² at CRRI to 1067 g/m² at Rewa with a grand mean of 857 g/m².

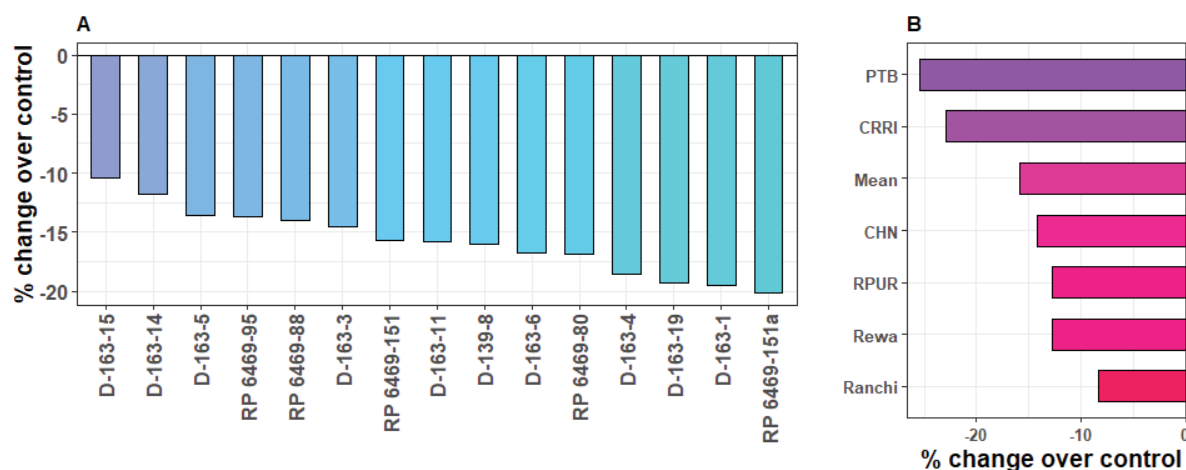


Fig 6.2.7 Influence of irrigation regimes on TDM (g/m²) at maturity in different rice genotypes at different AICRIP centres during kharif-2024. [A] Mean of all locations [B] Mean of all genotypes. Each value represents % change under rainfed treatment in comparison with irrigated control.

Among entries, RP 6469-151a at CRRI recorded the lowest TDM (650 g/m²) followed by RP 6469-88 at Chinsurah (686 g/m²) and D-163-15 at Rewa recorded the highest TDM (1444 g/m²)

followed by RP 6469-88 at Rewa (1329 g/m²) in control. In drought, D-169-8 at CRRI recorded the lowest TDM (582 g/m²) and D-163-15 at Rewa recorded the highest TDM (1308 g/m²). In terms of percent change in TDM with drought over control, D-163-15 has recorded the least reduction (-10.3%) followed by D-163-15 (-12.1 %) whereas, RP 6469-151a has recorded the highest reduction (-20 %) followed by D-163-1 (-19.7 %) (Fig 6.2.7a). Among centres, Pattambi recorded the highest reduction (-25.8%) followed by CRRI (-25.2 %) and the least reduction by Ranchi (-8.4 %) followed by Rewa and Raipur (-12.5 % each) (Fig 6.2.7b).

Mean harvest index (HI) ranged from 25.5% at CRRI to 50.9% at Rewa with a grand mean of 36.2% in control, whereas in drought, it ranged from 24.4% at Pattambi to 46.8% at Rewa with a grand mean of 32.8% (Table 6.2.12). Drought significantly affected the HI and significant variation was noticed among the entries. The interaction effects of Location x Treat, Location x Variety and Location x Treat x Variety were statistically significant. Among entries, D-163-3 has recorded the lowest reduction (-2.4%) followed by RP 6469-88 (-4%) whereas D-163-4 has recorded the highest reduction (-16.3%) followed by D-163-15 (-13.2%) with drought over control (Fig 6.2.8a). Among centres, CRRI has recorded marginal increase in TDM whereas the Pattambi has recorded the highest reduction (-22.8%) followed by Chinsurah with drought over control (-14.9%) (Fig 6.2.8b).

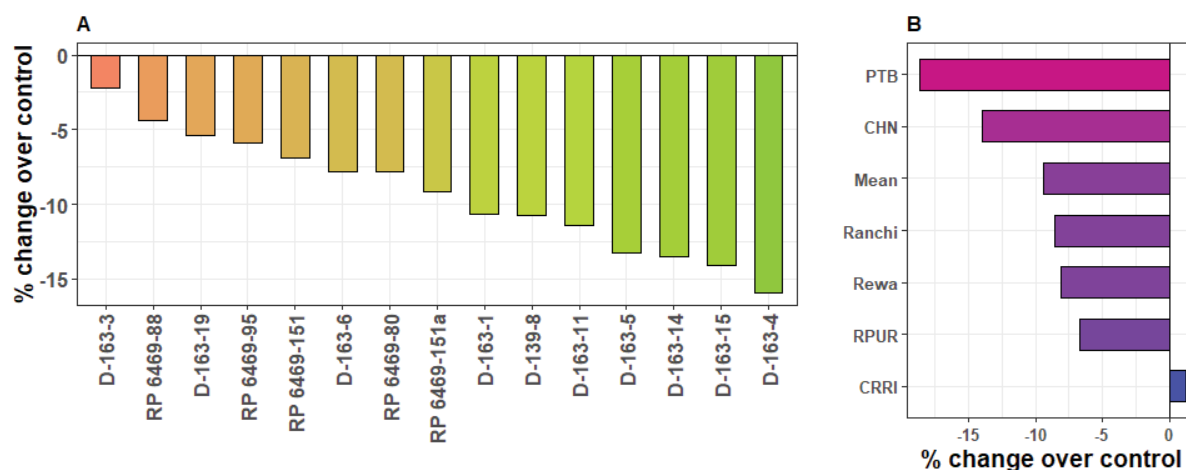


Fig 6.2.8 Influence of irrigation regimes Harvest Index (%) in different rice genotypes at different AICRIP centres during kharif-2024. [A] Mean of all locations [B] Mean of all genotypes. Each value represents % change under rainfed treatment in comparison with irrigated control.

Identification of Drought Tolerant genotypes using yield-based drought indices:

In order to identify genotypes tolerant to drought, different indices were computed based on the grain yield recorded under irrigated control and rainfed (drought) treatment. Different Drought tolerance indices including Drought susceptibility index (DSI), Relative Drought index (RDI), Drought tolerance index (DTI), Geometric mean productivity (GMP), Tolerance (TOL), Mean production (MP), Yield index (YI), Heat resistance index (HI), Yield stability index (YSI), Modified stress tolerance index (K1STI), were calculated using the relationships of (Fischer and Maurer, 1978; Fischer et al., 1998; Fernandez, 1992; Rosielle and Hamblin, 1981; Bouslama and Schapaugh, 1984; Blum, 1988; Moosavi et al., 2008; Farshadfar and Sutka, 2002). For calculating different drought indices, the means of all locations were used.

The results of Drought tolerance indices were presented in Table 6.2.13. Based on different drought indices individual entries were ranked. The overall rank for each entry was computed based on ranks for different indices. The genotype having highest overall rank was considered as most suitable for rain fed conditions as they have relative tolerance to water stressed conditions. The ranking of genotypes based on drought indices was presented in Table. 6.2.14. The data revealed that genotypes D-163-3, D-163-6, D-163-19, D-163-15 and D-163-4 have high overall Rank and they may be considered as relatively drought tolerant and are suitable for rain fed cultivation.

In order to identify most suitable index for drought phenotyping, multiple correlation was performed between yield measured under rain fed condition (Ys) and drought tolerance indices. The correlation analysis between grain yield and tolerance indices can be a good criterion for screening the best cultivars and indices used. A suitable index must have a significant association with yield recorded under stress condition. The results of correlation analysis indicated that the indices like DI (Drought Resistance Index), GMP (Geometric Mean Production), MP (Mean Production), DTI (Drought Tolerance Index, K1STI (Modified Stress Tolerance Index), K2STI (Modified Stress Tolerance Index) and YI (Yield index) showed highly significant positive association with grain yield recorded under stress condition (Fig 6.2.9). These indices are useful in selecting suitable genotypes for drought tolerance.

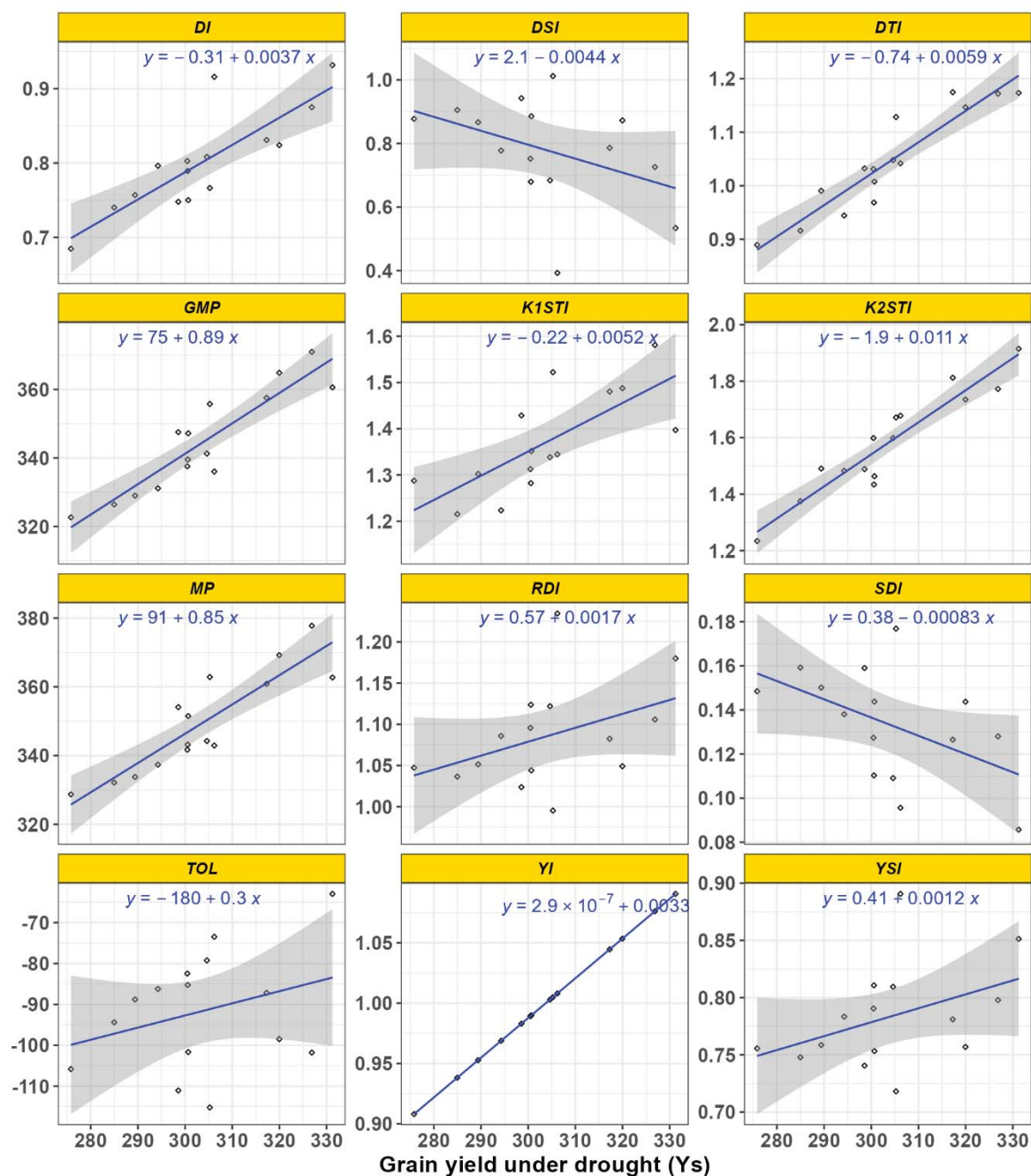


Fig 6.2.9 Relationship between grain yield recorded under rainfed condition (drought) and different drought tolerance indices computed from grain yield recorded under both rainfed and irrigated conditions. For computing indices mean grain yield values for all the locations were used.

Selection for high yield and stability of performance under rainfed conditions

In order to simultaneously select genotypes with higher yield and stability of performance across locations under rainfed conditions, a parametric model for simultaneous selection in yield and stability “Shukla’s stability variance and Kang’s” statistic was performed and the results were presented. Based on their performance across locations and YSi values, D-163-3, D-163-4, D-163-6, D-163-15, D-163-19, RP 6469-88 and RP 6469-95 could be identified as stable genotypes under rainfed condition.

Summary & Conclusions

- Mean grain yield (mean of all entries and locations) was reduced by show 23% under rainfed condition in comparison with irrigated control. D-163-3 followed by RP 6469-88 exhibited least reduction in grain yield and could be used as donors for rainfed upland situations.
- Based on drought indices computed from grain yield recorded under both irrigated as well as rainfed conditions, the results revealed that D-163-3, D-163-6, D-163-19, D-163-15 and D-163-4 may be considered as relatively drought tolerant.
- Parametric model for simultaneous selection in yield and stability across locations and YSi values identified D-163-3, D-163-4, D-163-6, D-163-15, D-163-19, RP 6469-88 and RP 6469-95 as stable genotypes under rainfed condition.
- Multiple correlation analysis between yield obtained under rainfed condition and the computed yield indices revealed a strong positive association between for DI, GMP, MP, DTI, K1STI, K2STI and YI and negative relation was observed for SDI and DSI and, these indices are useful for identification drought tolerant genotypes.

Table 6.2.1 Influence of drought on Tiller number/hill of elite rice cultures at different locations during *Kharif* 2024

S.No.	Genotypes	Irrigated						Grand Mean	Drought						Grand Mean		
		CHN	CRR1	FZB	PTB	Ranchi	Rewa		RPUR	CHN	CRR1	FZB	PTB	Ranchi		Rewa	RPUR
1	D-163-1	7	8	18	20	13	11	17	13	6	8	14	18	9	10	16	12
2	D-163-3	7	7	16	24	16	14	20	15	6	5	13	20	11	14	19	12
3	D-163-4	6	7	18	18	13	14	18	14	6	8	14	18	10	14	14	12
4	D-163-5	6	9	16	20	15	12	20	14	5	8	13	18	10	13	15	12
5	D-163-6	6	8	16	23	14	12	16	14	5	8	13	18	10	11	16	12
6	D-139-8	6	8	17	23	14	13	20	15	6	8	14	19	13	13	15	13
7	D-163-11	7	9	18	23	13	12	20	15	6	8	14	19	11	11	17	12
8	D-163-14	6	7	17	25	14	13	19	15	6	6	14	20	11	11	17	12
9	D-163-15	6	6	16	25	13	11	17	14	5	5	13	21	11	10	18	12
10	D-163-19	7	6	13	25	13	12	20	14	5	6	9	22	9	10	15	11
11	RP 6469-80	7	6	16	24	15	13	16	14	5	7	13	20	13	13	14	12
12	RP 6469-88	7	8	17	26	14	12	21	15	6	8	14	21	10	13	17	13
13	RP 6469-95	6	6	14	24	13	13	18	13	6	6	11	22	10	12	15	12
14	RP 6469-151	7	6	15	21	13	13	18	13	5	6	13	18	10	11	16	11
15	RP 6469-151a	8	7	16	18	16	12	20	14	5	6	13	15	12	10	16	11
	Mean	7	7	16	23	14	13	19	14	6	7	13	19	11	12	16	12
	LSD (Treat)								LSD (Treat x Variety)							ns	
	LSD (Location x Treat)								LSD (Location x Treat x Variety)							2.17**	
	LSD (Variety)								CV (%) Treat							15.00	
	LSD (Location x Variety)																

Table 6.2.2 Influence of drought on Shoot weight (g/m²) of elite rice cultures at different locations during *Kharif 2024*

S.No.	Genotypes	Irrigated						Grand Mean	Drought						Grand Mean
		CHN	CRRI	PTB	Ranchi	Rewa	RPUR		CHN	CRRI	PTB	Ranchi	Rewa	RPUR	
1	D-163-1	431	578	602	536	560	617	554	383	421	496	479	485	498	460
2	D-163-3	439	647	653	578	573	590	580	434	396	542	519	546	458	482
3	D-163-4	519	622	440	536	547	588	542	383	417	358	478	485	488	435
4	D-163-5	499	485	460	536	477	476	489	388	428	396	475	457	511	442
5	D-163-6	491	671	492	540	584	621	566	465	571	436	483	550	435	490
6	D-139-8	530	614	608	579	599	516	574	417	408	550	520	567	578	507
7	D-163-11	503	639	530	527	435	560	532	402	471	534	480	432	399	453
8	D-163-14	429	652	586	528	533	649	563	492	463	474	481	522	528	493
9	D-163-15	528	666	556	537	655	539	580	475	512	430	475	629	484	501
10	D-163-19	622	658	730	544	586	631	629	488	464	604	473	553	437	503
11	RP 6469-80	454	558	588	578	473	647	550	373	438	514	514	465	498	467
12	RP 6469-88	377	628	599	534	605	476	536	412	514	462	484	502	410	464
13	RP 6469-95	496	537	550	528	608	525	541	433	453	452	477	597	430	474
14	RP 6469-151	475	477	605	536	526	539	526	450	483	440	479	506	467	471
15	RP 6469-151a	502	394	530	573	553	592	524	516	378	328	515	489	484	451
	Mean	486	588	569	546	554	571	552	434	455	468	489	519	474	473
	LSD (Treat)								LSD (Treat x Variety)						ns
	LSD (Location x Treat)								LSD (Location x Treat x Variety)						108.49**
	LSD (Variety)								CV (%) Treat						14.82
	LSD (Location x Variety)														

Table 6.2.3 Influence of drought on Panicle weight (g/m²) of elite rice cultures at different locations during Kharif 2024

S.No.	Genotypes	Irrigated						Grand Mean	Drought						Grand Mean
		CHN	CRRI	PTB	Ranchi	Rewa	RPUR		CHN	CRRI	PTB	Ranchi	Rewa	RPUR	
1	D-163-1	367	295	515	520	638	458	466	333	222	215	489	508	395	361
2	D-163-3	367	366	343	537	690	431	456	344	256	305	505	624	385	403
3	D-163-4	444	389	368	513	685	396	466	282	275	252	482	564	462	386
4	D-163-5	394	343	355	519	521	505	440	292	241	255	483	436	454	360
5	D-163-6	362	385	562	525	699	475	501	319	348	298	493	608	324	398
6	D-139-8	411	281	382	536	707	562	480	319	174	235	502	517	526	379
7	D-163-11	400	376	335	511	612	459	449	313	272	270	486	496	404	373
8	D-163-14	318	366	468	524	662	415	459	306	265	365	486	590	434	408
9	D-163-15	400	328	452	519	789	341	471	362	278	352	481	679	494	441
10	D-163-19	469	371	508	526	653	516	507	296	231	382	490	595	484	413
11	RP 6469-80	388	325	682	539	600	320	476	335	248	345	501	526	359	386
12	RP 6469-88	309	404	450	510	724	275	445	327	334	305	494	625	194	380
13	RP 6469-95	363	356	332	518	707	241	419	311	263	182	492	579	305	355
14	RP 6469-151	493	303	435	519	662	459	478	339	280	292	491	493	361	376
15	RP 6469-151a	382	256	488	541	676	467	468	311	264	275	503	384	306	340
	Mean	391	343	445	524	668	421	465	319	263	288	492	548	392	384
	LSD (Treat)								LSD (Treat x Variety)						ns
	LSD (Location x Treat)								LSD (Location x Treat x Variety)						81.57**
	LSD (Variety)								CV (%) Treat						6.76
	LSD (Location x Variety)														

Table 6.2.4 Influence of drought on Panicle number/m² of elite rice cultures at different locations during *Kharif 2024*

S.No.	Genotypes	Irrigated						Grand Mean	Drought						Grand Mean
		CHN	CRRI	PTB	Ranchi	Rewa	RPUR		CHN	CRRI	PTB	Ranchi	Rewa	RPUR	
1	D-163-1	277	252	365	205	236	339	279	253	245	245	196	224	231	232
2	D-163-3	247	296	375	217	335	234	284	214	175	283	200	325	201	233
3	D-163-4	285	331	415	206	352	309	316	223	290	238	195	331	199	246
4	D-163-5	276	295	408	207	288	242	286	260	279	273	195	298	284	265
5	D-163-6	258	316	330	207	282	333	288	253	276	270	195	244	191	238
6	D-139-8	265	313	260	223	300	233	266	221	248	245	204	293	246	243
7	D-163-11	277	317	368	206	272	234	279	230	292	283	195	245	266	252
8	D-163-14	255	240	218	207	295	207	237	237	289	240	196	263	244	245
9	D-163-15	247	291	323	208	265	211	257	237	268	256	196	225	269	242
10	D-163-19	262	304	310	204	277	338	282	225	284	318	196	241	222	248
11	RP 6469-80	260	241	288	218	292	151	242	235	180	293	203	297	187	232
12	RP 6469-88	252	272	350	205	290	164	255	262	291	308	195	328	196	263
13	RP 6469-95	261	213	240	209	304	258	248	245	188	208	195	269	168	212
14	RP 6469-151	263	215	270	206	305	197	243	209	223	248	196	261	200	223
15	RP 6469-151a	245	210	323	219	287	254	256	216	222	270	203	240	186	223
	Mean	262	274	323	210	292	247	268	235	250	265	197	272	219	240
	LSD (Treat)								LSD (Treat x Variety)						ns
	LSD (Location x Treat)								LSD (Location x Treat x Variety)						46.25**
	LSD (Variety)								CV (%) Treat						15.03
	LSD (Location x Variety)														

Table 6.2.5 Influence of drought on Grain number/panicle of elite rice cultures at different locations during *Kharif* 2024

S.No.	Genotypes	Irrigated							Grand Mean	Drought							Grand Mean
		CHN	CRR1	FZB	PTB	Ranchi	Rewa	RPUR		CHN	CRR1	FZB	PTB	Ranchi	Rewa	RPUR	
1	D-163-1	95	70	235	106	110	141	220	140	92	54	155	70	94	115	139	103
2	D-163-3	116	76	162	77	123	138	176	124	102	75	104	47	101	119	120	96
3	D-163-4	114	85	162	74	113	131	216	128	97	54	118	63	92	112	125	94
4	D-163-5	89	76	173	62	108	110	155	110	97	62	122	64	91	86	143	95
5	D-163-6	86	81	174	59	106	150	237	128	81	72	131	41	91	123	145	98
6	D-139-8	73	52	163	60	119	138	196	114	108	44	101	39	101	103	135	90
7	D-163-11	125	85	176	66	112	135	229	133	110	69	110	42	90	119	118	94
8	D-163-14	133	82	145	84	112	142	185	126	102	51	117	66	92	120	124	96
9	D-163-15	117	83	124	87	108	164	227	130	100	61	89	59	93	154	120	96
10	D-163-19	106	77	194	130	107	156	253	146	77	51	117	85	91	132	124	97
11	RP 6469-80	84	77	143	118	124	128	230	129	86	67	107	69	102	109	91	90
12	RP 6469-88	67	88	112	108	110	141	111	105	77	76	89	55	93	120	105	88
13	RP 6469-95	100	130	129	87	109	132	199	127	102	86	85	48	93	110	115	92
14	RP 6469-151	107	83	169	96	109	131	202	128	102	82	134	70	91	104	133	102
15	RP 6469-151a	114	69	245	70	121	138	233	142	119	82	156	33	102	96	157	106
	Mean	102	81	167	86	113	138	204	127	97	66	116	57	94	115	126	96
	LSD (Treat)									LSD (Treat x Variety)							ns
	LSD (Location x Treat)									LSD (Location x Treat x Variety)							30.14**
	LSD (Variety)									CV (%) Treat							18.00
	LSD (Location x Variety)																

Table 6.2.6 Influence of drought on Spikelet number/panicle of elite rice cultures at different locations during *Kharif* 2024

S.No.	Genotypes	Irrigated					Grand Mean	Drought					Grand Mean
		CHN	CRRI	PTB	Ranchi	Rewa		CHN	CRRI	PTB	Ranchi	Rewa	
1	D-163-1	149	119	131	123	149	134	120	129	95	107	138	118
2	D-163-3	169	129	114	137	163	142	126	122	71	114	164	119
3	D-163-4	151	129	92	125	168	133	136	104	86	105	169	120
4	D-163-5	142	115	94	122	136	122	127	102	86	105	128	110
5	D-163-6	137	122	91	120	182	130	126	115	77	104	173	119
6	D-139-8	178	114	99	133	161	137	127	101	71	115	140	111
7	D-163-11	176	124	95	122	155	134	135	138	82	104	153	122
8	D-163-14	180	136	110	125	161	142	131	86	97	106	154	115
9	D-163-15	159	125	103	122	196	141	128	94	80	106	203	122
10	D-163-19	166	118	150	121	186	148	143	111	119	104	180	131
11	RP 6469-80	138	127	145	136	150	139	139	139	108	116	149	130
12	RP 6469-88	114	140	140	123	162	136	129	100	93	106	157	117
13	RP 6469-95	191	175	104	123	166	152	135	166	84	107	161	131
14	RP 6469-151	157	124	137	122	148	138	134	130	103	104	139	122
15	RP 6469-151a	187	160	98	136	160	148	145	173	83	115	139	131
	Mean	160	130	113	126	163	138	132	121	89	108	157	121
	LSD (Treat)							LSD (Treat x Variety)					ns
	LSD (Location x Treat)							LSD (Location x Treat x Variety)					ns
	LSD (Variety)							CV (%) Treat					10.85
	LSD (Location x Variety)												

Table 6.2.7 Influence of drought on Grain number/m² of elite rice cultures at different locations during *Kharif* 2024

S.No.	Genotypes	Irrigated						Grand Mean	Drought						Grand Mean
		CHN	CRR1	PTB	Ranchi	Rewa	RPUR		CHN	CRR1	PTB	Ranchi	Rewa	RPUR	
1	D-163-1	26394	17804	38345	22632	33332	74481	35498	23570	13205	17045	18452	25835	32039	21691
2	D-163-3	28935	22558	28895	26651	46365	41199	32434	21966	13713	13205	20168	38825	24022	21983
3	D-163-4	32644	28066	30675	23310	46240	66977	37985	21445	14903	14570	17906	36995	25082	21817
4	D-163-5	24645	22151	25185	22392	31464	37499	27223	25393	17427	17318	17651	25601	40505	23983
5	D-163-6	22190	25775	19775	21837	42310	78880	35128	20558	19906	11245	17840	30100	27663	21219
6	D-139-8	19432	16553	15480	26497	41360	45687	27502	24242	11055	9686	20638	30156	33085	21477
7	D-163-11	34340	26918	24021	23101	36759	53602	33123	25242	20257	11827	17577	29193	31417	22585
8	D-163-14	33859	19839	18275	23214	42034	38334	29259	24217	14983	15887	18065	31441	30249	22474
9	D-163-15	28638	24289	27985	22534	43520	47973	32490	23351	16024	14761	18227	34599	32145	23184
10	D-163-19	27127	23297	40103	21792	43252	85425	40166	17565	15278	26551	17934	31859	27539	22788
11	RP 6469-80	22059	18367	34114	27032	37468	34949	28998	20312	11828	20382	20630	32475	17191	20470
12	RP 6469-88	16618	23808	37888	22473	40647	18194	26605	20179	22099	16553	18103	39249	20654	22806
13	RP 6469-95	25086	27243	20969	22854	40191	51117	31243	24871	16256	9974	18235	29632	19344	19719
14	RP 6469-151	27955	17830	25734	22492	39980	39769	28960	21461	18224	17299	17898	27214	26607	21450
15	RP 6469-151a	28056	14361	22570	26610	39475	59097	31695	25913	18248	8736	20672	23088	29107	20961
	Mean	26532	21924	27334	23695	40293	51546	31887	22686	16227	15002	18666	31084	27776	21907
	LSD (Treat)								LSD (Treat x Variety)						ns
	LSD (Location x Treat)								LSD (Location x Treat x Variety)						8266.72**
	LSD (Variety)								CV (%) Treat						22.75
	LSD (Location x Variety)														

Table 6.2.8 Influence of drought on Spikelet number/m² of elite rice cultures at different locations during Kharif 2024

S.No.	Genotypes	Irrigated					Grand Mean	Drought					Grand Mean	
		CHN	CRR1	PTB	Ranchi	Rewa		CHN	CRR1	PTB	Ranchi	Rewa		
1	D-163-1	41786	30416	47385	25292	35302	36036	30635	31686	22943	20938	30952	27431	
2	D-163-3	42111	38139	42788	29611	54698	41469	27202	21970	20040	22839	53422	29094	
3	D-163-4	42935	42667	38250	25717	59105	41735	30350	30016	19848	20575	56144	31386	
4	D-163-5	39139	33926	38125	25294	38912	35079	33065	28824	23381	20505	38195	28794	
5	D-163-6	33976	38571	29980	24800	51406	35747	31815	31582	20760	20380	42259	29359	
6	D-139-8	47293	35831	25594	29613	48175	37301	27990	25011	17364	23498	40859	26944	
7	D-163-11	48416	39301	34617	25023	42089	37889	31114	40033	22964	20303	37536	30390	
8	D-163-14	45967	32799	23885	25843	47401	35179	30863	24855	23349	20739	40468	28055	
9	D-163-15	39022	36308	33118	25377	51923	37150	30396	25120	20302	20775	45605	28439	
10	D-163-19	42634	35519	46341	24712	51714	40184	32079	31548	37312	20483	43280	32940	
11	RP 6469-80	35987	30523	41704	29721	43871	36361	32783	24523	31717	23540	44216	31356	
12	RP 6469-88	28490	38255	49100	25138	46797	37556	33678	28958	28157	20772	51641	32641	
13	RP 6469-95	48735	37011	24947	25638	50498	37366	33047	31052	17523	20968	43355	29189	
14	RP 6469-151	41069	26550	36640	25098	45323	34936	28154	28949	25511	20448	36284	27869	
15	RP 6469-151a	45493	33231	31458	29755	46046	37196	31033	38212	22460	23305	33316	29665	
	Mean	41537	35270	36262	26442	47551	37412	30947	29489	23575	21338	42502	29570	
	LSD (Treat)							LSD (Treat x Variety)					ns	
	LSD (Location x Treat)							LSD (Location x Treat x Variety)					11120.43**	
	LSD (Variety)							CV (%) Treat					17.92	
	LSD (Location x Variety)													

Table 6.2.9 Influence of drought on Grain yield (g/m²) of elite rice cultures at different locations during *Kharif 2024*

S.No.	Genotypes	Irrigated						Grand Mean	Drought							Grand Mean
		CHN	CRRI	FZB	PTB	Ranchi	Rewa		CHN	CRRI	FZB	PTB	Ranchi	Rewa	RPUR	
1	D-163-1	346	200	569	427	413	595	410	238	154	405	185	354	467	287	299
2	D-163-3	280	187	586	321	446	646	394	227	204	477	219	373	576	243	331
3	D-163-4	411	256	592	305	414	638	420	183	198	487	179	343	521	225	305
4	D-163-5	321	302	592	288	416	478	379	273	153	428	141	354	389	258	285
5	D-163-6	260	239	528	527	417	655	429	273	234	382	231	339	560	269	327
6	D-139-8	294	221	511	196	439	658	378	212	102	393	159	375	475	310	289
7	D-163-11	361	218	532	344	415	567	402	250	189	380	253	343	453	238	301
8	D-163-14	377	248	557	166	420	613	383	233	163	375	152	348	545	287	300
9	D-163-15	373	240	473	207	417	744	404	250	197	366	157	348	628	276	317
10	D-163-19	383	228	576	296	416	610	418	253	160	390	253	342	552	290	320
11	RP 6469-80	284	185	455	396	441	553	380	257	165	345	134	371	479	309	294
12	RP 6469-88	146	303	480	450	416	678	380	247	277	359	193	347	575	146	306
13	RP 6469-95	293	283	545	176	412	662	384	216	220	379	158	350	531	280	305
14	RP 6469-151	448	235	430	223	415	615	386	287	217	315	205	348	440	293	301
15	RP 6469-151a	346	189	473	207	438	631	382	248	194	343	130	371	331	314	276
	Mean	328	236	526	302	422	623	395	243	188	388	183	354	501	268	304
	LSD (Treat)								LSD (Treat x Variety)							ns
	LSD (Location x Treat)								LSD (Location x Treat x Variety)							59.46**
	LSD (Variety)								CV (%) Treat							10.04
	LSD (Location x Variety)															

Table 6.2.10 Influence of drought on 1000 weight (g) of elite rice cultures at different locations during Kharif 2024

S.No.	Genotypes	Irrigated						Grand Mean	Drought						Grand Mean
		CHN	CRRI	PTB	Ranchi	Rewa	RPUR		CHN	CRRI	PTB	Ranchi	Rewa	RPUR	
1	D-163-1	18.3	14.7	19.9	23.0	24.6	16.8	19.5	17.4	13.3	16.8	19.7	24.0	17.6	18.1
2	D-163-3	17.2	16.1	17.2	23.3	20.1	17.5	18.6	16.8	15.5	15.1	20.3	18.2	18.2	17.4
3	D-163-4	16.9	15.7	19.8	22.3	20.0	17.1	18.6	16.4	15.0	15.9	19.6	18.6	17.8	17.2
4	D-163-5	17.8	14.8	17.6	23.3	21.4	17.0	18.7	17.1	15.8	16.2	19.2	19.5	17.3	17.5
5	D-163-6	21.2	15.5	19.6	22.3	22.4	18.5	19.9	16.3	16.2	15.8	20.1	20.4	17.6	17.7
6	D-139-8	19.0	15.5	21.6	23.0	20.9	20.5	20.1	20.0	15.6	18.5	19.9	19.0	21.4	19.1
7	D-163-11	13.8	16.6	17.6	22.7	21.7	13.3	17.6	18.1	15.7	17.2	19.1	20.8	19.1	18.3
8	D-163-14	20.6	13.9	19.9	22.9	21.3	17.5	19.3	13.3	15.2	14.8	19.7	20.6	18.3	17.0
9	D-163-15	18.8	16.0	20.0	22.9	23.4	18.3	19.9	19.8	16.7	16.1	20.1	22.2	18.3	18.8
10	D-163-19	20.0	16.3	18.1	22.5	22.4	17.3	19.4	16.1	15.2	17.9	20.5	20.5	19.0	18.2
11	RP 6469-80	23.2	19.6	24.8	22.9	21.9	20.6	22.2	20.2	21.6	20.8	20.3	19.0	23.6	20.9
12	RP 6469-88	19.9	19.3	21.7	22.7	22.2	18.5	20.7	21.8	16.6	18.7	18.5	19.5	18.1	18.9
13	RP 6469-95	17.7	18.7	19.9	22.7	23.7	19.4	20.3	17.1	17.8	17.9	19.0	21.8	19.7	18.9
14	RP 6469-151	18.0	17.7	20.0	23.0	21.9	17.5	19.7	18.9	16.9	18.5	19.2	20.4	18.5	18.7
15	RP 6469-151a	19.6	13.9	18.6	22.9	20.3	15.7	18.5	17.5	15.0	13.6	20.4	18.5	17.9	17.1
	Mean	18.8	16.3	19.8	22.8	21.9	17.7	19.5	17.8	16.1	16.9	19.7	20.2	18.8	18.3
	LSD (Treat)								LSD (Treat x Variety)						ns
	LSD (Location x Treat)								LSD (Location x Treat x Variety)						3.37**
	LSD (Variety)								CV (%) Treat						6.75
	LSD (Location x Variety)														

Table 6.2.11 Influence of drought on total dry matter (g/m²) of elite rice cultures at different locations during *Kharif* 2024

S.No.	Genotypes	Irrigated						Grand Mean	Drought						Grand Mean
		CHN	CRR1	PTB	Ranchi	Rewa	RPUR		CHN	CRR1	PTB	Ranchi	Rewa	RPUR	
1	D-163-1	798	874	1117	1057	1199	1076	1020	717	644	711	967	993	893	821
2	D-163-3	806	1013	996	1115	1264	1021	1036	778	652	847	1024	1170	843	886
3	D-163-4	962	1012	808	1049	1232	984	1008	664	693	610	960	1048	950	821
4	D-163-5	893	828	815	1056	997	981	928	679	669	651	958	892	964	802
5	D-163-6	853	1055	1054	1065	1283	1096	1068	784	920	734	976	1158	759	888
6	D-139-8	941	895	990	1115	1306	1078	1054	736	582	785	1022	1084	1104	885
7	D-163-11	903	1015	865	1038	1047	1019	981	714	743	804	966	927	804	826
8	D-163-14	747	1018	1055	1052	1195	1065	1022	798	728	839	967	1112	962	901
9	D-163-15	928	994	1008	1056	1444	880	1052	837	791	782	956	1308	978	942
10	D-163-19	1090	1030	1238	1071	1239	1147	1136	784	696	986	963	1148	921	916
11	RP 6469-80	841	883	1270	1118	1074	967	1025	708	686	859	1015	992	857	853
12	RP 6469-88	686	1033	1049	1044	1329	751	982	739	849	767	979	1127	604	844
13	RP 6469-95	859	892	882	1046	1315	765	960	744	716	634	969	1176	734	829
14	RP 6469-151	968	779	1040	1055	1188	998	1005	790	762	732	970	999	828	847
15	RP 6469-151a	884	650	1018	1113	1229	1059	992	827	641	603	1018	872	790	792
	Mean	877	931	1014	1070	1223	992	1018	753	718	756	981	1067	866	857
	LSD (Treat)								LSD (Treat x Variety)						ns
	LSD (Location x Treat)								LSD (Location x Treat x Variety)						149.90**
	LSD (Variety)								CV (%) Treat						9.46
	LSD (Location x Variety)														

Table 6.2.12 Influence of drought on harvest index (%) of elite rice cultures at different locations during *Kharif* 2024

S.No.	Genotypes	Irrigated						Grand Mean	Drought						Grand Mean
		CHN	CRRI	PTB	Ranchi	Rewa	RPUR		CHN	CRRI	PTB	Ranchi	Rewa	RPUR	
1	D-163-1	43.5	23.0	38.2	39.1	49.7	29.4	37.1	33.3	23.9	26.1	36.6	47.0	32.2	33.2
2	D-163-3	35.0	18.5	32.3	40.0	51.1	28.9	34.3	29.3	31.3	26.0	36.5	49.2	28.8	33.5
3	D-163-4	43.9	25.3	37.9	39.5	51.9	33.2	38.6	27.7	28.2	29.6	35.8	49.8	23.7	32.4
4	D-163-5	36.3	36.5	35.3	39.4	47.9	26.3	37.0	40.9	22.5	21.7	37.0	43.6	26.7	32.1
5	D-163-6	30.6	22.7	50.0	39.2	51.1	34.2	38.0	34.8	25.1	31.5	34.8	48.5	35.4	35.0
6	D-139-8	31.8	24.6	19.8	39.4	50.4	30.4	32.7	29.3	16.9	20.3	36.7	43.8	28.2	29.2
7	D-163-11	40.0	21.4	39.8	40.0	54.1	37.5	38.8	35.3	25.5	31.5	35.5	48.7	29.6	34.4
8	D-163-14	53.9	24.3	15.8	39.9	51.3	28.2	35.6	29.8	21.8	18.1	36.0	49.1	29.8	30.8
9	D-163-15	40.4	24.1	20.5	39.4	51.5	42.8	36.5	30.2	25.0	20.1	36.4	48.1	28.2	31.3
10	D-163-19	35.8	22.1	23.9	38.9	49.2	36.6	34.4	32.4	22.3	25.7	35.5	48.1	31.5	32.6
11	RP 6469-80	34.4	20.9	31.2	39.5	51.6	36.3	35.6	36.8	24.0	15.6	36.6	48.2	36.0	32.9
12	RP 6469-88	22.1	29.3	42.9	39.8	51.0	25.1	35.1	33.7	31.6	25.3	35.4	51.0	23.9	33.5
13	RP 6469-95	34.9	31.1	20.0	39.4	50.3	41.7	36.2	29.3	30.9	24.9	36.2	45.2	38.1	34.1
14	RP 6469-151	48.5	30.0	21.5	39.3	51.7	33.7	37.5	37.7	28.5	28.0	35.9	43.9	35.3	34.9
15	RP 6469-151a	39.3	29.1	20.5	39.4	51.4	36.6	36.1	30.2	30.3	21.7	36.5	38.1	39.7	32.7
	Mean	38.0	25.5	30.0	39.5	50.9	33.4	36.2	32.7	25.8	24.4	36.1	46.8	31.2	32.8
	LSD (Treat)								LSD (Treat x Variety)						ns
	LSD (Location x Treat)								LSD (Location x Treat x Variety)						7.65**
	LSD (Variety)								CV (%) Treat						14.26
	LSD (Location x Variety)														

Table 6.2.13 Drought tolerance indices of different genotypes across locations during Kharif 2024

S.No.	Genotype	DSI	RDI	DTI	GMP	TOL	MP	YI	YSI	DI	SDI	HM	K1STI	K2STI
1	D-163-1	0.94	1.02	1.03	347.5	-111.1	354.1	0.98	0.74	0.75	0.16	341.4	1.43	1.49
2	D-163-3	0.53	1.18	1.17	360.6	-63.0	362.7	1.09	0.85	0.93	0.09	358.5	1.40	1.91
3	D-163-4	1.01	1.00	1.13	355.8	-115.2	362.8	1.00	0.72	0.77	0.18	349.1	1.52	1.67
4	D-163-5	0.91	1.04	0.92	326.4	-94.4	332.2	0.94	0.75	0.74	0.16	321.0	1.22	1.38
5	D-163-6	0.73	1.11	1.17	371.0	-101.8	377.8	1.08	0.80	0.88	0.13	364.6	1.58	1.77
6	D-139-8	0.87	1.05	0.99	329.0	-88.8	333.8	0.95	0.76	0.76	0.15	324.5	1.30	1.49
7	D-163-11	0.89	1.04	1.01	347.2	-101.7	351.5	0.99	0.75	0.75	0.14	343.0	1.35	1.46
8	D-163-14	0.75	1.10	1.03	337.6	-82.5	341.7	0.99	0.79	0.80	0.13	333.6	1.31	1.60
9	D-163-15	0.79	1.08	1.17	357.6	-87.2	360.9	1.04	0.78	0.83	0.13	354.3	1.48	1.81
10	D-163-19	0.87	1.05	1.15	364.9	-98.5	369.2	1.05	0.76	0.82	0.14	360.6	1.49	1.74
11	RP 6469-80	0.78	1.09	0.94	331.1	-86.2	337.4	0.97	0.78	0.80	0.14	325.6	1.22	1.48
12	RP 6469-88	0.39	1.23	1.04	336.0	-73.5	342.9	1.01	0.89	0.92	0.10	329.5	1.34	1.68
13	RP 6469-95	0.68	1.12	1.05	341.3	-79.2	344.2	1.00	0.81	0.81	0.11	338.4	1.34	1.60
14	RP 6469-151	0.68	1.12	0.97	339.6	-85.3	343.2	0.99	0.81	0.79	0.11	336.0	1.28	1.43
15	RP 6469-151a	0.88	1.05	0.89	322.6	-105.8	328.7	0.91	0.76	0.68	0.15	316.8	1.29	1.23

Table 6.2.14 Ranking of elite rice cultures based on drought tolerance indices across locations during *Kharif 2024*

S.No.	Genotype	DSI	RDI	DTI	GMP	TOL	MP	YI	YSI	DI	SDI	HM	K1STI	K2STI	Overall Rank
1	D-163-1	2	14	8	6	14	6	11	14	13	3	7	5	10	9
2	D-163-3	14	2	2	3	1	4	1	2	1	15	3	6	1	1
3	D-163-4	1	15	5	5	15	3	6	15	10	1	5	2	6	5
4	D-163-5	3	13	14	14	9	14	14	13	14	2	14	15	14	14
5	D-163-6	11	5	3	1	12	1	2	5	3	9	1	1	3	2
6	D-139-8	7	9	11	13	8	13	13	9	11	4	13	11	9	12
7	D-163-11	4	12	10	7	11	7	8	12	12	6	6	7	12	10
8	D-163-14	10	6	9	10	4	11	10	6	7	10	10	10	7	8
9	D-163-15	8	8	1	4	7	5	4	8	4	11	4	4	2	4
10	D-163-19	6	10	4	2	10	2	3	10	5	7	2	3	4	3
11	RP 6469-80	9	7	13	12	6	12	12	7	8	8	12	14	11	12
12	RP 6469-88	15	1	7	11	2	10	5	1	2	14	11	8	5	6
13	RP 6469-95	12	4	6	8	3	8	7	4	6	13	8	9	8	7
14	RP 6469-151	13	3	12	9	5	9	9	3	9	12	9	13	13	11
15	RP 6469-151a	5	11	15	15	13	15	15	11	15	5	15	12	15	15

Table 6.2.15 Selection for high yield and stability of performance under rainfed conditions during *Kharif* 2024

S.No.	Genotypes	Mean Yield under drought (g/m ²)	Yield Rank (Y _n)	Adj.-rank	Adjustment to Yield Rank (Y _n)	Stability Variance (σ^2)	Stability Rating	YSi = (Y+S)	
1	D-163-1	298.6	5	-3	2	1167.4	-8	-6	
2	D-163-3	331.2	15	3	18	5777.0	-8	10	+
3	D-163-4	305.2	10	3	13	8650.2	-8	5	+
4	D-163-5	285.0	2	-3	-1	8640.7	-8	-9	
5	D-163-6	326.9	14	3	17	2509.7	-8	9	+
6	D-139-8	289.4	3	-3	0	5585.6	-8	-8	
7	D-163-11	300.7	8	-3	5	4319.8	-8	-3	
8	D-163-14	300.5	6	-3	3	1887.5	-8	-5	
9	D-163-15	317.3	12	3	15	8784.9	-8	7	+
10	D-163-19	320.0	13	3	16	3607.5	-8	8	+
11	RP 6469-80	294.3	4	-3	1	3472.6	-8	-7	
12	RP 6469-88	306.2	11	3	14	16270.3	-8	6	+
13	RP 6469-95	304.6	9	2	11	1518.0	-8	3	+
14	RP 6469-151	300.6	7	-3	4	6928.4	-8	-4	
15	RP 6469-151a	275.8	1	-3	-2	17399.2	-8	-10	
	Yield Mean	303.7			+Selected genotypes				
	YS Mean	-0.267	LSD (0.05): 0.684		Kang, M.S. 1993. Agronomy Journal. 85:754-757				

6.3 Screening for high temperature tolerance in rice genotypes

Locations: IIRR, KAUL, MTU, PNR, PTB, REWA & TTB

Global warming has resulted in increase in extreme environmental events such as high and/or erratic rainfall, drought, and high temperatures than normal across globe. These environmental events are causing abiotic stress like drought stress, heat stress, cold stress, and salinity stress etc. Among these stresses, rice is vulnerable to heat stress or high temperature stress at all the stages particularly at flowering stage or reproductive stage. Heat stress causes adverse effects on rice production particularly via pollen mortality among others. However, rice germplasm varies in heat stress tolerance. Some of the heat stress tolerant genotypes tolerate/mitigate heat stress by using some physiological and biochemical mechanisms that can help in mitigating heat stress. Thus, understanding morpho-physiological parameters/mechanisms involved in mitigation/tolerance of heat stress in rice is the way forward. The objective of this trial is to phenotype rice cultivars for high temperature tolerance and to understand the impact of high temperature stress on rice. Therefore, a trial was conducted in 7 AICRIP centres with 23 entries. Heat stress was imposed by enclosing the field grown crop with transparent polyethylene sheet supported by metal or bamboo frame. Enclosing the field crop during reproductive phase with polythene sheet had resulted in significant increase in temperature. The temperature inside the polythene tunnel was recorded until the crop was harvested.

At reproductive stage, the maximum temperature recorded at IIRR center outside the polytunnel is in the range of 27 to 34 °C whereas the same inside the polytunnel was 15 to 20 °C higher than ambient temperature recorded during *the* same period. The minimum temperature inside the polytunnel and ambient was almost similar (Fig 6.3.1). The maximum temperature inside the tunnel has ranged from 35-50°C during PI to maturity stage at IIRR center. Although there is wide variation among genotypes for flowering time, rice flowering typically takes place approximately between 8:00 to 11:00 hours. However, day time maximum temperature is recorded at about 15:00 hours. This means, temperature gradually increases from morning to afternoon until at about 15:00 hours. Therefore, during flowering time i.e. during 8:00 to 11:00 hours temperature typically reaches in the range of 35 to 40°C, which causes adverse effects on rice flowering.

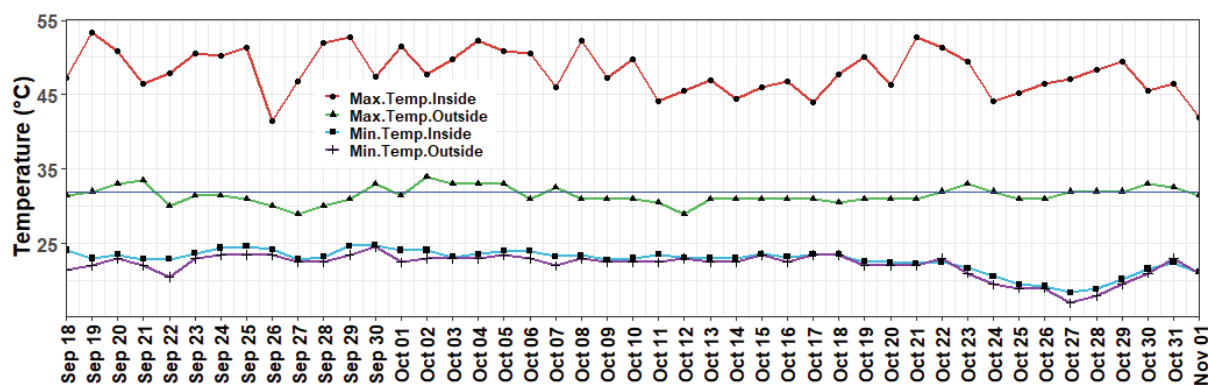


Fig 6.3.1 Maximum and minimum temperatures recorded between PI and maturity stages of rice crop inside and outside of the polythene tunnel at IIRR, Hyderabad during Kharif 2024. Horizontal blue line represents the threshold high temperature (32°C) for rice.

At Maruteru centre, the maximum ambient temperature was 28 to 35°C and the maximum temperature inside the polytunnel was ranging from 34 to 37°C barring few days. The minimum ambient temperature was about 28 °C during PI stage, which further gradually decreased to about 23 °C during maturity stage. The minimum temperature inside polytunnel also followed the same trend only it was 2-4 °C higher than the ambient.

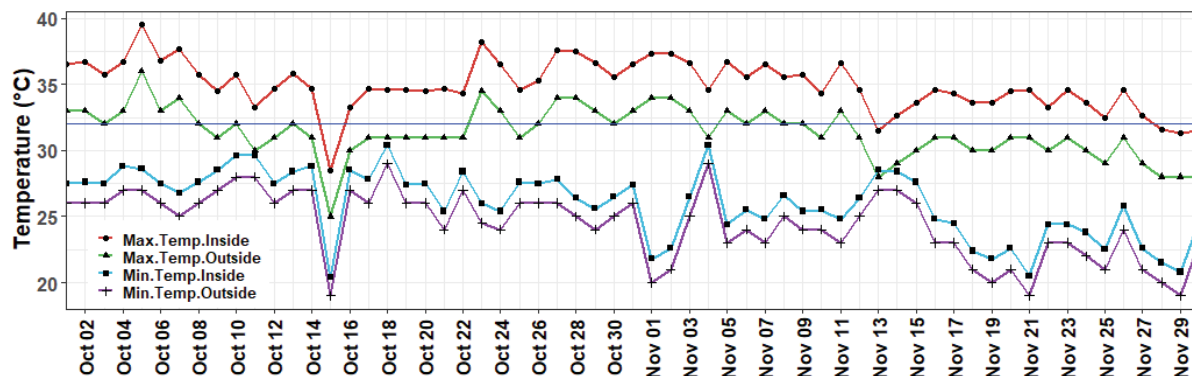


Fig 6.3.2 Maximum and minimum temperatures recorded between PI and maturity stages of rice crop inside and outside of the polythene tunnel at Maruteru during Kharif 2024. Horizontal blue line represents the threshold high temperature (32°C) for rice.

At Pantnagar, the maximum ambient temperature ranging from 27-35 °C during PI stage and gradually it stabilized at about 32 °C during maturity stage, however, the maximum temperature inside polytunnel was ranging from 37-48 °C during PI stage and gradually it reduced to 36-45 °C during maturity stage. The minimum ambient temperature was ranging from 20 -27 °C during PI stage and further reduced to 15-22 °C during maturity stage. The

minimum temperature inside the polytunnel also followed the similar trend, only it was 2-4 °C higher than the ambient minimum temperature.

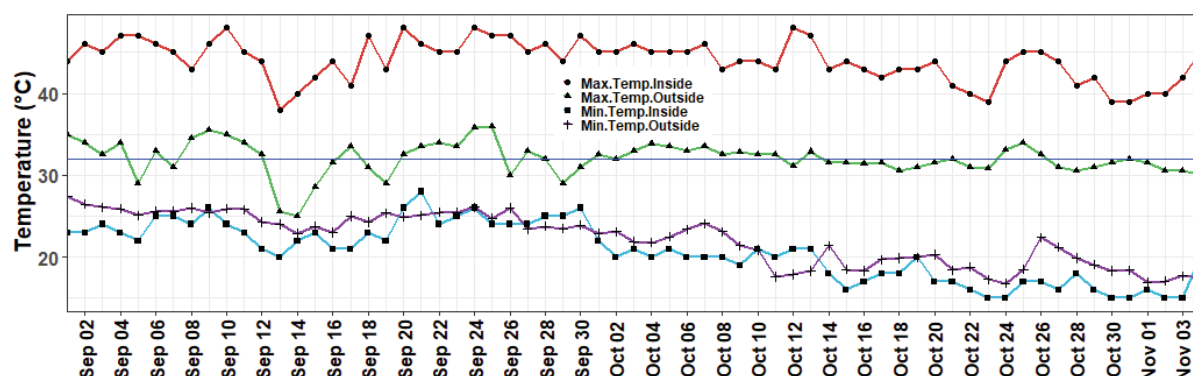


Fig 6.3.3 Maximum and minimum temperatures recorded between PI and maturity stages of rice crop inside and outside of the polythene tunnel at Pantnagar during Kharif 2024. Horizontal blue line represents the threshold high temperature (32°C) for rice.

At Pattambi centre, the maximum ambient temperature was varying from 29-34 °C during both PI and maturity stage whereas the maximum temperature inside polytunnel was ranging from 37-45 °C during both PI and maturity stage. Therefore, the treatment temperature was higher than the ambient by about 8-9 °C during both PI and maturity stages. The minimum ambient temperature was ranging from 20-24 °C and that inside polytunnel was ranging from 23-26 °C during both the PI and maturity stages.

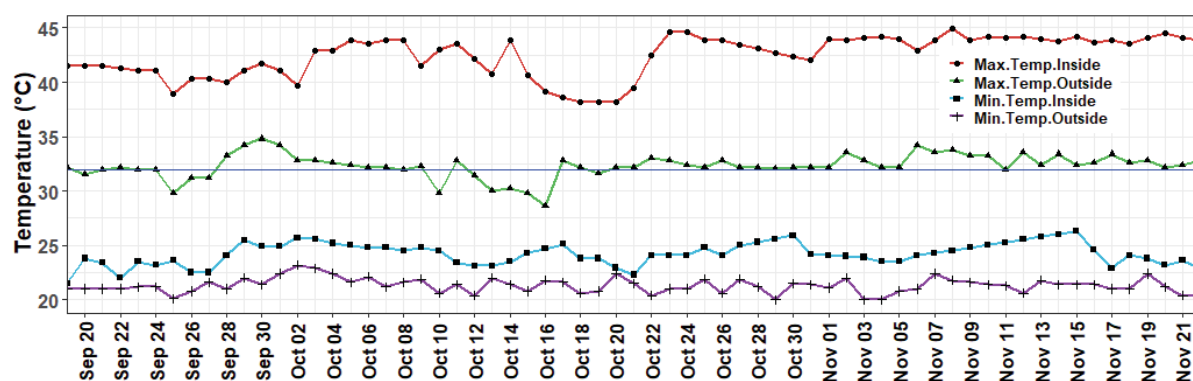


Fig 6.3.4 Maximum and minimum temperatures recorded between PI and maturity stages of rice crop inside and outside of the polythene tunnel at Pattambi, Kerala during Kharif 2024. Horizontal blue line represents the threshold high temperature (32°C) for rice.

At Rewa centre, the maximum ambient temperature was ranging from 27-35 °C during PI stage and then it further reduced to 25-29 °C during maturity stage. The maximum temperature inside

polytunnel was 32-40 °C during PI stage and then it further reduced to 29-35 °C during maturity stage. Therefore, the treatment temperature was 2-5 °C higher than the ambient temperature. The minimum ambient temperature was ranging from 20-25 °C during PI stage and further it reduced to 10-20 °C during maturity stage.

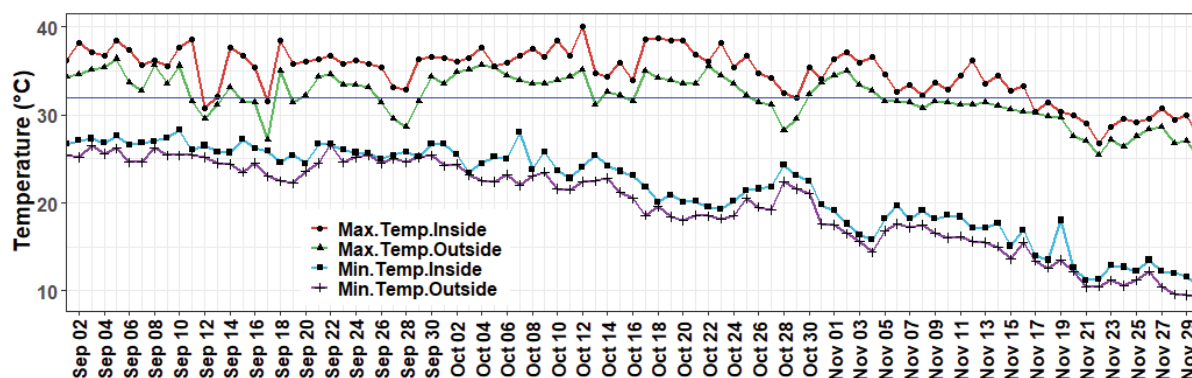


Fig 6.3.5 Maximum and minimum temperatures recorded between PI and maturity stages of rice crop inside and outside of the polythene tunnel at Rewa during Kharif 2024. Horizontal blue line represents the threshold high temperature (32°C) for rice.

High temperature stress did not significantly affect the days to flowering (Table 6.3.1). It ranged from 79 days at Titabar to 94 days at Maruteru with an overall mean of 86 days across all the locations in control whereas it ranged from 79 days at Pattambi and Titabar to 93 days at Maruteru with an overall mean of 85 days across all the locations in heat stress. In control, among entries, IET 31433 (60 days) followed closely by IET 30660 (62 days) at Titabar centre required the least number of days to flowering whereas IET 31433 (109 days) followed by IET 31540 (100 days) at Rewa center recorded the highest number of days to flowering. In heat stress, IET 31433 (60 days) followed closely by IET 30660 (62 days) at Titabar centre required the least number of days to flowering whereas IET 31433 (108 days) followed by IET 31540 (100 days) at Rewa center recorded the highest number of days to flowering. Heat stress has no significant effect on days to flowering, however, entries differed significantly and the interaction between Location x Treat, Location x Variety and Location x Treat x Variety were statistically significant except Treat x Variety (Table 6.3.1).

In case of days to maturity, heat stress significantly affected the rice entries (Table 6.3.2). The interactions between Location x Treat, Location x Variety, Treat x Variety and Location x Treat x Variety were statistically significant. In control, mean days to maturity ranged from 112 days (at Rewa and Titabar) to 136 days (at Pattambi) whereas in case of heat stress it ranged from

109 (at Rewa center) to 130 days (at Pattambi). Among entries in control, IET 31433 (93 days) followed closely by IET 30660 (95 days) at Titabar centre required the least number of days to maturity whereas IET30635 (143 days) at Pattambi followed by IET30653, IET31440, IET 31510, IET 31533, IET 31540 at Pattambi center, IET 30660 and IET 31533 (139 days) at Pantnagar required the highest number of days to maturity. In heat stress, IET 31433 (93 days) followed closely by Co-51 (94 days) at Titabar required the least number of days to maturity whereas IET 30635 (135 days) followed by IET 30505, IET 31510 and IET 31533 (133 days) at Pattambi required the highest number of days to maturity.

Table 6.3.3 shows plant height (cm) as influence by heat stress at flowering stage. Heat stress treatment did not significantly affect plant height of entries; however, entries differed significantly at different locations. Therefore, interactions between Location x Treat, Location x Variety, Treat x Variety and Location x Treat x Variety were statistically significant. In control, mean plant height ranged from 98 cm at IIRR to 116 cm at Rewa with an overall mean of 107 cm whereas in heat stress, it ranged from 98 cm at Kaul followed closely by IIRR (99 cm) to 125 cm at Maruteru with an overall mean of 110 cm.

Mean leaf weight (g/m^2) ranged from 107 g/m^2 at Maruteru to 295 g/m^2 at Rewa with an overall mean of 192 g/m^2 in control; whereas in heat stress, it ranged from 94 g/m^2 at Maruteru center to 272 g/m^2 at Rewa center with an overall mean of 164 g/m^2 (Table 6.3.4). Heat stress did not significantly influence leaf weight of entries, they differed location wise and among themselves.

Mean stem weight (g/m^2) ranged from 289 g/m^2 at Titabar to 595 g/m^2 at IIRR with an overall mean of 435 g/m^2 in control; whereas in heat stress, it ranged from 248 g/m^2 at Titabar to 557 g/m^2 at IIRR with an overall mean of 382 g/m^2 (Table 6.3.5). Among entries, CO-51 (205 g/m^2) recorded the lowest stem weight followed closely by IET 30660 (206 g/m^2) at Titabar whereas IET 30635 (737 g/m^2) followed closely by IET 31444 (733 g/m^2) at IIRR recorded the highest stem weight in control. In heat stress, CO-51 (163 g/m^2) at Titabar recorded the lowest stem weight whereas IET 30660 (667 g/m^2) at IIRR recorded the highest stem weight. Heat stress has significant effect on the entries. Interactions between Location x Treat, Location x Variety and Location x Treat x Variety were also statistically significant.

Mean panicle weight (g/m^2) of entries in control varied from 52 g/m^2 at Maruteru to 217 g/m^2 at Pattambi with an overall mean of 151 g/m^2 (Table 6.3.6). In heat stress, it ranged from 46

g/m² at Maruteru followed by 113 g/m² at Titabar, 152 g/m² at IIRR to 169 g/m² at Rewa followed by with an overall mean of 122 g/m². Heat stress treatment did not significantly influenced the panicle weight of entries.

Mean total dry matter at different locations ranged from 526 g/m² at Maruteru to 992 g/m² at Rewa with a grand mean of 591 g/m² in control (Table 6.3.7). In heat stress, it ranged from 465 g/m² at Maruteru followed by 548 g/m² at Pantnagar, 913 g/m² at IIRR to 964 g/m² at Rewa with a grand mean of 668 g/m². Heat stress did not significantly affect the total dry matter of the entries; however, entries differed significantly at differed locations.

Table 6.3.8 shows the influence of heat stress on SPAD value of entries at flowering stage. Mean SPAD value of entries ranged from 25.4 at Rewa to 42.7 at Kaul with a grand mean of 36.2 in control. In heat stress, it ranged from 24.0 at Rewa to 43.1 at IIRR with a grand mean of 36.5. Heat stress did not significantly influenced the SPAD values of entries; however, total chlorophyll content (mg/g fr.wt) was affected. Mean total chlorophyll content ranged from 1.82 (mg/g fr.wt) at Pantnagar to 3.22 (mg/g fr.wt) at Pattambi with a grand mean of 2.53 (mg/g fr.wt) in control (Table 6.3.8). In stress treatment, it ranged from 1.35 (mg/g fr.wt) at Pantnagar to 2.52 (mg/g fr.wt) at Pattambi with a grand mean of 1.98 (mg/g fr.wt).

Mean leaf area index (LAI) varied from 3.3 at IIRR to 5.2 at Rewa with a grand mean of 4.0 in control whereas in heat stress, it ranged from 2.7 at Pantnagar to 4.1 at Rewa with a grand mean of 3.3 (Table 6.3.9). Heat stress did not significantly influence the LAI of entries; thought entries varied significantly locations wise.

In control, mean shoot weight (g/m²) ranged from 447 g/m² at Titabar to 1102 g/m² at Pattambi with a grand mean of 693 g/m² whereas in heat stress, it ranged from 370 g/m² at Titabar to 1002 g/m² at Pattambi with a grand mean of 613 g/m² (Table 6.3.10). Heat stress did not significantly influence the shoot weight of entries. In terms of percent change over control, IET 31440 has shown 1% change over control in shoot weight and CO-51 has the highest reduction (-25%) followed by NDR-97 (-20%) (Fig 6.3.6A). Among the centers, the greatest reduction in shoot weight with heat stress over control was recorded at Pantnagar and the least at IIRR (Fig 6.3.6B).

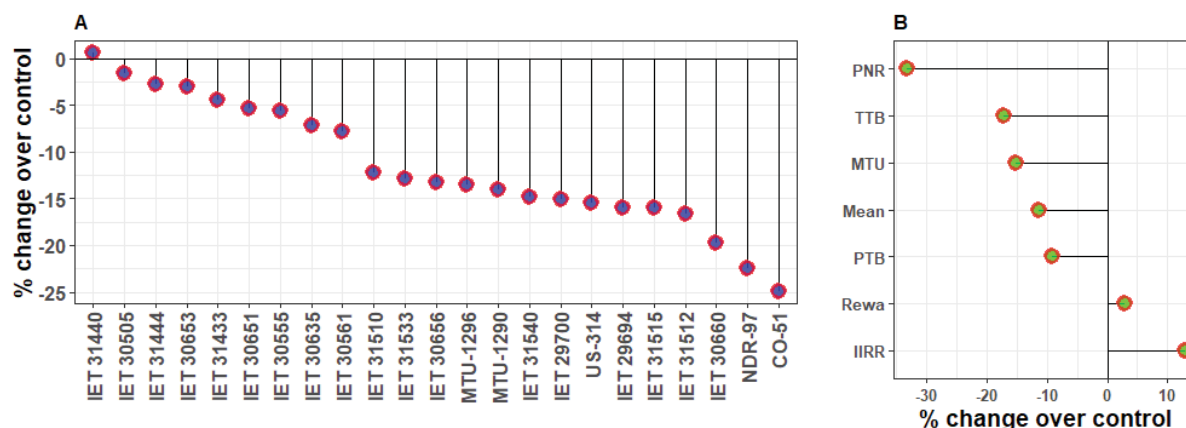


Fig 6.3.6 Influence of elevated temperature on shoot weight (g/m^2) recorded at maturity. Each bar represents percent change in shoot weight under elevated temperature in comparison with control (A) mean of all locations, (B) mean of all genotypes.

Table 6.3.11 shows the data for influence of heat stress on the panicle weight (g/m^2) at maturity stage. Mean panicle weight varied from 71 g/m^2 at Kaul to 1026 g/m^2 at Pattambi with a grand mean of 640 g/m^2 in control; whereas, it ranged from 52 g/m^2 at Kaul to 932 g/m^2 at Pattambi with a grand mean of 429 g/m^2 in heat stress. Heat stress has significantly influenced the panicle weight of entries. Interactions between Location x Treat, Location x Variety and Location x Treat x Variety were also statistically significant. Among entries, US-314 (48 g/m^2) at Kaul recorded the lowest panicle weight followed closely by IET 30653 (52 g/m^2) at Kaul whereas the IET 30635 (1203 g/m^2) followed by IET 31440 (1168 g/m^2) at Pattambi recorded the highest panicle weight in control. In heat stress, NDR-97 (23 g/m^2) at Kaul recorded the lowest panicle weight followed by IET 31515 (24 g/m^2) at Kaul whereas IET 30555 (1254 g/m^2) at Pattambi recorded the highest panicle weight followed by IET30561 (1236 g/m^2) at Pattambi.

Mean panicle number per sq.mt. ranged from 235 at Rewa to 472 at Maruteru with a grand mean of 345 in control (Table 6.3.12). In heat stress, it ranged from 217 at Pantnagar followed by 219 at Rewa to 415 at Maruteru followed by 378 at Pattambi with a grand mean of 309. Heat stress did not significantly affect the panicle number per sq.mt. Percent change in panicle number with heat stress over control (Fig 6.3.7A) shows that IET 31510 has shown the least reduction (-1.5%) followed by IET 30651 (-2.5%) and IET29694 has shown the highest reduction of -22%. The highest reduction in panicle number with heat stress over control was recorded at Pantnagar (-31%) followed by Pattambi center (-16%) and least reduction in panicle number with heat stress over control was recorded at Kaul (0.5%) followed by Rewa (-7%).

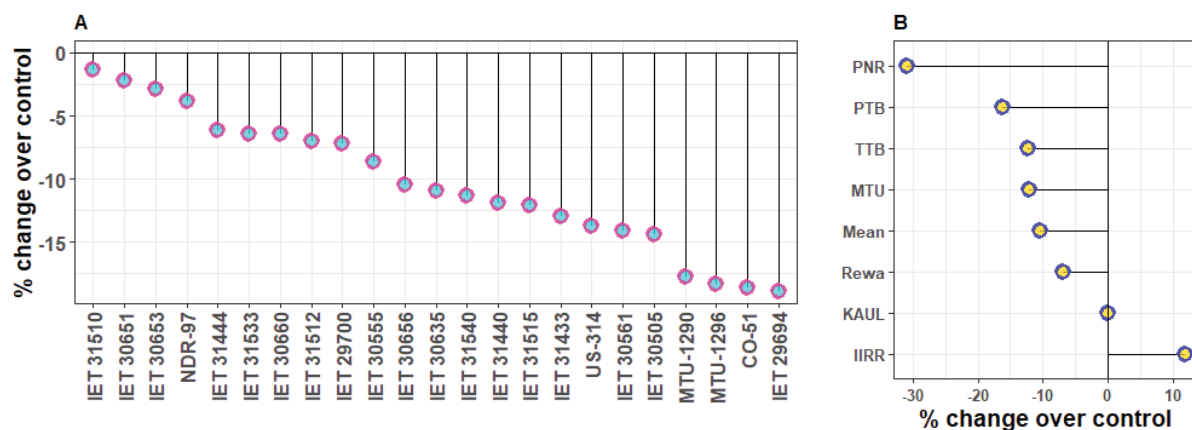


Fig 6.3.7 Influence of elevated temperature on panicle number/m² recorded at maturity. Each bar represents percent change in panicle number under elevated temperature in comparison with control (A) mean of all locations, (B) mean of all genotypes.

Mean grain number per panicle ranged from 101 at Titabar followed closely by 102 at Kaul to 162 at Pantnagar with a grand mean of 127 in control. In heat stress, it ranged from 28 at Rewa followed 75 at IIRR, 116 at Maruteru to 119 at Pattambi with a grand mean of 86 (Table 6.3.13). Heat stress has significantly affected the grain number per panicle. Interactions between Location x Treat, Location x Variety and Location x Treat x Variety were also statistically significant. Significant variation was noticed among the entries. In control, NDR-97 at IIRR (52) recorded the lowest grain number per panicle followed by the same entry (57) at Pantnagar whereas IET 29694 (234) at Pantnagar has recorded the highest grain number per panicle followed closely by IET 31540 (233) at Maruteru. In heat stress, IET 30656 at Rewa recorded the lowest grain number per panicle (10) followed closely by IET 30555 (11), IET 30635 (11) and IET 30660 (11) at Rewa whereas IET 31533 (190) at Pattambi recorded the highest grain number per panicle followed by IET 31540 (173) at Maruteru. In terms of percent change over control, IET 31512 has shown least reduction (-19.5%) with heat stress in grain number per panicle and IET 30505 has the highest reduction (-45%) followed by NDR-97 (-39%) over control (Fig 6.3.8A). Among the centers, the greatest reduction in grain number per panicle with heat stress over control was recorded at Rewa and the least at Pattambi (Fig 6.3.8B).

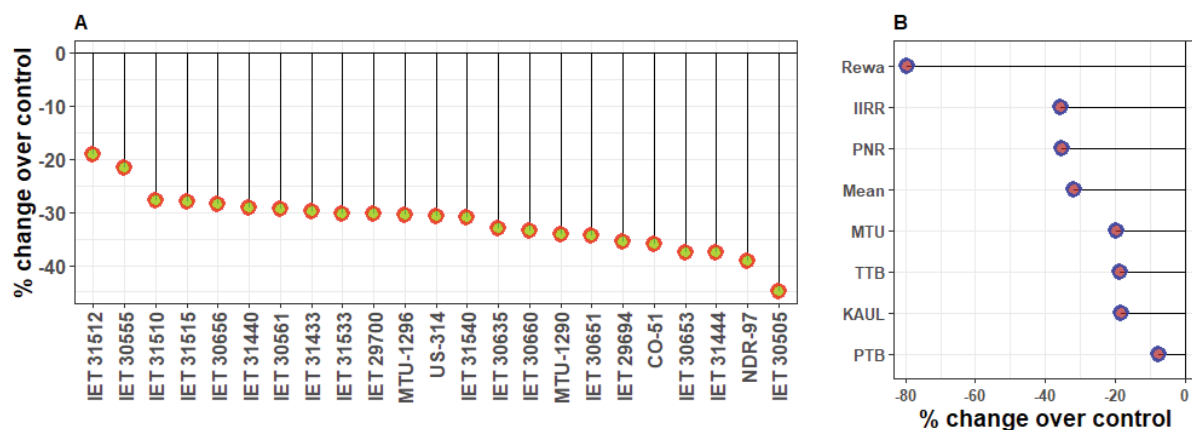


Fig 6.3.8 Influence of elevated temperature on grain number per/panicle recorded at maturity. Each bar represents percent change in grain number under elevated temperature in comparison with control (A) mean of all locations, (B) mean of all genotypes.

Mean spikelet number per panicle in control ranged from 133 at Titabar to 209 at Pantnagar with a grand mean of 153 (Table 6.3.14). In heat stress, it ranged from 129 at Titabar followed by 136 at IIRR as well as Pattambi to 156 at Rewa with a grand mean of 142. Heat stress has no significant effect on the spikelet number per panicle however, entries differed significant at different locations.

Mean grain number per sq.mt. (Table 6.3.15) ranged from 3351 at Kaul to 67876 at Maruteru with a grand mean of 39893 in control. In heat stress, it ranged from 2736 at Kaul followed by 4782 at Rewa to 47817 at Maruteru with a grand mean of 24625. Heat stress has significantly affected grain number per sq.mt. and significant variation was noticed among the entries. Interactions between Location x Treat, Location x Variety and Location x Treat x Variety were also statistically significant.

Mean grain yield (g/m^2) in control ranged from 453 g/m^2 at Pantnagar to 718 g/m^2 at Pattambi with a grand mean of 573 g/m^2 (Table 6.3.17). In heat stress, it ranged from 93 g/m^2 at Rewa followed by 235 g/m^2 at Pantnagar to 669 g/m^2 at Pattambi with a grand mean of 399 g/m^2 . Heat stress has significantly affected the grain yield of the entries. Interactions between Location x Treat, Location x Variety and Location x Treat x Variety were also statistically significant. Percent change of grain yield (g/m^2) with heat stress over control (Fig 6.3.9 A) shows that IET31512 has shown the least reduction (-19%) followed by NDR-97 (-22%) and CO-51 has shown the highest reduction (-33%). The highest reduction of percent change of grain yield with heat stress over control was recorded at Rewa (-85%) followed by Pantnagar (-48%) and least reduction at Pattambi (-7%) followed by Titabar (-13%) (Fig 6.3.9 B).

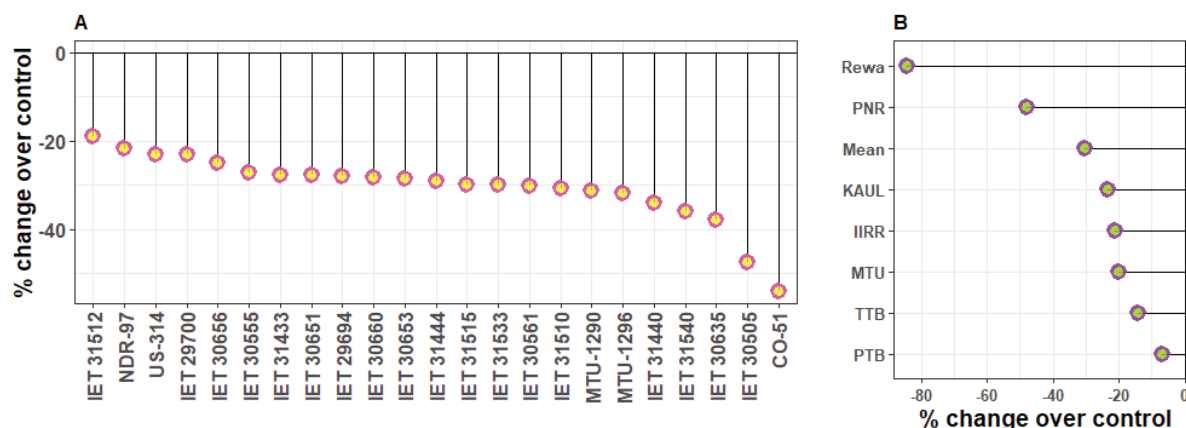


Fig 6.3.9 Influence of elevated temperature on grain yield (g/m^2) recorded at maturity. Each bar represents percent change in grain yield under elevated temperature in comparison with control (A) mean of all locations, (B) mean of all genotypes.

Mean total dry matter (g/m^2) in control ranged from 995 g/m^2 at Maruteru to 1847 g/m^2 at Pattambi with a grand mean of 1367 g/m^2 (Table 6.3.18). In heat stress, it ranged from 768 g/m^2 at Titabar closely followed by 769 g/m^2 at Pantnagar to 1799 g/m^2 at Pattambi with a grand mean of 1076 g/m^2 . Heat stress has significantly affected the total dry matter of the entries. Interactions between Location x Treat, Location x Variety and Location x Treat x Variety were also statistically significant. Among entries in control, CO-51 at Titabar has recorded the lowest total dry matter (652 g/m^2) followed by IET 30660 at Titabar (673 g/m^2) whereas, IET 30635 (1928 g/m^2) has recorded the highest total dry matter closely followed by IET 31515 (1925 g/m^2). In heat stress, IET 30660 has recorded the lowest total dry matter (494 g/m^2) at Titabar followed by IET 30653 (560 g/m^2) at Titabar whereas, IET 30555 has recorded the highest total dry matter at Titabar followed by IET 31440 (1912 g/m^2) at Titabar. All the entries have recorded the reduction in total dry matter with heat stress over control. IET 31433 has recorded the least reduction of about -14% whereas, CO-51 has recorded highest reduction about -36% (6.3.10A). Among centers, Pattambi has recorded about -3% total dry matter change with heat stress over control followed by Kaul (about -15%) whereas Pantnagar has recorded about -38% total dry matter change over control followed by Rewa (-33%) (Fig 6.3.10B).

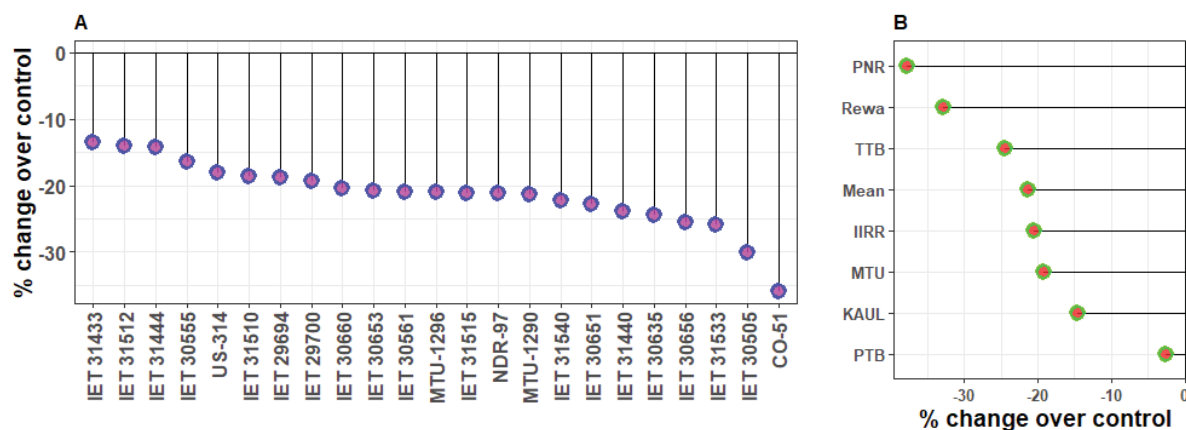


Fig 6.3.10 Influence of elevated temperature on total dry matter (g/m^2) recorded at maturity. Each bar represents percent change in total dry matter under elevated temperature in comparison with control (A) mean of all locations, (B) mean of all genotypes.

Mean 1000-grain weight (g) in control ranged from 21.2 g at Maruteru closely followed by 21.4 g at Kaul to 27.3 g at Pantnagar with a grand mean of 23.6 g (Table 6.3.19). In heat stress, it ranged from 18.4 g at Maruteru followed by 19.0 g at Kaul to 23.8 g at IIRR with a grand mean of 21.2 g. Heat stress has significantly affected the 1000-grain weight of the entries. Interactions between Location x Treat, Location x Variety and Location x Treat x Variety were also statistically significant. Among entries in control, IET 31540 at Pattambi has recorded the lowest 1000-grain weight (15.1 g) followed by NDR-97 at Kaul (15.2 g) whereas, IET 31440 (32.6 g) has recorded the highest 1000-grain weight closely followed by IET 31510 (32.0 g). In heat stress, IET 31540 has recorded the lowest 1000-grain weight (14.2 g) at Pattambi followed by IET 331533 (14.8 g) at Maruteru as well as Pantnagar whereas IET 30505 has recorded the highest 1000-grain weight (30.1 g) at IIRR followed by IET 31440 (27.9 g) at Pantnagar.

Mean harvest index (HI) in control ranged from 34.8% at Rewa to 57.5% at Maruteru with a grand mean of 43.4% (Table 6.3.20). In heat stress, it ranged from 30.4% at Pantnagar to 56.8% at Maruteru with a grand mean of 38.4%. Heat stress has not significantly affected the HI, however, the entries varied significantly at different locations. Percent change of HI with heat stress over control (Fig 6.3.11A) showed that IET 30656 has least reduction (-0.5%) followed by NDR-97 (-2%) and IET 30505 has highest reduction of -22%. The highest reduction in HI with heat stress over control was recorded at Rewa (-79%) followed by Pantnagar (-17%) and least reduction was recorded at Maruteru (-2 %) (Fig 6.3.11B).

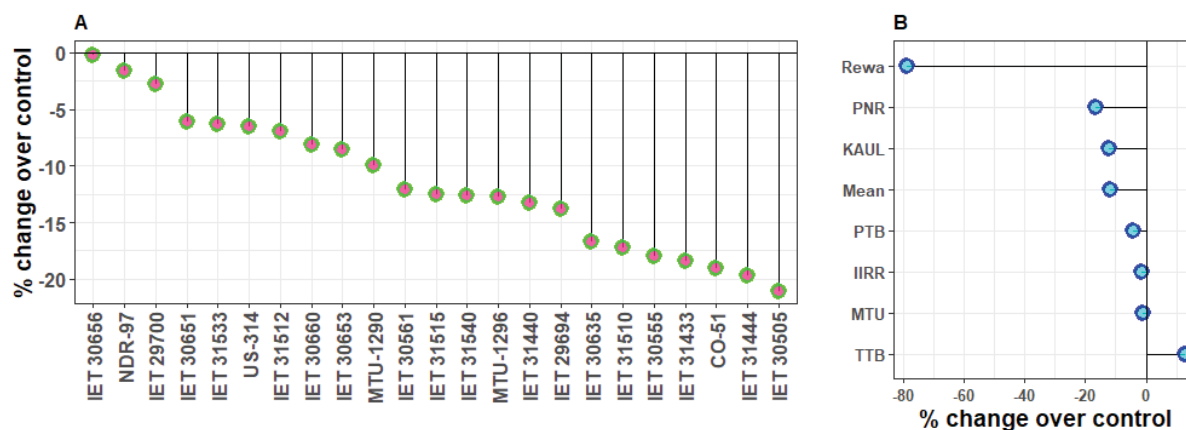


Fig 6.3.11 Influence of elevated temperature on harvest index (%) recorded at maturity. Each bar represents percent change in harvest index under elevated temperature in comparison with control (A) mean of all locations, (B) mean of all genotypes.

The mean actual quantum yield of PSII in control was observed 0.427 and that in heat stress treatment was 0.414 (Table 6.3.21A). In control, the lowest actual quantum yield of PSII was scored by IET 29694 and IET 31510 (0.354) whereas the highest actual quantum yield of PSII was noted in IET 30656 (0.509). In heat stress, the lowest actual quantum yield of PSII was noted in IET 30555 (0.456) whereas the highest actual quantum yield of PSII was noted in MTU-1296 (0.456). qP was significantly affected by heat stress while the effect of heat stress on qN was non-significant. In control, qP ranged from 0.607 (IET 29694) to 0.828 (IET 30635) with a mean of 0.715 whereas in heat stress treatment, it ranged from 0.578 (IET 31444) to 0.737 (MTU-1293) with a mean of 0.661 (Table 6.3.21.B).

Identification of high temperature tolerant genotypes using yield-based stress indices

To identify genotypes tolerant to high temperature, various indices were computed based on the grain yield recorded under ambient (control) and high temperature conditions. Different heat indices such as Heat susceptibility index (HSI), Relative Heat index (RHI), Heat tolerance index (HTI), Geometric mean productivity (GMP), Tolerance (TOL), Mean production (MP), Yield index (YI), Heat resistance index (HI), Yield stability index (YSI), Sensitivity Heat Index (SHI), Harmonic Mean (HM), Modified stress tolerance index (K1STI), were calculated following the equations published (Fischer and Maurer, 1978; Fischer et al., 1998; Fernandez, 1992; Rosielle and Hamblin, 1981; Bouslama and Schapaugh, 1984; Blum, 1988; Moosavi et al., 2008; Farshadfar and Sutka, 2002).

The results are presented in Table (6.3.22). Significant Variation was observed amongst the genotypes for most of the indices. The genotypes were ranked for each index and overall rank for each genotype was calculated (6.3.23). The genotype with high overall rank was considered as heat tolerant genotype. Based on the overall rank, IET 30555, IET 29694, IET 31512, IET 29700 and IET 30561 can be identified as relatively heat tolerant genotypes. In order to determine the most desirable heat stress tolerant criteria, the correlation coefficients between Y_s , and other quantitative indices of heat tolerance were calculated. The correlation analysis between grain yield and heat tolerance indices can be a good criterion for screening the best cultivars and indices used. A suitable index must have a significant association with yield recorded under stress condition. Fig. 6.3.14 represents the results of correlation analysis which indicate that the indices like HTI (Heat Tolerance Index), GMP (Geometric Mean Production), MP (Mean Production), HI (Heat Resistance Index), K2STI (Modified Stress Tolerance Index) and Yield index (YI) showed highly significant positive association with grain yield recorded under stress condition. These indices are useful in selecting suitable genotypes for heat tolerance.

Selection for high yield and stability of performance under elevated temperature:

In order to simultaneously select genotypes with higher yield and stability of performance across locations under elevated temperature conditions, a parametric model for simultaneous selection in yield and stability “Shukla’s stability variance and Kang’s” statistic was performed and the results were presented in (Table 6.3.24). Based on their performance across locations and YS_i values under elevated temperature conditions genotypes IET 29694, IET 29700, IET 30555, IET 30561, IET 30656, IET 31433, IET 31440, IET 31444, IET 31510, IET 31512, IET 31533, MTU-1296 and US-314 can be selected as they produced relatively higher yield under heat stress condition and showed a lower variation.

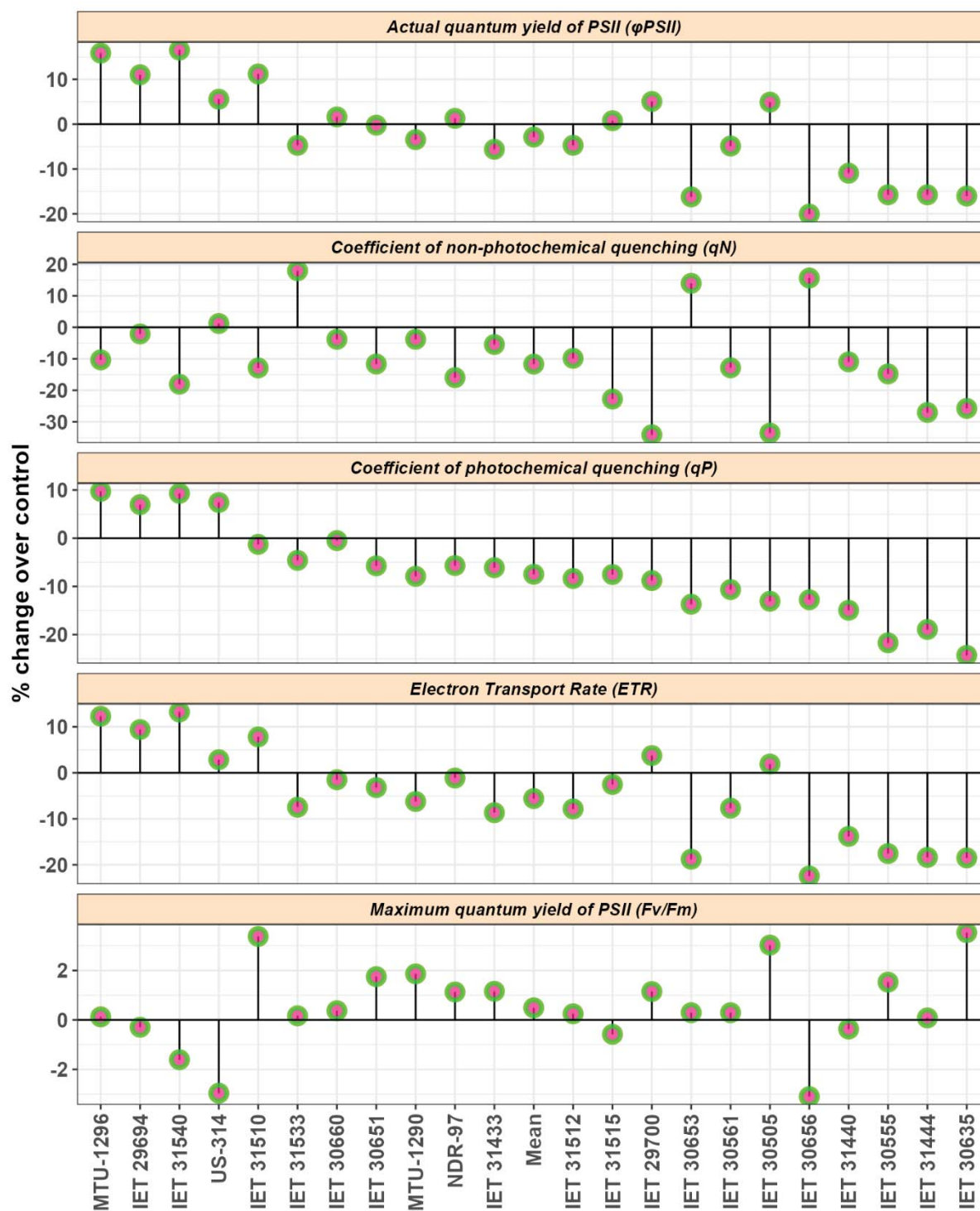


Fig 6.3.12 Percentage change in chlorophyll fluorescence traits under heat stress with respect to control at IIRR during Kharif 2024.

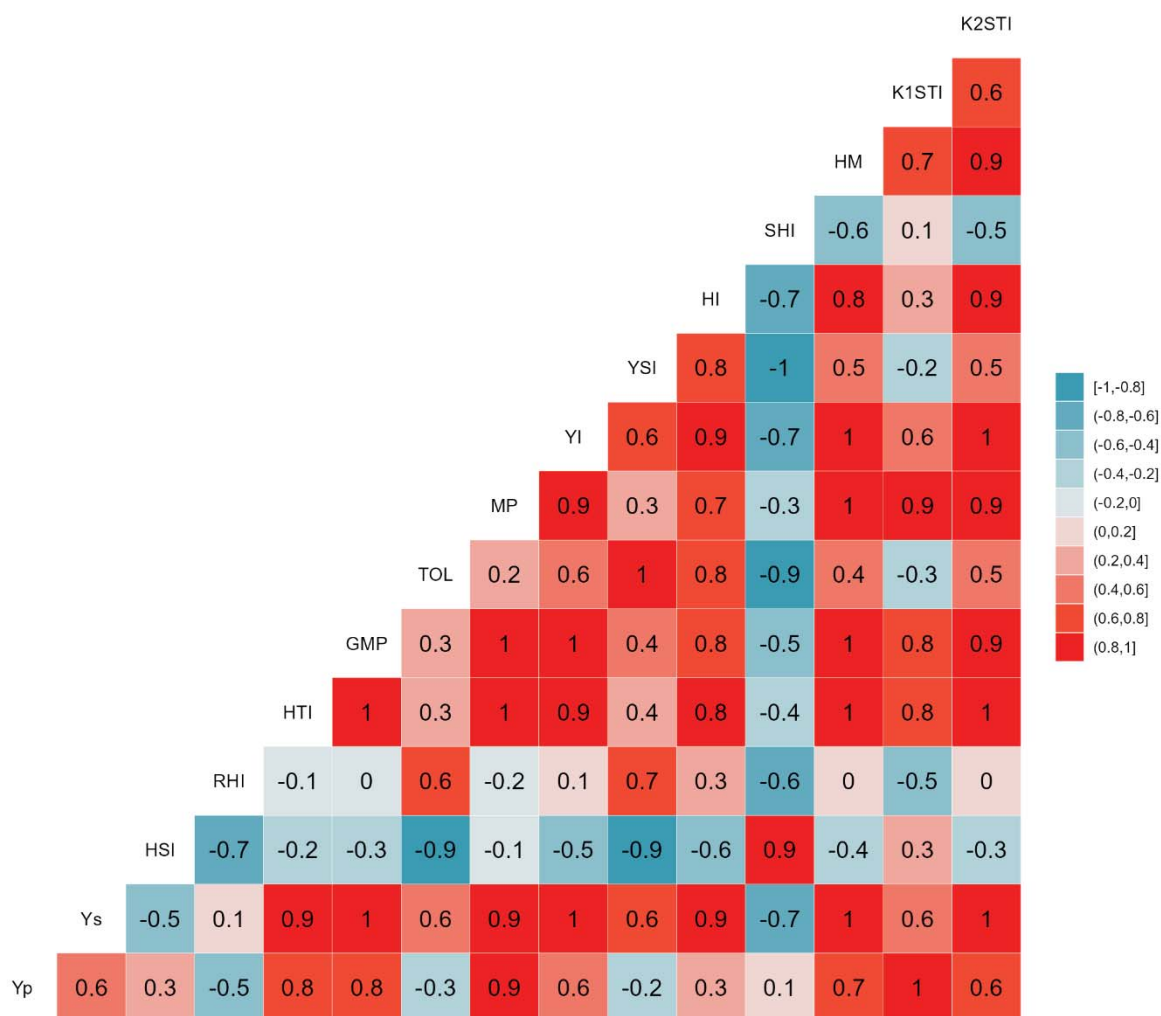


Fig 6.3.13 Correlation between grain yield recorded under control and elevated temperature condition and heat indices computed from grain yield recorded under both control and elevated temperature condition. Mean yield data from all locations was used for computing the correlation coefficients.

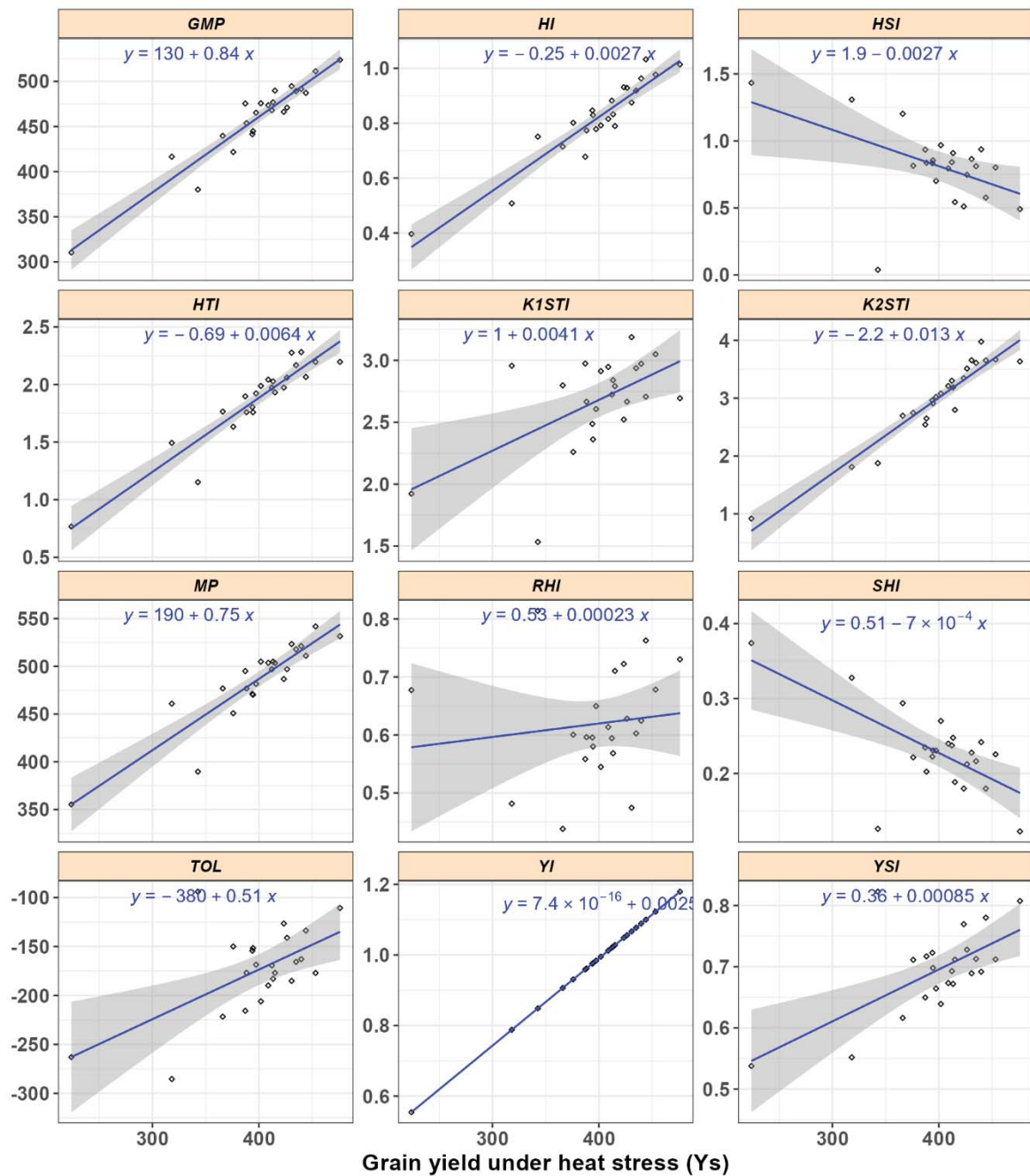


Fig 6.3.14 Relationship between heat stress indices and grain yield recorded under elevated temperature (Ys). Mean of grain yield recorded at different locations was used for regression analysis.

Summary and Conclusions:

- This trial was conducted in view of changing climate scenario leading to global warming that resulted in elevated atmospheric temperature which in-turn increased events of high temperatures stress to crops at various growth stages.
- IET 31512 recorded the least reduction in grain yield under heat stress over control which can be utilized as promising donor in breeding programmes.
- Significant variation was observed amongst the genotypes for most of the heat indices. Based on the overall rank IET 30555, IET 29694, IET 31512, IET 29700 and IET 30561 were identified as relatively heat tolerant genotypes.
- Multiple correlation and regression analysis indicate highly significant positive association between grain yield under heat stress and the heat indices- HTI (Heat Tolerance Index), GMP (Geometric Mean Production), MP (Mean Production), HI (Heat Resistance Index), K2STI (Modified Stress Tolerance Index) and Yield index (YI) which are useful in selecting suitable genotypes for heat tolerance.
- Based on the performance across locations and YSi values under elevated temperature conditions, genotypes IET 29694, IET 29700, IET 30555, IET 30561, IET 30656, IET 31433, IET 31440, IET 31444, IET 31510, IET 31512, IET 31533, MTU-1296 and US-314 were selected as promising entries as they have relatively higher yield with greater stability under heat stress condition.

Table 6.3.1 Influence of Heat Stress on Days to flowering at different locations during Kharif 2024

S.No.	Genotype	Control						Grand Mean	Heat Stress						Grand Mean
		KAUL	MTU	PNR	PTB	Rewa	TTB		KAUL	MTU	PNR	PTB	Rewa	TTB	
1	CO-51	-	-	89	-	81	61	77	-	-	83	-	79	61	75
2	IET 29694	84	90	96	81	89	71	85	84	89	93	79	88	71	84
3	IET 29700	81	93	85	73	78	76	81	81	93	83	74	77	76	81
4	IET 30505	92	94	96	89	74	87	89	92	94	92	86	74	87	87
5	IET 30555	80	95	87	82	80	65	81	80	94	84	81	80	65	80
6	IET 30561	81	90	92	82	78	82	84	81	90	88	79	77	82	83
7	IET 30635	82	94	90	90	81	91	88	82	93	88	87	80	91	87
8	IET 30651	82	92	91	81	95	76	86	82	91	86	79	96	76	85
9	IET 30653	79	92	85	91	85	70	84	79	91	83	77	84	70	81
10	IET 30656	90	94	93	82	91	86	89	90	92	89	78	92	86	88
11	IET 30660	85	92	94	78	88	62	83	85	92	91	76	87	62	82
12	IET 31433	82	90	86	74	109	60	84	82	91	83	75	108	60	83
13	IET 31440	91	95	94	93	91	87	92	91	94	86	79	91	87	88
14	IET 31444	80	96	85	75	90	74	83	80	94	83	74	91	74	83
15	IET 31510	92	94	94	91	90	81	90	92	93	91	86	91	81	89
16	IET 31512	85	95	91	78	77	84	85	85	93	87	78	78	84	84
17	IET 31515	95	96	92	83	98	87	92	95	95	89	78	98	87	90
18	IET 31533	94	95	91	93	90	86	92	94	94	87	85	91	86	90
19	IET 31540	83	96	88	92	100	84	90	83	95	84	80	100	84	88
20	MTU-1290	84	97	92	88	79	87	88	84	96	89	79	78	87	86
21	MTU-1296	84	95	92	81	79	87	86	84	93	87	79	78	87	85
22	NDR-97	76	96	-	80	-	87	85	76	96	-	80	-	87	85
23	US-314	83	97	93	81	83	74	85	83	96	91	75	82	74	84
	Mean	85	94	91	83	87	79	86	85	93	87	79	86	79	85
		LSD (Treat)							LSD (Treat x Variety)						
		LSD (Location x Treat)							LSD (Location x Treat x Variety)						
		LSD (Variety)							CV (%) Treat						
		LSD (Location x Variety)													
		ns							ns						
		0.38**							1.95**						
		0.56**							0.88						
		1.38**													

Table 6.3.2 Influence of Heat Stress on Days to maturity at different locations during Kharif 2024

S.No.	Genotype	Control						Grand Mean	Heat Stress						Grand Mean
		KAUL	MTU	PNR	PTB	Rewa	TTB		KAUL	MTU	PNR	PTB	Rewa	TTB	
1	CO-51	-	-	127	-	101	94	107	-	-	123	-	100	94	106
2	IET 29694	117	121	137	135	113	104	121	117	117	131	132	112	104	119
3	IET 29700	117	122	127	128	110	109	119	117	120	122	128	108	109	117
4	IET 30505	123	123	136	137	100	120	123	123	121	128	133	99	120	121
5	IET 30555	116	126	136	135	110	98	120	116	120	129	132	108	98	117
6	IET 30561	116	121	135	135	106	115	121	116	119	126	128	104	115	118
7	IET 30635	119	125	134	143	103	124	125	119	120	126	135	100	124	121
8	IET 30651	119	121	133	135	115	109	122	119	118	125	128	113	109	119
9	IET 30653	110	122	134	139	110	103	120	110	118	127	128	108	103	116
10	IET 30656	120	125	133	135	111	119	124	120	121	124	128	107	119	120
11	IET 30660	122	121	139	132	114	95	120	122	120	129	128	111	95	118
12	IET 31433	122	121	136	129	132	93	122	122	119	126	128	130	93	120
13	IET 31440	123	124	132	139	118	120	126	123	119	127	128	116	120	122
14	IET 31444	110	125	134	137	114	107	121	110	119	129	128	112	107	118
15	IET 31510	125	124	135	139	115	114	125	125	121	130	133	112	114	123
16	IET 31512	117	125	133	129	107	117	121	117	123	128	128	103	117	119
17	IET 31515	125	126	135	137	123	120	128	125	121	126	128	121	120	123
18	IET 31533	130	128	139	139	115	119	128	130	124	132	133	112	119	125
19	IET 31540	114	128	131	139	124	117	125	114	123	125	132	121	117	122
20	MTU-1290	114	127	134	137	110	120	124	114	121	129	128	108	120	120
21	MTU-1296	114	123	128	135	103	120	120	114	120	122	128	101	120	118
22	NDR-97	107	126	-	135	-	120	122	107	123	-	132	-	120	120
23	US-314	114	124	131	135	104	107	119	114	121	126	128	101	107	116
	Mean	118	124	134	136	112	112	122	118	120	127	130	109	112	119
		LSD (Treat)							LSD (Treat x Variety)						0.65*
		LSD (Location x Treat)							LSD (Location x Treat x Variety)						2.09**
		LSD (Variety)							CV (%) Treat						0.44
		LSD (Location x Variety)													

Table 6.3.3 Influence of Heat Stress on Plant height (cm) at flowering at different locations during **Kharif 2024**

S.No.	Genotype	Control					Grand Mean	Heat Stress					Grand Mean
		IIRR	KAUL	MTU	PNR	PTB		Rewa	PTB	PNR	MTU	Rewa	
1	CO-51	-	-	-	99	-	96	112	-	91	-	121	100
2	IET 29694	100	111	114	110	134	111	111	132	102	112	110	111
3	IET 29700	98	103	127	109	91	105	114	110	103	126	115	109
4	IET 30505	103	100	137	108	115	113	110	130	99	137	117	114
5	IET 30555	93	110	127	108	94	107	116	126	103	125	118	113
6	IET 30561	98	106	136	107	101	110	113	122	99	135	112	113
7	IET 30635	106	112	143	107	111	115	125	140	98	140	119	117
8	IET 30651	94	110	127	112	113	113	120	131	104	125	117	115
9	IET 30653	97	92	129	109	99	106	116	122	96	128	118	109
10	IET 30656	102	93	140	107	98	109	114	128	101	139	121	114
11	IET 30660	100	100	120	105	102	106	115	116	95	119	120	107
12	IET 31433	97	82	123	108	97	103	117	120	98	122	118	106
13	IET 31440	103	93	136	117	121	115	118	139	108	135	121	115
14	IET 31444	102	101	123	113	97	108	118	130	102	122	119	112
15	IET 31510	101	100	118	106	102	107	115	134	97	116	120	110
16	IET 31512	87	84	113	102	96	100	116	109	94	111	119	101
17	IET 31515	106	110	143	110	118	117	113	138	100	140	111	117
18	IET 31533	102	95	137	109	115	112	117	138	104	136	116	114
19	IET 31540	100	97	126	109	108	109	116	115	103	124	118	108
20	MTU-1290	98	93	113	107	99	104	118	108	98	112	118	105
21	MTU-1296	96	82	118	98	99	101	116	114	86	116	118	102
22	NDR-97	80	97	108	-	97	99	-	103	-	106	-	101
23	US-314	89	97	130	118	96	106	119	112	112	128	124	109
	Mean	98	99	127	108	105	107	116	123	100	125	118	110
		LSD (Treat)						LSD (Treat x Variety)					
		LSD (Location x Treat)						LSD (Location x Treat x Variety)					
		LSD (Variety)						CV (%) Treat					
		LSD (Location x Variety)											
								1.87**					
								2.08**					
								5.51**					
								ns					
								7.79**					
								3.52					

Table 6.3.4 Influence of Heat Stress on Leaf weight (g/m²) at flowering at different locations during Kharif 2024

S.No.	Genotype	Control						Grand Mean	Heat Stress						Grand Mean
		IIRR	MTU	PNR	PTB	Rewa	TTB		IIRR	MTU	PNR	PTB	Rewa	TTB	
1	CO-51	-	-	410	-	262	194	289	-	-	199	-	252	91	181
2	IET 29694	204	108	211	228	285	163	200	227	94	154	186	259	104	171
3	IET 29700	170	93	233	100	263	178	173	205	90	123	150	261	154	164
4	IET 30505	231	107	228	211	264	79	187	259	96	124	172	249	160	177
5	IET 30555	162	107	225	89	260	161	167	185	90	183	197	239	106	167
6	IET 30561	178	112	269	78	266	189	182	180	106	130	117	250	127	152
7	IET 30635	207	106	177	200	331	186	201	200	89	116	300	321	144	195
8	IET 30651	174	111	378	211	266	195	222	160	102	186	200	250	167	178
9	IET 30653	217	106	217	133	289	143	184	243	95	137	92	261	86	152
10	IET 30656	174	100	228	150	352	186	198	196	95	122	144	248	267	179
11	IET 30660	162	101	266	78	378	144	188	196	98	132	92	340	98	159
12	IET 31433	178	109	169	200	348	150	192	163	90	127	208	341	129	176
13	IET 31440	202	114	210	250	291	94	193	228	86	134	200	266	114	171
14	IET 31444	211	120	231	256	283	102	201	270	96	162	214	259	115	186
15	IET 31510	206	92	178	183	259	161	180	161	80	138	271	246	96	165
16	IET 31512	128	118	181	111	282	179	166	175	101	77	117	278	116	144
17	IET 31515	223	108	220	178	338	133	200	248	104	121	67	328	167	172
18	IET 31533	169	100	271	133	290	114	179	200	89	143	167	269	87	159
19	IET 31540	137	115	343	217	309	160	213	199	105	187	89	260	88	155
20	MTU-1290	154	109	148	144	281	159	166	195	100	116	133	266	88	150
21	MTU-1296	169	99	339	189	272	190	210	195	95	106	92	257	99	141
22	NDR-97	173	110	-	133	-	214	158	155	91	-	89	-	136	118
23	US-314	152	112	171	122	317	186	177	243	86	141	117	278	83	158
	Mean	181	107	241	163	295	159	192	204	94	139	155	272	123	164
		LSD (Treat)							LSD (Treat x Variety)						
		LSD (Location x Treat)							LSD (Location x Treat x Variety)						
		LSD (Variety)							CV (%) Treat						
		LSD (Location x Variety)													

Table 6.3.5 Influence of Heat Stress on Stem weight (g/m²) at flowering at different locations during Kharif 2024

S.No.	Genotype	Control					Grand Mean	Heat Stress					Grand Mean	
		IIRR	MTU	PNR	PTB	Rewa		TTB	IIRR	MTU	PNR	PTB		Rewa
1	CO-51	-	-	425	-	531	387	-	-	189	-	509	163	287
2	IET 29694	565	374	498	361	556	445	660	319	375	341	581	290	427
3	IET 29700	568	314	513	250	509	419	541	303	315	375	479	223	373
4	IET 30505	661	361	287	564	535	454	663	328	227	450	513	281	410
5	IET 30555	693	369	486	328	505	439	627	307	361	492	487	237	418
6	IET 30561	656	382	411	294	570	422	555	368	275	314	582	218	385
7	IET 30635	737	350	507	517	517	506	663	314	329	628	513	309	459
8	IET 30651	630	401	526	583	511	498	447	366	380	422	497	224	389
9	IET 30653	498	362	365	383	568	407	485	343	247	225	566	213	347
10	IET 30656	549	341	345	478	550	428	570	325	271	378	538	263	391
11	IET 30660	608	331	325	372	546	398	667	331	206	400	537	178	386
12	IET 31433	633	384	481	467	522	463	510	305	286	431	528	309	395
13	IET 31440	610	386	303	578	576	454	653	285	225	525	544	312	424
14	IET 31444	733	416	578	333	526	485	574	320	436	417	511	321	430
15	IET 31510	630	317	329	417	555	425	393	276	204	556	506	216	358
16	IET 31512	479	411	343	317	534	391	521	346	217	267	531	236	353
17	IET 31515	642	365	577	444	528	468	621	362	247	206	542	242	370
18	IET 31533	482	350	357	333	487	379	502	311	307	389	491	216	369
19	IET 31540	461	397	612	533	485	468	555	366	466	269	501	213	395
20	MTU-1290	543	362	248	400	496	386	510	343	176	358	472	248	351
21	MTU-1296	564	338	394	372	519	412	547	324	336	342	509	243	384
22	NDR-97	659	376	-	344	-	418	369	307	-	233	-	247	289
23	US-314	494	386	438	478	569	450	623	280	337	278	576	307	400
	Mean	595	367	425	416	532	435	557	324	291	377	523	248	382
		LSD (Treat)						LSD (Treat x Variety)					ns	
		LSD (Location x Treat)						LSD (Location x Treat x Variety)					104.36**	
		LSD (Variety)						CV (%) Treat					17.38	
		LSD (Location x Variety)												

Table 6.3.6 Influence of Heat Stress on Panicle weight (g/m²) at flowering at different locations during Kharif 2024

S.No.	Genotype	Control					Grand Mean	Heat Stress					Grand Mean	
		IIRR	MTU	PNR	PTB	Rewa		TTB	IIRR	MTU	PNR	PTB		Rewa
1	CO-51	-	-	163	-	122	139	-	-	78	-	126	61	88
2	IET 29694	185	53	184	200	135	164	200	48	109	94	133	110	116
3	IET 29700	175	45	235	233	238	195	218	41	139	183	241	98	153
4	IET 30505	123	50	129	206	204	138	137	47	105	178	208	81	126
5	IET 30555	184	50	214	161	205	162	153	45	105	89	207	179	130
6	IET 30561	156	52	256	128	202	150	160	49	174	75	205	107	128
7	IET 30635	129	48	206	267	151	154	114	45	124	200	153	121	126
8	IET 30651	118	54	231	358	131	167	102	51	174	267	134	124	142
9	IET 30653	105	51	159	331	130	154	129	48	102	58	134	119	98
10	IET 30656	151	48	144	261	144	147	126	46	108	61	148	158	108
11	IET 30660	146	47	117	178	156	138	167	45	97	117	161	103	115
12	IET 31433	230	54	161	189	146	146	196	45	113	219	149	167	148
13	IET 31440	152	53	206	144	211	156	183	40	98	133	217	96	128
14	IET 31444	235	59	184	150	205	158	187	47	121	172	210	114	142
15	IET 31510	158	47	145	117	157	140	66	41	110	344	160	122	140
16	IET 31512	141	59	137	233	145	137	135	51	97	144	149	140	119
17	IET 31515	134	53	184	161	147	131	160	51	130	56	149	116	110
18	IET 31533	162	51	141	244	96	134	162	45	138	183	99	70	116
19	IET 31540	160	55	178	278	137	153	180	51	117	114	139	99	117
20	MTU-1290	137	51	122	100	161	116	139	48	97	125	164	92	111
21	MTU-1296	128	48	172	283	224	178	139	45	133	111	228	86	124
22	NDR-97	134	54	-	350	-	162	113	42	-	94	-	75	81
23	US-314	114	58	212	211	203	154	182	42	123	44	206	172	128
	Mean	153	52	176	217	166	151	152	46	118	139	169	113	122
		LSD (Treat)						LSD (Treat x Variety)					ns	
		LSD (Location x Treat)						LSD (Location x Treat x Variety)					64.26**	
		LSD (Variety)						CV (%) Treat					30.88	
		LSD (Location x Variety)												

Table 6.3.7 Influence of Heat Stress on Total dry matter (g/m²) at flowering at different locations during Kharif 2024

S.No.	Genotype	Control						Grand Mean	Heat Stress						Grand Mean
		IIRR	MTU	PNR	PTB	Rewa	TTB		IIRR	MTU	PNR	PTB	Rewa	TTB	
1	CO-51	-	-	999	-	914	530	814	-	-	466	-	886	315	556
2	IET 29694	954	535	893	789	975	704	808	1086	460	638	622	973	503	714
3	IET 29700	913	453	981	583	1010	785	787	964	434	577	708	981	475	690
4	IET 30505	1014	518	645	981	1003	507	778	1059	471	456	800	970	522	713
5	IET 30555	1038	526	924	578	970	574	768	966	443	649	778	932	522	715
6	IET 30561	990	546	936	500	1039	515	754	894	523	579	506	1037	452	665
7	IET 30635	1072	504	889	983	999	720	861	977	448	569	1128	987	574	781
8	IET 30651	923	566	1135	1153	908	637	887	709	519	740	889	881	516	709
9	IET 30653	821	520	740	848	987	552	745	857	486	486	375	962	417	597
10	IET 30656	874	488	716	889	1046	629	774	892	466	501	583	934	687	677
11	IET 30660	916	480	707	628	1079	534	724	1030	475	435	608	1037	379	661
12	IET 31433	1041	547	810	856	1016	537	801	869	441	526	858	1018	605	719
13	IET 31440	964	554	719	972	1078	533	803	1063	411	457	858	1027	522	723
14	IET 31444	1180	595	993	739	1014	537	843	1030	463	720	803	981	550	758
15	IET 31510	995	456	651	717	971	681	745	620	397	452	1171	912	434	664
16	IET 31512	747	588	660	661	961	547	694	830	498	391	528	958	492	616
17	IET 31515	998	526	980	783	1014	493	799	1029	517	498	328	1020	524	652
18	IET 31533	812	500	769	711	873	488	692	863	445	587	739	860	373	645
19	IET 31540	758	568	1133	1028	931	588	834	934	522	770	472	901	401	667
20	MTU-1290	835	523	517	644	938	554	668	843	491	389	617	902	428	612
21	MTU-1296	860	486	905	844	1015	687	800	881	464	575	544	995	427	648
22	NDR-97	967	540	-	827	-	614	737	637	440	-	417	-	459	488
23	US-314	760	556	821	811	1090	644	780	1048	408	601	439	1060	562	686
	Mean	929	526	842	797	992	591	778	913	465	548	671	964	484	668
		LSD (Treat)							LSD (Treat x Variety)						
		LSD (Location x Treat)							LSD (Location x Treat x Variety)						
		LSD (Variety)							CV (%) Treat						
		LSD (Location x Variety)													

Table 6.3.8 Influence of Heat Stress on SPAD values/Total chlorophyll content (mg/g fr.wt) at different locations during *Kharif 2024*

S.No.	Genotype	SPAD										Total chlorophyll content					
		Control				Heat Stress			Grand Mean	Control			Grand Mean	Heat Stress			Grand Mean
		IIRR	KAUL	Rewa	Grand Mean	IIRR	KAUL	Rewa		MTU	PNR	PTB		MTU	PNR	PTB	
1	CO-51	-	-	29.31	29.31	-	-	28.04	28.04	-	1.82	-	1.82	-	1.54	-	1.54
2	IET 29694	40.27	38.03	22.67	33.66	42.63	38.33	21.34	34.10	2.08	1.68	3.57	2.44	1.89	1.44	2.48	1.94
3	IET 29700	42.08	37.33	30.44	36.62	40.43	38.67	28.51	35.87	2.22	1.39	4.00	2.54	1.84	1.00	1.84	1.56
4	IET 30505	39.38	36.70	25.26	33.78	42.15	36.67	24.36	34.39	2.38	2.00	2.52	2.30	2.04	1.43	2.03	1.83
5	IET 30555	42.25	41.97	21.54	35.25	42.42	42.00	20.17	34.86	2.27	2.08	4.18	2.84	1.94	1.94	2.93	2.27
6	IET 30561	41.43	44.83	21.67	35.98	47.27	44.73	20.81	37.60	2.49	2.37	2.93	2.60	2.11	1.43	3.01	2.18
7	IET 30635	42.47	42.40	25.10	36.66	42.72	42.37	23.47	36.18	2.31	2.04	3.49	2.61	1.81	1.63	2.76	2.07
8	IET 30651	41.62	42.67	20.22	34.83	43.58	42.73	20.12	35.48	2.44	1.71	3.09	2.41	2.01	0.82	3.31	2.05
9	IET 30653	42.22	44.67	23.48	36.79	43.23	44.67	20.95	36.28	3.09	1.62	3.24	2.65	2.51	1.31	2.13	1.98
10	IET 30656	40.07	44.10	25.81	36.66	41.07	44.13	24.11	36.44	2.41	1.89	2.49	2.26	2.04	1.12	2.22	1.80
11	IET 30660	41.22	42.30	32.10	38.54	43.30	42.23	31.27	38.93	2.23	1.86	3.40	2.50	2.05	1.44	2.73	2.08
12	IET 31433	38.55	45.17	26.51	36.74	42.12	45.17	24.57	37.29	2.29	2.01	3.47	2.59	1.63	1.41	2.57	1.87
13	IET 31440	42.05	45.17	27.63	38.28	41.75	45.27	25.76	37.59	2.84	1.68	3.04	2.52	1.70	1.31	2.57	1.86
14	IET 31444	39.97	43.53	24.87	36.12	42.73	43.50	22.40	36.21	2.66	1.60	3.76	2.68	1.78	1.53	1.28	1.53
15	IET 31510	43.18	44.40	26.65	38.08	43.37	44.33	24.28	37.33	3.34	1.72	2.62	2.56	2.84	1.60	3.74	2.73
16	IET 31512	39.97	44.10	24.04	36.04	42.30	44.17	23.41	36.62	2.92	2.04	3.13	2.70	2.43	1.63	2.47	2.18
17	IET 31515	38.53	40.73	21.70	33.66	44.98	40.67	21.10	35.58	2.59	1.84	2.51	2.32	2.07	1.54	2.36	1.99
18	IET 31533	41.20	42.67	27.43	37.10	44.20	42.73	25.93	37.62	2.37	2.18	2.78	2.44	2.13	1.13	2.43	1.90
19	IET 31540	42.37	42.90	25.21	36.83	41.72	42.87	23.35	35.98	2.71	1.64	2.84	2.40	2.23	0.97	2.22	1.80
20	MTU-1290	39.55	45.23	25.82	36.87	43.72	45.23	25.19	38.05	3.01	1.43	3.96	2.80	2.41	0.57	2.35	1.78
21	MTU-1296	38.48	41.03	24.61	34.71	43.52	41.07	23.21	35.93	2.95	1.94	3.69	2.86	2.21	1.67	2.50	2.13
22	NDR-97	44.82	43.43	-	44.13	45.62	43.60	-	44.61	2.60	-	3.40	3.00	2.27	-	2.37	2.32
23	US-314	38.13	46.33	26.74	37.07	44.27	46.33	25.61	38.74	3.04	1.59	2.75	2.46	2.30	1.11	3.05	2.16
	Mean	40.90	42.71	25.40	36.25	43.14	42.79	24.00	36.51	2.60	1.82	3.22	2.53	2.10	1.35	2.52	1.98
	LSD (Treat)			ns		LSD (Treat x Variety)			ns	LSD (Treat)			0.05*	LSD (Treat x Variety)			ns
	LSD (Location x Treat)			1.59**		LSD (Location x Treat x Variety)			ns	LSD (Location x Treat)			0.09*	LSD (Location x Treat x Variety)			0.51**
	LSD (Variety)			1.31*		CV (%) Treat			7.21	LSD (Variety)			0.15*	CV (%) Treat			10.98
	LSD (Location x Variety)			3.01**						LSD (Location x Variety)			0.36**				

Table 6.3.9 Influence of Heat Stress on leaf area index at flowering at different locations during *Kharif* 2024

S.No.	Genotype	Control				Grand Mean	Heat Stress				Grand Mean
		IIRR	PNR	PTB	Rewa		IIRR	PNR	PTB	Rewa	
1	CO-51	-	3.3	-	5.7	4.5	-	2.3	-	4.4	3.3
2	IET 29694	2.5	4.3	4.8	5.5	4.3	3.3	3.2	3.9	4.7	3.8
3	IET 29700	3.4	2.7	3.1	5.1	3.6	4.4	1.7	3.5	4.3	3.5
4	IET 30505	4.7	2.7	4.0	5.9	4.3	4.0	2.1	4.0	5.1	3.8
5	IET 30555	3.0	4.0	3.5	5.1	3.9	2.7	3.4	3.0	3.9	3.2
6	IET 30561	3.3	2.8	3.7	6.1	4.0	2.3	1.8	2.9	4.4	2.9
7	IET 30635	3.9	3.0	5.1	3.9	4.0	4.0	2.2	4.2	2.9	3.3
8	IET 30651	3.2	4.6	4.3	5.6	4.4	3.1	3.4	4.7	4.8	4.0
9	IET 30653	4.2	3.7	3.5	4.2	3.9	4.0	2.4	2.1	3.6	3.0
10	IET 30656	3.4	3.4	3.3	6.7	4.2	3.8	2.1	3.0	5.6	3.6
11	IET 30660	3.0	3.1	2.5	5.7	3.6	3.7	2.1	2.6	4.2	3.2
12	IET 31433	3.3	4.7	3.9	5.5	4.3	2.8	3.6	4.5	4.1	3.8
13	IET 31440	3.5	3.7	4.9	5.4	4.4	4.4	2.7	4.7	4.3	4.0
14	IET 31444	4.0	2.9	4.9	4.8	4.1	5.0	2.4	3.3	3.9	3.6
15	IET 31510	4.0	4.9	3.4	4.8	4.3	2.7	3.3	4.6	3.7	3.6
16	IET 31512	2.4	2.8	2.6	5.3	3.3	3.3	2.0	2.8	3.5	2.9
17	IET 31515	2.2	3.6	3.4	4.0	3.3	2.6	2.1	1.5	2.6	2.2
18	IET 31533	2.7	3.2	2.6	3.8	3.1	3.5	2.7	3.4	3.2	3.2
19	IET 31540	2.7	3.5	4.5	4.9	3.9	3.6	3.1	1.9	4.1	3.2
20	MTU-1290	3.2	4.7	2.7	5.3	4.0	3.7	3.1	2.8	4.2	3.5
21	MTU-1296	3.1	3.8	3.6	4.7	3.8	3.7	3.3	1.8	3.5	3.1
22	NDR-97	4.3	-	3.7	-	4.0	2.8	-	2.0	-	2.4
23	US-314	3.0	5.0	2.5	5.4	4.0	4.8	3.6	2.0	5.0	3.9
	Mean	3.3	3.6	3.7	5.2	4.0	3.6	2.7	3.2	4.1	3.3
	LSD (Treat)	ns					LSD (Treat x Variety)				ns
	LSD (Location x Treat)	0.33**					LSD (Location x Treat x Variety)				1.09**
	LSD (Variety)	0.38**					CV (%) Treat				16.74
	LSD (Location x Variety)	0.77**									

Table 6.3.10 Influence of Heat Stress on Shoot weight (g/m²) at maturity at different locations during Kharif 2024

S.No.	Genotype	Control					Grand Mean	Heat Stress					Grand Mean	
		IIRR	MTU	PNR	PTB	Rewa		TTB	IIRR	MTU	PNR	PTB		Rewa
1	CO-51	-	-	797	-	569	572	-	-	432	-	602	254	429
2	IET 29694	467	917	667	872	632	674	606	686	498	576	638	393	566
3	IET 29700	432	832	675	1078	545	684	545	620	566	825	564	361	580
4	IET 30505	543	904	719	967	586	684	722	786	484	992	593	461	673
5	IET 30555	456	808	678	1239	567	699	595	608	542	1272	577	362	659
6	IET 30561	482	846	660	1233	645	705	634	705	458	1077	670	351	649
7	IET 30635	561	797	745	1294	567	760	769	597	493	1296	592	485	705
8	IET 30651	531	824	805	1278	563	757	834	792	557	1139	583	391	716
9	IET 30653	445	707	592	806	615	595	506	594	438	1027	634	261	577
10	IET 30656	557	897	637	1250	603	737	563	780	344	1004	612	530	639
11	IET 30660	556	777	737	1078	604	682	521	726	363	788	607	278	547
12	IET 31433	474	856	699	1239	577	718	634	740	585	1122	602	432	686
13	IET 31440	471	898	794	733	580	638	568	754	429	1068	597	434	642
14	IET 31444	529	746	760	828	587	649	506	651	576	1004	613	437	631
15	IET 31510	533	900	828	1189	578	750	698	813	519	1024	582	312	658
16	IET 31512	431	839	723	1239	577	707	389	805	360	995	625	365	590
17	IET 31515	552	786	672	1355	600	728	555	639	395	1056	611	412	611
18	IET 31533	491	772	868	1089	551	691	530	743	550	956	563	270	602
19	IET 31540	538	802	740	1114	557	705	537	681	533	994	571	288	601
20	MTU-1290	543	818	721	1197	555	710	567	671	438	1088	565	336	611
21	MTU-1296	509	864	622	1183	582	706	528	727	460	1025	593	328	610
22	NDR-97	430	752	-	727	-	603	263	574	-	653	-	379	467
23	US-314	542	824	917	1250	634	781	432	706	711	1060	660	390	660
	Mean	503	826	730	1102	585	693	568	700	488	1002	602	370	613
		LSD (Treat)						LSD (Treat x Variety)					ns	
		LSD (Location x Treat)						LSD (Location x Treat x Variety)					153.03**	
		LSD (Variety)						CV (%) Treat					7.79	
		LSD (Location x Variety)												

Table 6.3.11 Influence of Heat Stress on Panicle weight (g/m²) at maturity at different locations during Kharif 2024

S.No.	Genotype	Control					Grand Mean	Heat Stress					Grand Mean
		IIRR	KAUL	PNR	PTB	Rewa		IIRR	KAUL	PNR	PTB	Rewa	
1	CO-51	-	-	615	-	721	530	-	-	243	-	225	213
2	IET 29694	1146	90	528	1009	789	690	1051	68	218	1080	183	511
3	IET 29700	711	97	488	1145	924	693	798	79	307	1043	312	463
4	IET 30505	909	64	468	1118	1056	671	448	40	268	747	241	328
5	IET 30555	1084	82	482	1123	783	641	755	74	225	1254	233	507
6	IET 30561	1124	73	333	1156	902	678	722	61	241	1236	247	483
7	IET 30635	829	87	436	1203	804	668	375	86	272	925	183	415
8	IET 30651	793	61	518	861	579	568	602	49	321	925	150	369
9	IET 30653	791	52	393	1011	750	587	643	50	282	1005	155	386
10	IET 30656	1040	64	423	1135	699	739	867	53	274	1100	168	449
11	IET 30660	812	63	541	1132	654	586	730	59	261	906	176	382
12	IET 31433	1038	94	443	1017	840	674	843	78	320	1198	180	563
13	IET 31440	946	71	623	1168	734	695	730	47	290	1065	254	446
14	IET 31444	1074	62	542	805	844	656	981	52	253	978	246	497
15	IET 31510	950	66	611	1022	732	661	835	48	263	912	187	446
16	IET 31512	803	67	597	833	824	597	768	59	267	778	541	482
17	IET 31515	934	62	388	1113	650	596	796	24	215	826	285	410
18	IET 31533	923	73	663	900	1116	682	615	26	346	781	669	458
19	IET 31540	1063	76	593	1121	745	670	769	45	362	952	266	443
20	MTU-1290	1071	53	398	1025	1046	654	812	49	272	669	267	389
21	MTU-1296	980	81	357	1159	891	644	832	46	223	804	265	411
22	NDR-97	380	66	-	587	-	431	428	23	-	532	-	335
23	US-314	1123	48	662	922	742	708	933	31	477	785	249	482
	Mean	933	71	504	1026	810	640	742	52	282	932	258	429
		LSD (Treat)						LSD (Treat x Variety)					ns
		LSD (Location x Treat)						LSD (Location x Treat x Variety)					192.62**
		LSD (Variety)						CV (%) Treat					26.04
		LSD (Location x Variety)											

Table 6.3.12 Influence of Heat Stress on Panicle number/m² at maturity at different locations during *Kharif 2024*

S.No.	Genotype	Control						Grand Mean	Heat Stress						Grand Mean	
		IIRR	KAUL	MTU	PNR	PTB	Rewa		TTB	IIRR	KAUL	MTU	PNR	PTB		Rewa
1	CO-51	-	-	-	317	-	255	430	334	-	-	250	-	235	330	272
2	IET 29694	280	263	418	383	489	231	260	332	303	341	267	329	213	168	269
3	IET 29700	317	256	451	267	567	236	330	346	360	385	200	528	221	302	321
4	IET 30505	307	287	473	317	530	283	405	372	350	385	217	411	268	311	318
5	IET 30555	313	273	484	283	417	238	387	342	343	385	183	400	222	378	313
6	IET 30561	320	277	473	333	539	262	353	365	337	462	183	422	257	259	314
7	IET 30635	230	262	506	333	428	258	344	337	280	451	217	311	244	336	301
8	IET 30651	323	296	462	283	361	178	310	316	397	429	217	356	153	321	310
9	IET 30653	313	288	418	267	383	183	344	314	383	396	183	383	165	336	305
10	IET 30656	370	278	506	267	489	222	370	357	373	429	183	417	230	330	320
11	IET 30660	277	284	506	333	467	167	353	341	300	473	217	439	148	369	319
12	IET 31433	357	247	484	367	525	255	337	367	410	429	217	400	242	295	320
13	IET 31440	343	296	495	333	389	265	312	348	310	418	233	367	250	270	306
14	IET 31444	327	277	473	383	311	250	353	339	363	407	267	367	240	311	319
15	IET 31510	333	264	495	317	417	254	362	349	377	484	233	456	232	362	344
16	IET 31512	327	286	462	317	333	200	362	327	390	451	217	328	185	270	304
17	IET 31515	303	293	473	283	494	218	337	343	363	451	217	306	196	286	302
18	IET 31533	283	274	473	250	156	260	256	279	273	363	200	256	232	228	261
19	IET 31540	320	275	495	317	433	255	330	346	380	396	233	311	224	330	307
20	MTU-1290	337	286	484	333	517	268	311	362	353	429	233	317	252	220	298
21	MTU-1296	340	277	473	267	572	255	288	353	357	396	183	317	234	254	289
22	NDR-97	310	267	451	-	583	-	362	395	417	396	-	522	-	296	380
23	US-314	327	279	429	367	517	181	454	365	363	374	233	378	171	403	314
	Mean	316	277	472	314	451	235	346	345	354	415	217	378	219	303	309
		LSD (Treat)						LSD (Treat x Variety)						ns		
		LSD (Location x Treat)						LSD (Location x Treat x Variety)						82.6**		
		LSD (Variety)						CV (%) Treat						14.74		
		LSD (Location x Variety)														

Table 6.3.13 Influence of Heat Stress on Grain number per panicle at different locations during Kharif 2024

S.No.	Genotype	Control						Grand Mean	Heat Stress						Grand Mean		
		IIRR	KAUL	MTU	PNR	PTB	Rewa		TTB	IIRR	KAUL	MTU	PNR	PTB		Rewa	TTB
1	CO-51	-	-	-	197	-	112	84	-	-	-	137	-	28	87	84	
2	IET 29694	194	103	190	234	119	153	131	124	98	131	112	119	19	121	103	
3	IET 29700	76	123	145	180	146	130	119	81	121	121	67	138	27	84	91	
4	IET 30505	84	68	123	159	117	161	74	30	51	100	117	79	12	44	62	
5	IET 30555	132	117	116	132	149	113	65	73	114	98	117	166	11	66	92	
6	IET 30561	120	98	131	110	128	134	93	61	87	112	79	144	13	76	82	
7	IET 30635	119	121	140	110	130	111	101	35	121	114	100	99	11	77	80	
8	IET 30651	87	96	112	154	102	140	97	46	77	89	117	105	12	71	74	
9	IET 30653	100	65	174	85	118	162	64	49	68	142	72	87	12	50	68	
10	IET 30656	124	94	130	125	124	129	114	86	92	109	105	97	10	102	86	
11	IET 30660	114	92	117	179	129	162	70	89	89	89	120	95	11	80	82	
12	IET 31433	98	122	111	142	114	131	98	61	100	87	128	148	13	37	82	
13	IET 31440	89	99	151	160	126	111	128	70	72	122	98	125	15	111	88	
14	IET 31444	143	83	157	220	102	112	175	99	82	129	79	110	12	107	88	
15	IET 31510	104	89	136	168	120	112	99	76	63	123	104	109	13	111	85	
16	IET 31512	97	87	117	180	138	167	86	70	86	98	94	107	130	120	101	
17	IET 31515	120	84	168	192	183	129	87	95	47	138	118	153	51	91	99	
18	IET 31533	140	124	173	225	179	161	150	83	71	138	118	190	116	86	115	
19	IET 31540	176	148	233	153	192	116	101	91	111	173	77	166	39	114	110	
20	MTU-1290	145	99	150	144	129	160	114	85	91	109	119	98	29	87	88	
21	MTU-1296	109	101	120	147	132	130	89	101	78	100	101	108	13	74	82	
22	NDR-97	52	132	111	-	57	-	115	45	47	95	-	66	-	31	57	
23	US-314	152	88	166	171	109	137	64	106	56	130	130	114	17	61	88	
	Mean	117	102	144	162	129	135	101	75	83	116	105	119	28	82	86	
		LSD (Treat)						1.24*		LSD (Treat x Variety)						ns	
		LSD (Location x Treat)						4.58**		LSD (Location x Treat x Variety)						24.45**	
		LSD (Variety)								CV (%) Treat						8.78	
		LSD (Location x Variety)						17.29**									

Table 6.3.14 Influence of Heat Stress on Spikelet number per panicle at different locations during Kharif 2024

S.No.	Genotype	Control						Grand Mean	Heat Stress						Grand Mean
		IIRR	MTU	PNR	PTB	Rewa	TTB		IIRR	MTU	PNR	PTB	Rewa	TTB	
1	CO-51	-	-	212	-	124	105	147	-	-	176	-	132	121	143
2	IET 29694	221	200	250	125	163	185	191	198	194	218	148	171	183	185
3	IET 29700	86	159	196	160	137	154	149	102	150	121	142	145	132	132
4	IET 30505	99	135	180	128	169	113	137	85	131	118	94	177	86	115
5	IET 30555	147	129	155	159	125	77	132	146	127	133	181	133	113	139
6	IET 30561	136	145	207	135	154	139	153	131	140	129	155	162	129	141
7	IET 30635	155	151	218	140	130	130	154	145	146	197	134	139	118	147
8	IET 30651	101	125	188	108	151	130	134	110	123	164	121	158	106	130
9	IET 30653	118	187	169	127	176	86	144	96	182	108	124	184	82	129
10	IET 30656	138	143	146	132	144	141	141	116	141	119	102	152	132	127
11	IET 30660	126	128	229	136	179	111	152	126	126	165	106	187	125	139
12	IET 31433	110	123	159	125	140	127	130	135	120	149	169	152	73	133
13	IET 31440	142	163	195	137	127	162	154	151	157	128	148	135	150	145
14	IET 31444	158	167	246	113	126	213	171	128	164	137	120	134	196	146
15	IET 31510	123	146	194	126	119	130	140	140	144	114	122	126	164	135
16	IET 31512	111	129	202	145	174	121	147	101	126	112	116	182	165	134
17	IET 31515	132	181	227	193	138	105	163	151	173	194	159	145	118	157
18	IET 31533	216	186	247	212	173	192	204	243	187	118	215	181	136	180
19	IET 31540	228	246	208	208	129	122	190	195	228	181	186	140	188	186
20	MTU-1290	174	163	252	139	176	134	173	144	157	151	117	184	118	145
21	MTU-1296	128	132	179	135	147	146	144	147	133	111	123	155	149	136
22	NDR-97	68	118	-	63	-	161	103	55	115	-	75	-	87	83
23	US-314	163	179	341	115	152	87	173	154	163	227	128	160	93	154
	Mean	140	156	209	139	148	133	153	136	151	149	136	156	129	142
		LSD (Treat)							LSD (Treat x Variety)						
		LSD (Location x Treat)							LSD (Location x Treat x Variety)						
		LSD (Variety)							CV (%) Treat						
		LSD (Location x Variety)													

Table 6.3.15 Influence of Heat Stress on Grain number/m² at different locations during Kharif 2024

S.No.	Genotype	Control						Grand Mean	Heat Stress						Grand Mean
		IIRR	KAUL	MTU	PNR	PTB	Rewa		TTB	Rewa	PTB	PNR	MTU	IIRR	
1	CO-51	-	-	-	62433	-	26777	41626	35668	-	-	34250	-	-	22680
2	IET 29694	54383	3408	79629	89717	58119	33433	50373	33926	3408	58119	29900	44847	37651	25406
3	IET 29700	24478	4046	65428	48100	82400	28956	41857	39588	4046	82400	13400	46728	29658	27994
4	IET 30505	25680	2251	58047	50350	61899	43432	38643	28846	2251	61899	25333	38621	10377	17653
5	IET 30555	41322	3863	56078	37450	62150	25208	35807	24576	3863	62150	21500	37873	25304	25794
6	IET 30561	38420	3230	61666	36600	68498	33145	39202	32855	3230	68498	14600	51656	20527	24492
7	IET 30635	27429	3991	70840	36833	55435	26915	36499	34049	3991	55435	21550	51557	9080	20648
8	IET 30651	28298	3170	51062	43617	35430	23385	30717	30060	3170	35430	25367	38082	18228	20790
9	IET 30653	31092	2156	72611	22767	44920	28038	31981	22282	2156	44920	13183	56353	18906	20326
10	IET 30656	46418	3111	65780	33667	59752	26885	39678	42133	3111	59752	19150	40589	32267	25271
11	IET 30660	30480	3040	59092	59733	60450	25347	37561	24781	3040	60450	26050	41615	26205	24211
12	IET 31433	34688	4039	53768	52300	59506	31565	38429	33136	4039	59506	27933	37334	25360	23663
13	IET 31440	30573	3254	74910	53567	48439	27523	39759	40049	3254	48439	22733	50754	22617	25286
14	IET 31444	45686	2750	74371	84200	31457	26290	46467	60512	2750	31457	21067	52162	36196	26754
15	IET 31510	35790	2941	67452	53100	49963	26712	38835	35888	2941	49963	24283	59477	28884	29474
16	IET 31512	31718	2864	53955	56883	45376	31555	36213	31141	2864	45376	20300	44198	26941	26197
17	IET 31515	36322	2765	79596	54467	90257	26445	45547	28973	2765	90257	25683	62216	34167	29251
18	IET 31533	39559	4081	82093	56250	26830	39845	40992	38283	4081	26830	23533	50105	22538	27314
19	IET 31540	56733	4877	115280	48383	82881	27823	52751	33278	4877	82881	18033	68640	33974	31545
20	MTU-1290	48764	3267	72831	47900	66539	40897	45048	35141	3267	66539	27850	46695	29898	23198
21	MTU-1296	36984	3340	56969	39000	75102	31199	38353	25880	3340	75102	18483	39490	35954	21478
22	NDR-97	15914	4369	49874	-	33172	-	28993	41635	4369	33172	-	37488	18185	20193
23	US-314	49708	2904	71940	62850	55667	23189	42209	29204	2904	55667	30383	48444	38051	26765
	Mean	36838	3351	67876	51371	57011	29753	39893	33995	3351	57011	22935	47817	26408	24625
		LSD (Treat)						LSD (Treat x Variety)						ns	
		LSD (Location x Treat)						LSD (Location x Treat x Variety)						10626.65**	
		LSD (Variety)						CV (%) Treat						19.02	
		LSD (Location x Variety)													

Table 6.3.16 Influence of Heat Stress on Spikelet number/m² at different locations during Kharif 2024

S.No.	Genotype	Control						Grand Mean	Heat Stress						Grand Mean
		IIRR	MTU	PNR	PTB	Rewa	TTB		IIRR	MTU	PNR	PTB	Rewa	TTB	
1	CO-51	-	-	67067	-	29894	44546	47169	-	-	44000	-	29351	39746	37699
2	IET 29694	61580	83523	95833	61332	35681	47548	64249	60010	66143	57917	48349	34604	30005	49504
3	IET 29700	27718	71852	52250	90417	30476	51042	53959	37430	57849	24133	75023	30115	39122	43945
4	IET 30505	30175	63877	57083	67498	45547	44424	51434	29866	50105	25433	38726	45401	26526	36010
5	IET 30555	46066	62722	43750	66267	27933	29463	46033	50098	48774	24300	71733	27871	42279	44176
6	IET 30561	43503	68332	69150	72340	38235	48779	56723	43717	64691	23500	65066	39630	32649	44875
7	IET 30635	35620	76241	72433	59809	31679	43857	53273	39381	65901	42600	41428	32021	39531	43477
8	IET 30651	32756	56914	53450	38248	25248	40339	41159	43201	52976	35583	43148	22664	34036	38601
9	IET 30653	36736	77836	44833	48291	30507	29645	44641	36738	71687	20000	48881	28661	27878	38641
10	IET 30656	51333	72424	39267	64133	30017	52090	51544	43265	60456	21533	42309	33070	43426	40677
11	IET 30660	33785	64988	76350	63633	28077	39148	50997	37532	59587	35833	46348	26052	46133	41914
12	IET 31433	38674	59422	58283	65356	33735	43076	49758	55309	51535	32233	67689	34920	21434	43853
13	IET 31440	51933	80685	65267	52689	31628	50357	55427	46585	65120	29717	54000	31928	40398	44625
14	IET 31444	50591	79255	94517	34698	29653	73812	60421	46353	66275	36700	43948	30361	60698	47389
15	IET 31510	42302	72600	61250	52507	28320	47305	50714	53497	69817	26467	55472	27585	59377	48702
16	IET 31512	36152	59466	63950	47820	33037	43927	47392	38393	56914	24300	37567	31988	44435	38933
17	IET 31515	40058	85448	64167	95248	28307	35310	58090	54298	77803	41967	47917	26824	33747	47093
18	IET 31533	60910	88231	61667	32031	42865	48958	55777	65902	67870	23533	54087	40046	30573	47002
19	IET 31540	73283	121693	66083	89679	31057	40303	70350	73116	90288	42333	57654	29717	61932	59173
20	MTU-1290	58773	78969	84150	71481	45038	41414	63304	50466	67221	35183	35596	44325	26094	43148
21	MTU-1296	42830	62513	47533	76811	35539	42234	51243	52291	52448	20283	37663	34464	37964	39186
22	NDR-97	20621	53185	-	36683	-	58403	42223	22141	45672	-	39233	-	25876	33231
23	US-314	53192	77583	125100	57989	25726	39408	63166	55818	61116	52950	48328	25817	36067	46683
	Mean	44027	73535	66520	61135	32645	45017	53437	47064	62284	32750	49917	32155	38258	43415
		LSD (Treat)							LSD (Treat x Variety)						ns
		LSD (Location x Treat)							LSD (Location x Treat x Variety)						14107**
		LSD (Variety)							CV (%) Treat						17.96
		LSD (Location x Variety)													

Table 6.3.17 Influence of Heat Stress on Grain yield (g/m²) at different locations during Kharif 2024

S.No.	Genotype	Control						Grand Mean	Heat Stress						Grand Mean	
		IIRR	KAUL	MTU	PNR	PTB	Rewa		TTB	IIRR	KAUL	MTU	PNR	PTB		Rewa
1	CO-51	-	-	-	555	-	563	343	487	-	-	204	-	104	363	224
2	IET 29694	823	648	623	485	723	647	464	630	739	498	182	726	55	499	453
3	IET 29700	563	657	561	441	774	610	438	578	618	564	250	748	76	458	444
4	IET 30505	701	514	609	428	788	724	459	604	312	357	220	493	38	374	318
5	IET 30555	791	616	538	442	817	528	487	603	563	574	175	918	31	426	440
6	IET 30561	806	568	598	297	875	637	530	616	542	475	199	878	47	430	431
7	IET 30635	670	626	565	397	799	568	489	588	218	638	224	670	34	358	366
8	IET 30651	631	521	575	484	658	465	490	546	435	433	281	714	21	388	394
9	IET 30653	645	451	504	354	718	574	434	526	486	439	376	739	26	347	376
10	IET 30656	754	505	590	396	778	513	438	568	653	441	205	743	25	435	426
11	IET 30660	670	519	556	485	783	520	305	548	590	490	214	640	21	309	394
12	IET 31433	781	642	574	408	757	606	436	601	589	540	275	784	36	352	435
13	IET 31440	716	596	576	568	713	507	578	608	519	411	242	736	42	390	402
14	IET 31444	804	497	549	483	618	555	565	582	727	427	217	667	40	367	412
15	IET 31510	722	496	602	534	773	512	534	596	601	378	217	638	32	480	413
16	IET 31512	674	543	583	534	605	614	555	587	620	493	218	602	397	466	476
17	IET 31515	683	521	548	342	719	493	654	566	632	212	179	710	140	483	397
18	IET 31533	690	570	559	567	538	756	464	592	416	213	303	598	546	381	415
19	IET 31540	769	584	571	518	818	570	391	603	590	374	312	506	131	323	387
20	MTU-1290	774	439	553	354	710	700	427	565	621	416	206	489	108	432	388
21	MTU-1296	743	616	596	319	783	646	487	599	688	389	192	673	43	414	409
22	NDR-97	322	508	512	-	378	-	464	437	365	194	-	379	-	377	343
23	US-314	804	399	573	579	662	513	318	550	712	257	446	658	48	374	423
	Mean	706	547	569	453	718	583	467	573	556	419	235	669	93	401	399
		LSD (Treat)							LSD (Treat x Variety)						ns	
		LSD (Location x Treat)							LSD (Location x Treat x Variety)						103.09**	
		LSD (Variety)							CV (%) Treat						11.87	
		LSD (Location x Variety)														

Table 6.3.18 Influence of Heat Stress on Total dry matter (g/m²) at different locations during Kharif 2024

S.No.	Genotype	Control						Grand Mean	Heat Stress						Grand Mean	
		IIRR	KAUL	MTU	PNR	PTB	Rewa		TTB	IIRR	KAUL	MTU	PNR	PTB		Rewa
1	CO-51	-	-	-	1413	-	1542	652	-	-	-	674	-	1069	566	770
2	IET 29694	1892	1497	1104	1195	1868	1696	1054	1838	1293	842	715	1707	1070	905	1196
3	IET 29700	1312	1555	991	1163	1868	1722	1335	1423	1371	657	873	1823	1127	746	1146
4	IET 30505	1720	1142	1057	1187	1872	1847	829	761	962	786	753	1738	1073	672	963
5	IET 30555	1873	1391	895	1160	1914	1600	791	1368	1330	690	767	1978	1039	864	1148
6	IET 30561	1886	1247	1008	993	1900	1771	954	1293	1107	770	699	1905	1157	786	1103
7	IET 30635	1565	1396	965	1181	1928	1692	1245	593	1381	724	765	1880	1086	1105	1076
8	IET 30651	1474	1127	1043	1323	1909	1398	1127	1046	1001	872	878	1852	974	637	1037
9	IET 30653	1498	935	875	985	1817	1644	953	1146	912	659	720	1860	1040	560	985
10	IET 30656	1846	1108	1054	1060	1919	1644	1615	1572	969	834	617	1850	1019	765	1089
11	IET 30660	1560	1136	1019	1277	1882	1626	673	1364	1103	908	624	1694	1113	494	1043
12	IET 31433	1858	1412	1009	1142	1851	1755	1053	1452	1261	862	905	1903	1114	1217	1245
13	IET 31440	1774	1273	1054	1417	1875	1595	1022	1275	1046	810	719	1912	1107	738	1087
14	IET 31444	1858	1039	926	1302	1633	1703	1033	1736	939	767	829	1864	1107	907	1164
15	IET 31510	1756	1135	989	1439	1871	1559	1048	1481	983	1016	782	1850	1005	854	1139
16	IET 31512	1541	1180	997	1320	1878	1673	964	1445	1097	973	627	1772	1433	866	1173
17	IET 31515	1700	1112	995	1060	1925	1578	1066	1475	682	798	610	1849	1213	809	1062
18	IET 31533	1689	1231	988	1531	1849	1866	837	1032	770	794	896	1736	1491	675	1056
19	IET 31540	1804	1273	981	1332	1904	1601	903	1404	990	825	895	1860	1087	563	1089
20	MTU-1290	1883	979	958	1119	1880	1807	783	1493	941	728	710	1757	1087	688	1058
21	MTU-1296	1812	1391	1041	979	1909	1735	932	1585	1097	789	683	1796	1106	690	1107
22	NDR-97	702	1098	953	-	1313	-	1228	802	733	694	-	1185	-	757	834
23	US-314	1891	858	991	1579	1875	1683	1267	1745	689	883	1188	1812	1177	806	1186
	Mean	1677	1205	995	1234	1847	1670	1016	1333	1030	804	769	1799	1122	768	1076
		LSD (Treat)						26.11**	LSD (Treat x Variety)						ns	
		LSD (Location x Treat)						69.10**	LSD (Location x Treat x Variety)						265.19**	
		LSD (Variety)							CV (%) Treat						11.50	
		LSD (Location x Variety)						187.52**								

Table 6.3.19 Influence of Heat Stress on 1000 grain weight (g) at different locations during Kharif 2024

S.No.	Genotype	Control						Grand Mean	Heat Stress						Grand Mean	
		IIRR	KAUL	MTU	PNR	PTB	Rewa		TTB	IIRR	KAUL	MTU	PNR	PTB		Rewa
1	CO-51	-	-	-	24.9	-	24.9	24.5	24.8	-	-	22.8	-	21.8	22.9	22.5
2	IET 29694	21.5	26.0	22.4	31.3	22.6	23.6	20.0	23.9	24.0	21.0	20.8	25.1	23.6	22.0	22.4
3	IET 29700	25.8	23.9	21.5	24.8	23.4	25.4	23.4	24.0	25.3	19.8	19.4	17.3	23.4	24.2	21.1
4	IET 30505	31.6	28.6	22.8	31.2	30.2	23.3	24.9	27.5	30.1	23.7	19.0	25.5	27.5	19.7	23.9
5	IET 30555	25.1	21.2	22.1	24.1	23.5	24.4	23.0	23.3	24.2	19.6	19.0	12.9	23.4	21.3	20.7
6	IET 30561	28.7	22.6	22.2	30.4	26.8	23.5	25.7	25.7	27.8	21.0	19.4	22.8	25.0	24.2	23.3
7	IET 30635	26.8	21.8	21.7	26.9	24.7	25.5	27.5	25.0	23.8	21.6	18.3	23.9	22.5	21.2	22.0
8	IET 30651	25.1	19.2	22.3	29.7	27.4	23.0	21.6	24.0	24.3	19.3	19.2	24.2	23.6	15.9	20.9
9	IET 30653	22.9	24.6	22.5	28.2	27.0	24.4	24.7	24.9	26.6	22.2	20.2	23.1	25.0	20.8	22.9
10	IET 30656	21.6	20.6	21.8	25.5	26.2	22.6	23.5	23.1	23.4	17.4	19.4	19.5	26.0	19.9	21.1
11	IET 30660	24.5	20.7	21.5	25.5	23.1	24.0	23.4	23.3	24.2	19.9	17.4	21.1	21.2	20.1	21.3
12	IET 31433	28.3	23.4	22.0	29.3	26.0	23.5	22.0	24.9	25.9	23.9	18.4	22.1	22.3	20.4	22.1
13	IET 31440	27.1	21.7	22.0	32.6	25.5	22.2	20.2	24.5	25.9	19.7	18.8	27.9	24.8	18.0	22.4
14	IET 31444	24.2	22.6	22.1	28.1	24.7	25.1	23.6	24.4	25.3	19.4	17.5	26.3	25.0	24.4	23.1
15	IET 31510	26.2	22.5	19.0	32.0	25.2	22.7	27.0	24.9	24.0	22.8	18.2	20.5	25.9	17.8	21.6
16	IET 31512	24.0	23.4	18.6	31.7	26.0	23.7	26.6	24.8	25.1	20.6	18.2	23.2	24.4	20.4	21.9
17	IET 31515	22.1	22.3	21.3	26.3	20.3	22.1	24.3	22.7	20.0	15.5	18.3	23.4	20.3	18.3	19.6
18	IET 31533	19.4	17.9	16.4	22.6	17.1	27.8	24.8	20.9	18.5	11.1	14.8	14.8	17.1	25.6	18.1
19	IET 31540	17.9	15.6	17.4	20.4	15.1	24.5	26.1	19.6	19.4	12.6	15.0	16.6	14.2	20.1	16.9
20	MTU-1290	21.8	16.3	21.2	25.2	22.1	22.7	25.1	22.0	22.8	16.5	18.3	21.2	20.3	20.2	19.9
21	MTU-1296	24.4	24.1	24.4	25.6	22.3	25.4	21.4	23.9	21.8	17.8	19.1	22.0	22.0	23.3	20.9
22	NDR-97	20.2	15.2	19.4	-	19.9	-	22.5	19.4	20.2	15.1	18.3	-	19.9	-	18.6
23	US-314	22.6	16.4	20.8	23.6	21.2	25.8	19.0	21.3	21.3	16.7	19.0	17.6	20.5	24.0	20.0
	Mean	24.2	21.4	21.2	27.3	23.6	24.1	23.7	23.6	23.8	19.0	18.4	21.5	22.6	21.2	21.2
		LSD (Treat)							LSD (Treat x Variety)						ns	
		LSD (Location x Treat)							LSD (Location x Treat x Variety)						3.74**	
		LSD (Variety)							CV (%) Treat						7.99	
		LSD (Location x Variety)														

Table 6.3.20 Influence of Heat Stress on Harvest index (%) at different locations during *Kharif* 2024

S.No.	Genotype	Control						Grand Mean	Heat Stress						Grand Mean		
		IIRR	KAUL	MTU	PNR	PTB	Rewa		TTB	IIRR	KAUL	MTU	PNR	PTB		Rewa	TTB
1	CO-51	-	-	-	39.3	-	36.5	52.9	42.9	-	-	-	30.3	-	9.8	64.1	34.7
2	IET 29694	43.5	43.3	56.9	40.6	38.7	38.2	45.1	43.8	40.2	38.6	56.5	25.4	42.6	5.2	55.6	37.7
3	IET 29700	43.5	42.3	56.7	38.0	41.5	35.5	33.1	41.5	43.8	41.2	59.5	28.6	41.1	6.8	61.5	40.3
4	IET 30505	40.9	45.0	58.2	36.1	42.1	39.2	55.8	45.3	40.9	37.0	55.4	29.3	28.4	3.5	55.8	35.8
5	IET 30555	42.3	44.2	60.2	38.1	42.7	32.9	61.7	46.0	41.5	43.1	57.1	22.8	46.4	3.0	50.3	37.7
6	IET 30561	42.8	45.5	59.5	29.9	46.1	35.9	56.0	45.1	41.9	42.9	58.4	28.4	46.1	4.1	55.6	39.6
7	IET 30635	43.1	44.9	59.0	33.7	41.4	33.6	39.3	42.1	36.4	46.2	58.4	29.4	35.6	3.1	36.5	35.1
8	IET 30651	43.2	46.2	55.1	36.6	34.5	33.2	43.5	41.8	41.5	43.3	55.7	32.1	38.6	2.2	60.9	39.2
9	IET 30653	43.3	48.2	57.7	36.0	39.5	34.9	49.4	44.2	42.4	48.1	57.4	30.3	39.7	2.5	62.0	40.4
10	IET 30656	40.8	45.7	56.6	37.3	40.5	30.7	27.2	39.8	41.8	45.5	57.8	33.3	40.2	2.5	57.1	39.7
11	IET 30660	43.1	45.8	54.8	38.0	41.6	32.0	48.0	43.3	43.3	44.5	54.3	34.3	37.7	1.9	62.6	39.8
12	IET 31433	42.1	45.6	57.3	35.7	40.9	34.5	41.5	42.5	40.5	42.8	54.4	30.3	41.2	3.2	30.2	34.7
13	IET 31440	40.4	46.7	55.3	40.1	38.1	31.8	56.5	44.1	41.2	39.2	58.5	33.5	38.5	3.8	53.2	38.3
14	IET 31444	43.1	48.1	59.1	37.1	37.9	32.7	54.8	44.7	42.1	45.2	57.4	26.1	35.8	3.6	40.9	35.9
15	IET 31510	41.2	43.8	61.4	37.1	41.3	33.0	51.1	44.1	40.7	38.6	53.9	27.7	34.5	3.2	56.8	36.5
16	IET 31512	43.9	46.1	59.1	40.4	32.3	36.7	57.7	45.2	43.0	45.0	55.3	34.6	34.1	27.6	54.4	42.0
17	IET 31515	40.2	47.0	55.0	32.3	37.4	31.3	61.4	43.5	43.0	31.1	53.1	29.4	38.4	11.6	59.9	38.0
18	IET 31533	40.8	46.3	56.6	37.1	29.1	40.5	56.2	43.8	40.4	27.6	56.6	33.9	34.4	36.6	57.7	41.0
19	IET 31540	42.6	45.9	58.8	38.8	43.0	35.6	43.6	44.0	41.9	37.8	58.0	34.9	27.2	12.1	57.5	38.5
20	MTU-1290	41.1	44.8	57.9	31.7	37.8	38.7	55.2	43.9	41.7	44.3	61.2	29.1	27.9	9.9	62.8	39.5
21	MTU-1296	41.1	44.4	57.3	32.5	41.0	37.2	53.7	43.9	44.2	35.5	59.1	28.0	37.5	3.9	60.0	38.3
22	NDR-97	45.8	46.4	53.7	-	28.7	-	42.5	43.4	45.7	26.4	58.1	-	32.2	-	51.0	42.7
23	US-314	42.5	46.6	57.8	36.7	35.4	30.5	25.7	39.3	40.9	37.2	53.0	37.6	36.3	4.1	48.0	36.7
	Mean	42.3	45.6	57.5	36.5	38.7	34.8	48.3	43.4	41.8	40.1	56.8	30.4	37.0	7.5	54.5	38.4
		LSD (Treat)							LSD (Treat x Variety)							ns	
		LSD (Location x Treat)							LSD (Location x Treat x Variety)							7.05**	
		LSD (Variety)							CV (%) Treat							9.07	
		LSD (Location x Variety)															

Table 6.3.21.A Influence of Heat Stress on chlorophyll fluorescence traits at IIRR during Kharif 2024

S No	Genotype	Actual quantum yield of PSII (ϕ PSII)			Electron Transport Rate (ETR)			Maximum quantum yield of PSII (Fv/Fm)		
		Control	Heat Stress	Mean	Control	Heat Stress	Mean	Control	Heat Stress	Mean
1	IET 29694	0.354	0.393	0.373	22.4	24.5	23.4	0.796	0.793	0.795
2	IET 29700	0.395	0.415	0.405	24.9	25.8	25.4	0.784	0.793	0.789
3	IET 30505	0.387	0.406	0.396	24.5	25.0	24.7	0.782	0.806	0.794
4	IET 30555	0.436	0.367	0.402	27.5	22.7	25.1	0.785	0.797	0.791
5	IET 30561	0.424	0.403	0.414	26.9	24.8	25.9	0.796	0.799	0.798
6	IET 30635	0.487	0.409	0.448	31.0	25.3	28.1	0.784	0.811	0.798
7	IET 30651	0.456	0.455	0.455	29.0	28.1	28.5	0.780	0.794	0.787
8	IET 30653	0.504	0.422	0.463	32.1	26.1	29.1	0.794	0.796	0.795
9	IET 30656	0.509	0.407	0.458	32.4	25.1	28.8	0.817	0.792	0.805
10	IET 30660	0.414	0.421	0.417	26.4	26.0	26.2	0.806	0.809	0.808
11	IET 31433	0.446	0.421	0.433	28.5	26.0	27.2	0.805	0.814	0.810
12	IET 31440	0.427	0.380	0.404	27.3	23.5	25.4	0.816	0.813	0.815
13	IET 31444	0.440	0.371	0.405	28.1	22.9	25.5	0.801	0.801	0.801
14	IET 31510	0.354	0.394	0.374	22.6	24.4	23.5	0.790	0.816	0.803
15	IET 31512	0.453	0.432	0.442	28.9	26.6	27.8	0.800	0.802	0.801
16	IET 31515	0.430	0.433	0.432	27.5	26.8	27.2	0.803	0.799	0.801
17	IET 31533	0.459	0.437	0.448	29.4	27.2	28.3	0.799	0.801	0.800
18	IET 31540	0.383	0.447	0.415	24.5	27.7	26.1	0.808	0.795	0.802
19	MTU-1290	0.425	0.410	0.418	27.2	25.5	26.4	0.788	0.803	0.795
20	MTU-1296	0.393	0.456	0.425	25.2	28.3	26.8	0.801	0.802	0.801
21	NDR-97	0.411	0.417	0.414	26.3	26.0	26.2	0.797	0.806	0.801
22	US-314	0.401	0.424	0.413	25.7	26.5	26.1	0.811	0.787	0.799
	Mean	0.427	0.414	0.421	27.2	25.7	26.4	0.797	0.801	0.799
	LSD (Treat)			ns			ns			ns
	LSD (Variety)			0.06**			3.73**			0.02**
	LSD (Treat x Variety)			0.08**			5.27**			0.02**
	CV(%) Treat			11.84			11.85			2.23

Table 6.3.21.B Influence of Heat Stress on chlorophyll fluorescence traits at IIRR during Kharif 2024

S No	Genotype	Coefficient of photochemical quenching (qP)			Coefficient of non-photochemical quenching (qN)		
		Control	Heat Stress	Mean	Control	Heat Stress	Mean
1	IET 29694	0.607	0.650	0.629	0.335	0.328	0.331
2	IET 29700	0.736	0.672	0.704	0.467	0.308	0.388
3	IET 30505	0.717	0.623	0.670	0.437	0.290	0.364
4	IET 30555	0.754	0.590	0.672	0.352	0.300	0.326
5	IET 30561	0.753	0.673	0.713	0.410	0.357	0.383
6	IET 30635	0.828	0.627	0.728	0.391	0.290	0.341
7	IET 30651	0.762	0.718	0.740	0.349	0.308	0.329
8	IET 30653	0.789	0.681	0.735	0.320	0.365	0.342
9	IET 30656	0.757	0.660	0.709	0.258	0.298	0.278
10	IET 30660	0.670	0.667	0.668	0.341	0.328	0.335
11	IET 31433	0.703	0.660	0.682	0.360	0.340	0.350
12	IET 31440	0.683	0.581	0.632	0.301	0.268	0.284
13	IET 31444	0.713	0.578	0.646	0.360	0.263	0.311
14	IET 31510	0.649	0.640	0.645	0.414	0.360	0.387
15	IET 31512	0.726	0.665	0.696	0.295	0.266	0.280
16	IET 31515	0.752	0.696	0.724	0.414	0.320	0.367
17	IET 31533	0.740	0.706	0.723	0.317	0.374	0.346
18	IET 31540	0.652	0.713	0.682	0.389	0.319	0.354
19	MTU-1290	0.734	0.676	0.705	0.385	0.370	0.378
20	MTU-1296	0.672	0.737	0.705	0.368	0.330	0.349
21	NDR-97	0.675	0.636	0.656	0.351	0.295	0.323
22	US-314	0.648	0.696	0.672	0.359	0.363	0.361
	Mean	0.715	0.661	0.688	0.362	0.320	0.341
	LSD (Treat)			0.05*			0.003**
	LSD (Variety)			ns			ns
	LSD (Treat x Variety)			ns			ns
	CV(%) Treat			10.21			0.53

Table 6.3.22 Heat tolerance indices of different genotypes across locations during Kharif 2024

S.No.	Genotype	HSI	RHI	HTI	GMP	TOL	MP	YI	YSI	HI	SHI	HM	K1STI	K2STI
1	CO-51	1.43	0.68	0.77	310.4	-263.0	355.3	0.55	0.54	0.40	0.37	275.4	1.92	0.92
2	IET 29694	0.80	0.68	2.20	511.2	-177.1	541.8	1.12	0.71	0.98	0.23	492.2	3.05	3.67
3	IET 29700	0.58	0.76	2.07	487.2	-133.7	511.0	1.10	0.78	1.03	0.18	470.4	2.71	3.65
4	IET 30505	1.31	0.48	1.49	416.5	-285.4	460.9	0.79	0.55	0.51	0.33	390.8	2.96	1.81
5	IET 30555	0.94	0.62	2.28	491.7	-162.9	521.2	1.09	0.69	0.96	0.24	474.7	2.97	3.98
6	IET 30561	0.87	0.47	2.28	494.7	-185.2	523.3	1.07	0.69	0.88	0.23	478.1	3.19	3.66
7	IET 30635	1.20	0.44	1.77	439.7	-221.7	476.9	0.91	0.62	0.71	0.29	417.2	2.80	2.70
8	IET 30651	0.85	0.58	1.76	444.8	-151.6	470.2	0.98	0.70	0.83	0.23	431.7	2.36	2.91
9	IET 30653	0.81	0.60	1.63	421.7	-150.0	450.9	0.93	0.71	0.80	0.22	408.1	2.26	2.75
10	IET 30656	0.75	0.63	2.06	470.9	-141.1	497.0	1.06	0.73	0.93	0.21	458.1	2.67	3.51
11	IET 30660	0.83	0.60	1.80	441.4	-154.3	471.0	0.98	0.72	0.85	0.22	427.1	2.49	2.96
12	IET 31433	0.81	0.60	2.17	489.3	-165.7	517.8	1.08	0.71	0.92	0.22	474.2	2.94	3.61
13	IET 31440	0.97	0.54	1.99	475.7	-206.1	504.9	1.00	0.64	0.79	0.27	455.9	2.91	3.08
14	IET 31444	0.84	0.59	1.97	468.0	-169.4	496.9	1.02	0.69	0.88	0.24	450.5	2.72	3.30
15	IET 31510	0.91	0.57	2.03	476.8	-183.0	504.8	1.02	0.67	0.83	0.25	460.8	2.84	3.18
16	IET 31512	0.49	0.73	2.20	523.8	-110.7	531.5	1.18	0.81	1.01	0.12	516.7	2.69	3.63
17	IET 31515	0.70	0.65	1.92	465.3	-168.6	481.6	0.98	0.66	0.78	0.23	450.9	2.61	3.02
18	IET 31533	0.54	0.71	1.93	489.7	-176.9	503.6	1.03	0.71	0.79	0.19	476.9	2.79	2.80
19	IET 31540	0.93	0.56	1.90	475.5	-215.7	495.0	0.96	0.65	0.68	0.23	458.8	2.97	2.54
20	MTU-1290	0.84	0.60	1.76	453.8	-176.9	476.8	0.96	0.72	0.77	0.20	436.9	2.67	2.65
21	MTU-1296	0.79	0.61	2.04	473.6	-189.8	503.7	1.01	0.67	0.82	0.24	456.9	2.95	3.21
22	NDR-97	0.04	0.81	1.15	380.1	-94.0	389.7	0.85	0.82	0.75	0.13	371.4	1.53	1.88
23	US-314	0.51	0.72	1.97	466.2	-126.5	486.7	1.05	0.77	0.93	0.18	453.7	2.52	3.35
	Mean	0.82	0.62	1.88	459.47	-174.31	485.76	0.99	0.69	0.82	0.23	442.93	2.67	2.99

Table 6.3.23 Ranking of rice genotypes for heat tolerance indices across locations during Kharif 2024

S.No.	Genotype	DSI	RDI	DTI	GMP	TOL	MP	YI	YSI	DI	SDI	HM	K1STI	K2STI	Overall Rank
1	CO-51	1	7	23	23	22	23	23	23	23	1	23	22	23	23
2	IET 29694	15	6	4	2	15	1	2	9	3	13	2	2	2	2
3	IET 29700	19	2	6	7	4	6	3	3	1	21	7	13	4	4
4	IET 30505	2	21	21	21	23	20	22	22	22	2	21	5	22	22
5	IET 30555	5	10	1	4	9	4	4	14	4	6	5	4	1	1
6	IET 30561	8	22	2	3	17	3	6	15	9	12	3	1	3	5
7	IET 30635	3	23	17	19	21	16	20	21	20	3	19	10	18	19
8	IET 30651	9	17	19	17	7	19	15	12	12	10	17	20	15	17
9	IET 30653	13	13	20	20	6	21	19	11	14	15	20	21	17	19
10	IET 30656	17	9	7	12	5	11	7	5	6	17	10	16	7	7
11	IET 30660	12	15	16	18	8	18	16	6	10	14	18	19	14	15
12	IET 31433	14	12	5	6	10	5	5	8	7	16	6	7	6	6
13	IET 31440	4	20	10	9	19	7	13	20	15	4	12	8	12	13
14	IET 31444	10	16	12	13	12	12	11	13	8	8	15	12	9	11
15	IET 31510	7	18	9	8	16	8	10	17	11	5	8	9	11	8
16	IET 31512	22	3	3	1	2	2	1	2	2	23	1	14	5	3
17	IET 31515	18	8	14	15	11	15	14	18	17	11	14	17	13	16
18	IET 31533	20	5	13	5	14	10	9	10	16	19	4	11	16	12
19	IET 31540	6	19	15	10	20	13	18	19	21	9	9	3	20	14
20	MTU-1290	11	14	18	16	13	17	17	7	18	18	16	15	19	18
21	MTU-1296	16	11	8	11	18	9	12	16	13	7	11	6	10	10
22	NDR-97	23	1	22	22	1	22	21	1	19	22	22	23	21	21
23	US-314	21	4	11	14	3	14	8	4	5	20	13	18	8	9

Table 6.3.24 Selection for high yield and stability of performance under heat stress during Kharif 2024

S.No.	Genotype	Mean Yield (g/m ²)	Yield Rank (Y _n)	Adj-rank	Adjustment to Yield Rank (Y _n)	Stability Variance (σ^2)	Stability Rating	YSi = (Y+S)	
1	CO-51	225.8	1	-3	-2	81228.4	-8	-10	
2	IET 29694	453.3	22	3	25	24469.1	-8	17	+
3	IET 29700	444.1	21	3	24	15393.3	-8	16	+
4	IET 30505	318.2	2	-3	-1	20406.6	-8	-9	
5	IET 30555	439.8	20	3	23	52977.3	-8	15	+
6	IET 30561	430.8	18	3	21	28371.5	-8	13	+
7	IET 30635	366.0	4	-3	1	84172.1	-8	-7	
8	IET 30651	394.4	9	-3	6	12864.1	-8	-2	
9	IET 30653	375.9	5	-3	2	10495.2	-8	-6	
10	IET 30656	426.4	17	3	20	12876.8	-8	12	+
11	IET 30660	393.9	8	-3	5	13128.0	-8	-3	
12	IET 31433	434.9	19	3	22	18397.8	-8	14	+
13	IET 31440	401.9	11	3	14	5335.3	-8	6	+
14	IET 31444	412.2	13	3	16	19853.7	-8	8	+
15	IET 31510	413.3	14	3	17	12483.9	-8	9	+
16	IET 31512	476.2	23	3	26	37869.3	-8	18	+
17	IET 31515	397.3	10	-3	7	33020.8	-8	-1	
18	IET 31533	415.1	15	3	18	138038.0	-8	10	+
19	IET 31540	387.2	6	-3	3	18194.4	-8	-5	
20	MTU-1290	388.4	7	-3	4	16622.1	-8	-4	
21	MTU-1296	408.8	12	3	15	13811.2	-8	7	+
22	NDR-97	344.0	3	-3	0	110533.0	-8	-8	
23	US-314	423.4	16	3	19	50626.3	-8	11	+
	Yield Mean	398.8			* + Selected genotypes				
	YS Mean	4.39	LSD (0.05): 0.683		Kang, M.S. 1993. Agronomy Journal. 85:754-757				

6.4 Physiological characterization of selected rice genotypes for multiple abiotic stress tolerance

Locations: CBT, CRRI, FZB, KAUL, KJT, KRK, MTU, PNR, PTB & TTB

Agricultural productivity around the world is constantly being challenged by the growing frequency of unfavourable weather events. Rice is farmed in a range of ecosystem due to which rice is constantly exposed to various adverse climatic condition which tend to lower its productivity. These unfavourable climatic conditions primarily drought, flood etc. poses serious threat to global food security. Rice, due its availability of vast range of germplasm and wide genetic base provide an excellent opportunity to identify rice genotypes tolerant to multiple abiotic stresses which can be used as donor to improve yield potential. Keeping this in mind, an experiment was designed to identify and physiologically characterize rice genotypes tolerant to multiple abiotic stresses. In this regard, a set of 35 rice lines were subjected to three distinct abiotic stress viz. (i) salinity (equivalent to 12 dS m⁻¹ of NaCl) at early seedling stage, (ii) osmotic or dehydration stress (1 and 2% mannitol solution equivalent to -3.0 to -5.0 bars osmotic potential) at early seedling stage, and (iii) anaerobic condition (8-10 cm of standing water above the soil surface) after direct sowing of the seeds. For salinity and osmotic stress experiment seeds were grown hydroponically in Yoshida's as per the protocol described by Gregory *et al.* (1997). Salinity and osmotic stress were given separately after 3-4 leaf stage of rice plant by adding the required amount of NaCl and mannitol respectively. One set was grown in normal Yoshida's solution and considered as control. For anaerobic experiment seeds were grown in plastic trays filled with about 5 cm soil. Right after sowing the trays were filled with 10 cm of water to create anoxic condition. Seeds were set to germinate under water. Another set of seeds was germinated in plastic trays but without water to evaluate the germination potential in aerobic condition. This additional set is referred as control. Total 35 rice lines were subjected to different abiotic stress condition viz. anaerobic stress, salinity stress, and osmotic stress at different AICRIP centres across India. The result received from different centres are presented below.

Anaerobic Germination:

Anaerobic germination potential (AGP) of the 35 genotypes was assessed at five different locations including CRRI, KAUL, KJT, KRK, and MTU. The AGI of CBT, FZB, and PNR could not be calculated due to non-availability of germination percentage in control. Similarly, the germination percentage in stress was not available in PTB centre. AGI of few genotypes in TTB centre was more than 100%. So, the AGI of these centres were not included in the study.

To know the AGP of these genotypes, anaerobic germination index (AGI) was estimated by dividing germination percentage under anaerobic condition with germination percentage under aerobic condition. Across different locations, the average AGI of the genotypes ranged from a lowest of 30.91% AGI in KRK to a highest of 48.27% in KJT where the overall CV was about 21.56%. The tolerant check Rashpanjor recorded the AGI of around 60.83% across different locations. Based on the result of multilocation trial of different entries, Ratnagiri-8 recorded the highest AGI of 59.85%. Apart from this, three more entries, NICRA 20 (51.26%), CRRG6(AUS 171) (55.05%), and AC 34245 (55.94%) recorded AGI more than 50% and considered as tolerant to anaerobic condition. Whereas, many entries including susceptible checks IR 29 (20.83%), FL 478 (28.64%), and Naveen (29.06%) reported AGI less than 30% (Fig 6.4.1).

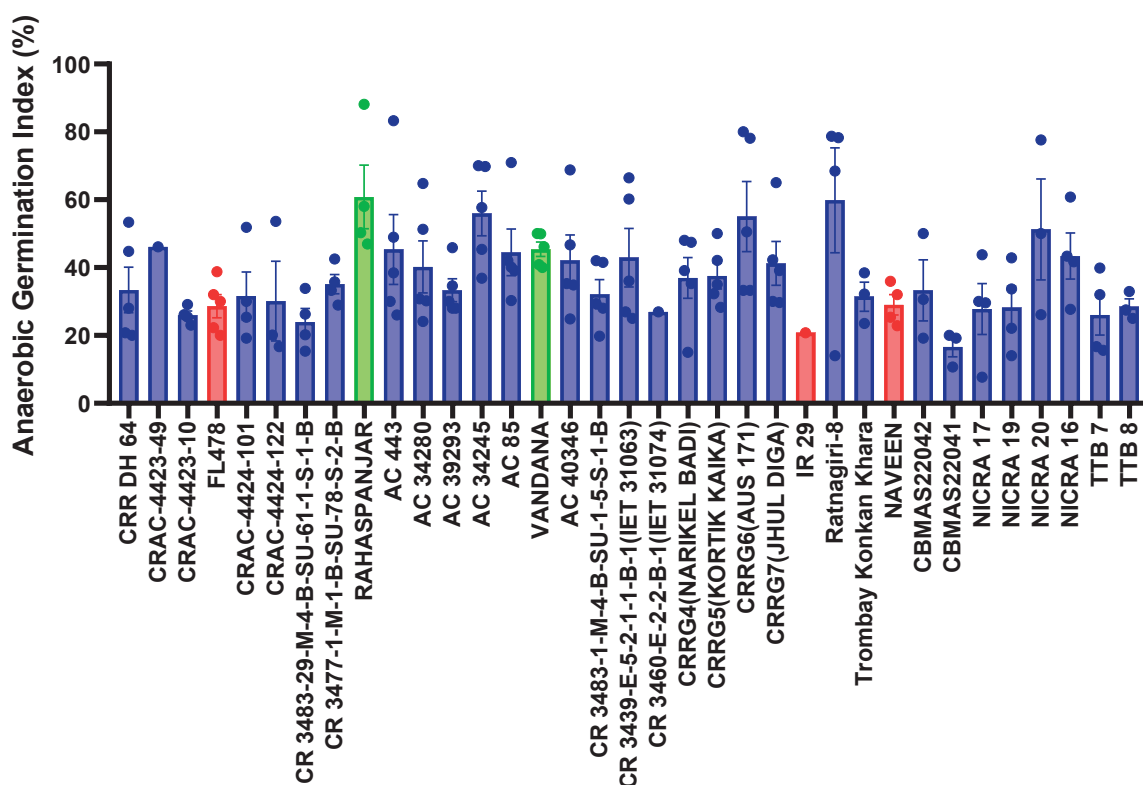


Fig. 6.4.1 Mean AGI (%) of rice genotypes recorded after 21 days of germination stage under anaerobic condition tested across different locations. Error bars representing SE (mean) of all locations and scattered dots are representing mean of individual location.

In addition to AGP, rice's ability to withstand AG stress is significantly influenced by the underwater elongation of its epicotyl. Epicotyl length of all the germinated entries was measured at 21 days after sowing under anaerobic condition. The genotypes varied

significantly for epicotyl length across the locations. The epicotyl length of the entries ranged from 15.79% in PNR to 41.24% in FZB with the overall mean of 27.90 and CV of 13.19%. Across the locations, the genotype Rashpanjor followed by Vandana reported the highest epicotyl length of 43.22 cm and 39.23 cm respectively. This was succeeded by the entries AC 34280 and AC 443 which showed epicotyl length of 37.52 cm and 36.19 cm respectively at 21 days after anaerobic germination. Contrastingly, the epicotyl length was lowest in the entry NICRA 19 (18.84 cm), which was even lower than the susceptible checks IR 29 (19.70 cm) and Naveen (21.34 cm) (Fig 6.4.2). This was followed by the genotype NICRA 20 which reported epicotyl length of 20.34 cm. Notably, the entry NICRA 20 showed a high anaerobic germination index despite of low epicotyl length across the locations. Moreover, a highly significant ($R^2=0.223^{**}$) and positive association was found between AGI and epicotyl length at 21 days after anaerobic germination (Fig 6.4.3). This indicates that, higher the elongation of epicotyl, higher is the germination potential of the given entry under anaerobic condition.

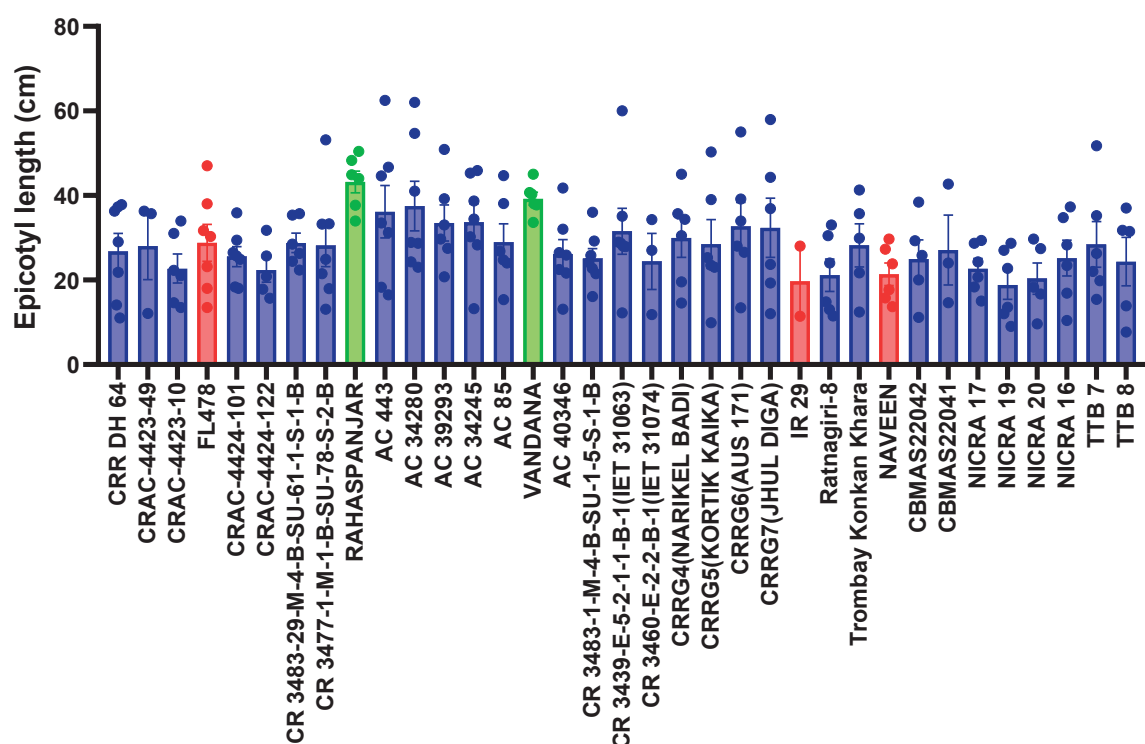


Fig. 6.4.2 Mean length of epicotyl (cm) of rice genotypes recorded after 21 days of germination stage under anaerobic condition across different locations. Error bars representing SE (mean) of all locations and scattered dots are representing mean of individual location.

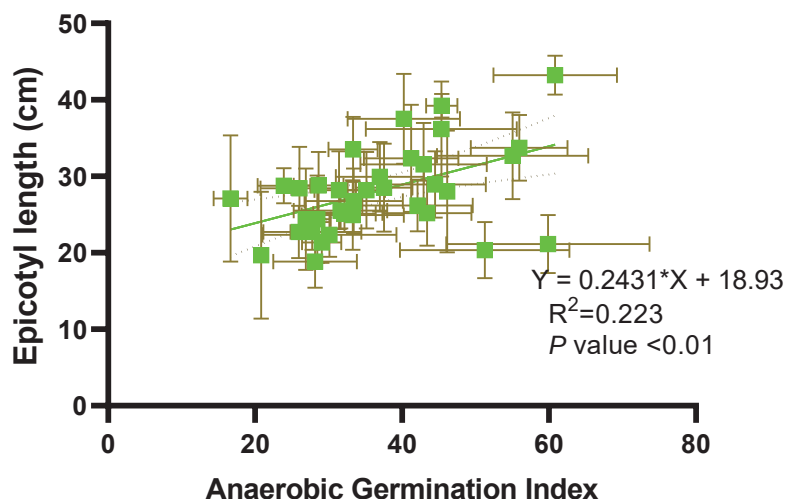


Fig. 6.4.3 An XY-scatter plot showing simple linear regression between anaerobic germination potential and epicotyl length of rice genotypes after 21 days of germination under anaerobic condition tested across different locations. Error bars representing SE (mean) of all locations.

Salinity Stress:

Salinity stress tolerance of 35 genotypes was assessed across different locations namely, CBT, CRRI, KJT, KRK, MTU, PNR, and PTB. To assess the ability of these genotypes to tolerate salinity stress, these genotypes were evaluated based on chlorophyll content, root length, shoot length, root dry weight, shoot dry weight, visual salt injury score, and shoot Na^+/K^+ ratio at seedling stage under saline condition. Significant difference was found among the genotypes for root length under salinity stress across the locations. A decline in root length was noted from 7.29cm in control to 5cm in salinity stress condition with 31.41% reduction over control. Among the tested entries, the decline in root length in response to salinity stress was highest in CR 3460-E-2-2-B-1(IET 31074) (61.29%) succeeded by CBMAS22041 (45.98%), AC 34245 (42.49%), susceptible checks Naveen (41.84%) and IR 29 (40.88%). While least reduction in root length was noted in the tolerant check FL 478 (16.64%) followed by Trombay Konkan Khara (22.23%), CRAC-4424-101 (22.42%), and Rashpanjor (23.35%). Shoot length also varied significantly among the tested entries across the locations. In response to salinity stress, shoot length declined reduced by 31.12% in stress condition (26.06 cm) as compared to the control condition (17.95 cm). The decline in shoot length was most prominent in the entry CR 3460-E-2-2-B-1(IET 31074) (58.41%) followed by the susceptible check Naveen (43.45%), and AC 34245 (42.50%). Tolerant checks FL 478 and Rashpanjor reported 23.71% and 23.32% decline in shoot length under stress condition. Two entries CRAC-4424-101 (23.53%)

and CRAC-4424-122 (23.20%) recorded even lower reduction in shoot length than the tolerant genotype FL 478 (Fig 6.4.4).

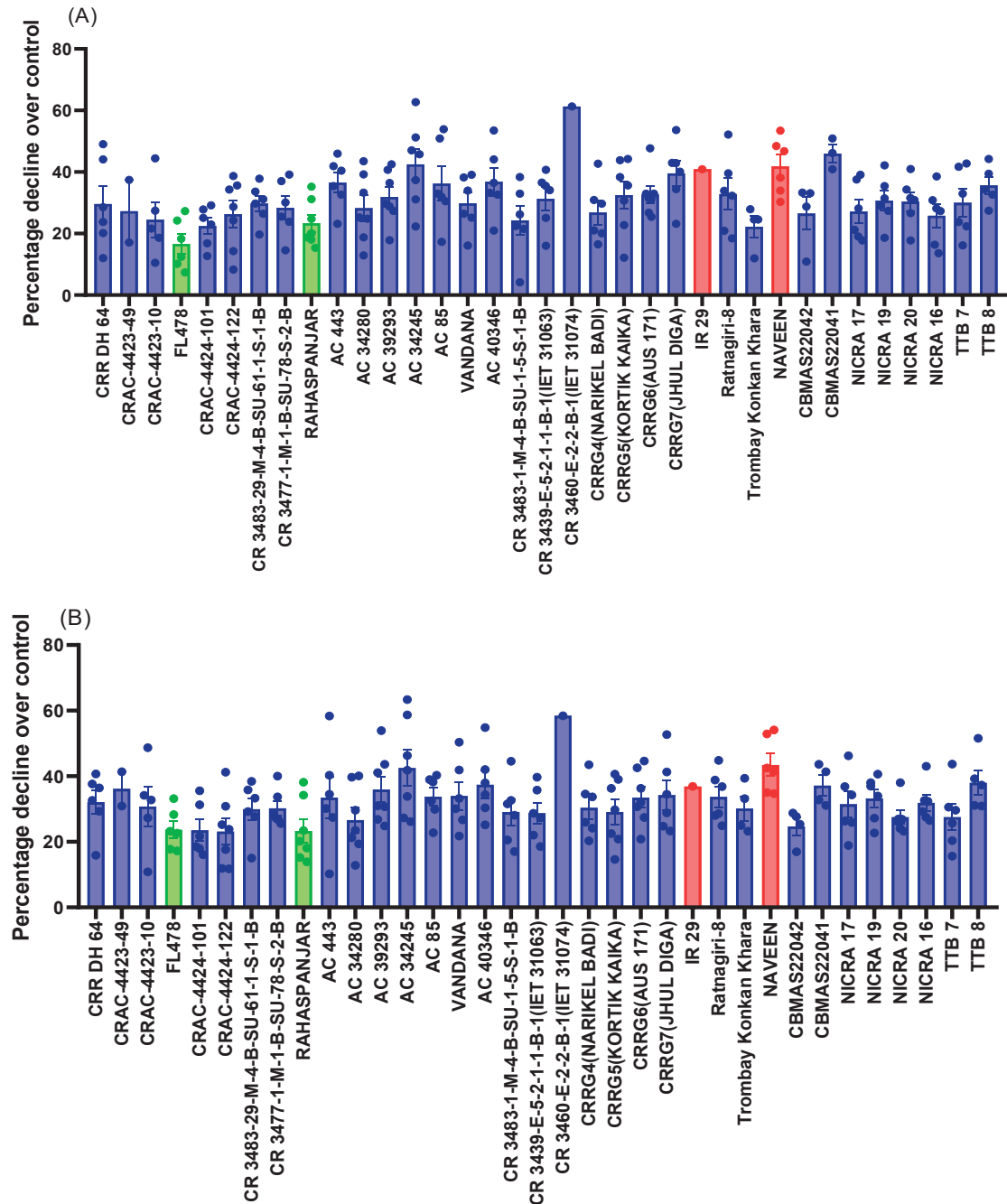


Fig. 6.4.4 Changes in root length (A) and shoot length (B) of 35 rice genotypes (mean of all locations) in response to 12 dS m⁻¹ salinity stress imposed at seedling stage tested across distinct locations. Error bars representing SE (mean) of all locations and scattered dots are representing mean of individual location.

Substantial reduction in root and shoot dry weight was observed in all the entries in response to salinity stress. Result obtained from different locations showed about 37.40% cut down in root dry weight off all the entries under salinity stress (0.053 g) as compared to the control (0.034 g). The decline in root dry weight in salinity was most pronounced in CBMAS22041 (55.27%), succeeded by Naveen (52.72%), and CR 3460-E-2-2-B-1(IET 31074) (51.27%). However, the reduction in root dry weight in saline condition was found to be lowest in CBMAS22042 (27.51%), followed by CR 3483-1-M-4-B-SU-1-5-S-1-B (27.75%), CRAC-4424-122 (27.99%), Trombay Konkan Khara (28.19%), and CRAC-4424-101 (28.86%). The decline in root dry weight of these entries was even lesser than the tolerant check FL 478 which recorded about 30% decline in root dry weight. Shoot dry weight in all the entries in different location reduced by 37.75% from 0.217 g in control to 0.137 g in salinity stress condition. Among all the entries, CR 3460-E-2-2-B-1(IET 31074) recorded highest 51.36% decline in shoot dry weight in salinity stress over control. This was followed by the entries AC 443 (47.70%), TTB 8 (46.54%), AC 34245 (45.21%), and CRRG7(JHUL DIGA) (45.15%). While the least reduction in shoot dry weight was noted in CRAC-4424-122 (26.66%), succeeded by CRAC-4424-101 (29.28%), NICRA 17 (29.27%), Trombay Konkan Khara (30.52%), and AC 34280 (30.65%). The reduction in shoot dry weight of these entries was lower than the tolerant genotype FL 478 (31.07%) (Fig 6.4.5).

Total chlorophyll content declined significantly under salinity stress condition as compared to control in all the entries across different locations. Total chlorophyll content depleted from 1.69 mg g⁻¹ FW in control to 0.93 mg g⁻¹ FW which was about 44.97%. Among the entries, CR 3460-E-2-2-B-1(IET 31074) recorded highest reduction in chlorophyll content under salinity stress which was about 69.44%. This was followed by the entries, CRAC-4423-49 (62.03%) and AC 34245 (60.05%). Whereas, lowest reduction in chlorophyll content was noted in Trombay Konkan Khara (29.26%), followed by CR 3483-1-M-4-B-SU-1-5-S-1-B (30.99%). Apart from this, many genotypes reported comparatively lower reduction in chlorophyll content than the tolerant genotypes FL 478 (40.41%) Rashpanjor (36.81%) (Fig 6.4.6).

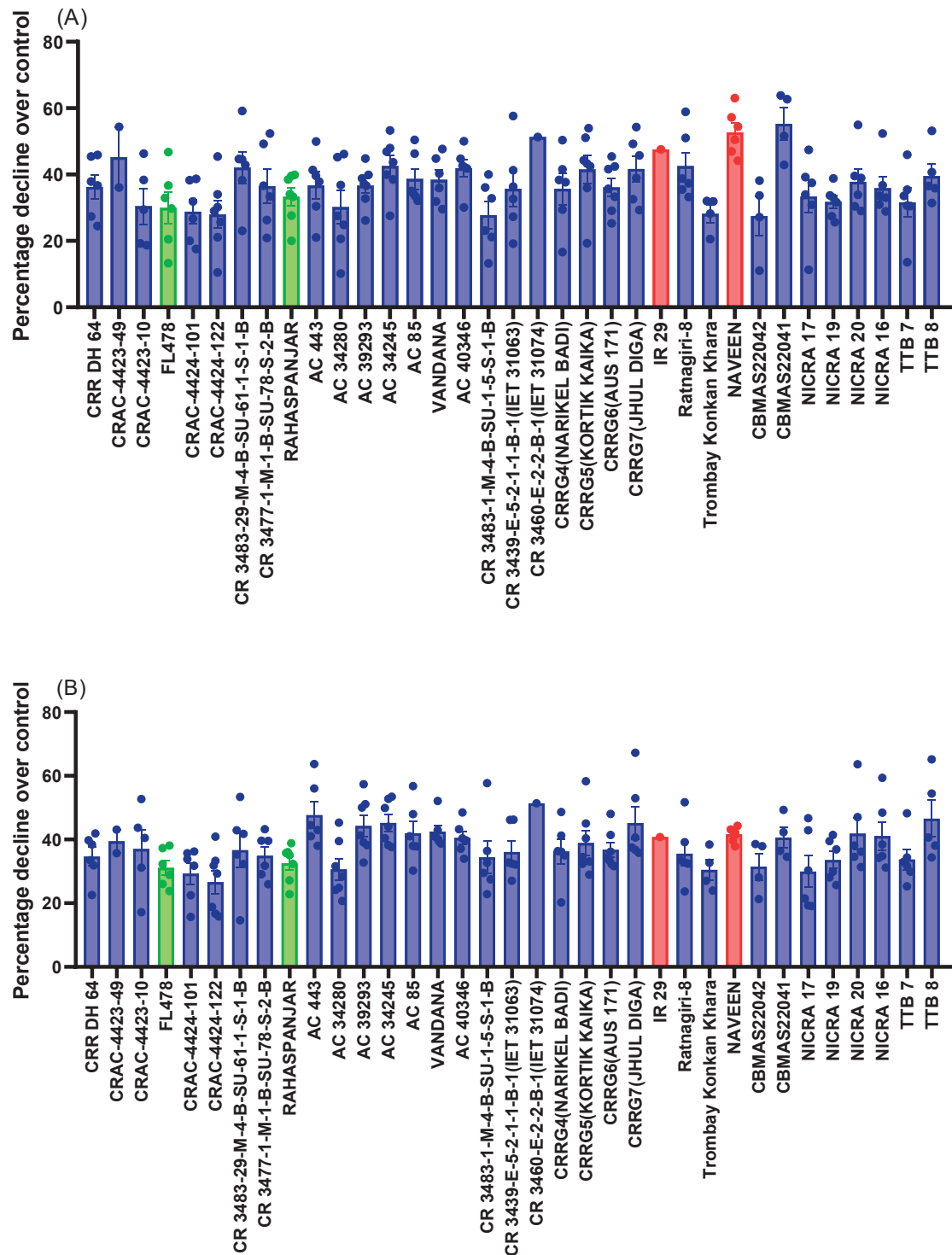


Fig. 6.4.5 Changes in root dry weight (A) and shoot dry weight (B) of 35 rice genotypes (mean of all locations) in response to 12 dS m⁻¹ salinity stress imposed at seedling stage tested across distinct locations. Error bars representing SE (mean) of all locations and scattered dots are representing mean of individual location.

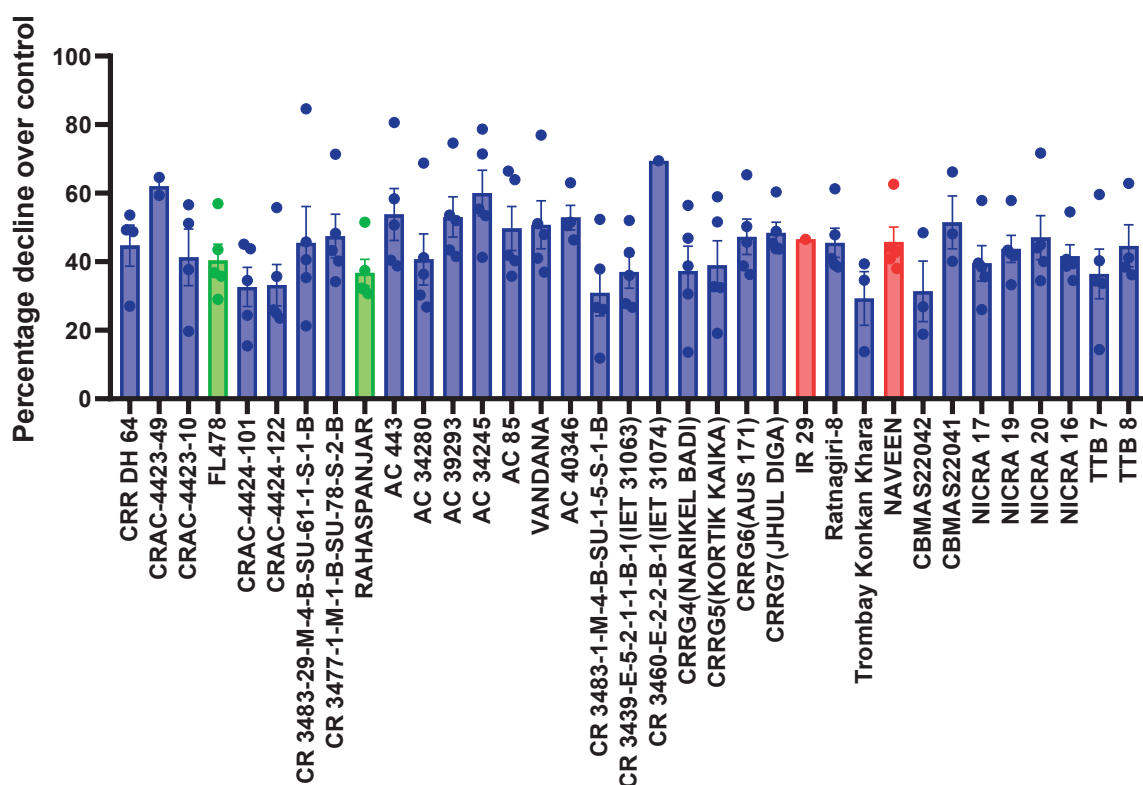


Fig. 6.4.6 Changes in total chlorophyll content of the leaf of 35 rice genotypes (mean of all locations) in response to 12 dS m⁻¹ salinity stress imposed at seedling stage tested across different locations. Error bars representing SE (mean) of all locations and scattered dots are representing mean of individual location.

The visual salt injury score (SES score) of all 35 entries was taken across different locations. However, SES score of CBT and MTU was not included in the study as the tolerant check FL 478 recorded a SES score of ‘9’ in these centres. A susceptible genotype Naveen recorded highest SES score of ‘9’. Apart from this, two entries, CBMAS22041 and CR 3460-E-2-2-B-1(IET 31074) recorded SES score of ‘9’ and IR 29 scored ‘7’. Whereas, lowest SES score of ‘3’ was noted in FL 478. This was followed by 19 genotypes with SES score of ‘5’. As per the standard evaluation system these entries may be considered as moderately tolerant to salinity stress during seedling stage (Fig 6.4.7).

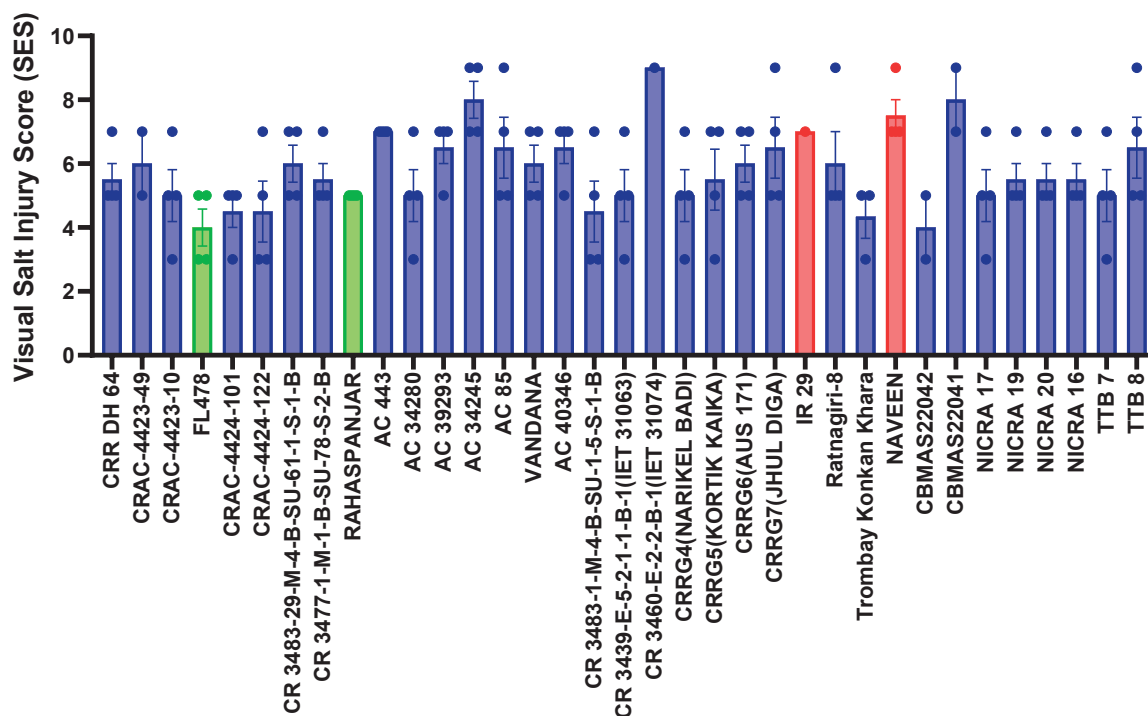


Fig. 6.4.7 Visual salt injury (VSI) score (mean of all locations) in response to 12 dS m⁻¹ salinity stress imposed at seedling stage tested across different locations. Error bars representing SE (mean) of all biological replicates. Error bars representing SE (mean) of all locations and scattered dots are representing mean of individual location.

The visual salt injury score (SES) and shoot Na⁺/K⁺ ratio under salt stress condition are two interrelated traits that are generally used to assess salt tolerance ability of rice genotypes. The result of linear regression analysis between SES score and shoot Na⁺/K⁺ ratio of different tested entries showed a highly significant and positive association ($R^2 = 0.310^{***}$). The shoot Na⁺/K⁺ ratio in different lines ranged from 0.86 to 3.62. The tolerant check FL 478 recorded Na⁺/K⁺ ratio of 0.88 in the shoot tissue. Interestingly, two entries CRAC-4424-122 and CRAC-4423-10 reported even lower shoot Na⁺/K⁺ ratio which was about 0.86 and 0.87 respectively. These lines were considered to be tolerant to salinity stress condition at seedling stage. Whereas, highest shoot Na⁺/K⁺ ratio was noted in the lines AC 443 (3.62), followed by CR 3460-E-2-2-B-1(IET 31074) (3.28) and IR 29 (2.75). The examination of various adaptive traits showed that, CRAC-4423-10, FL 478, CRAC-4424-122, AC 34280, CR 3439-E-5-2-1-1-B-1(IET 31063), and CBMAS22042 were potent ion excluder due to which these genotypes were tolerant to seedling stage salt stress. Whereas, the entries such as CR 3477-1-M-1-B-SU-78-S-2-B, CR 3483-1-M-4-B-SU-1-5-S-1-B, and CRRG7(JHUL DIGA) were found to be moderately tolerant to salt stress (Fig 6.4.8).

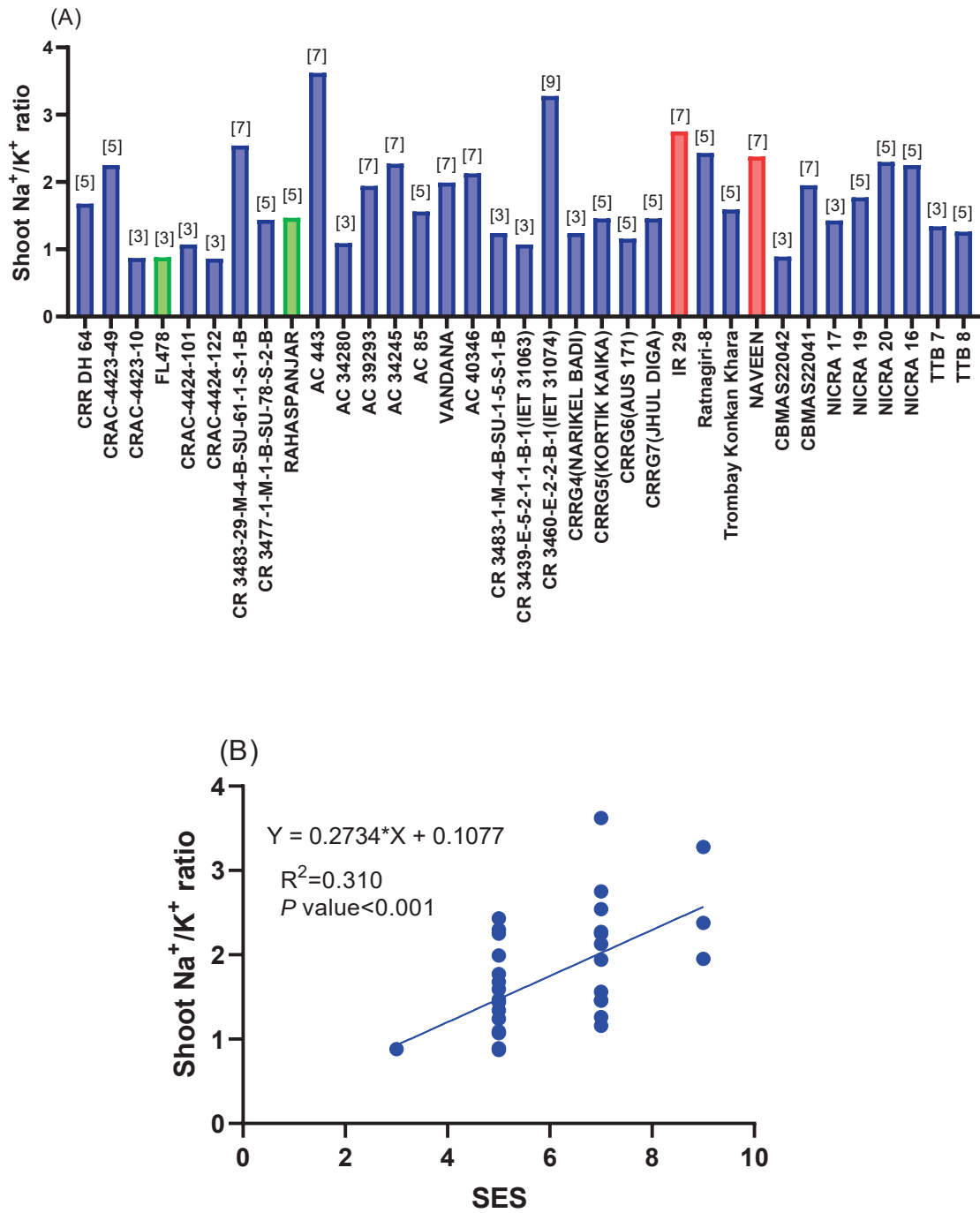


Fig. 6.4.8 Changes in shoot Na⁺/K⁺ ratio and visual salt injury (VSI) score (A) and XY-scatter plot showing simple linear regression between shoot Na⁺/K⁺ ratio and visual salt injury (VSI) score (B) of 35 rice entries (mean of all locations) in response to 12 dS m⁻¹ salinity stress imposed at seedling stage. Error bars representing SE (mean) of all biological replicates.

Osmotic Stress

Root length: Several research institutions, including CBT, CRRI, KJT, KRK, MTU, PNR, PTB, and TTB, conducted a thorough osmotic stress screening. In order to create stress conditions, 1% and 2% mannitol solutions were added to the hydroponic growing medium. The 1% and 2% mannitol treatments exhibited substantial differences in a variety of characteristics across a variety of research locations. The mean root length was reported to be 6.53 and 5.97 cm under 1% and 2% mannitol stress, respectively across the genotypes and centres. There was a decrease in the length of roots as the concentration of mannitol increased, which indicates the varieties are experiencing water stress and struggling to maintain root growth and development. Germplasms such as NICRA19 and CRRG4 (NARIKEL BADI) have the longest root length of 7.98 cm and 7.59 cm, respectively, which shows that these varieties have tolerance mechanisms against mannitol-induced stress (Fig. 6.4.9). On the other hand, varieties like IR29 and CR3460-E-2-2-B-1 have shorter root length as compared to other varieties, which shows their susceptibility to osmotic stress conditions.

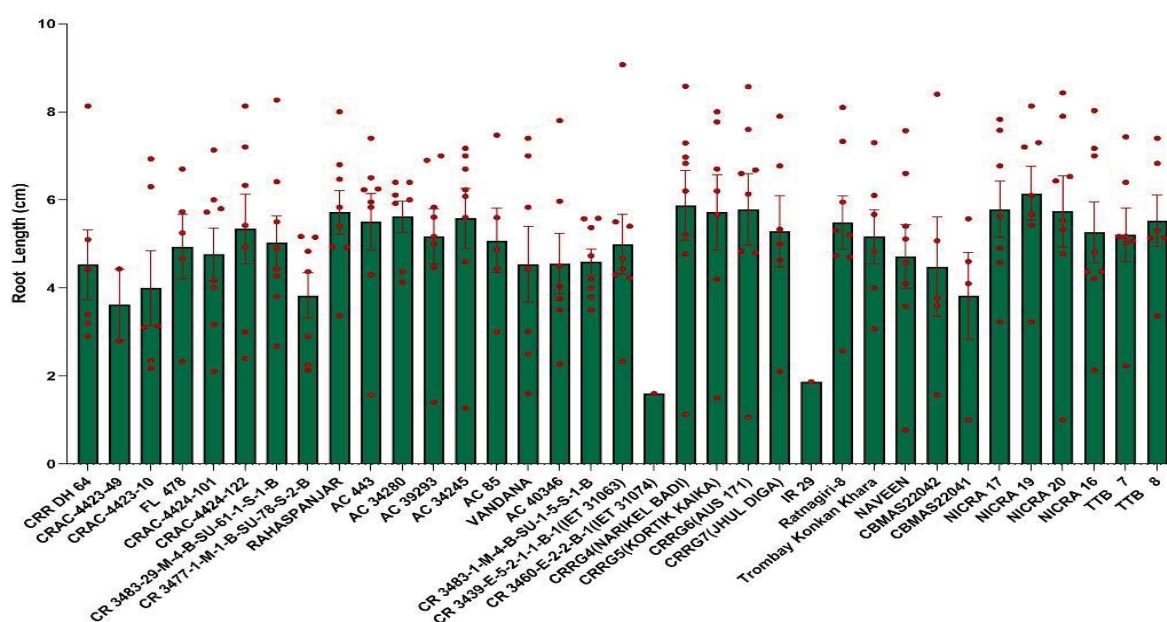


Fig. 6.4.9 Root length of the 35 rice entries grown under 2 % mannitol osmotic stress imposed at the seedling stage across different locations. The error bars represent the standard error mean (SEM) of all locations, and scattered dots represent the means of the individual location.

Shoot length: The different germplasms showing differing shoot lengths indicate that they react differently to stress caused by mannitol. The shoot lengths of the different germplasms vary widely, ranging from as low as 7.52 cm to as high as 11.65 cm in 2% mannitol stress condition. Germplasms such as RAHASPANJAR and AC443 having mean shoot lengths of

11.53 and 11.65 cm, respectively exhibit relatively longer shoot lengths, suggesting they may be more tolerant as compared to other varieties. Conversely, germplasms like CR3483-29-M-4-B-SU-61-1-S-1-B (7.64 cm) and CR3477-1-M-1-B-SU-78-S-2-B (7.52 cm) have shorter shoot lengths, indicating potential sensitivity to 2 % mannitol stress (Fig. 6.4.10). The shoot length of a plant provides clear information about its genetic potential, adaptability to various stresses and overall health. Germplasms like CRAC-4424-122, RAHASPANJAR and AC443 show comparatively longer shoot lengths, indicating they might possess mechanisms to withstand mannitol-induced osmotic stress. These aforementioned cultivars can be considered as tolerant to osmotic stress.

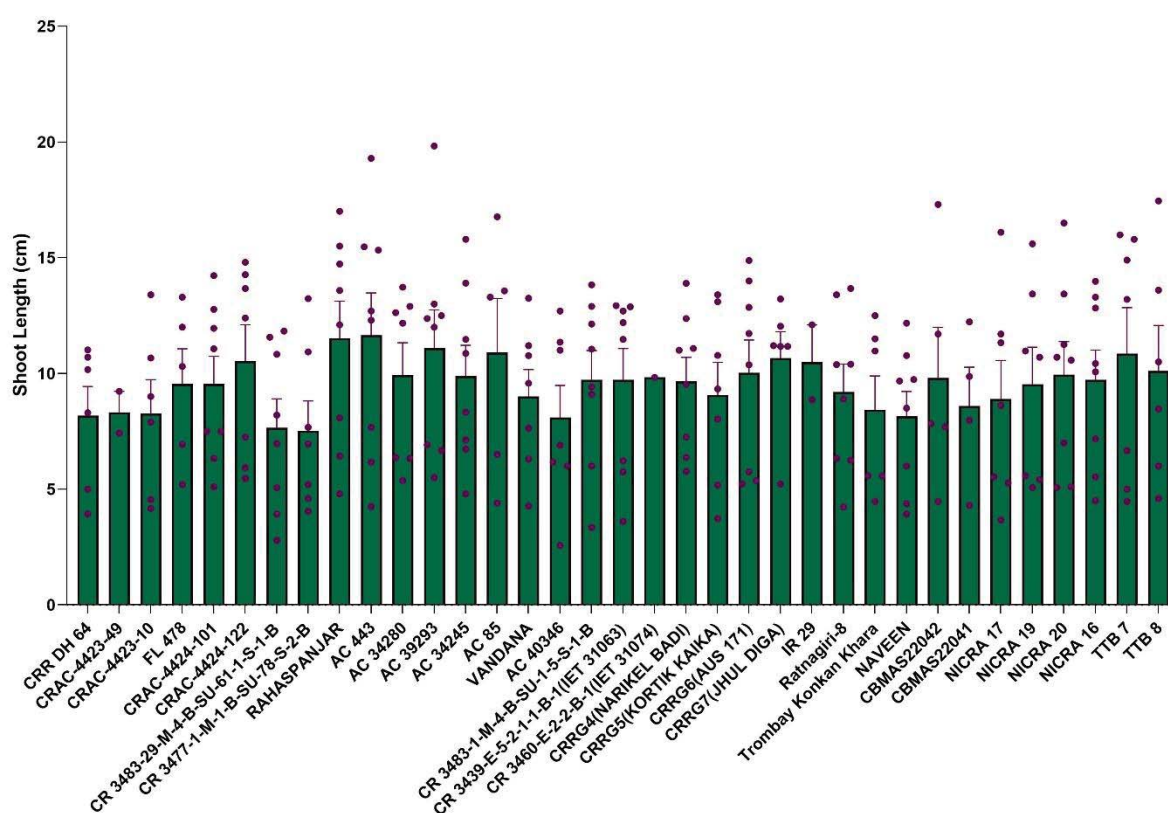


Fig. 6.4.10 Shoot length of the 35 rice entries grown under 2 % mannitol osmotic stress imposed at the seedling stage across different locations. The error bars represent the standard error mean (SEM) of all locations, and scattered dots represent the means of the individual location.

Root dry Weight: The root weights under 2% mannitol stress vary across different germplasms, ranging from as low as 0.0195 g to as high as 0.0444 g CRAC-4423-49 and NICRA 19, respectively. Among the genotypes, NICRA 19 (0.0444 g), CR 3483-1-M-4-B-SU-1-5-S-1-B (0.0393 g), AC 85 (0.0374 g), and IR 29 (0.0375 g) exhibited the highest RDW values, suggesting their higher root biomass production (Fig. 6.4.11). These genotypes likely

possess a well-developed root system and can be a valuable genotype for breeding programs aimed at improving drought tolerance.

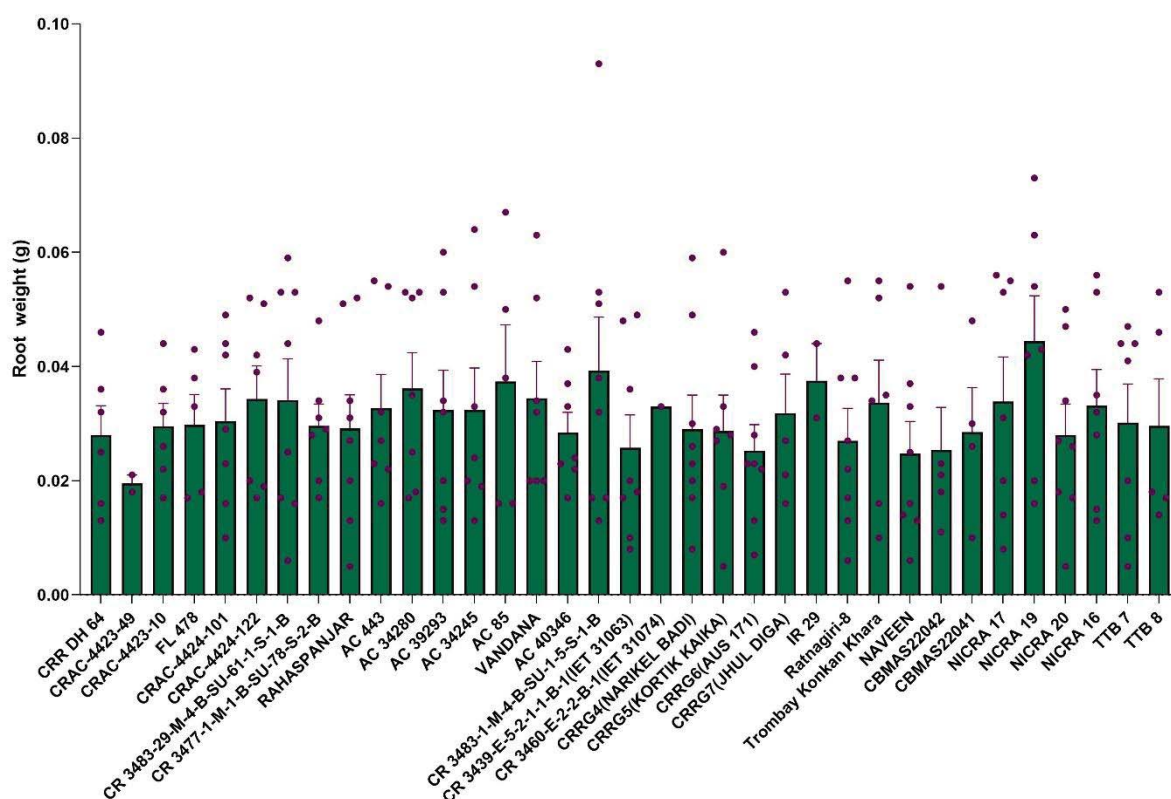


Fig. 6.4.11 Root dry weight of the 35 rice entries grown under 2 % mannitol osmotic stress imposed at the seedling stage across different locations. The error bars represent the standard error mean (SEM) of all locations, and scattered dots represent the means of the individual location.

Shoot dry weight: The SDW values ranged from 0.0247 g (CRRG5 - KORTIK KAIKA) to 0.0636 g (CR 3460-E-2-2-B-1 - IET 31074), indicating a significant spread in shoot biomass potential across the tested entries (Fig. 6.4.12). Among the genotypes, CR 3460-E-2-2-B-1 (IET 31074) (0.0636 g), CRAC-4423-49 (0.0629 g), and VANDANA (0.0511 g) exhibited the highest SDW, suggesting a strong shoot biomass accumulation capacity. In addition, CR 3483-29-M-4-B-SU-61-1-S-1-B, CR 3477-1-M-1-B-SU-78-S-2-B, AC 443, NICRA-19, CRRG6(AUS 171) showed moderate capacity of shoot biomass accumulation. These results highlight the genetic diversity in the germplasm collection under study with regard to osmotic stress.

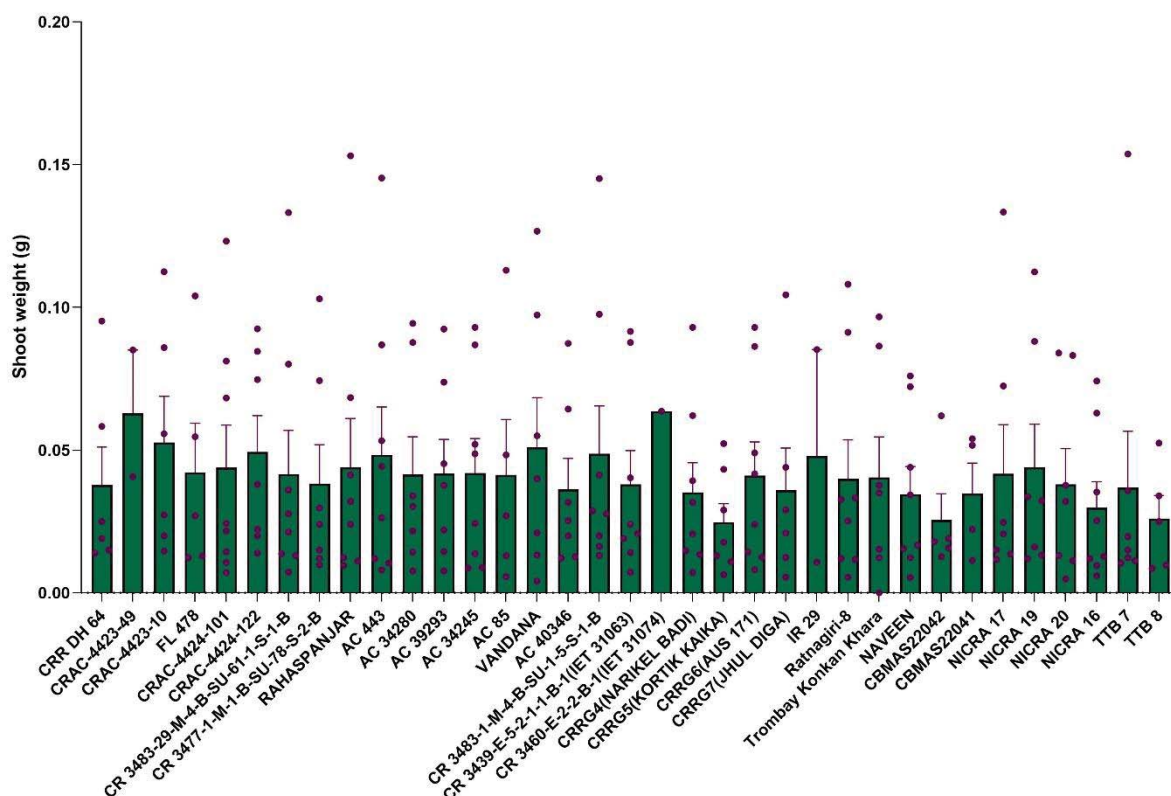


Fig. 6.4.12 Shoot dry weight of the 35 rice entries grown under 2 % mannitol osmotic stress imposed at the seedling stage across different locations. The error bars represent the standard error mean (SEM) of all locations, and scattered dots represent the means of the individual location.

Total chlorophyll content:

The total chlorophyll content in the evaluated rice genotypes varied significantly, ranging from 0.24 mg/100 g FW (CRAC-4423-49) to 1.04 mg/100 g FW (CR 3483-29-M-4-B-SU-61-1-S-1-B). This variation indicates differences in photosynthetic potential and adaptability to environmental conditions among the genotypes. Among the tested genotypes, CR 3483-29-M-4-B-SU-61-1-S-1-B (1.04 mg/100 g FW) and CR 3477-1-M-1-B-SU-78-S-2-B (1.03 mg/100 g FW) exhibited the highest total chlorophyll content, suggesting superior photosynthetic efficiency. Other high-performing genotypes included AC 34280 (1.003 mg/100 g FW), VANDANA (0.996 mg/100 g FW), and CR 3483-1-M-4-B-SU-1-5-S-1-B (1.001 mg/100 g FW) (Fig. 6.4.13). These genotypes could be potential candidates for further breeding and stress adaptation studies.

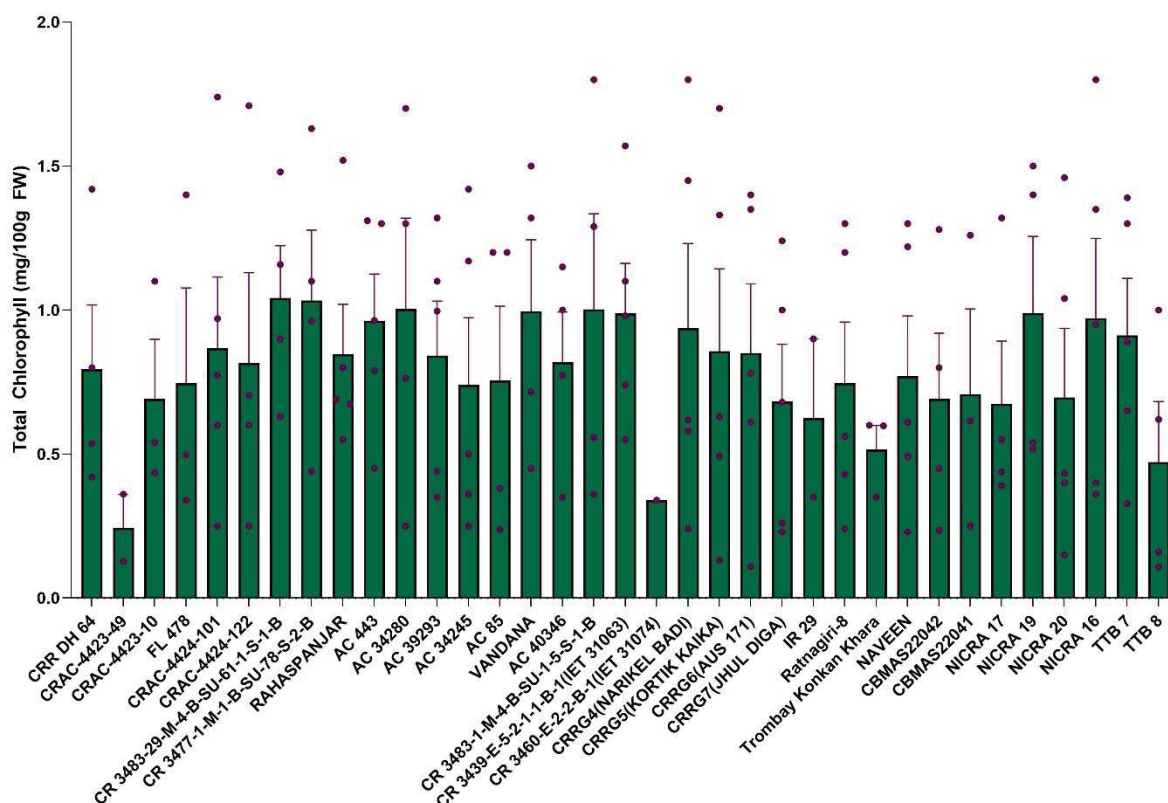


Fig. 6.4.13 Total Chlorophyll Content (mg/100 g FW) of the 35 rice entries grown under 2 % mannitol osmotic stress imposed at the seedling stage across different locations. The error bars represent the standard error mean (SEM) of all locations, and scattered dots represent the means of the individual location.

Tolerance score: Different germplasms have varying tolerance scores suggests that they react differently to stress caused by mannitol. Scores range from as low as 1 to as high as 8. These genotypes demonstrated superior drought resilience and may serve as potential candidates for breeding programs aimed at developing drought-resistant rice varieties. Germplasms such as IR-29 and CR3483-1-M-4-B-SU-1-5-S-1-B display lower tolerance scores, around 1 to 4.33 (Fig. 6.4.14), suggesting higher susceptibility to the osmotic stress condition. Germplasms with lower tolerance scores are more vulnerable to environmental stressors, diseases, and pests. They often result in reduced growth, yields, and economic viability, especially in areas facing environmental challenges. Germplasms such as TTB8 and AC85 shows high tolerance scores having 8.66 and 8.33 respectively.

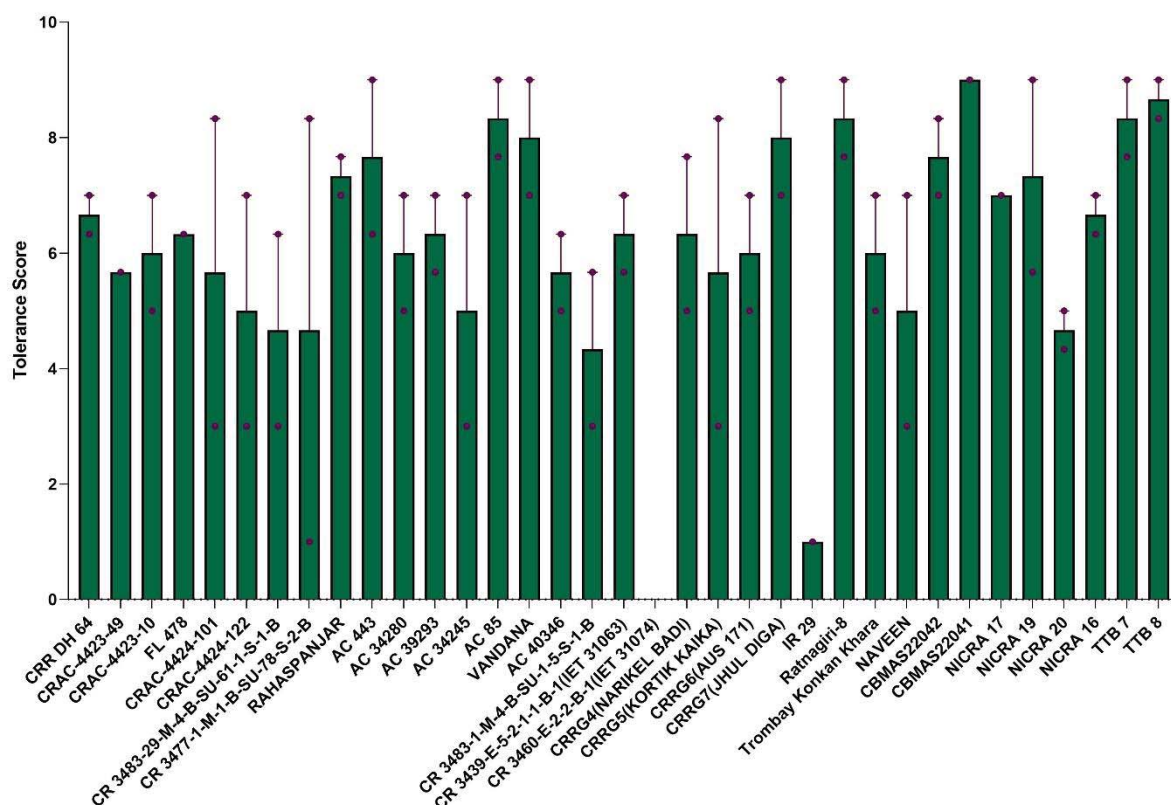


Fig. 6.4.14 Tolerance Score of the 35 rice entries grown under 2 % mannitol osmotic stress imposed at the seedling stage across locations. The error bars represent the standard error mean (SEM) of all locations, and scattered dots represent the means of the individual location.

Germination Percentage: Maximum varieties showed considerably high germination rates which signify that the seeds are able to tolerate or adapt to conditions of low water availability or high osmotic pressure. However, germination percentage varies from as low as 42.88% in Trombay konkan khara to as high as 100% in IR29. Germplasms such as IR29, FL478 and TTB8 shows high germination above 96% which indicate that they are highly tolerant to osmotic stress conditions created by 2% mannitol treatment (Fig. 6.4.15). Conversely germplasms like Trombay konkan khara, AC40346 and Vandana shows low germination percentage which shows their susceptibility for mannitol induced stress. The varieties with high germination rates are critical for maintaining agricultural productivity in areas prone to environmental stresses, such as drought or soil salinization, and are important in the context of climate change and sustainable agriculture.

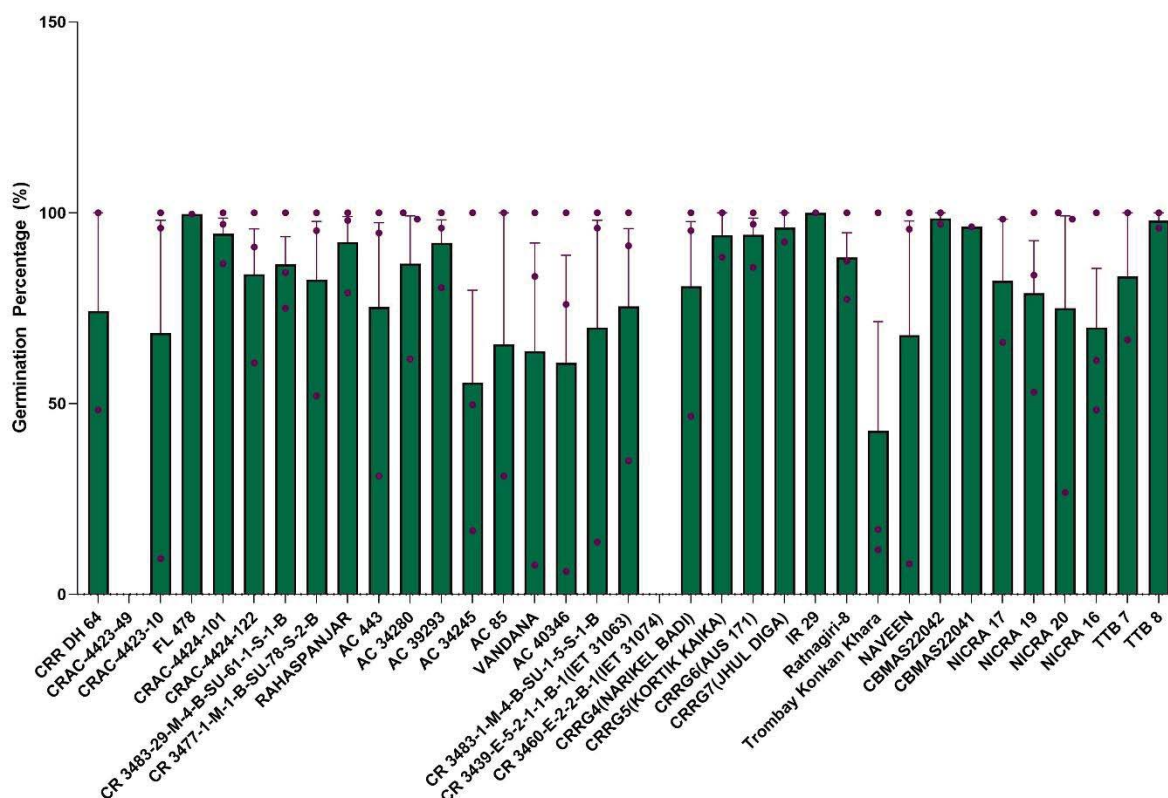


Fig. 6.4.15 Germination percentage (%) of the 35 rice entries grown under 2 % mannitol osmotic stress imposed at the seedling stage across different locations. The error bars represent the standard error mean (SEM) of all locations, and scattered dots represent the means of the individual location.

Summary and Conclusion:

Thirty-five rice lines were screened for multiple abiotic stresses including anaerobic germination, salinity stress (12 dS m⁻¹), and osmotic stress (1 and 2% mannitol) at early seedling stage across different AICRIP centres. The different abiotic stresses have an impact on rice lines which resulted in decline in the key physiological parameters i.e., germination percentage, epicotyl length, shoot and root dry weight, shoot and root length, leaf chlorophyll content and shoot Na⁺/K⁺ ratio. As per the result obtained from multilocation trial it was found that the entries Rashpanjor, Ratnagiri-8, NICRA 20, VANDANA, CRRG6(AUS 171), AC 34245 were highly tolerant to AG stress. Three genotypes AC 443, AC 34280 and NICRA 16 were moderately tolerant to AG stress. These genotypes can be used as potential donor to improve the anaerobic germination potential in rice genotypes. Whereas, the rice lines CRAC-4423-10, FL 478, CRAC-4424-122, AC 34280, CR 3439-E-5-2-1-1-B-1, CBMAS22042 found to be highly tolerant to seedling stage salinity stress with lesser SES score and shoot Na⁺/K⁺ ratio. whereas, the lines NICRA-19, Ratnagiri-8, AC 34245, NICRA 16, CR 3477-1-

M-1-B-SU-78-S-2-B, Rashpanjor, CR 3483-1-M-4-B-SU-1-5-S-1-B, and CRRG7(JHUL DIGA) were moderately tolerant to salt stress with lower SES score. Out of 35 lines, CR 3460-E-2-2-B-1 (IET 31074), CRAC-4423-49, and VANDANA reported be highly tolerant to osmotic stress with high shoot biomass. CR 3483-29-M-4-B-SU-61-1-S-1-B, CR 3477-1-M-1-B-SU-78-S-2-B, AC 443, NICRA-19, CRRG6 (AUS 171) showed moderate level of tolerance to osmotic stress. Out of 35 lines, Rashpanjor, Ratnagiri-8, AC 34245, NICRA 16, AC 34280 reported tolerance to both anaerobic germination stress and salinity stress. Two lines, AC 443 and CRRG6(AUS 171) reported tolerance to both anaerobic germination stress and osmotic stress. CR 3483-1-M-4-B-SU-1-5-S-1-B, CR 3477-1-M-1-B-SU-78-S-2-B reported tolerance to both salinity stress and osmotic stress.

Table 6.4.1 List of genotypes identified as tolerant to individual and combination of multiple abiotic stresses based on the data obtained from multi-locational screening

S.No.	Nature of Stress	Tolerant genotypes identified
1	Anaerobic germination (AG)	Rashpanjor, Ratnagiri-8, NICRA 20, VANDANA, CRRG6(AUS 171), AC 443, AC 34280, and AC 34245, NICRA 16
2	Salinity stress (SS)	CRAC-4423-10, FL 478, CRAC-4424-122, AC 34280, CR 3439-E-5-2-1-1-B-1, CBMAS22042, NICRA-19, Ratnagiri-8, AC 34245, NICRA 16, CR 3477-1-M-1-B-SU-78-S-2-B, Rashpanjor, CR 3483-1-M-4-B-SU-1-5-S-1-B, CRRG7(JHUL DIGA)
3	Osmotic stress (OS)	CR 3483-29-M-4-B-SU-61-1-S-1-B, CR 3477-1-M-1-B-SU-78-S-2-B, AC 443, VANDANA, CRAC-4423-49, NICRA-19, CRRG6(AUS 171)
4	AG + SS	Rashpanjor, Ratnagiri-8, AC 34245, NICRA 16, AC 34280
5	AG + OS	AC 443, CRRG6(AUS 171)
6	SS + OS	CR 3483-1-M-4-B-SU-1-5-S-1-B, CR 3477-1-M-1-B-SU-78-S-2-B
7	AG + SS+ OS	None

Table 6.4.2 Effect of 21 days of submergence stress on anaerobic germination index (%) of rice genotypes during *Kharif* 2024 at different locations.

S.No	GENOTYPES	CRRI	KAUL	KJT	KRK	MTU	Mean
1	CRR DH 64	28.00	20.83	44.76	53.41	20.07	33.41
2	CRAC-4423-49		46.15				46.15
3	CRAC-4423-10	25.45	26.09	29.14	23.08		25.94
4	FL 478	22.31	30.00	38.78	32.03	20.07	28.64
5	CRAC-4424-101	30.00	19.23	51.91	25.38		31.63
6	CRAC-4424-122		16.67	53.60		20.13	30.13
7	CR 3483-29-M-4-B-SU-61-1-S-1-B	26.25	15.38	33.90		20.20	23.93
8	CR 3477-1-M-1-B-SU-78-S-2-B	42.50	33.33	35.80	28.92		35.14
9	RAHASPANJAR	58.00	46.92	88.14		50.27	60.83
10	AC 443	83.33	38.46	48.92	26.02	30.00	45.35
11	AC 34280	51.33	30.77	64.75	24.13	30.20	40.24
12	AC 39293	28.00	34.62	45.86	28.08	30.07	33.33
13	AC 34245	70.00	57.69	69.76	36.84	45.40	55.94
14	AC 85	42.00	39.13	70.92	30.31	40.10	44.49
15	VANDANA	50.00	46.15	49.93	40.91	40.00	45.40
16	AC 40346	68.75	46.67	34.90	24.88	35.30	42.10
17	CR 3483-1-M-4-B-SU-1-5-S-1-B	42.00	29.41	41.58	19.79	28.00	32.16
18	CR 3439-E-5-2-1-1-B-1(IET 31063)	26.92	36.00	66.43	60.24	25.00	42.92
19	CR 3460-E-2-2-B-1(IET 31074)		26.92				26.92
20	CRRG4(NARIKEL BADI)	15.00	48.00	39.15	47.44	35.30	36.98
21	CRRG5(KORTIK KAIKA)	32.31	50.00	42.12	28.30	35.00	37.55
22	CRRG6(AUS 171)	33.33	80.00	78.16	33.26	50.51	55.05
23	CRRG7(JHUL DIGA)	65.00	42.31	39.14	29.70	30.00	41.23
24	IR 29		20.83				20.83
25	Ratnagiri-8	14.01	78.26	78.70	68.42		59.85
26	Trombay Konkan Khara		38.46	32.22	23.58		31.42
27	NAVEEN		32.00	35.97	22.91	25.34	29.06
28	CBMAS22042		19.23	30.61		50.00	33.28
29	CBMAS22041		19.23	10.73		20.00	16.65
30	NICRA 17		29.63	43.83	7.69	30.00	27.79
31	NICRA 19	14.00	42.86	33.69	22.14		28.17
32	NICRA 20		50.00	77.65	26.12		51.26
33	NICRA 16		41.67	60.81	27.67	43.40	43.39
34	TTB 7		16.67	39.88	15.66	32.00	26.05
35	TTB 8		25.00	32.94	27.52		28.49
	Mean	39.48	36.42	48.27	30.91	32.76	36.91
	LSD (Genotype)						5.91
	LSD (Location × Genotype)						13.22
	CV (Residual) %						21.56

Table 6.4.3 Effect of 21 days of submergence stress on epicotyl growth (cm) of rice genotypes during *Kharif* 2024 at different locations.

S.No	GENOTYPES	CRR	FZB	KAUL	KJT	KRK	PNR	TTB	Mean
1	CRR DH 64	29.00	37.83	36.33	21.80	14.07	11.04	37.31	26.77
2	CRAC-4423-49			35.67			12.12	36.28	28.02
3	CRAC-4423-10	21.00		31.00	22.29	14.60	13.52	33.97	22.73
4	FL 478	30.33	47.00	38.00	23.17	18.00	13.51	31.67	28.81
5	CRAC-4424-101	25.67	29.45	18.00	26.50	24.90	18.34	35.90	25.54
6	CRAC-4424-122		20.83	15.67	25.70		17.84	31.79	22.37
7	CR 3483-29-M-4-B-SU-61-1-S-1-B	28.50	24.45	35.67	26.31		22.36	35.38	28.78
8	CR 3477-1-M-1-B-SU-78-S-2-B	21.50	53.17	33.33	24.90	17.97	13.12	33.21	28.17
9	RAHASPANJAR	37.67	50.43	44.00	33.98		44.92	48.33	43.22
10	AC 443	33.50	62.50	46.67	31.23	16.50	18.28	44.62	36.19
11	AC 34280	28.67	62.00	41.00	28.93	24.33	23.00	54.71	37.52
12	AC 39293	27.50	50.90	33.00		29.67	20.76	39.23	33.51
13	AC 34245	28.33	45.31	38.67	34.40	30.23	13.24	45.90	33.73
14	AC 85	24.00	38.07	44.67		26.80	15.36	24.74	28.94
15	VANDANA	38.00		40.33	37.75	40.67	33.60	45.00	39.23
16	AC 40346	26.50	21.60	32.00	22.47	25.90	13.08	41.79	26.19
17	CR 3483-1-M-4-B-SU-1-5-S-1-B	21.50	24.17	36.00	22.77	25.83	16.12	29.23	25.09
18	CR 3439-E-5-2-1-1-B-1(IET 31063)	28.00	60.00	28.67	28.97	27.87	12.24	35.13	31.55
19	CR 3460-E-2-2-B-1(IET 31074)			34.33			11.84	27.05	24.41
20	CRRG4(NARIKEL BADI)	30.50	45.00	35.67		19.57	14.56	34.36	29.94
21	CRRG5(KORTIK KAIKA)	23.00	50.33	39.00	25.33	23.47	9.92		28.51
22	CRRG6(AUS 171)	28.00	55.00	39.17		26.57	13.44	33.97	32.69
23	CRRG7(JHUL DIGA)	23.67	57.98	44.33		19.33	12.00	36.92	32.37
24	IR 29			28.00			11.40		19.70
25	Ratnagiri-8	11.50		33.00	24.00	13.00	14.84	30.51	21.14
26	Trombay Konkan Khara		41.33	35.67		21.73	12.40	29.87	28.20
27	NAVEEN		29.67	23.83	15.77	17.73	13.72	27.31	21.34
28	CBMAS22042		20.00	29.33	25.80		11.16	38.46	24.95
29	CBMAS22041			24.00			14.60	42.69	27.10
30	NICRA 17		15.00	28.67	24.27	18.37	20.72	29.36	22.73
31	NICRA 19	9.00		27.00	22.77	13.57	12.00	28.72	18.84
32	NICRA 20			29.67	18.33	16.67	9.60	27.44	20.34
33	NICRA 16		37.33	28.33	23.43	16.93	10.40	34.74	25.20
34	TTB 7		51.77	22.00	26.33	15.40	19.80	35.26	28.43
35	TTB 8			31.50	31.77	13.90	7.68	37.05	24.38
	Mean	26.15	41.24	33.20	25.96	21.24	15.79	35.69	27.90
	LSD (Genotype)								2.26
	LSD (Location × Genotype)								6.00
	CV (Residual) %								13.19

Table 6.4.4 Effect of salinity stress on root length (cm) of rice genotypes during *Kharif* 2024 at different locations.

S.No	GENOTYPES	CBT	CRR1	KJT	KRK	MTU	PNR	PTB	Mean
1	CRR DH 64		7.06	3.63	8.21	4.67	4.17	4.33	5.35
2	CRAC-4423-49				5.92		4.20		5.06
3	CRAC-4423-10		5.25	4.53	7.23		5.40	3.75	5.23
4	FL 478		7.76	5.50	6.59	4.97	5.20	4.33	5.72
5	CRAC-4424-101		6.11	6.20	5.25	4.97	5.60	6.33	5.74
6	CRAC-4424-122	5.30	4.76	4.20	6.83	4.07	5.87	4.00	5.00
7	CR 3483-29-M-4-B-SU-61-1-S-1-B		6.52	2.73	5.41	4.17	4.93	4.29	4.68
8	CR 3477-1-M-1-B-SU-78-S-2-B		6.79	4.50	4.19	3.97	3.90	5.98	4.89
9	RAHASPANJAR	6.20	7.21	5.60	6.96	4.27	5.30	5.78	5.90
10	AC 443		4.60	5.87	6.24	4.20	4.07	6.79	5.29
11	AC 34280	4.63	3.66	5.07	5.65	4.03	6.07	4.00	4.73
12	AC 39293	4.20	5.15	3.97	6.08	4.27	3.07	5.00	4.53
13	AC 34245	5.03	4.97	3.10	4.88	4.07	2.40	4.33	4.11
14	AC 85		4.71	2.13	7.65	4.20	4.63	4.43	4.63
15	VANDANA		4.56	3.77	7.92	3.97	3.50	4.83	4.76
16	AC 40346		4.27	2.83	6.24	4.00	2.00	5.17	4.09
17	CR 3483-1-M-4-B-SU-1-5-S-1-B		7.68	5.43	4.88	4.07	4.83	6.92	5.63
18	CR 3439-E-5-2-1-1-B-1(IET 31063)		9.05	3.37	6.05	3.50	4.37	5.24	5.26
19	CR 3460-E-2-2-B-1(IET 31074)						1.60		1.60
20	CRRG4(NARIKEL BADI)		9.36	5.60	5.84	4.37	3.20	7.33	5.95
21	CRRG5(KORTIK KAIKA)	5.77	6.91	5.47	6.21	3.80	2.17	6.33	5.24
22	CRRG6(AUS 171)	5.57	6.88	6.23	9.47	3.80	2.56	7.00	5.93
23	CRRG7(JHUL DIGA)		5.95	3.36	7.25	4.07	3.13	6.27	5.01
24	IR 29						3.13		3.13
25	Ratnagiri-8		7.51	6.37	6.35	4.40	4.13	4.17	5.49
26	Trombay Konkan Khara		8.21	5.70	10.03		4.20	4.67	6.56
27	NAVEEN		4.92	4.27	5.92	3.50	3.07	5.00	4.45
28	CBMAS22042		0.00	3.77	7.33	3.33	3.53		3.59
29	CBMAS22041		0.00		5.17	3.47	1.87		2.63
30	NICRA 17		7.63	7.27	6.27	4.00	5.87	7.64	6.44
31	NICRA 19		8.12	5.20	8.19	5.10	4.37	7.95	6.49
32	NICRA 20		8.82	4.37	6.35	4.47	2.93	6.02	5.49
33	NICRA 16		9.64	5.47	7.60	4.00	3.63	5.27	5.93
34	TTB 7		6.88	4.17	5.39	4.40	5.37	6.67	5.48
35	TTB 8		5.69	4.13	4.91		4.50	6.10	5.07
	Mean	5.24	6.15	4.64	6.50	4.14	3.96	5.53	5.00
	LSD (Genotype)								0.531
	LSD (Location × Genotype)								1.405
	CV (Residual) %								19.427

Table 6.4.5 Effect of salinity stress on shoot length (cm) of rice genotypes during *Kharif* 2024 at different locations.

S.No	GENOTYPES	CBT	CRR1	KJT	KRK	MTU	PNR	PTB	Mean
1	CRR DH 64		22.20	13.67	20.46	15.30	12.08	13.00	16.12
2	CRAC-4423-49				16.74		9.92		13.33
3	CRAC-4423-10		24.57	10.36	18.63		22.12	9.66	17.07
4	FL 478		29.15	11.89	29.01	18.84	18.28	18.67	20.97
5	CRAC-4424-101		28.29	15.30	28.35	22.44	21.88	19.42	22.61
6	CRAC-4424-122	19.27	20.96	13.08	25.14	19.56	21.88	10.75	18.66
7	CR 3483-29-M-4-B-SU-61-1-S-1-B		27.51	9.79	18.84	19.62	21.04	16.45	18.87
8	CR 3477-1-M-1-B-SU-78-S-2-B		32.30	12.25	19.59	20.76	13.08	11.80	18.30
9	RAHASPANJAR	26.97	36.98	14.81	23.79	18.42	15.92	29.64	23.79
10	AC 443		30.48	16.96	26.52	22.68	11.32	18.89	21.14
11	AC 34280	18.90	22.65	13.83	27.36	21.96	22.16	20.42	21.04
12	AC 39293	15.57	25.83	11.56	25.32	19.08	12.72	15.43	17.93
13	AC 34245	17.33	23.12	16.16	19.41	18.12	7.40	12.90	16.35
14	AC 85		27.24	10.24	34.29	21.36	18.16	21.00	22.05
15	VANDANA		29.42	11.53	27.78	19.20	14.72	17.32	19.99
16	AC 40346		20.01	9.97	22.44	19.56	9.92	10.50	15.40
17	CR 3483-1-M-4-B-SU-1-5-S-1-B		24.90	12.49	22.68	19.44	24.92	13.23	19.61
18	CR 3439-E-5-2-1-1-B-1(IET 31063)		27.24	10.49	24.48	19.50	16.68	20.80	19.87
19	CR 3460-E-2-2-B-1(IET 31074)						7.52		7.52
20	CRRG4(NARIKEL BADI)		25.77	13.54	19.53	19.68	13.16	20.94	18.77
21	CRRG5(KORTIK KAIKA)	20.23	22.80	13.71	27.15	18.66	11.52	19.30	19.05
22	CRRG6(AUS 171)	16.40	19.32	16.26	31.44	16.56	15.80	17.27	19.01
23	CRRG7(JHUL DIGA)		21.75	11.36	28.95	18.36	18.60	18.70	19.62
24	IR 29						11.08		11.08
25	Ratnagiri-8		27.06	15.00	24.06	19.44	14.56	15.12	19.21
26	Trombay Konkan Khara		24.84	13.89	28.86		14.00		20.40
27	NAVEEN		19.11	11.91	19.11	19.92	13.04	14.30	16.23
28	CBMAS22042			10.03	25.20	18.36	16.84		17.61
29	CBMAS22041			10.25	16.77	18.48	12.68		14.54
30	NICRA 17		20.94	14.44	18.72	18.30	23.52	12.10	18.00
31	NICRA 19		17.13	12.02	22.80	22.50	13.68	13.44	16.93
32	NICRA 20		18.03	10.85	21.78	23.58	12.12	14.68	16.84
33	NICRA 16		23.19	12.75	19.20	18.30	14.36	11.91	16.62
34	TTB 7		21.12	12.25	16.77	25.56	21.76	14.28	18.62
35	TTB 8		17.43	13.80	15.09		14.92	14.23	15.09
	Mean	19.24	24.38	12.70	23.22	19.78	15.52	16.07	17.95
	LSD (Genotype)								1.129
	LSD (Location × Genotype)								2.988
	CV (Residual) %								11.555

Table 6.4.6 Effect of salinity stress on root dry weight (g) of rice genotypes during *Kharif* 2024 at different locations.

S.No	GENOTYPES	CBT	CRR1	KJT	KRK	MTU	PNR	PTB	Mean
1	CRR DH 64		0.033	0.023	0.023	0.030	0.043	0.022	0.029
2	CRAC-4423-49				0.018		0.031		0.024
3	CRAC-4423-10		0.022	0.035	0.021		0.056	0.024	0.032
4	FL 478		0.043	0.032	0.027	0.027	0.053	0.051	0.039
5	CRAC-4424-101		0.045	0.031	0.029	0.036	0.064	0.051	0.043
6	CRAC-4424-122	0.037	0.032	0.042	0.029	0.037	0.054	0.039	0.038
7	CR 3483-29-M-4-B-SU-61-1-S-1-B		0.020	0.036	0.016	0.033	0.044	0.039	0.031
8	CR 3477-1-M-1-B-SU-78-S-2-B		0.047	0.045	0.022	0.023	0.034	0.047	0.036
9	RAHASPANJAR	0.040	0.036	0.039	0.024	0.029	0.024	0.036	0.033
10	AC 443		0.029	0.034	0.022	0.031	0.036	0.026	0.030
11	AC 34280	0.036	0.028	0.040	0.027	0.033	0.065	0.051	0.040
12	AC 39293	0.024	0.029	0.047	0.021	0.026	0.041	0.066	0.036
13	AC 34245	0.030	0.031	0.031	0.022	0.025	0.033	0.045	0.031
14	AC 85		0.035	0.030	0.029	0.031	0.044	0.034	0.034
15	VANDANA		0.029	0.037	0.036	0.025	0.042	0.029	0.033
16	AC 40346		0.016	0.039	0.021	0.026	0.033	0.033	0.028
17	CR 3483-1-M-4-B-SU-1-5-S-1-B		0.059	0.041	0.023	0.031	0.053	0.025	0.039
18	CR 3439-E-5-2-1-1-B-1(IET 31063)		0.053	0.043	0.026	0.031	0.044	0.043	0.040
19	CR 3460-E-2-2-B-1(IET 31074)						0.038		0.038
20	CRRG4(NARIKEL BADI)		0.050	0.038	0.029	0.025	0.039	0.052	0.039
21	CRRG5(KORTIK KAIKA)	0.026	0.048	0.036	0.033	0.023	0.033	0.059	0.037
22	CRRG6(AUS 171)	0.022	0.055	0.036	0.034	0.024	0.035	0.052	0.037
23	CRRG7(JHUL DIGA)		0.043	0.039	0.025	0.023	0.036	0.046	0.035
24	IR 29						0.025	0.000	0.025
25	Ratnagiri-8		0.061	0.040	0.021	0.018	0.035	0.048	0.037
26	Trombay Konkan Khara		0.065	0.041	0.037		0.045		0.047
27	NAVEEN		0.040	0.031	0.023	0.012	0.021	0.051	0.030
28	CBMAS22042		0.000	0.031	0.027	0.025	0.034		0.030
29	CBMAS22041		0.000	0.022	0.020	0.020	0.027		0.022
30	NICRA 17		0.046	0.036	0.018	0.025	0.065	0.033	0.037
31	NICRA 19		0.039	0.032	0.026	0.038	0.064	0.047	0.041
32	NICRA 20		0.068	0.038	0.022	0.028	0.035	0.031	0.037
33	NICRA 16		0.060	0.045	0.022	0.025	0.047	0.039	0.040
34	TTB 7		0.048	0.038	0.032	0.036	0.075	0.041	0.045
35	TTB 8		0.038	0.033	0.016		0.051	0.028	0.033
	Mean	0.031	0.042	0.036	0.025	0.027	0.043	0.041	0.035
	LSD (Genotype)								0.001
	LSD (Location × Genotype)								0.002
	CV (Residual) %								5.946

Table 6.4.7 Effect of salinity stress on shoot dry weight (g) of rice genotypes during *Kharif* 2024 at different locations.

S.No	GENOTYPES	CBT	CRR1	KJT	KRK	MTU	PNR	PTB	Mean
1	CRR DH 64		0.115	0.110	0.115	0.124	0.124	0.105	0.115
2	CRAC-4423-49				0.093		0.113		0.103
3	CRAC-4423-10		0.098	0.103	0.105		0.154	0.094	0.111
4	FL 478		0.149	0.112	0.173	0.107	0.144	0.176	0.144
5	CRAC-4424-101		0.143	0.153	0.147	0.133	0.173	0.120	0.145
6	CRAC-4424-122	0.158	0.130	0.129	0.170	0.128	0.164	0.131	0.144
7	CR 3483-29-M-4-B-SU-61-1-S-1-B		0.180	0.192	0.116	0.126	0.202	0.121	0.156
8	CR 3477-1-M-1-B-SU-78-S-2-B		0.163	0.158	0.107	0.116	0.174	0.153	0.145
9	RAHASPANJAR	0.191	0.165	0.145	0.128	0.112	0.203	0.135	0.154
10	AC 443		0.123	0.122	0.099	0.091	0.173	0.077	0.114
11	AC 34280	0.128	0.145	0.202	0.151	0.140	0.202	0.118	0.155
12	AC 39293	0.141	0.098	0.107	0.091	0.120	0.144	0.121	0.117
13	AC 34245	0.139	0.130	0.152	0.101	0.130	0.122	0.131	0.129
14	AC 85		0.095	0.152	0.170	0.124	0.184	0.112	0.139
15	VANDANA		0.123	0.159	0.159	0.121	0.203	0.104	0.145
16	AC 40346		0.090	0.103	0.110	0.093	0.134	0.099	0.105
17	CR 3483-1-M-4-B-SU-1-5-S-1-B		0.192	0.102	0.101	0.115	0.213	0.075	0.133
18	CR 3439-E-5-2-1-1-B-1(IET 31063)		0.252	0.133	0.131	0.130	0.192	0.145	0.164
19	CR 3460-E-2-2-B-1(IET 31074)						0.105		0.105
20	CRRG4(NARIKEL BADI)		0.250	0.152	0.100	0.123	0.163	0.155	0.157
21	CRRG5(KORTIK KAIKA)	0.182	0.185	0.142	0.153	0.121	0.125	0.214	0.160
22	CRRG6(AUS 171)	0.150	0.153	0.168	0.181	0.118	0.153	0.252	0.168
23	CRRG7(JHUL DIGA)		0.139	0.175	0.150	0.110	0.176	0.100	0.142
24	IR 29						0.122		0.122
25	Ratnagiri-8		0.202	0.120	0.118	0.103	0.145	0.133	0.137
26	Trombay Konkan Khara		0.312	0.138	0.195		0.163		0.202
27	NAVEEN		0.147	0.139	0.175	0.113	0.103	0.139	0.136
28	CBMAS22042			0.142	0.132	0.118	0.145		0.134
29	CBMAS22041			0.106	0.119	0.089	0.112		0.106
30	NICRA 17		0.123	0.128	0.107	0.121	0.255	0.081	0.136
31	NICRA 19		0.151	0.117	0.138	0.128	0.187	0.092	0.136
32	NICRA 20		0.205	0.123	0.085	0.105	0.114	0.078	0.118
33	NICRA 16		0.259	0.117	0.119	0.121	0.133	0.091	0.140
34	TTB 7		0.182	0.133	0.096	0.143	0.242	0.181	0.163
35	TTB 8		0.126	0.152	0.062		0.103	0.129	0.114
	Mean	0.156	0.161	0.137	0.127	0.118	0.159	0.126	0.137
	LSD (Genotype)							0.006	
	LSD (Location × Genotype)							0.016	
	CV (Residual) %							8.132	

Table 6.4.8 Effect of salinity stress on leaf total chlorophyll content (mg g⁻¹ dry weight) of rice genotypes during *Kharif* 2024 at different locations.

S.No	GENOTYPES	CRRI	KRK	MTU	PNR	PTB	Mean
1	CRR DH 64	0.85	0.966	1.33	0.520		0.92
2	CRAC-4423-49		0.382		0.431		0.41
3	CRAC-4423-10	0.86	1.323		0.906	0.58	0.92
4	FL 478	1.29	1.043	1.18	0.659	1.01	1.04
5	CRAC-4424-101	1.31	1.093	1.51	0.665	1.41	1.20
6	CRAC-4424-122	0.66	1.440	1.45	0.679	0.95	1.04
7	CR 3483-29-M-4-B-SU-61-1-S-1-B	1.19	0.343	1.31	0.658	1.22	0.94
8	CR 3477-1-M-1-B-SU-78-S-2-B	1.12	0.419	1.23	0.686	0.66	0.82
9	RAHASPANJAR	1.08	0.635	1.30	1.026	1.69	1.14
10	AC 443	1.09	0.333	1.04	0.426	1.37	0.85
11	AC 34280	0.82	0.904	1.01	0.670	1.48	0.98
12	AC 39293	1.07	0.307	1.14	0.552	0.63	0.74
13	AC 34245	0.52	0.287	0.91	0.422	1.33	0.69
14	AC 85	0.83	0.626	1.14	0.647	1.02	0.85
15	VANDANA	0.55	0.994	1.06	0.543	0.56	0.74
16	AC 40346	0.78	0.817	0.89	0.776		0.81
17	CR 3483-1-M-4-B-SU-1-5-S-1-B	1.42	0.829	1.16	0.907	0.56	0.97
18	CR 3439-E-5-2-1-1-B-1(IET 31063)	1.40	0.735	1.32	1.004	1.43	1.18
19	CR 3460-E-2-2-B-1(IET 31074)				0.314		0.31
20	CRRG4(NARIKEL BADI)	1.64	0.662	1.12	0.658	1.01	1.02
21	CRRG5(KORTIK KAIKA)	1.03	0.412	0.99	0.550	1.29	0.86
22	CRRG6(AUS 171)	1.28	0.972	1.08	0.428	1.39	1.03
23	CRRG7(JHUL DIGA)	0.90	1.153	1.10	0.430	1.21	0.96
24	IR 29				0.538		0.54
25	Ratnagiri-8	1.10	1.176	1.21	0.538	0.66	0.94
26	Trombay Konkan Khara	2.41	1.484		0.649		1.52
27	NAVEEN	1.01	0.777	1.14	0.517	1.11	0.91
28	CBMAS22042		0.990	1.12	0.911		1.01
29	CBMAS22041		0.504	1.09	0.535		0.71
30	NICRA 17	2.43	0.817	1.20	1.004	0.71	1.23
31	NICRA 19	1.42	0.952	1.04	0.993	0.82	1.04
32	NICRA 20	2.90	0.504	1.08	0.532	1.35	1.27
33	NICRA 16	2.33	0.716	1.20	0.554	0.74	1.11
34	TTB 7	1.69	0.768	1.01	1.149	1.63	1.25
35	TTB 8	1.06	0.345		0.412	0.90	0.68
	Mean	1.27	0.78	1.15	0.65	1.06	0.93
	LSD (Genotype)						0.091
	LSD (Location × Genotype)						0.202
	CV (Residual) %						13.185

6.5 Screening of Rice Genotypes for Submergence Tolerance

Locations: CBT, CHN, CRRI, KRK, PTB, and TTB

Productivity of rice is highly affected by the multiple abiotic stresses which stems from the worldwide climate changes. Submergence, water logging, and stagnant flooding are among these stresses that significantly reduce the productivity of rice plant. This issue has brought a lot of attention and extensive research is going on to explore new strategies to improve tolerance of rice plant to excess water stress. In complete submergence stress entire plant canopy is completely immersed in water. Whereas, in waterlogging of stagnant flooding a part of the plant canopy stays above the water level. This condition creates some additional stresses that hampers plant growth and yield. To cope with submergence stress, plant uses several strategies like quiescence where it stays under water and conserve energy. Some plants also follow escape strategy with high internode elongation to rise above the water surface. With this idea, a complete submergence trial was designed during *Kharif* 2024 where promising rice lines were imposed with 14 days of complete submergence stress.

The submergence trial was performed at six different AICRIP centres namely, Coimbatore (CBT), Tamil Nadu; Chinsurah (CHN), West Bengal; CRRI (CTC), Odisha; Karaikal (KRK), Tamil Nadu; Patambi (PTB), Kerala; Titabar (TTB), Assam. In this experiment, 27 rice lines including two tolerant (FR 13A and Swarna Sub1) and two susceptible checks (Naveen and Swarna) were imposed with 14 days of complete submergence. After de-submergence these genotypes were assessed for some key tolerance traits such as, survival rate (%), elongation ability (%), final plant height (cm) and leaf starch content (mg g^{-1} DW). The genotypes varied significantly for all the traits. However, the observations recorded in KRK centre was not included in the analysis as the submergence tolerant check Swarna Sub1 could not survive the submergence stress. Across different locations highest survival rate was noted in CHN (62.42%), TTB (58.74%), CRRI (54.42%), PTB (50.64%), and CBT (40.59%). The tolerant check FR 13A reported the highest survival rate of 83.86%. Survival rate of Swarna Sub1 was also quite high which was about 74.55%. Whereas, the susceptible checks Swarna and Naveen recorded the lowest survival rate of 8.90% and 25.46% respectively. Moreover, we found that among 27 rice entries, seven entries i.e., CBMAS22061 (77.39%), CR 4215-2-5-2-M-4-SU-2-S-1 (74.10%), AC 34280 (72.25%), CRAC-4423-10 (70.82%), CBMAS22062 (69.71%), AC 85 (66.65%), CBMAS22041 (64.38%) showed high survival rate of > 60%. Eight tested entries (CRAC-4423-3, CRAC-4423-111, CBMAS22042, CRAC-4423-5, CRRG4(NARIKEL

BADI), CRRG5(KORTIK KAIKA), CR 4111-1-2-1-B-SU-1-SU-B, and CRAC-4423-14) reported moderate survival ability of around 50-60% (Fig 6.5.1).

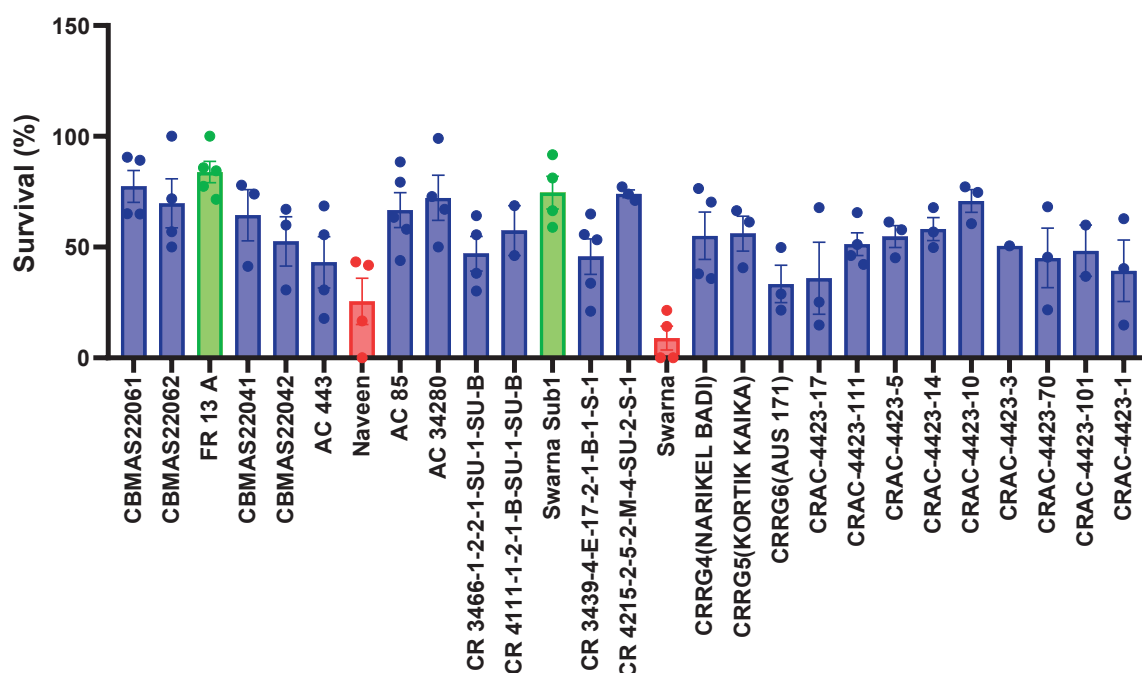


Fig. 6.5.1 Mean survival rate (%) of rice genotypes under 14 days of complete submergence stress. Error bars representing SE (mean) of all locations and scattered dots are representing mean of individual location.

Submergence tolerance ability of a genotype can be assessed by looking into the underwater internode elongation and the subsequent increase in plant height of that genotype. This is generally governed by the *SUB1A* gene action. The genotypes tolerant to submergence stress often adapt quiescence strategy to limit underwater growth. It helps in preservation of energy and carbohydrate by slowing down plant growth during submergence period. This conserved energy supports plant recovery after the water recedes. As per the result obtained from different centre, the plant height post submergence varied significantly among the genotypes. The plant height in tested lines post submergence ranged from 37.14 cm to 71.65 cm. Among the genotypes, highest plant height was observed in AC 34280 (71.65 cm) followed by AC 85 (66.45 cm), AC 443 (57.66 cm), CRRG6(AUS 171) (57.14 cm), CRAC-4423-3 (56.83 cm), and CRAC-4423-17 (56.47 cm). The susceptible checks Naveen and Swarna recorded plant height of 61.55 cm and 56.21 cm respectively. While, lowest plant height after submergence stress was noted in tolerant check Swarna Sub1 (37.14 cm) followed by CBMAS22041 (38.46 cm), CBMAS22042 (40.55cm), CBMAS22061 (41 cm), and FR 13 A (42.88 cm) (Fig 6.5.2).

From the multilocation trial it was found that, the tested entries adapted quiescence strategy and remained under water to survive submergence stress which might be due to *SUB1A* gene action.

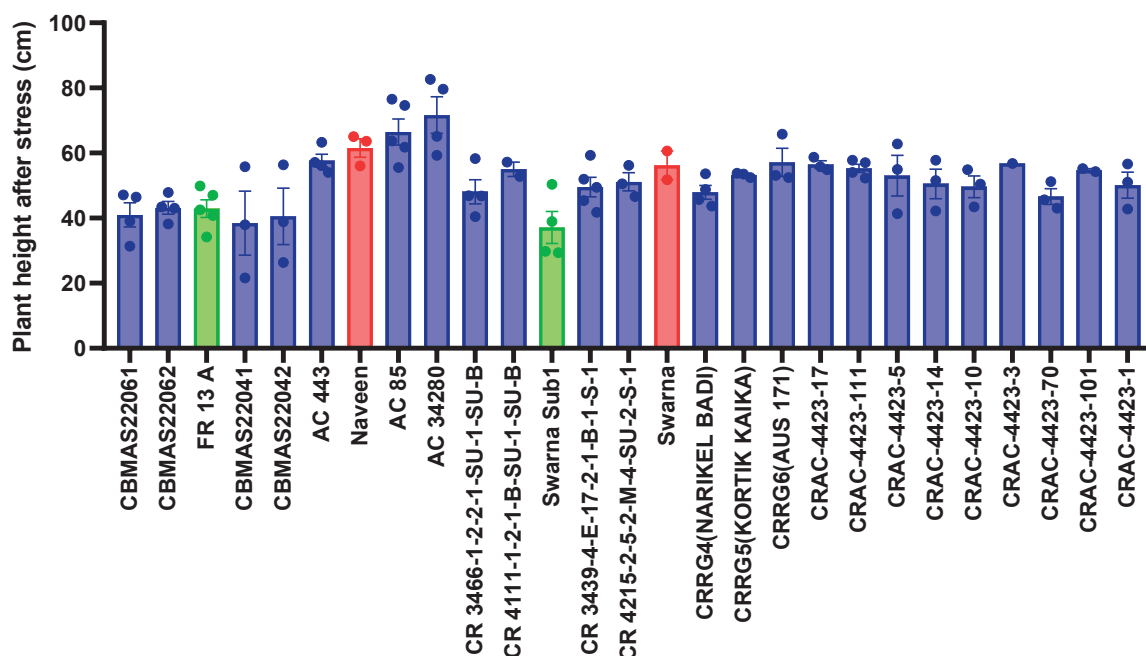


Fig. 6.5.2 Mean plant height (cm) of rice genotypes under 14 days of complete submergence tested across different locations. Error bars representing SE (mean) of all locations and scattered dots are representing mean of individual location.

Elongation ability varied significantly among the tested entries across the locations with a mean EA of 43.57%. The susceptible checks Naveen and Swarna recorded a high EA of about 65.43% and 49.21% respectively. On the contrary, the tolerant checks FR 13A and Swarna Sub1 reported the EA of 11.71% and 27.13% respectively. Among the tested lines three lines CBMAS22041, CBMAS22062, and CBMAS22061 reported least EA of 24.43%, 26.68%, and 27.07% respectively which was even lower than the tolerant check Swarna Sub1. These genotypes also showed high survival rate. The EA of promising lines with high survival ability (>60%) ranged from 11.71 to 51.26%. Interestingly, we noted a line AC 34280 with high survival ability (72.25%) even after a high elongation ability (51.26%) (Fig 6.5.3). As this line has higher EA in submerged condition it might have both SUB1 and SNORKEL QTLs. But as the plant height remained below water level, this line is considered as tolerant to submergence stress.

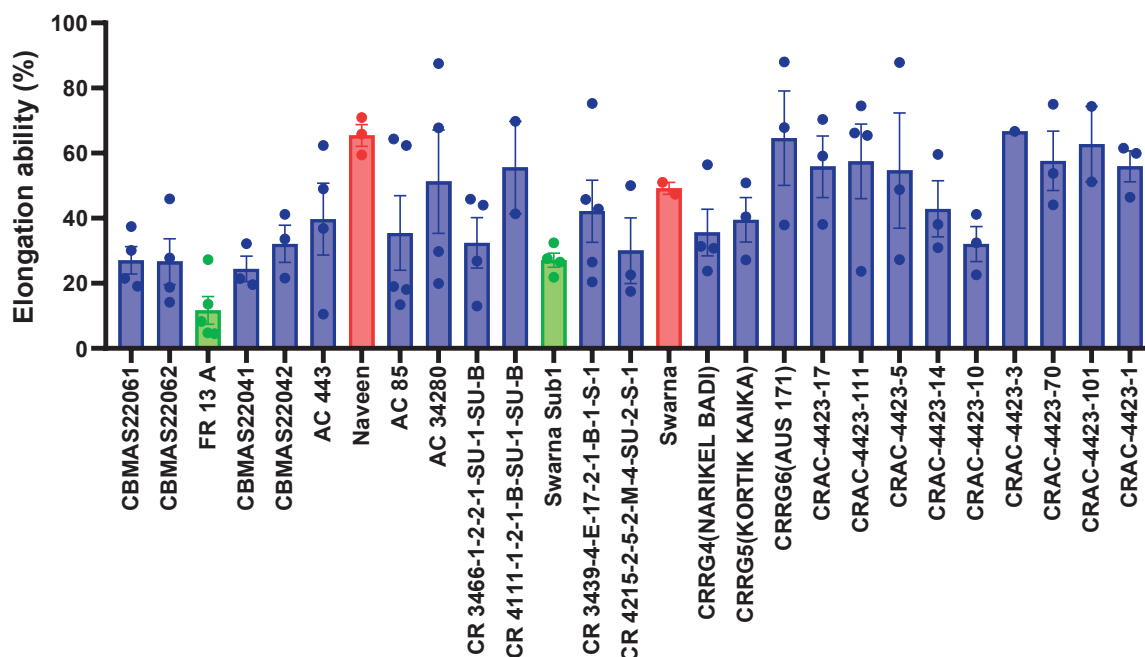


Fig. 6.5.3 Mean elongation ability (%) of rice genotypes under 14 days of complete submergence tested across different locations. Error bars representing SE (mean) of all locations and scattered dots are representing mean of individual location.

Another determining factor for submergence tolerance is leaf carbohydrate content and its depletion under submergence condition. The SUB1 containing genotypes usually known to conserve leaf starch content and its depletion during submergence stress is comparatively lower. The reserved carbohydrate is used to resume plant growth after de-submergence. Leaf starch content of 27 genotypes was assessed in three centers CBT, CHN, and CRRI 14 days after stress. Highest leaf starch content was noted in the genotype CBMAS22061 (70.55 mg g⁻¹ DW), followed by CR 4215-2-5-2-M-4-SU-2-S-1 (69.54 mg g⁻¹ DW), and CR 3439-4-E-17-2-1-B-1-S-1 (54.23 mg g⁻¹ DW). Whereas, lowest starch content was observed in CRAC-4423-14 (26.06 mg g⁻¹ DW), CRAC-4423-10 (28.27 mg g⁻¹ DW), CRAC-4423-5 (28.75 mg g⁻¹ DW), CRAC-4423-3 (29.35 mg g⁻¹ DW), and CBMAS22062 (29.75 mg g⁻¹ DW) (Fig 6.5.4). The result obtained from different locations showed a positive association of survival rate with leaf starch content.

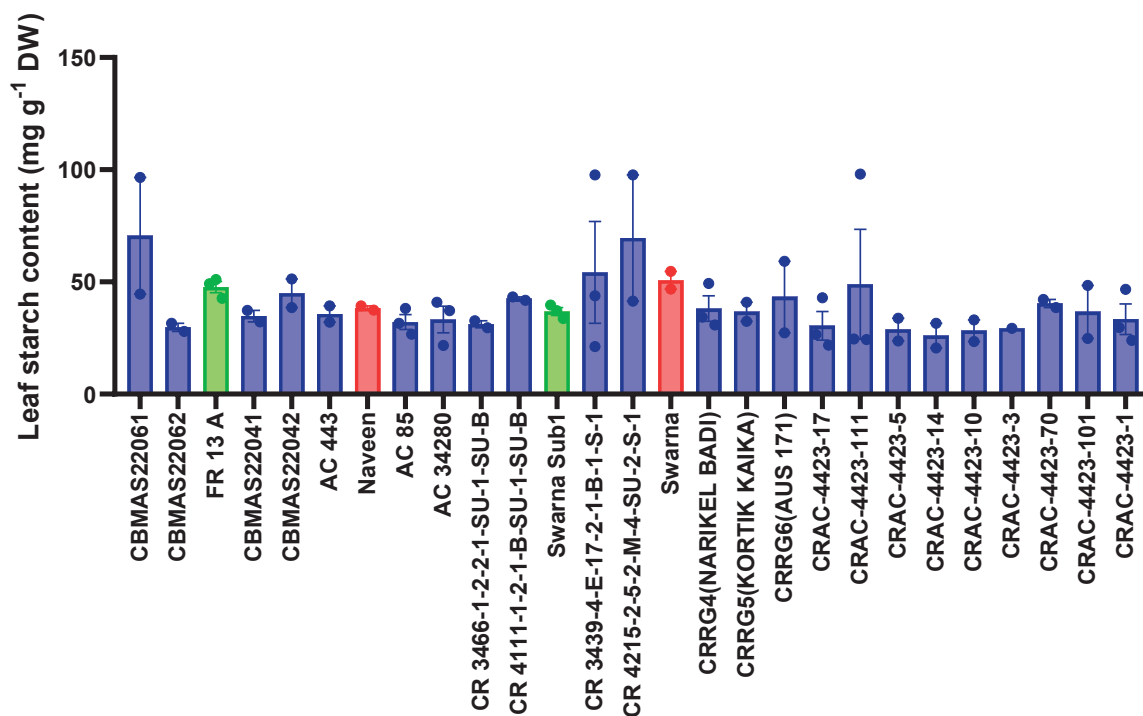


Fig. 6.5.4 Mean starch content (mg g^{-1} DW) of rice genotypes under 14 days of complete submergence tested across different locations. Error bars representing SE (mean) of all locations and scattered dots are representing mean of individual location.

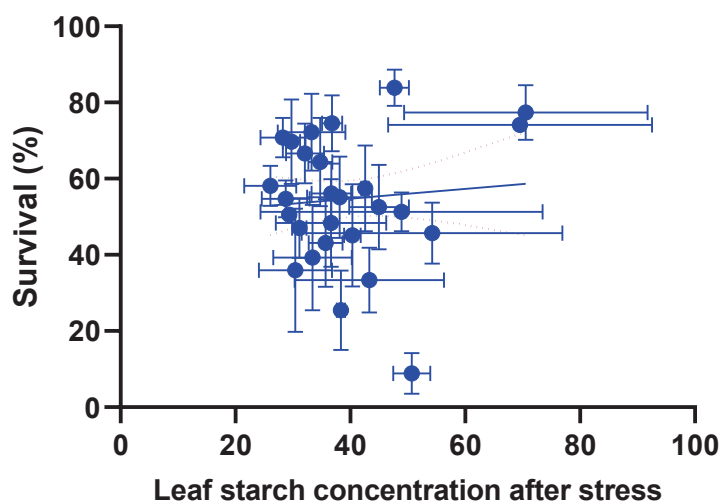


Fig. 6.5.5 An XY-scatter plot showing simple linear regression between survival rate and elongation ability of rice genotypes under 14 days of complete submergence tested across different locations. Error bars representing SE (mean) of all locations.

Summary & Conclusion:

The submergence trial was carried across different locations (CBT, CHN, CRRI, KRK, PTB, and TTB) using 27 rice genotypes. After submergence stress the tolerant check FR 13A reported highest survival rate of 83.86%. Whereas, lowest survival rate was found in the susceptible checks Swarna (8.90%) and Naveen (25.46%). The mean survival rate of genotypes was 54.15% across the locations where highest survival rate was noted in CHN (62.42%) and lowest was noted in CBT (40.59%). The tolerant check FR 13A reported the highest survival rate of 83.86%. Based on the result obtained from different locations it was observed that, the entry CBMAS22061 was highly tolerant to submergence with survival ability of 77.39% which was even higher than the tolerant check Swarna Sub1. Apart from this, six more lines (M-4-SU-2-S-1, AC 34280, CRAC-4423-10, CBMAS22062, AC 85, and CBMAS22041) with survival ability >60% were considered to be tolerant to complete submergence stress. Additionally, eight lines (CRAC-4423-3, CRAC-4423-111, CBMAS22042, CRAC-4423-5, CRRG4(NARIKEL BADI), CRRG5(KORTIK KAIKA), CR 4111-1-2-1-B-SU-1-SU-B, and CRAC-4423-14) recorded survival ability around 50-60% and found to be moderately tolerant to submergence stress. From the observations recorded from the multilocation trial it was found that most of the genotypes with low internode elongation ability also showed high survival ability and highly tolerant to submergence stress. Moreover, one genotype AC 34280 was identified with both high elongation ability (51.26%) and high survival ability (72.25%). These genotypes can be used as potential donor to improve the submergence tolerance in high-yielding rice genotypes.

Table 6.5.1 Effect of 14 days of submergence stress on survival rate (%) on rice genotypes during Kharif 2024 at different locations.

S.No	GENOTYPES	CBT	CHN	CRRI	PTB	TTB	Mean
1	CBMAS22061		64.93	77.39	90.52	65.0	77.39
2	CBMAS22062		56.99	69.71	100.00	50.0	69.71
3	FR 13 A	71.57	85.86	83.86	100.00	77.4	83.86
4	CBMAS22041		77.92	64.38	41.33		64.38
5	CBMAS22042		59.88	52.54	30.67		52.54
6	AC 443		68.54	43.13	30.67	55.6	43.13
7	Naveen	0.00	41.85	25.46	43.33		25.46
8	AC 85	88.48	79.37	66.65	58.00	43.9	66.65
9	AC 34280	99.01	72.87	72.25		50.0	72.25
10	CR 3466-1-2-2-1-SU-1-SU-B		64.21	47.03	30.15	55.6	47.03
11	CR 4111-1-2-1-B-SU-1-SU-B		46.18	57.46			57.46
12	Swarna Sub1	58.93	66.38	74.55	91.67		74.55
13	CR 3439-4-E-17-2-1-B-1-S-1	21.07	64.94	45.74	33.69	53.3	45.74
14	CR 4215-2-5-2-M-4-SU-2-S-1		77.20	74.10		71.1	74.10
15	Swarna	0.00	21.46	8.90	0.00		8.90
16	CRRG4(NARIKEL BADI)	35.81	76.48	55.12	37.89		55.12
17	CRRG5(KORTIK KAIKA)		66.38	56.11	61.33		56.11
18	CRRG6(AUS 171)		49.78	33.37	21.56		33.37
19	CRAC-4423-17	14.75	67.82	35.93			35.93
20	CRAC-4423-111	42.13	51.23	51.28		65.6	51.28
21	CRAC-4423-5		61.33	54.74	45.16		54.74
22	CRAC-4423-14		67.82	58.14	49.86		58.14
23	CRAC-4423-10		77.20	70.82	74.67		70.82
24	CRAC-4423-3		50.51	50.51			50.51
25	CRAC-4423-70		45.45	45.10	21.69		45.10
26	CRAC-4423-101		59.88	48.37			48.37
27	CRAC-4423-1	14.75	62.77	39.29			39.29
	Mean	40.59	62.42	54.15	50.64	58.74	54.15
	LSD (Genotype)						7.332
	LSD (Location × Genotype)						16.395
	CV (Residual) %						17.968

Table 6.5.2 Effect of 14 days of submergence stress on plant height (in cm after stress) on rice genotypes during *Kharif* 2024 at different locations.

S.No	GENOTYPES	CBT	CHN	CRRI	PTB	TTB	Mean
1	CBMAS22061		46.44	39.07	31.35	47.13	41.00
2	CBMAS22062		47.86	38.24	43.48	43.00	43.14
3	FR 13 A	34.23	47.01	49.91	42.51	40.75	42.88
4	CBMAS22041		55.76	37.96	21.65		38.46
5	CBMAS22042		56.38	38.89	26.37		40.55
6	AC 443		54.08	63.33	56.12	57.13	57.66
7	Naveen		65.05	63.59	56.01		61.55
8	AC 85	74.63	61.81	76.57	63.71	55.50	66.45
9	AC 34280	82.60	59.25	79.63		65.13	71.65
10	CR 3466-1-2-2-1-SU-1-SU-B		58.27	46.76	40.47	46.88	48.09
11	CR 4111-1-2-1-B-SU-1-SU-B		57.22	52.78			55.00
12	Swarna Sub1	29.80	50.39	38.98	29.40		37.14
13	CR 3439-4-E-17-2-1-B-1-S-1	59.30	49.43	51.94	41.78	45.38	49.57
14	CR 4215-2-5-2-M-4-SU-2-S-1		56.24	46.66		50.50	51.14
15	Swarna		60.64	51.78			56.21
16	CRRG4(NARIKEL BADI)	45.67	48.75	53.59	43.67		47.92
17	CRRG5(KORTIK KAIKA)		53.57	52.46	53.83		53.29
18	CRRG6(AUS 171)		53.11	65.83	52.48		57.14
19	CRAC-4423-17	55.80	58.69	54.91			56.47
20	CRAC-4423-111	52.33	57.08	57.78		54.00	55.30
21	CRAC-4423-5		54.99	62.78	41.35		53.04
22	CRAC-4423-14		57.79	51.58	42.20		50.52
23	CRAC-4423-10		54.89	43.43	50.47		49.60
24	CRAC-4423-3		56.83				56.83
25	CRAC-4423-70		51.21	45.65	43.08		46.65
26	CRAC-4423-101		55.19	54.26			54.73
27	CRAC-4423-1	42.80	56.61	51.02			50.14
	Mean	53.02	54.98	52.67	43.33	50.54	51.56
	LSD (Genotype)					3.605	
	LSD (Location × Genotype)					8.061	
	CV (Residual) %					9.751	

Table 6.5.3 Effect of 14 days of submergence stress on elongation ability (%) on rice genotypes during Kharif 2024 at different locations.

S.No	GENOTYPES	CBT	CHN	CRRI	PTB	TTB	Mean
1	CBMAS22061		37.47	30.13	21.51	19.16	27.07
2	CBMAS22062		45.95	27.78	18.77	14.22	26.68
3	FR 13 A	4.77	8.33	27.26	4.56	13.63	11.71
4	CBMAS22041		21.43	32.20	19.65		24.43
5	CBMAS22042		41.19	33.61	21.64		32.15
6	AC 443		36.90	62.41	49.02	10.58	39.73
7	Naveen		70.95	59.46	65.87		65.43
8	AC 85	64.41	19.05	62.37	13.45	18.11	35.48
9	AC 34280	87.51	29.76	67.78		19.99	51.26
10	CR 3466-1-2-2-1-SU-1-SU-B		44.05	45.84	26.87	13.04	32.45
11	CR 4111-1-2-1-B-SU-1-SU-B		69.81	41.36			55.59
12	Swarna Sub1	21.9	32.48	26.50	27.63		27.13
13	CR 3439-4-E-17-2-1-B-1-S-1	75.26	42.86	45.82	26.52	20.43	42.18
14	CR 4215-2-5-2-M-4-SU-2-S-1		22.62	50.04		17.52	30.06
15	Swarna		51.00	47.41			49.21
16	CRRG4(NARIKEL BADI)	31.37	23.81	56.43	30.79		35.60
17	CRRG5(KORTIK KAIKA)		40.48	27.21	50.91		39.53
18	CRRG6(AUS 171)		67.86	88.01	37.99		64.62
19	CRAC-4423-17	70.35	38.10	59.10			55.85
20	CRAC-4423-111	74.5	65.48	66.23		23.70	57.48
21	CRAC-4423-5		48.81	87.91	27.33		54.68
22	CRAC-4423-14		38.10	59.62	30.95		42.89
23	CRAC-4423-10		22.62	41.22	32.44		32.09
24	CRAC-4423-3		66.67				66.67
25	CRAC-4423-70		75.00	44.16	53.77		57.64
26	CRAC-4423-101		51.19	74.41			62.80
27	CRAC-4423-1	59.93	46.43	61.52			55.96
	Mean	54.44	42.90	50.99	31.09	17.04	43.57
	LSD (Genotype)						6.379
	LSD (Location × Genotype)						14.264
	CV (Residual) %						21.502

Table 6.5.4 Effect of 14 days of submergence stress on leaf starch concentration (mg g⁻¹ leaf dry weight) on rice genotypes during *Kharif* 2024 at different locations.

S.No	GENOTYPES	CBT	CHN	CRR	Mean
1	CBMAS22061				70.55
2	CBMAS22062		44.58	96.51	29.75
3	FR 13 A		27.92	31.58	47.67
4	CBMAS22041	49.17	42.72	51.11	34.78
5	CBMAS22042		32.24	37.31	44.98
6	AC 443		51.34	38.62	35.68
7	Naveen		39.28	32.07	38.36
8	AC 85		39.25	37.47	32.11
9	AC 34280	26.67	31.53	38.13	33.24
10	CR 3466-1-2-2-1-SU-1-SU-B	21.67	40.91	37.15	31.12
11	CR 4111-1-2-1-B-SU-1-SU-B		29.61	32.64	42.58
12	Swarna Sub1		41.80	43.36	36.83
13	CR 3439-4-E-17-2-1-B-1-S-1	33.67	39.68	37.15	54.23
14	CR 4215-2-5-2-M-4-SU-2-S-1	21.17	43.84	97.69	69.54
15	Swarna		41.39	97.69	50.71
16	CRRG4(NARIKEL BADI)		46.76	54.65	38.12
17	CRRG5(KORTIK KAIKA)	30.83	34.27	49.26	36.70
18	CRRG6(AUS 171)		32.48	40.91	43.31
19	CRAC-4423-17		27.37	59.24	30.44
20	CRAC-4423-111	21.83	26.62	42.88	48.94
21	CRAC-4423-5	24.50	24.27	98.04	28.75
22	CRAC-4423-14		23.63	33.87	26.06
23	CRAC-4423-10		20.54	31.58	28.27
24	CRAC-4423-3		23.48	33.05	29.35
25	CRAC-4423-70		29.35		40.38
26	CRAC-4423-101		42.14	38.62	36.65
27	CRAC-4423-1		24.86	48.44	33.42
	Mean	29.67	23.95	46.64	39.72
	LSD (Genotype)				13.185
	LSD (Location × Genotype)				22.837
	CV (Residual) %				35.443

6.6 Screening of rice varieties for tolerance to low light stress

Locations: IIRR, KJT, MTU, NRRI, PNR, RPUR, CHN & TTB

Light is one of the essential environmental inputs that can influence plant growth, development and yield processes. More specifically, its duration, intensity and the range of wavelength that represents visible radiation are important for the generation of reducing power as well as energy required for photosynthesis which consecutively also contributes for the crop sustenance and yield. Hence, rice yield is comparatively low during the kharif (wet) season in eastern and north eastern regions of India, primarily due to cloudy days with sub-optimal light intensity. Literature indicates that low light can reduce tillering, panicle and spikelet numbers; and weight, yield and quality of the grain. Further, it was estimated that the solar radiation of 200 hrs and bright sunshine during 30 days before harvest could be optimum for grain yield. However, in kharif (wet) season, bright sun shine with a light intensity ($200\text{-}300\text{ cal cm}^{-2}\text{day}^{-1}$) that prevails for only a few hours ($\sim 4\text{ hrs day}^{-1}$) is a major limitation for rice production.

Consequently, in the 51st ARGM, this trial was constituted in AICRPR to screen elite germplasm for low light stress tolerance with an objective to identify donors to improve the breeding program in low light stress tolerance environment. The trial was conducted at 8 locations with material from AVT-2 obtained from eastern and north eastern India. The entries were screened for tolerance to low light stress with Swarnaprabha as tolerant check and IR8 as susceptible check. The trial was conducted in split plot (RCBD) design with 3 replications with light regimes as main plot treatment and genotypes as sub plot treatments. Low light was imposed immediately after transplantation by enclosing the plants in shade net having 50% transmittance. The shade net was supported by metal rods/bamboo poles.

The effect of low light stress on days to 50% flowering (DFF) was non-significant (Table No. 6.6.1). However, DFF varied significantly ($p < 0.01$) in the varieties. Further, the interaction was significant ($p < 0.01$) for Location x Treatment, Location x Varieties and Location x Silicon x Variety. While the interaction was non-significant for Treat x Variety.

The effect of low light stress on days to maturity was significant ($p < 0.05$) (Table No. 6.6.2). Variation of days to maturity was also significant ($p < 0.01$) among the varieties. Besides, the interaction was significant ($p < 0.01$) for Location x Treatment, Location x Varieties and Location x Silicon x Variety. While the interaction was non-significant for Treat x Variety.

The effect of low light stress on plant height was non-significant (Table No. 6.6.3). However, variation of plant height was significant ($p < 0.01$) among the varieties. In addition, the interaction was significant ($p < 0.01$) for Location x Treatment, Location x Varieties and Location x Silicon x Variety. While the interaction was non-significant for Treat x Variety.

The effect of low light stress on total chlorophyll content (mg/g f.w.) at panicle initiation was non-significant (Table No. 6.6.4). Likewise, variation of total chlorophyll content at panicle initiation was non-significant among the varieties. In addition, the interaction was significant ($p < 0.01$) for Location x Treatment, Location x Varieties and Location x Silicon x Variety. While the interaction was non-significant for Treat x Variety.

The effect of low light stress on total chlorophyll content (mg/g f.w.) at flowering was non-significant (Table No. 6.6.5). However, variation of total chlorophyll content at flowering was significant ($p < 0.01$) among the varieties. Moreover, the interaction was significant ($p < 0.01$) for Location x Treatment, Location x Varieties and Location x Silicon x Variety. While the interaction was non-significant for Treat x Variety.

The effect of low light stress on Total dry matter (g/m²) flowering was significant ($p < 0.01$) (Table No. 6.6.6). Variation of Total dry matter (g/m²) flowering was also significant ($p < 0.01$) among the varieties. Besides, the interaction was significant ($p < 0.01$) for Location x Treatment, Location x Varieties and Location x Silicon x Variety. While the interaction was non-significant for Treat x Variety.

The effect of low light stress on Shoot weight (g/m²) maturity was significant ($p < 0.01$) (Table No. 6.6.7). Variation of Shoot weight (g/m²) maturity was also significant ($p < 0.01$) among the varieties. Further, the interaction was significant ($p < 0.01$) for Location x Treatment, Location x Varieties and Location x Silicon x Variety. While the interaction was non-significant for Treat x Variety.

The effect of low light stress on Panicle weight (g/m²) was significant ($p < 0.01$) (Table No. 6.6.8). However, variation of Panicle weight (g/m²) was non-significant among the varieties. Moreover, the interaction was significant ($p < 0.01$) for Location x Treatment, Location x Varieties and Location x Silicon x Variety. While the interaction was non-significant for Treat x Variety.

The effect of low light stress on Panicle number/m² was significant ($p < 0.05$) (Table No. 6.6.9). Likewise, variation of Panicle number/m² was significant ($p < 0.01$) among the varieties.

Moreover, the interaction was significant ($p < 0.01$) for Location x Treatment, Location x Varieties and Location x Silicon x Variety. While the interaction was non-significant for Treat x Variety.

The effect of low light stress on grain number per panicle was non-significant (Table No. 6.6.10). However, variation of grain number per panicle was significant ($p < 0.01$) among the varieties. Moreover, the interaction was significant ($p < 0.01$) for Location x Treatment, Location x Varieties and Location x Silicon x Variety. While the interaction was non-significant for Treat x Variety. The reduction in grain number per panicle under low light stress over control (Fig 6.6.1a) varied from 4.9% to 30% among the 33 varieties. Two varieties (IET-31237 and IET-32134) noted around 5% reduction. Another two varieties (IET-31220 (R) and IET-32147) noted around 10% reduction. Fifteen varieties (IET-31246 (R), CR-6456-1, Swarnaprabha, IET-32150, Ratnagiri-8, IET-32146, Pooja, Rajendra Sweta, IET-32122, IET-32123, IET-33264, Karjat-3, IET-31204, IET-32130 and IET-32175) noted $\leq 20\%$ reduction. Fourteen varieties noted more reduction in grain number per panicle over control than low light stress tolerant check (Swarna Prabha). Of the 8 locations, least and highest reduction in grain number per panicle over control was observed at Titabar and CRRI locations respectively (Fig 6.6.1b).

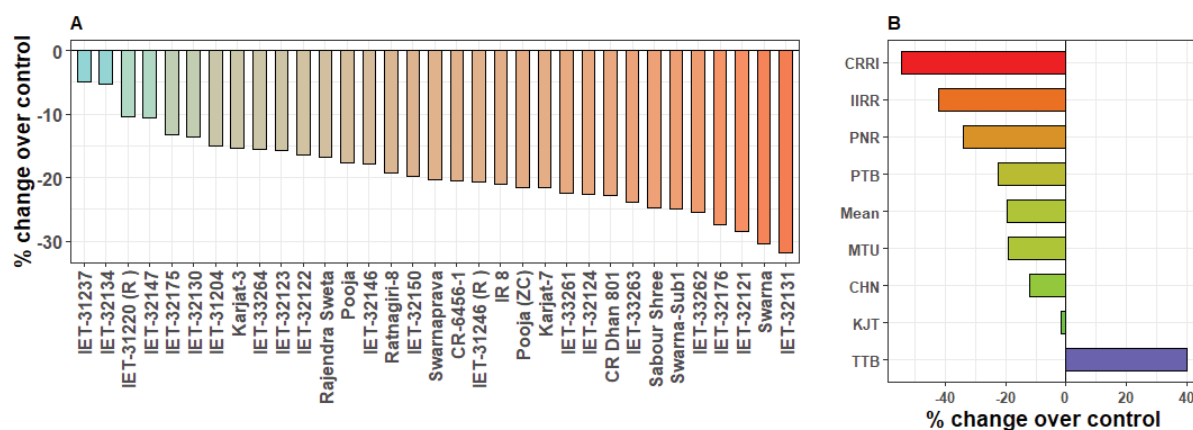


Fig 6.6.1 Influence of Low-Light Stress on grain number per panicle: a) mean of all locations b) mean of all genotypes.

The effect of low light stress on spikelet number per panicle was non-significant (Table No. 6.6.11). Still, variation of spikelet number per panicle was significant ($p < 0.01$) among the varieties. Besides, the interaction was significant ($p < 0.01$) for Location x Treatment, Location x Varieties and Location x Silicon x Variety. While the interaction was non-significant for Treat x Variety.

The effect of low light stress on grain number/m² was significant ($p < 0.01$) (Table No. 6.6.12). Likewise, variation of grain number/m² was significant ($p < 0.01$) among the varieties. In addition, the interaction was significant ($p < 0.01$) for Location x Treatment, Location x Varieties and Location x Silicon x Variety. While the interaction was non-significant for Treat x Variety.

The effect of low light stress on spikelet number/m² was significant ($p < 0.05$) (Table No. 6.6.13). Simultaneously, variation of spikelet number/m² was significant ($p < 0.01$) among the varieties. Further, the interaction was significant ($p < 0.01$) for Location x Treatment, Location x Varieties and Location x Silicon x Variety. While the interaction was non-significant for Treat x Variety.

The effect of low light stress on grain yield (g/m²) was significant ($p < 0.01$) (Table No. 6.6.14). Consecutively, variation of grain yield (g/m²) was significant ($p < 0.01$) among the varieties. Further, the interaction was significant ($p < 0.01$) for Location x Treatment, Location x Varieties and Location x Silicon x Variety. While the interaction was non-significant for Treat x Variety. The percent change in grain yield (g/m²) over control was negative in all the varieties. The reduction in grain yield (g/m²) under low light stress over control (Fig 6.6.2a) varied from 20% to 57% among the 33 varieties. Only one variety (IET-32176) noted around 20% reduction. Seventeen varieties noted lesser reduction in grain yield (g/m²) over control than low light stress tolerant check (Swarna Prabha). The percent change in grain yield (g/m²) over control was negative across the 8 locations indicating that low light can reduce grain yield. The least and highest reduction in grain yield (g/m²) over control was observed at Pattambi and CRRI locations respectively (Fig 6.6.2b).

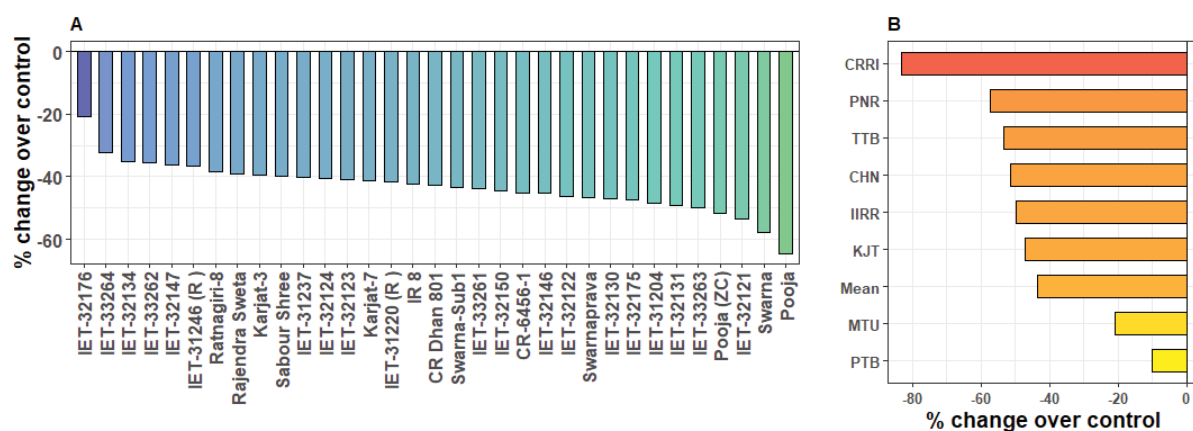


Fig 6.6.2 Influence of Low-Light Stress on grain yield (g/m²): a) mean of all locations b) mean of all genotypes.

The effect of low light stress on total dry matter (TDM) (g/m^2) was significant ($p < 0.01$) (Table No. 6.6.15). Concurrently, variation of TDM (g/m^2) was significant ($p < 0.05$) among the varieties. Further, the interaction was significant ($p < 0.01$) for Location x Treatment, Location x Varieties and Location x Silicon x Variety. While the interaction was non-significant for Treat x Variety. The percent change in TDM (g/m^2) over control was negative in all the varieties. The reduction in TDM (g/m^2) under low light stress over control (Fig 6.6.3a) varied from 13% to 41% among the 33 varieties. Only two varieties (IET-32176 and Rajendra Sweta) noted $< 20\%$ reduction. Twenty-two varieties noted lesser reduction in TDM (g/m^2) over control than low light stress tolerant check (Swarna Prabha). The percent change in TDM (g/m^2) over control was negative across the 8 locations indicating that low light can reduce TDM. The least and highest reduction in TDM (g/m^2) over control was observed at Pattambi and CRRI locations respectively (Fig 6.6.3b).

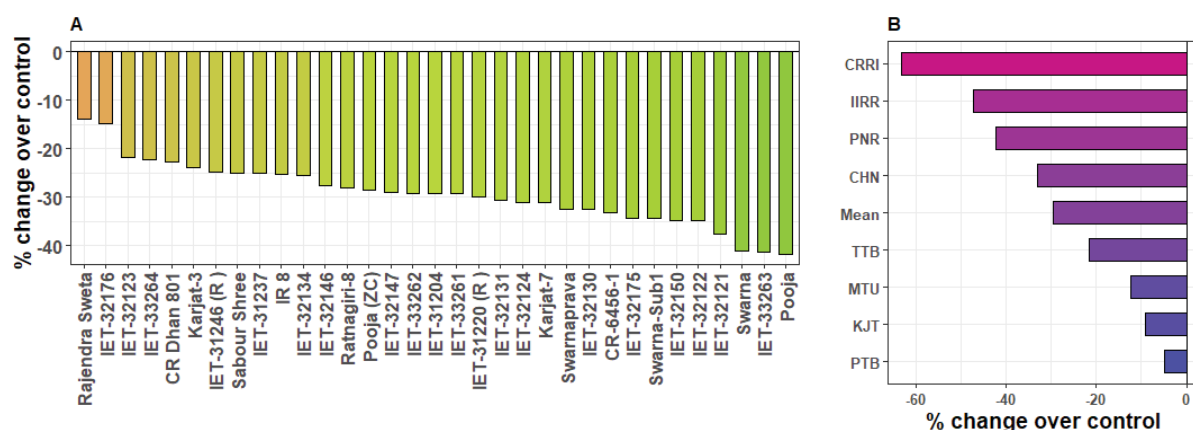


Fig 6.6.3 Influence of Low-Light Stress on total dry matter (g/m^2) at maturity: a) mean of all locations b) mean of all genotypes.

The effect of low light stress on thousand grain weight (TGW) was non-significant (Table No. 6.6.16). However, variation of TGW was significant ($p < 0.05$) among the varieties. Besides, the interaction was significant ($p < 0.01$) for Location x Treatment, Location x Varieties and Location x Silicon x Variety. While the interaction was non-significant for Treat x Variety. The percent change in TGW over control was negative in 29 of the 33 varieties. The reduction in TGW under low light stress over control (Fig 6.6.4a) varied from 0.7% to 12.2% among the 29 of 33 varieties. Besides, four varieties (including Swarnaprabha) noted more TGW under low light stress over control conditions. Only three varieties (IET-32176, IET-31220 (R) and IET-32122) performed better than low light stress tolerant check (Swarnaprabha) in terms of percent change in TGW over control. Reduction in percent change in TGW over control was noted in 5 of the 8 locations (Fig 6.6.4b).

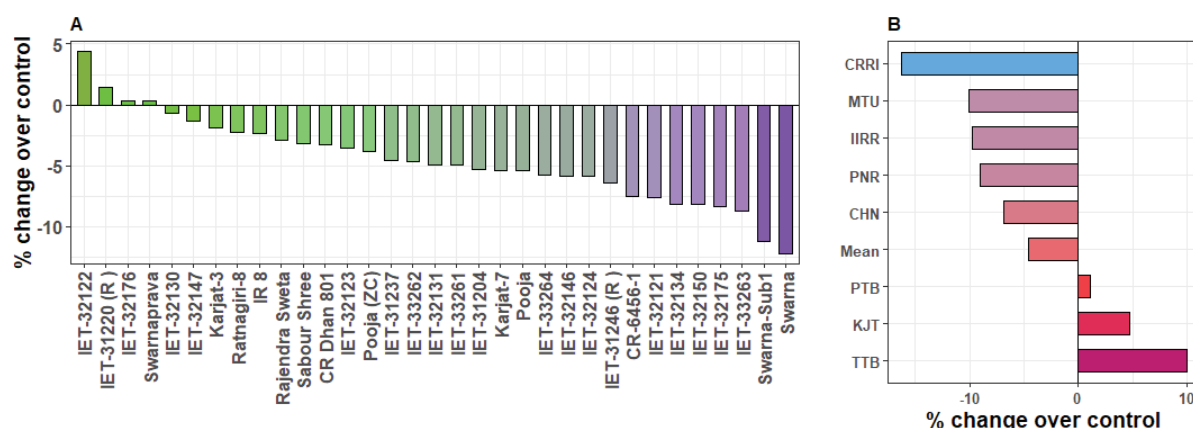


Fig 6.6.4 Influence of Low-Light Stress on 1000 grain weight (g): a) mean of all locations b) mean of all genotypes.

The effect of low light stress on harvest index (HI) was non-significant (Table No. 6.6.17). However, variation of HI was significant ($p < 0.05$) among the varieties. Further, the interaction was significant ($p < 0.01$) for Location x Treatment, Location x Varieties and Location x Silicon x Variety. While the interaction was non-significant for Treat x Variety. The percent change in HI (g/m²) over control was negative in 32 of the 33 varieties. The reduction in HI under low light stress over control (Fig 6.6.5a) varied from 5% to 25% in 32 of the 33 varieties. Only one variety (IET-32176) noted higher HI under low light stress than control conditions. Nineteen varieties performed better than low light stress tolerant check (Swarna Prabha) in terms of HI. The percent change in HI (g/m²) over control was negative in 6 of the 8 locations (Fig 6.6.3b).

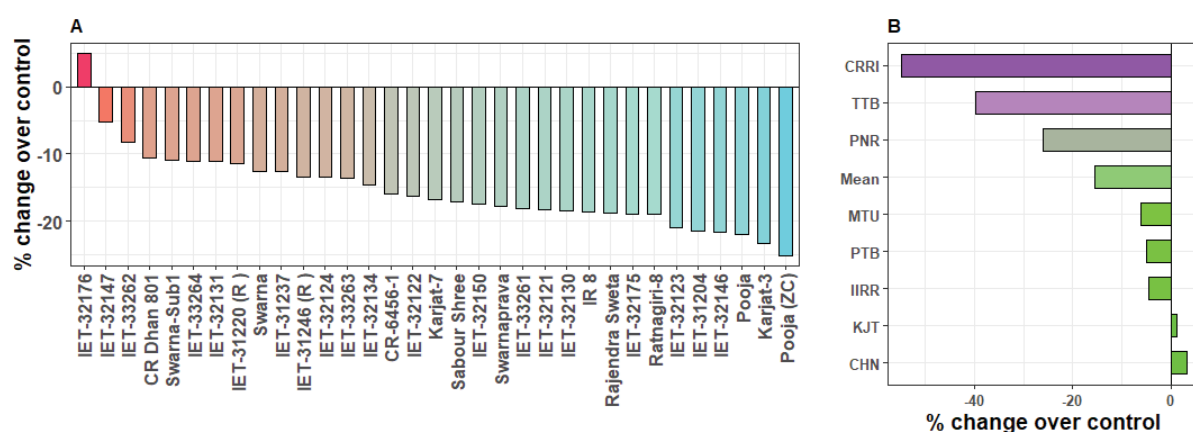


Fig 6.6.5 Influence of Low-Light Stress on harvest index (%): a) mean of all locations b) mean of all genotypes.

Chlorophyll Fluorescence

Efficient functioning of the photosystems under changing climate conditions such as low light stress can be monitored by measuring chlorophyll fluorescence. Hence, chlorophyll fluorescence traits were also recorded under low light stress trial at IIRR. Low light stress significantly affected maximum quantum yield of PSII (Table 6.6.18A). Significant variation noticed among the genotypes and treatment x genotype interaction found significant for all the chlorophyll fluorescence traits (actual quantum yield of PSII (Φ PSII), electron transport rate (ETR), maximum quantum yield of PSII (F_v/F_m), coefficient of photochemical quenching (qP) and coefficient of non-photochemical quenching (qN) (Table 6.6.18B). IET-32175, IET-32123, Swarna, IET-32147 and Ratnagiri-8 noted better ETR under low light stress than control conditions. Similarly, Swarna-Sub1, IET-32147, IET-32175 and Ratnagiri-8 noted better qP under low light stress than control conditions. Therefore, the above genotypes can be a good source of donors to breed for varieties with efficiently functioning photosystems under low light conditions.

Summary and conclusions:

- Reduced rice yield was observed during the kharif (wet) season in eastern and north eastern regions of India due to cloudy days with low or sub-optimal light. Hence, in the 51st ARGM, this trial was constituted to screen AVT-2 material to identify donors having low light stress tolerance. Low light was imposed immediately after transplantation by enclosing the plants in shade net having 50% transmittance supported by metal rods/bamboo poles.
- A total of 18 parameters were noted in both control and low light stress conditions. Low light stress was significant for 11 parameters (days to maturity, TDM at flowering as well as maturity, shoot weight, panicle weight, panicle number/m², grain number/m², spikelet number/m², grain yield, ETR and qP).
- Low light stress has led to reduction in yield ranging from 20% to 60% among the 33 tested varieties with a mean reduction of 43% over control.
- IET-31246 (R), IET-32147, IET-33262, IET-32134, IET-33264 and IET-32176 noted least reduction in grain yield under low light stress over control and can be utilized as donors for low light breeding.

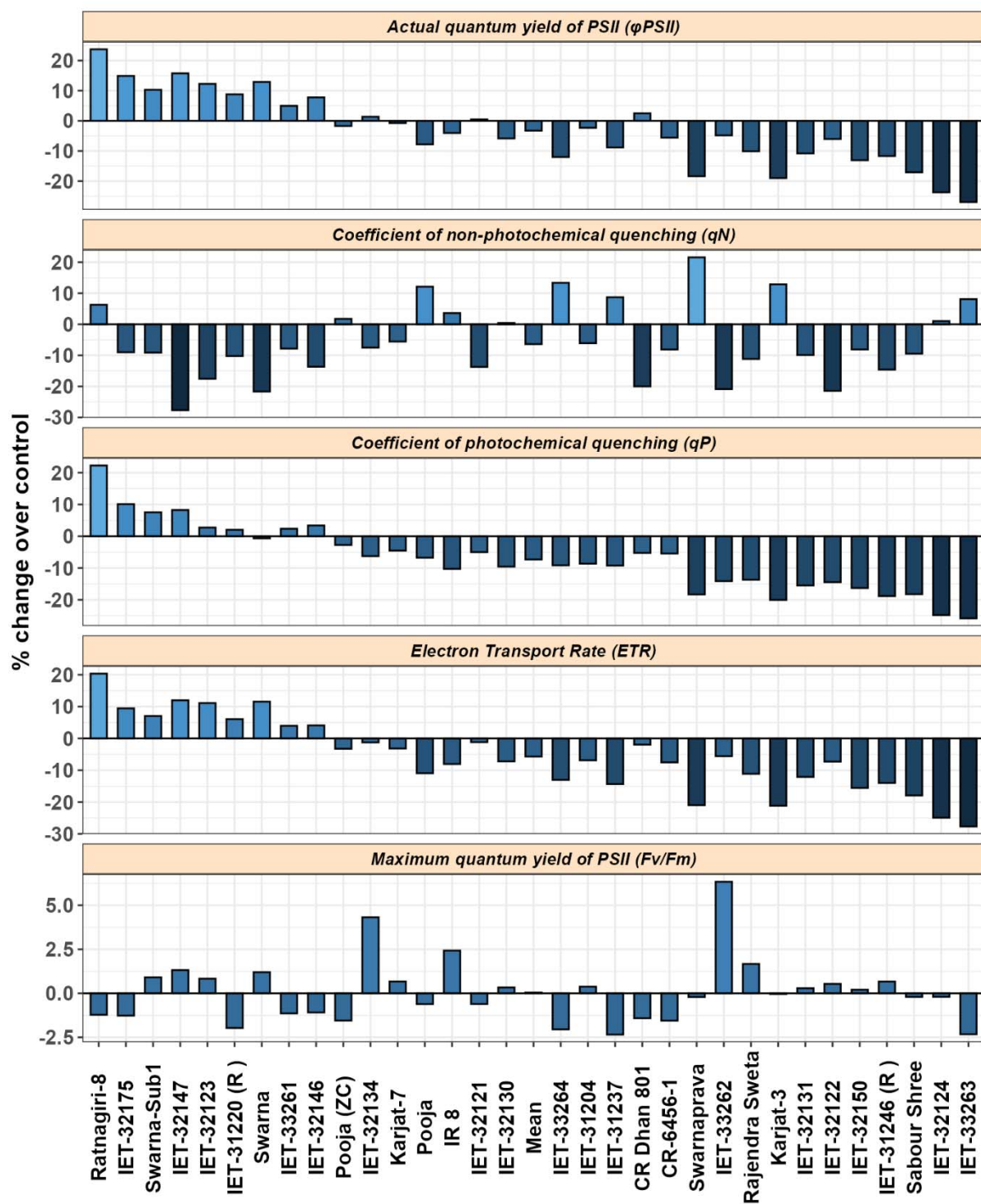


Fig 6.6.6 Percentage change in chlorophyll fluorescence traits under low light stress with respect to control at IIRR during Kharif 2023.

Table 6.6.1 Influence of Low-Light Stress on Days to flowering at different locations during Kharif 2024

S.No.	Genotype	Control								Low light stress							
		CHN	CRRI	KJT	MTU	PNR	PTB	TTB	Mean	CHN	CRRI	KJT	MTU	PNR	PTB	TTB	Mean
1	CR Dhan 801	103	110	78	98	120	84	95	98	109	102	80	102	122	79	95	98
2	CR-6456-1	111	115	96	101	143	97	78	106	118	115	98	103	144	90	78	107
3	IET-31204	97	102	79	92	120	81	94	95	104	97	81	95	121	88	94	97
4	IET-31220 (R)	115	115	86	100	121	102	107	107	118	115	88	103	126	96	107	108
5	IET-31237	97	104	78	96	116	82	93	95	108	102	82	99	120	81	93	98
6	IET-31246 (R)	113	115	84	101	143	89	84	104	129	112	84	105	146	88	84	107
7	IET-32121	114	110	87	96	127	92	100	104	117	115	90	98	132	88	100	106
8	IET-32122	114	110	83	98	110	83	95	99	117	112	85	100	115	86	95	102
9	IET-32123	119	112	95	101	123	85	107	106	127	115	98	104	130	88	107	110
10	IET-32124	115	112	85	99	99	87	84	97	117	115	88	100	105	88	84	100
11	IET-32130	116	142	105	108	128	91	115	115	125	142	107	111	132	89	115	117
12	IET-32131	119	142	103	107	102	91	118	112	127	135	106	109	103	88	118	112
13	IET-32134	96	97	80	92	113	92	80	93	100	100	82	93	115	88	80	94
14	IET-32146	112	115	88	106	143	85	108	108	118	135	90	108	147	75	108	112
15	IET-32147	109	122	86	111	118	108	114	110	121	115	98	115	121	108	114	113
16	IET-32150	96	102	86	95	113	86	96	96	108	100	90	97	115	89	96	99
17	IET-32175	116	129	82	106	119	121	116	113	121	92	85	110	124	98	116	107
18	IET-32176	108	150	105	95	121	116	-	116	102	150	107	98	125	121	-	117
19	IET-33261	97	102	85	96	129	78	95	98	110	102	85	98	129	78	95	100
20	IET-33262	103	110	85	98	106	86	98	98	99	107	86	99	110	92	98	99
21	IET-33263	117	115	85	109	-	90	109	104	127	142	88	110	-	91	109	111
22	IET-33264	116	145	103	109	101	91	122	112	117	142	105	110	103	91	122	113
23	IR 8	97	102	83	100	143	81	84	99	101	100	83	103	147	81	84	100
24	Karjat-3	108	97	76	97	122	84	82	95	104	97	78	100	126	86	82	96
25	Karjat-7	97	88	77	100	96	109	78	92	100	93	80	102	99	77	78	90
26	Pooja	109	145	96	-	121	-	118	118	119	142	99	-	125	-	118	120
27	Pooja (ZC)	117	142	102	-	123	92	121	116	122	142	105	-	126	81	121	116
28	Rajendra Sweta	98	110	105	97	106	81	100	100	111	112	105	98	112	81	100	103
29	Ratnagiri-8	111	112	100	101	96	93	100	102	117	115	102	102	100	91	100	104
30	Sabour Shree	110	110	85	98	99	92	100	99	118	112	87	100	105	90	100	102
31	Swarna	99	115	93	-	136	-	-	111	99	107	95	-	140	-	-	110
32	Swarnaprabha	97	90	88	-	119	-	70	93	101	87	80	-	122	-	70	92
33	Swarna-Sub1	115	115	77	102	143	88	106	107	128	115	80	104	147	87	106	110
	Mean	108	115	89	100	119	92	99	104	114	115	91	103	123	89	99	105
		LSD (Treat)					ns			LSD (Treat x Variety)					ns		
		LSD (Location x Treat)					1.78**			LSD (Location x Treat x Variety)					4.81**		
		LSD (Variety)					1.28**			CV (%) Treat					4.22		
		LSD (Location x Variety)					3.41**										

Table 6.6.2 Influence of Low-Light Stress on Days to maturity at different locations during Kharif 2024

S.No.	Genotype	Control								Low light stress							
		CHN	CRRI	KJT	MTU	PNR	PTB	TTB	Mean	CHN	CRRI	KJT	MTU	PNR	PTB	TTB	Mean
1	CR Dhan 801	132	140	108	129	143	125	128	129	142	152	110	135	146	120	128	133
2	CR-6456-1	143	150	125	130	-	129	111	131	151	150	126	133	-	125	111	133
3	IET-31204	126	130	106	122	142	120	127	125	141	152	108	127	146	125	127	132
4	IET-31220 (R)	144	150	114	130	142	129	140	135	152	150	116	133	147	137	140	139
5	IET-31237	126	130	107	127	142	120	126	125	142	150	109	133	145	125	126	133
6	IET-31246 (R)	141	148	112	132	-	125	117	129	142	146	112	137	-	130	117	131
7	IET-32121	142	146	117	127	144	129	133	134	149	150	119	129	150	125	133	136
8	IET-32122	136	146	110	128	142	120	128	130	151	146	113	130	147	125	128	134
9	IET-32123	147	146	125	132	143	125	140	137	160	150	127	136	147	125	140	141
10	IET-32124	137	146	114	129	137	120	117	129	151	150	116	130	143	125	117	133
11	IET-32130	145	178	133	137	144	129	148	145	158	176	136	139	150	125	148	147
12	IET-32131	149	178	133	137	141	125	151	145	160	156	135	139	149	125	151	145
13	IET-32134	125	130	106	122	144	129	113	124	134	133	111	124	149	129	113	128
14	IET-32146	151	149	115	136	-	125	141	136	152	156	118	139	-	120	141	138
15	IET-32147	149	156	122	140	143	137	147	142	154	150	125	144	148	138	147	144
16	IET-32150	124	123	117	127	143	120	129	126	142	133	119	130	147	129	129	133
17	IET-32175	145	150	111	136	143	129	149	138	154	123	113	141	147	137	149	138
18	IET-32176	148	180	133	125	144	139	-	145	136	180	135	131	147	145	-	146
19	IET-33261	126	133	114	124	145	120	128	127	140	133	114	129	150	125	128	131
20	IET-33262	132	143	114	128	138	125	131	130	133	137	114	130	143	137	131	132
21	IET-33263	145	150	114	139	-	125	142	136	160	176	116	140	-	130	142	144
22	IET-33264	144	178	132	137	141	125	155	145	150	176	133	138	150	137	155	149
23	IR 8	127	129	112	131	-	120	117	123	137	135	112	133	-	125	117	127
24	Karjat-3	126	129	104	126	145	120	115	124	138	129	106	130	150	125	115	128
25	Karjat-7	125	120	106	129	145	139	111	125	134	123	108	132	150	120	111	125
26	Pooja	152	178	126	-	145	-	151	150	162	176	128	-	149	-	151	153
27	Pooja (ZC)	145	178	131	-	143	129	154	147	155	176	133	-	148	120	154	148
28	Rajendra Sweta	126	143	133	127	138	120	133	131	145	146	133	128	144	125	133	136
29	Ratnagiri-8	140	146	129	131	144	120	133	135	151	150	131	132	149	130	133	139
30	Sabour Shree	138	146	114	128	137	129	133	132	152	146	117	131	142	130	133	136
31	Swarna	128	150	121	-	-	-	-	133	133	137	123	-	-	-	-	131
32	Swarnaprava	125	120	106	-	144	-	103	120	135	117	109	-	148	-	103	122
33	Swarna-Sub1	144	148	107	133	-	125	139	133	161	150	108	135	-	125	139	136
	Mean	137	147	117	130	142	126	132	133	147	149	119	133	147	128	132	136
		LSD (Treat)					0.17*			LSD (Treat x Variety)						ns	
		LSD (Location x Treat)					0.65**			LSD (Location x Treat x Variety)						5.16**	
		LSD (Variety)					1.38**			CV (%) Treat						1.23	
		LSD (Location x Variety)					3.65**										

Table 6.6.3 Influence of Low-Light Stress on Plant height (cm) at different locations during Kharif 2024

S.No.	Genotype	Control								Low light stress															
		CHN	CRRI	IIRR	KJT	MTU	PNR	PTB	TTB	Mean	CHN	CRRI	IIRR	KJT	MTU	PNR	PTB	TTB	Mean						
1	CR Dhan 801	93	110	101	104	141	106	94	111	107	93	103	108	113	137	104	99	127	110						
2	CR-6456-1	104	156	116	122	177	99	119	139	129	104	133	134	94	174	123	135	140	130						
3	IET-31204	96	129	109	127	153	99	106	117	117	96	120	119	128	147	111	97	141	120						
4	IET-31220 (R)	103	131	109	109	158	115	91	119	117	105	130	114	120	153	122	90	129	120						
5	IET-31237	115	128	109	125	152	115	94	114	119	122	111	116	121	149	126	107	117	121						
6	IET-31246 (R)	97	102	94	111	127	109	88	105	104	97	100	105	109	119	124	86	110	106						
7	IET-32121	110	133	107	127	159	127	103	122	123	111	119	101	118	155	134	102	118	120						
8	IET-32122	95	140	118	122	167	126	99	128	124	97	121	100	133	158	130	106	89	117						
9	IET-32123	132	109	102	98	132	114	94	98	110	135	86	93	109	128	113	91	151	113						
10	IET-32124	100	111	97	109	123	133	93	106	109	98	100	89	107	121	151	98	130	112						
11	IET-32130	102	118	101	110	154	99	84	118	111	102	126	103	129	148	127	89	134	120						
12	IET-32131	106	128	112	95	156	111	88	117	114	105	116	105	138	154	122	84	104	116						
13	IET-32134	98	133	108	114	141	114	101	126	117	100	121	113	116	138	139	104	120	119						
14	IET-32146	99	107	102	111	163	110	71	105	108	100	85	100	99	157	131	84	103	107						
15	IET-32147	92	131	112	131	152	125	98	124	121	93	122	124	138	147	133	95	121	122						
16	IET-32150	93	133	125	131	147	133	87	122	121	95	117	123	78	144	133	92	128	114						
17	IET-32175	120	138	126	128	159	105	105	133	127	122	134	127	134	153	121	103	144	130						
18	IET-32176	101	122	-	97	147	97	102	-	111	99	112	-	117	142	106	110	-	114						
19	IET-33261	94	104	103	92	124	128	95	101	105	94	95	91	98	120	164	95	117	109						
20	IET-33262	93	107	109	122	136	119	103	110	112	93	90	103	110	132	140	85	102	107						
21	IET-33263	97	98	97	94	144	104	85	91	101	98	92	84	93	139	136	90	117	106						
22	IET-33264	96	120	106	105	148	103	85	103	108	97	113	99	119	141	121	87	95	109						
23	IR 8	84	111	98	96	128	98	79	103	99	83	96	95	100	126	130	83	96	101						
24	Karijat-3	99	94	88	93	119	103	78	98	97	100	91	95	66	113	118	75	100	95						
25	Karijat-7	85	96	85	84	112	99	75	93	91	85	87	86	67	108	106	73	92	88						
26	Pooja	95	119	103	102	-	150	-	113	114	96	108	117	112	-	166	-	112	119						
27	Pooja (ZC)	115	117	95	95	-	99	79	110	101	117	108	107	121	-	128	84	121	112						
28	Rajendra Sweta	104	115	102	102	124	112	88	102	106	103	99	87	92	123	127	101	96	103						
29	Rathagiri-8	102	112	103	107	150	98	97	105	109	101	94	92	105	148	118	97	112	108						
30	Sabour Shree	97	128	101	116	148	124	106	112	117	97	107	115	120	144	126	97	103	114						
31	Swarna	104	99	104	84	-	126	-	-	104	103	100	109	98	-	140	-	-	110						
32	Swarnapra	111	138	118	129	-	97	-	137	121	116	150	115	99	-	114	-	129	120						
33	Swarna-Sub1	121	107	101	97	133	98	96	97	106	124	88	85	104	128	118	83	101	104						
	Mean	102	119	105	109	144	112	93	112	112	102	108	105	109	140	127	94	116	113						
		LSD (Treat)								LSD (Treat x Variety)								ns							
		LSD (Location x Treat)								LSD (Location x Treat x Variety)								11.21**							
		LSD (Variety)								CV (%) Treat								5.2							
		LSD (Location x Variety)																							

Table 6.6.4 Influence of Low-Light Stress on Total chlorophyll content (mg/g f.w.) at panicle initiation at different locations in *Kharif* 2024

S.No.	Genotype	Control						Low light stress					
		CHN	CRR1	KJT	PNR	PTB	Mean	CHN	CRR1	KJT	PNR	PTB	Mean
1	CR Dhan 801	1.4	2.5	4.1	2.7	6.0	3.3	2.3	3.3	2.6	4.8	3.3	3.3
2	CR-6456-1	1.7	2.5	4.1	2.5	4.1	3.0	2.4	4.2	3.1	3.6	3.7	3.4
3	IET-31204	0.9	6.0	4.9	2.6	5.7	4.0	3.4	2.2	3.4	4.3	3.3	3.3
4	IET-31220 (R)	1.3	3.2	4.1	3.1	3.9	3.1	3.1	4.4	3.3	4.3	3.9	3.8
5	IET-31237	1.7	2.9	3.6	2.6	5.4	3.3	1.7	3.5	4.3	5.2	1.8	3.3
6	IET-31246 (R)	0.9	3.4	3.9	2.3	4.7	3.0	2.3	4.1	3.2	3.6	4.1	3.5
7	IET-32121	1.7	2.7	2.4	2.8	5.3	3.0	2.8	2.7	3.0	3.5	3.6	3.1
8	IET-32122	1.0	2.8	4.0	2.3	5.3	3.1	3.6	3.9	3.7	3.5	2.8	3.5
9	IET-32123	0.8	6.0	4.4	2.4	6.0	3.9	2.6	4.1	3.2	3.2	3.5	3.3
10	IET-32124	1.8	3.1	3.7	2.4	6.0	3.4	2.6	3.1	3.6	3.5	4.3	3.4
11	IET-32130	1.8	3.1	3.4	2.5	5.5	3.3	1.9	3.1	3.2	3.6	3.4	3.1
12	IET-32131	1.6	2.7	3.0	2.5	5.3	3.0	2.1	2.9	3.7	4.1	3.9	3.3
13	IET-32134	1.3	3.2	3.4	2.6	4.6	3.0	2.4	3.8	3.2	4.1	2.4	3.2
14	IET-32146	0.9	3.2	4.3	2.6	5.3	3.3	1.9	3.4	2.4	4.3	3.3	3.1
15	IET-32147	1.1	2.2	3.9	2.5	3.2	2.6	1.9	3.1	4.0	3.4	2.8	3.0
16	IET-32150	1.0	2.6	3.7	2.3	5.1	2.9	2.7	2.1	3.1	3.8	3.7	3.1
17	IET-32175	3.2	2.1	4.1	2.4	3.8	3.1	2.6	2.8	4.0	4.6	2.9	3.4
18	IET-32176	1.4	2.0	4.0	2.3	2.5	2.4	2.4	2.3	2.8	4.9	2.0	2.9
19	IET-33261	1.7	2.3	3.5	3.3	5.9	3.3	2.8	3.6	3.4	4.2	5.2	3.8
20	IET-33262	1.4	3.1	3.6	3.2	5.2	3.3	2.1	3.2	3.5	4.4	5.3	3.7
21	IET-33263	0.9	3.3	3.6	3.1	5.3	3.2	2.7	4.6	2.9	4.4	4.3	3.8
22	IET-33264	1.4	2.7	3.1	2.2	5.9	3.1	2.8	4.3	2.9	4.4	3.6	3.6
23	IR 8	0.9	2.5	4.7	2.4	5.6	3.2	2.6	2.0	3.2	3.4	2.4	2.7
24	Karjat-3	0.8	2.9	4.3	2.3	4.2	2.9	2.4	3.7	3.7	3.9	1.4	3.0
25	Karjat-7	1.3	2.4	3.2	2.4	4.8	2.8	2.3	5.2	3.0	3.1	2.8	3.3
26	Pooja	1.4	2.7	4.1	2.4	0.5	2.2	2.5	2.2	3.6	4.4	-	3.2
27	Pooja (ZC)	0.6	2.8	3.1	2.7	5.3	2.9	2.7	3.0	3.4	4.6	2.2	3.2
28	Rajendra Sweta	0.9	3.2	2.8	3.2	4.1	2.8	1.8	3.4	3.1	4.4	1.7	2.9
29	Ratnagiri-8	1.3	2.8	4.0	3.1	3.3	2.9	2.9	4.6	3.4	4.3	4.2	3.9
30	Sabour Shree	1.4	3.8	3.8	2.4	5.0	3.3	1.9	3.6	3.5	3.6	2.6	3.0
31	Swarna	1.1	2.8	3.5	3.2	-	2.6	2.6	4.0	2.8	4.4	-	3.4
32	Swarnaprava	1.3	2.4	3.2	2.5	-	2.4	2.7	3.7	3.3	4.6	-	3.6
33	Swarna-Sub1	2.3	3.8	4.0	2.7	5.2	3.6	2.1	3.3	3.3	4.3	4.6	3.5
	Mean	1.3	3.0	3.7	2.6	4.8	3.1	2.5	3.4	3.3	4.1	3.3	3.3
		LSD (Treat)				ns		LSD (Treat x Variety)				ns	
		LSD (Location x Treat)				0.65**		LSD (Location x Treat x Variety)				1.02**	
		LSD (Variety)				ns		CV (%) Treat				46.48	
		LSD (Location x Variety)				0.72**							

Table 6.6.5 Influence of Low-Light Stress on Total chlorophyll content (mg/g f.w.) at flowering at different locations during Kharif 2024

S.No.	Genotype	Control							Low light stress						
		CHN	CRR	KJT	MTU	PNR	PTB	Mean	CHN	CRR	KJT	MTU	PNR	PTB	Mean
1	CR Dhan 801	2.1	2.2	1.8	4.0	1.6	3.0	2.4	1.7	2.8	2.3	4.2	2.2	3.2	2.7
2	CR-6456-1	2.2	2.5	2.1	3.7	1.5	3.8	2.6	0.9	2.1	2.6	4.0	3.3	2.8	2.6
3	IET-31204	1.2	3.3	2.4	3.9	1.8	2.1	2.4	1.1	3.2	3.0	4.0	2.3	2.5	2.7
4	IET-31220 (R)	1.9	3.2	3.1	2.9	1.7	3.6	2.7	1.1	3.3	2.5	3.3	2.1	3.8	2.7
5	IET-31237	1.4	2.9	1.9	3.9	1.5	2.6	2.4	0.9	2.7	2.5	4.0	2.6	3.4	2.7
6	IET-31246 (R)	3.1	2.0	2.1	4.1	1.7	4.0	2.8	1.4	1.9	2.0	4.2	3.5	2.9	2.6
7	IET-32121	2.1	3.2	2.8	3.5	1.8	4.6	3.0	1.3	2.8	1.7	4.0	2.8	2.5	2.5
8	IET-32122	1.4	2.8	2.2	3.1	1.7	2.3	2.2	1.4	2.4	2.7	3.4	2.4	3.0	2.5
9	IET-32123	2.3	2.7	2.3	3.0	1.5	4.8	2.8	0.9	3.2	2.6	3.2	2.4	3.1	2.6
10	IET-32124	1.6	2.3	2.7	4.1	1.4	4.1	2.7	1.7	3.0	1.9	4.2	2.6	3.2	2.8
11	IET-32130	1.6	1.9	3.1	3.9	1.8	2.8	2.5	1.7	3.0	1.8	4.1	2.2	2.6	2.5
12	IET-32131	1.4	2.5	2.5	4.0	1.8	3.5	2.6	1.8	2.8	2.9	4.0	2.7	2.0	2.7
13	IET-32134	2.2	2.5	3.7	3.5	1.7	4.2	2.9	0.8	2.1	2.9	3.8	1.6	2.9	2.3
14	IET-32146	2.3	2.9	2.0	3.7	1.7	2.2	2.5	0.8	3.1	2.4	3.8	3.5	2.0	2.6
15	IET-32147	2.2	2.4	2.7	4.0	1.3	2.6	2.5	2.5	2.3	2.2	4.1	2.2	3.4	2.8
16	IET-32150	1.9	2.5	2.9	3.9	1.7	2.7	2.6	1.5	2.0	2.4	4.0	3.3	2.0	2.5
17	IET-32175	2.2	2.1	2.0	4.0	1.5	2.7	2.4	1.0	2.0	2.3	4.1	2.2	2.5	2.4
18	IET-32176	2.1	2.5	2.0	3.5	1.8	3.1	2.5	1.0	1.9	2.3	3.8	2.3	2.9	2.3
19	IET-33261	1.2	2.6	2.4	3.6	1.6	4.2	2.6	0.9	2.9	2.7	3.9	2.5	2.6	2.6
20	IET-33262	1.6	1.9	2.2	3.8	1.7	3.2	2.4	1.4	2.3	2.6	4.0	2.6	2.5	2.6
21	IET-33263	2.2	2.3	2.5	3.9	1.6	4.2	2.8	1.5	2.9	1.8	4.1	2.4	2.6	2.5
22	IET-33264	3.1	2.9	1.8	4.9	1.6	2.5	2.8	0.9	3.7	2.0	4.9	3.1	2.3	2.8
23	IR 8	2.5	2.9	2.2	4.1	1.7	3.5	2.8	1.2	2.5	2.5	4.2	2.5	2.3	2.5
24	Karjat-3	2.5	2.4	2.4	4.1	1.5	2.8	2.6	1.0	3.1	2.5	4.2	2.6	1.9	2.5
25	Karjat-7	2.3	3.9	2.1	4.1	1.6	1.8	2.6	1.1	4.3	2.5	3.5	2.1	2.4	2.6
26	Pooja	2.3	2.2	2.8	-	1.1	-	2.1	1.0	2.8	2.7	-	1.7	-	2.1
27	Pooja (ZC)	2.4	2.9	2.0	-	1.5	3.4	2.4	0.7	2.2	2.9	-	3.2	3.0	2.4
28	Rajendra Sweta	2.3	2.1	2.3	4.1	1.6	2.2	2.4	1.7	2.9	2.3	4.3	2.3	2.5	2.7
29	Ratnagiri-8	1.6	3.3	2.9	4.2	1.8	3.9	2.9	1.4	2.9	2.6	4.4	3.1	3.6	3.0
30	Sabour Shree	2.1	2.7	2.4	3.4	1.7	3.9	2.7	1.8	2.4	2.6	3.8	2.7	3.4	2.8
31	Swarna	2.2	2.6	2.3	-	1.4	-	2.2	1.4	2.9	2.0	-	2.5	-	2.2
32	Swarnaprava	2.1	3.0	2.3	-	1.7	-	2.3	2.4	3.8	2.1	-	1.6	-	2.5
33	Swarna-Sub1	2.7	2.8	2.6	3.2	1.6	3.7	2.8	1.4	3.1	2.3	3.6	2.5	3.1	2.7
	Mean	2.1	2.6	2.4	3.8	1.6	3.3	2.6	1.3	2.8	2.4	4.0	2.5	2.8	2.6
		LSD (Treat)				ns			LSD (Treat x Variety)				ns		
		LSD (Location x Treat)				0.43**			LSD (Location x Treat x Variety)				0.73**		
		LSD (Variety)				0.16*			CV (%) Treat				39.86		
		LSD (Location x Variety)				0.51**									

Table 6.6.6 Influence of Low-Light Stress on Total dry matter (g/m²) at flowering at different locations during Kharif 2024

S.No.	Genotype	Control								Low light stress									
		CHN	CRR1	IIRR	KJT	MTU	PNR	PTB	TTB	Mean	CHN	CRR1	IIRR	KJT	MTU	PNR	PTB	TTB	Mean
1	CR Dhan 801	831	670	983	896	396	1100	917	899	836	530	398	768	588	304	452	955	1182	647
2	CR-6456-1	882	1298	1257	1092	518	1435	1150	923	1070	722	850	957	1134	492	843	1067	937	875
3	IET-31204	930	1052	1484	1232	515	613	600	992	927	718	685	1121	630	417	514	983	1028	762
4	IET-31220 (R)	854	742	1007	910	559	718	900	925	827	785	809	1054	966	348	422	717	888	749
5	IET-31237	822	1053	1311	928	426	782	583	1160	883	596	488	933	1062	278	751	908	884	735
6	IET-31246 (R)	553	776	1061	798	487	1263	1067	910	865	424	404	914	686	353	879	1150	900	714
7	IET-32121	862	1037	1297	1106	437	1129	1267	1137	1034	607	515	843	630	345	442	1183	981	693
8	IET-32122	842	1087	1256	1022	458	1450	983	1068	1021	715	482	735	910	302	676	983	898	713
9	IET-32123	578	701	906	588	585	934	867	756	739	450	292	920	700	513	609	867	712	633
10	IET-32124	923	772	972	1456	427	921	1150	904	941	745	381	596	785	329	556	1183	1022	700
11	IET-32130	579	1050	1060	980	552	944	1083	1239	936	427	454	972	616	456	621	1100	1221	733
12	IET-32131	898	1052	1186	1106	570	1008	900	1063	973	706	659	793	644	448	424	550	763	623
13	IET-32134	786	754	1174	1134	530	854	1117	857	901	548	472	830	686	471	495	883	838	653
14	IET-32146	866	890	1455	658	501	1333	433	823	870	704	337	1060	938	450	552	717	932	711
15	IET-32147	772	1101	1202	672	508	938	967	942	888	616	608	1320	1050	333	364	1033	627	744
16	IET-32150	826	883	1389	1078	551	1208	767	961	958	714	404	1217	644	443	582	1033	892	741
17	IET-32175	1024	1077	1602	1050	512	926	1317	1057	1070	747	592	1004	840	448	413	1167	923	767
18	IET-32176	963	1160	-	714	545	911	1533	-	971	617	771	-	616	375	461	1217	-	676
19	IET-33261	994	971	1047	1470	545	1146	1000	1204	1047	671	436	702	686	458	400	1067	1001	678
20	IET-33262	864	769	1465	1120	494	1162	1367	961	1025	523	643	878	756	356	556	1017	582	664
21	IET-33263	699	745	923	1022	483	702	1200	828	825	449	276	701	700	325	261	1250	522	561
22	IET-33264	864	1160	1085	980	543	1121	1267	1121	1018	596	938	827	840	504	505	1000	911	765
23	IR 8	739	797	1128	700	535	1500	867	901	896	630	372	752	574	484	578	967	738	637
24	Karjat-3	697	612	939	868	536	923	1117	955	831	569	285	680	1022	526	670	717	1013	685
25	Karjat-7	689	575	755	770	555	980	350	929	701	599	245	615	658	517	513	533	935	577
26	Pooja	659	1034	1109	728	-	1232	-	1126	981	514	579	961	1008	-	506	-	1021	765
27	Pooja (ZC)	1218	930	898	1106	-	975	750	938	974	700	350	1132	700	-	461	617	904	695
28	Rajendra Sweta	838	846	1187	1428	556	859	1150	1062	991	525	389	731	574	513	702	1100	1170	713
29	Rathnagiri-8	699	854	1089	1036	555	989	817	824	858	653	300	848	1008	432	712	867	932	719
30	Sabour Shree	1014	867	1342	938	550	942	1050	828	942	603	457	810	784	481	441	950	997	690
31	Swarna	789	755	1117	1246	-	1096	-	-	1001	516	666	692	518	-	493	-	-	577
32	Swarnaprava	863	708	827	700	-	782	-	866	791	710	470	1136	798	-	355	-	828	716
33	Swarna-Sub1	938	771	1269	756	530	1116	1117	959	932	745	386	836	1064	417	428	1000	745	703
	Mean	829	895	1149	978	516	1030	988	971	925	617	496	885	782	418	534	959	901	697
		LSD (Treat)				16.84**						LSD (Treat x Variety)				ns			
		LSD (Location x Treat)				47.63**						LSD (Location x Treat x Variety)				195.87**			
		LSD (Variety)				48.96**						CV (%) Treat				14.7			
		LSD (Location x Variety)				138.5**													

Table 6.6.7 Influence of Low-Light Stress on Shoot weight (g/m²) at maturity at different locations during Kharif 2024

S.No.	Genotype	Control						Low light stress												
		CHN	CRRI	IIRR	KJT	MTU	PNR	PTB	TTB	Mean	CHN	CRRI	IIRR	KJT	MTU	PNR	PTB	TTB	Mean	
1	CR Dhan 801	791	613	767	615	688	739	917	752	735	526	286	370	687	603	614	825	1004	614	
2	CR-6456-1	724	1056	837	864	754	900	1200	764	887	537	647	761	803	670	302	1103	847	709	
3	IET-31204	735	807	825	735	810	702	750	772	767	463	496	617	450	669	587	825	842	619	
4	IET-31220 (R)	688	833	735	638	817	847	942	750	781	503	425	620	555	696	479	731	704	599	
5	IET-31237	679	538	742	570	800	669	747	954	712	487	306	551	555	684	496	813	708	575	
6	IET-31246 (R)	813	657	641	353	772	983	1036	679	742	466	378	573	480	665	505	1067	698	604	
7	IET-32121	759	730	686	623	745	953	1217	942	832	477	327	462	390	655	469	1178	781	592	
8	IET-32122	720	685	808	683	754	788	1088	847	797	480	341	449	533	672	583	1039	700	600	
9	IET-32123	787	543	547	630	766	816	1040	604	717	624	211	437	553	596	558	1075	624	585	
10	IET-32124	761	754	582	803	748	585	1106	745	760	489	380	469	405	730	440	1167	817	612	
11	IET-32130	763	923	618	922	781	924	1217	1029	897	382	496	630	645	536	688	1198	965	692	
12	IET-32131	659	1000	575	510	720	1165	1097	858	823	421	491	455	672	466	930	683	662	598	
13	IET-32134	811	524	650	623	722	1021	925	709	748	491	353	541	330	684	592	892	689	571	
14	IET-32146	776	557	801	744	733	1332	694	617	782	539	272	482	435	596	859	747	716	581	
15	IET-32147	811	1042	1225	564	817	1238	936	715	919	566	490	608	660	680	589	1053	493	642	
16	IET-32150	833	809	877	908	695	721	1087	820	844	537	384	689	345	586	395	1161	750	606	
17	IET-32175	674	1132	1374	743	773	1046	1175	847	970	505	416	808	650	666	630	828	777	660	
18	IET-32176	726	423	-	406	807	768	1388	-	753	484	-	-	597	658	497	1257	-	699	
19	IET-33261	757	590	495	398	871	1558	1217	990	860	512	278	454	660	743	663	1100	786	649	
20	IET-33262	675	665	672	473	756	970	1417	778	801	413	208	524	735	736	835	1106	461	627	
21	IET-33263	780	579	602	950	792	985	1214	662	821	502	183	489	572	711	351	1278	316	550	
22	IET-33264	776	1004	738	827	788	934	1228	933	904	467	593	696	682	788	802	1248	758	754	
23	IR 8	827	430	469	623	828	1537	933	698	793	612	228	395	722	715	1085	783	572	639	
24	Karijat-3	847	560	503	585	803	907	1077	720	750	524	248	477	448	837	649	853	732	596	
25	Karijat-7	818	404	399	660	704	673	633	674	621	565	92	409	575	657	429	638	632	500	
26	Pooja	692	960	864	795	-	1440	-	902	942	419	461	664	705	-	975	-	801	671	
27	Pooja (ZC)	747	876	541	902	-	709	750	778	757	448	319	608	800	-	344	783	703	572	
28	Rajendra Sweta	629	582	517	443	833	1267	1136	821	778	368	308	418	810	823	877	1267	892	720	
29	Ratnagiri-8	751	561	458	659	809	808	1056	586	711	489	248	463	315	773	400	967	697	544	
30	Sabour Shree	701	609	527	703	738	1020	1108	687	762	527	331	354	732	701	856	1083	805	674	
31	Swarna	720	618	710	621	-	840	-	-	702	418	242	520	647	-	508	-	-	467	
32	Swarnaprava	749	378	830	578	-	875	-	700	685	435	164	554	360	-	585	-	695	465	
33	Swarna-Sub1	817	634	718	465	782	762	1083	736	750	496	239	531	360	644	617	925	526	542	
	Mean	751	699	698	655	773	954	1047	776	791	490	339	534	572	677	612	989	714	610	
		LSD (Treat)						19.27**			LSD (Treat x Variety)						ns			
		LSD (Location x Treat)						54.51**			LSD (Location x Treat x Variety)						183.66**			
		LSD (Variety)						45.91**			CV (%) Treat						19.48			
		LSD (Location x Variety)						129.86**												

Table 6.6.8 Influence of Low-Light Stress on Panicle weight (g/m²) at different locations during Kharif 2024

S.No.	Genotype	Control										Low light stress											
		CHN	CRRI	IIRR	KJT	MTU	PNR	PTB	TTB	Mean	CHN	CRRI	IIRR	KJT	MTU	PNR	PTB	TTB	Mean				
1	CR Dhan 801	909	335	781	465	548	654	861	571	640	373	88	321	422	404	413	761	483	408				
2	CR-6456-1	715	636	985	472	560	677	1201	544	724	336	89	423	422	466	186	1114	310	418				
3	IET-31204	672	691	976	505	627	610	859	745	711	331	164	654	495	471	236	864	443	457				
4	IET-31220 (R)	669	605	950	420	582	587	1228	505	693	362	190	613	468	452	395	858	315	457				
5	IET-31237	838	538	844	580	581	598	1008	751	717	362	105	598	327	456	320	1110	306	448				
6	IET-31246 (R)	674	652	887	263	581	674	978	655	670	286	186	376	435	467	428	998	560	467				
7	IET-32121	530	559	1043	540	589	658	1321	546	723	334	100	403	390	395	252	939	316	391				
8	IET-32122	642	620	1088	499	567	665	1223	464	721	282	82	484	360	418	409	1111	276	428				
9	IET-32123	662	415	677	574	586	653	981	353	613	364	59	410	420	383	338	1292	329	449				
10	IET-32124	571	343	861	524	603	423	1164	614	638	274	110	346	330	538	228	1097	248	397				
11	IET-32130	624	560	630	364	544	608	1283	631	655	364	97	336	352	341	402	856	407	394				
12	IET-32131	561	488	645	379	581	934	926	604	640	311	172	329	585	301	257	958	275	399				
13	IET-32134	758	410	926	548	554	724	920	416	657	309	78	648	480	428	307	1082	284	452				
14	IET-32146	914	353	872	398	542	706	1091	465	668	303	81	439	480	390	237	1158	367	432				
15	IET-32147	1060	703	885	398	611	832	1173	522	773	309	214	606	555	471	234	1307	220	489				
16	IET-32150	683	582	900	448	540	720	1283	613	721	319	85	716	337	405	278	917	292	419				
17	IET-32175	745	680	1233	338	573	654	1018	620	732	340	126	655	385	439	324	846	318	429				
18	IET-32176	1001	343	-	328	600	614	978	-	644	302	-	-	271	467	277	775	-	418				
19	IET-33261	649	593	575	540	638	980	871	533	672	322	119	338	525	488	377	1107	420	462				
20	IET-33262	883	391	859	540	547	672	913	576	673	282	72	359	555	472	432	972	226	421				
21	IET-33263	782	499	821	469	563	-	1257	458	693	339	69	208	375	474	-	839	205	358				
22	IET-33264	729	623	657	450	613	660	1089	720	693	393	201	477	375	565	399	1090	267	471				
23	IR 8	762	504	631	460	638	562	978	549	635	358	89	422	620	506	302	1058	238	449				
24	Karijat-3	569	445	597	413	577	650	898	552	588	339	69	604	307	563	291	883	309	421				
25	Karijat-7	655	352	647	555	578	575	843	435	580	318	48	575	292	512	171	625	282	353				
26	Pooja	731	540	1271	445	-	897	-	665	758	327	179	392	468	-	408	-	300	346				
27	Pooja (ZC)	686	504	650	554	-	635	816	553	628	323	60	243	398	-	263	1092	294	382				
28	Rajendra Sweta	773	528	522	585	635	723	898	619	660	287	121	262	615	591	397	1095	617	498				
29	Rathnagiri-8	622	500	774	498	621	608	1111	547	660	365	80	444	330	579	305	1094	340	442				
30	Sabour Shree	544	509	856	585	548	748	1201	606	700	311	126	390	435	472	466	1193	504	487				
31	Swarna	686	567	1267	533	-	722	-	-	755	343	141	683	412	-	298	-	-	375				
32	Swarnaprava	843	526	1074	578	-	588	-	343	659	326	56	683	465	-	318	-	434	380				
33	Swarna-Sub1	699	511	823	375	567	430	1021	582	626	308	83	302	450	455	240	936	205	372				
	Mean	722	518	850	473	582	670	1046	560	676	327	111	461	428	461	318	1001	335	423				
		LSD (Treat)										LSD (Treat x Variety)								ns			
		LSD (Location x Treat)										LSD (Location x Treat x Variety)								151.86**			
		LSD (Variety)										CV (%) Treat								17.19			
		LSD (Location x Variety)																					

Table 6.6.9 Influence of Low-Light Stress on Panicle number/m² at different locations during Kharif 2024

S.No.	Genotype	Control						Low light stress											
		CHN	CRRI	IIRR	KJT	MTU	PNR	PTB	TTB	Mean	CHN	CRRI	IIRR	KJT	MTU	PNR	PTB	TTB	Mean
1	CR Dhan 801	306	225	390	406	418	283	400	180	326	146	185	273	238	352	217	500	390	288
2	CR-6456-1	387	238	320	378	407	217	500	360	351	210	123	313	238	396	217	558	360	302
3	IET-31204	279	233	327	308	418	250	417	250	310	136	118	323	196	385	183	517	390	281
4	IET-31220 (R)	339	211	297	308	440	267	472	300	329	201	162	263	196	396	167	414	370	271
5	IET-31237	311	253	367	336	407	267	428	200	321	189	153	313	238	341	233	475	310	282
6	IET-31246 (R)	284	221	347	350	429	267	506	380	348	230	173	330	210	396	217	517	330	300
7	IET-32121	290	256	353	350	429	283	578	270	351	192	118	327	168	396	167	575	440	298
8	IET-32122	357	255	370	252	429	233	558	330	348	188	118	270	140	407	167	550	340	272
9	IET-32123	173	255	350	308	429	200	508	370	324	208	112	390	238	418	150	558	340	302
10	IET-32124	388	250	380	294	429	233	600	310	361	185	160	367	168	418	200	450	370	290
11	IET-32130	251	305	333	364	451	183	522	330	342	219	175	410	224	396	200	533	360	315
12	IET-32131	318	283	333	322	440	217	583	350	356	197	193	350	252	407	117	533	330	297
13	IET-32134	346	190	317	308	418	300	400	270	319	183	117	293	196	396	183	508	340	277
14	IET-32146	380	140	310	308	462	217	383	280	310	182	73	273	238	374	117	458	330	256
15	IET-32147	317	240	317	364	418	250	450	350	338	166	167	260	196	385	150	558	360	280
16	IET-32150	331	270	333	308	418	333	489	500	373	186	168	290	252	374	250	450	370	292
17	IET-32175	320	213	337	392	451	283	467	370	354	186	123	283	210	429	217	450	400	287
18	IET-32176	294	168	-	336	418	300	400	-	319	167	-	-	168	385	283	550	-	311
19	IET-33261	311	316	277	336	385	217	533	350	341	234	147	353	252	352	117	525	350	291
20	IET-33262	319	298	267	336	385	267	583	240	337	211	157	350	280	363	200	433	340	292
21	IET-33263	313	251	320	336	407	-	461	370	351	215	95	330	210	308	-	483	360	286
22	IET-33264	316	286	297	350	418	217	567	350	350	198	218	317	196	407	133	492	300	283
23	IR 8	282	258	407	322	451	233	600	320	359	172	137	307	224	418	217	642	300	302
24	Karijat-3	318	345	387	308	451	300	594	390	387	234	205	403	294	418	200	575	420	344
25	Karijat-7	332	308	343	350	440	217	522	460	371	235	112	370	252	396	167	525	480	317
26	Pooja	289	283	353	238	-	333	-	420	320	214	198	357	322	-	200	-	400	282
27	Pooja (ZC)	259	285	357	336	-	250	417	390	328	210	117	403	266	-	133	500	480	301
28	Rajendra Sweta	282	210	357	294	440	250	483	370	336	247	168	317	238	429	200	508	330	305
29	Ratnagiri-8	341	256	333	420	418	267	489	400	366	222	135	330	238	341	217	442	380	288
30	Sabour Shree	290	266	330	280	418	283	567	280	339	205	115	320	182	363	200	508	430	290
31	Swarna	311	231	290	364	-	233	-	-	286	198	138	317	224	-	150	-	-	205
32	Swarnapraya	322	213	367	280	-	233	-	310	287	190	92	293	210	-	167	-	400	225
33	Swarna-Sub1	310	293	440	322	418	250	517	370	365	170	127	323	252	385	217	600	380	307
	Mean	311	252	341	329	426	254	500	336	339	198	144	326	224	387	186	513	370	288
		LSD (Treat)						LSD (Treat x Variety)						ns					
		LSD (Location x Treat)						LSD (Location x Treat x Variety)						81.4**					
		LSD (Variety)						CV (%) Treat						13.38					
		LSD (Location x Variety)																	

Table 6.6.10 Influence of Low-Light Stress on Grain number/panicle at different locations during Kharif 2024

S.No.	Genotype	Control						Low light stress												
		CHN	CRRI	IIRR	KJT	MTU	PNR	PTB	TTB	Mean	CHN	CRRI	IIRR	KJT	MTU	PNR	PTB	TTB	Mean	
1	CR Dhan 801	155	108	72	146	146	206	123	157	139	119	38	48	106	122	83	97	243	107	
2	CR-6456-1	145	168	142	112	155	45	161	100	129	130	45	64	142	123	39	110	165	102	
3	IET-31204	151	152	125	168	136	170	175	75	144	130	64	77	198	118	113	101	177	122	
4	IET-31220 (R)	137	166	131	174	165	123	125	102	140	117	144	101	167	132	78	113	156	126	
5	IET-31237	166	82	78	120	137	146	130	109	121	154	42	58	185	111	111	120	139	115	
6	IET-31246 (R)	136	150	104	137	163	76	170	118	132	122	59	54	134	125	61	108	175	105	
7	IET-32121	140	145	136	134	193	200	182	98	154	114	70	63	118	141	101	134	140	110	
8	IET-32122	146	146	127	142	131	134	152	112	136	124	112	66	177	108	83	122	117	114	
9	IET-32123	166	118	95	147	97	122	152	91	123	136	64	53	143	76	80	140	140	104	
10	IET-32124	170	116	118	126	144	108	164	116	133	156	63	49	137	120	82	125	89	103	
11	IET-32130	128	112	80	124	135	218	170	112	135	113	89	36	151	115	136	127	162	116	
12	IET-32131	154	103	86	157	99	203	192	113	138	141	64	42	158	74	87	79	109	94	
13	IET-32134	159	108	87	103	114	148	138	38	112	151	50	66	160	93	107	110	110	106	
14	IET-32146	153	198	122	133	170	47	165	104	136	129	83	77	124	143	48	116	177	112	
15	IET-32147	159	202	145	109	179	192	149	110	156	143	92	117	155	143	128	120	215	139	
16	IET-32150	135	128	98	173	109	134	157	99	129	139	19	96	158	93	123	107	92	103	
17	IET-32175	177	134	154	135	175	125	136	94	141	171	77	96	156	143	51	127	157	122	
18	IET-32176	159	151	-	125	128	130	151	-	141	141	-	-	111	94	94	71	-	102	
19	IET-33261	152	164	128	178	152	198	145	180	162	135	42	59	149	123	166	123	210	126	
20	IET-33262	152	150	142	221	97	144	105	110	140	113	93	51	110	79	121	116	152	104	
21	IET-33263	127	123	127	133	174	-	156	143	140	114	60	34	159	137	-	135	108	107	
22	IET-33264	145	130	96	138	113	132	153	132	130	124	93	72	141	99	94	116	137	110	
23	IR 8	180	172	71	159	169	114	176	103	143	158	71	59	127	133	57	157	142	113	
24	Karjat-3	145	90	64	175	97	103	123	100	112	121	17	61	145	74	86	106	150	95	
25	Karjat-7	129	102	77	167	114	96	117	74	109	108	11	61	154	98	72	94	88	86	
26	Pooja	152	109	132	148	-	135	-	79	126	140	69	47	166	-	102	-	97	103	
27	Pooja (ZC)	162	115	74	122	-	149	113	115	121	133	30	26	168	-	81	117	112	95	
28	Rajendra Sweta	156	173	102	208	111	139	180	56	141	142	81	50	106	97	122	129	209	117	
29	Ratnagiri-8	132	158	129	108	226	117	159	121	144	128	50	77	177	179	65	137	114	116	
30	Sabour Shree	156	144	122	155	208	147	185	114	154	130	47	63	132	167	65	146	175	116	
31	Swarna	181	153	148	168	-	128	-	-	156	164	65	76	154	-	81	-	-	108	
32	Swamaprava	162	112	97	175	-	165	-	45	126	129	38	77	155	-	99	-	104	100	
33	Swarna-Sub1	124	141	85	189	155	65	198	73	129	117	56	37	109	123	53	169	107	96	
	Mean	151	137	109	149	145	136	153	103	135	133	62	63	146	117	90	119	144	109	
		LSD (Treat)						ns			LSD (Treat x Variety)						ns			
		LSD (Location x Treat)						8.93**			LSD (Location x Treat x Variety)						35.63**			
		LSD (Variety)						8.91**			CV (%) Treat						18.38			
		LSD (Location x Variety)						25.19**												

Table 6.6.11 Influence of Low-Light Stress on Spikelet number/panicle at different locations during Kharif 2024

S.No.	Genotype	Control						Low light stress											
		CHN	CRRI	IIRR	KJT	MTU	PNR	PTB	TTB	Mean	CHN	CRRI	IIRR	KJT	MTU	PNR	PTB	TTB	Mean
1	CR Dhan 801	160	147	111	162	159	229	140	187	162	136	63	112	122	155	124	105	278	137
2	CR-6456-1	164	216	173	126	166	116	178	119	157	161	142	113	156	164	79	129	208	144
3	IET-31204	167	200	171	182	146	228	198	102	174	141	101	171	210	142	176	125	206	159
4	IET-31220 (R)	167	190	149	188	176	138	144	110	158	146	165	130	182	175	110	123	179	151
5	IET-31237	184	145	104	137	148	178	142	125	145	141	63	78	202	146	142	131	178	135
6	IET-31246 (R)	153	170	156	149	173	158	177	150	161	122	102	115	152	172	155	126	192	142
7	IET-32121	204	183	167	152	209	273	203	105	187	147	108	90	133	205	153	160	156	144
8	IET-32122	229	226	154	154	141	160	164	125	169	148	148	91	192	134	106	136	157	139
9	IET-32123	183	168	115	154	107	135	174	114	144	115	92	86	157	105	143	166	156	128
10	IET-32124	195	155	130	137	154	118	183	124	149	118	89	80	145	153	188	138	102	127
11	IET-32130	153	144	123	137	145	277	194	130	163	144	140	75	164	148	183	135	194	148
12	IET-32131	191	132	113	168	113	235	203	139	162	144	92	72	172	108	137	102	135	120
13	IET-32134	160	169	95	117	119	221	151	59	136	141	81	92	169	115	129	128	139	124
14	IET-32146	158	285	150	151	182	173	188	125	176	152	123	134	136	186	108	126	207	147
15	IET-32147	164	233	203	120	190	237	172	126	181	152	141	152	166	191	174	134	234	168
16	IET-32150	176	166	113	185	118	201	162	128	156	131	71	145	176	119	154	118	135	131
17	IET-32175	167	162	206	151	183	164	160	121	164	123	142	151	169	179	78	139	193	147
18	IET-32176	156	183	-	142	139	208	169	-	166	115	-	-	126	135	164	93	-	126
19	IET-33261	162	255	156	190	162	286	168	224	200	178	68	136	164	156	248	143	234	166
20	IET-33262	176	210	180	245	106	251	119	125	176	167	113	79	123	104	216	123	178	138
21	IET-33263	153	146	191	149	186	-	186	205	174	132	113	87	176	180	-	152	141	140
22	IET-33264	184	176	172	148	123	176	198	143	165	152	145	109	154	121	124	149	159	139
23	IR 8	171	256	131	176	180	137	210	175	179	148	117	154	141	173	80	165	167	143
24	Karijat-3	157	186	90	186	103	163	180	117	148	115	89	124	162	96	147	118	173	128
25	Karijat-7	169	171	96	179	123	118	150	112	140	149	40	104	167	120	112	112	127	116
26	Pooja	193	143	158	160	-	162	-	115	155	152	100	102	177	-	143	-	124	133
27	Pooja (ZC)	174	136	135	136	-	160	114	137	142	130	76	64	185	-	131	131	127	121
28	Rajendra Sweta	179	249	118	223	121	187	192	85	169	135	122	100	121	118	168	139	233	142
29	Ratnagiri-8	153	190	166	122	235	130	181	134	164	132	67	108	191	214	130	150	149	143
30	Sabour Shree	191	204	143	169	218	178	195	137	179	129	82	100	145	207	146	159	203	146
31	Swarna	170	172	173	178	-	179	-	-	174	146	94	108	171	-	129	-	-	130
32	Swarnaprava	145	173	130	188	-	233	-	75	157	142	63	112	173	-	179	-	139	135
33	Swarna-Sub1	147	161	127	202	167	147	214	105	159	129	68	108	121	169	96	187	164	130
	Mean	171	185	144	162	155	186	174	128	163	140	101	109	161	151	142	135	173	138
		LSD (Treat)						LSD (Treat x Variety)						ns					
		LSD (Location x Treat)						LSD (Location x Treat x Variety)						39.45**					
		LSD (Variety)						CV (%) Treat						17.56					
		LSD (Location x Variety)																	

Table 6.6.12 Influence of Low-Light Stress on Grain number/m² at different locations during Kharif 2024

S.No.	Genotype	Control										Low light stress									
		CHN	CRRI	IIRR	KJT	MTU	PNR	PTB	TTB	Mean	CHN	CRRI	IIRR	KJT	MTU	PNR	PTB	TTB	Mean		
1	CR Dhan 801	47565	24206	27635	59318	60973	58450	49083	28200	44429	17354	7294	13048	25270	42944	18100	47967	95300	33410		
2	CR-6456-1	56206	39630	45719	42336	63239	9817	80956	35870	46722	27262	6111	19872	33894	48675	8500	61217	60200	33216		
3	IET-31204	42221	35461	40314	51828	56804	42517	72122	18960	45028	17560	7525	24681	38850	45364	20533	52267	69300	34510		
4	IET-31220 (R)	46431	34993	38933	53732	72875	32733	59283	30250	46154	23436	25160	26460	32746	52404	13017	46176	55260	34332		
5	IET-31237	51661	21195	28184	40418	55671	39033	55276	22200	39205	29189	6334	18065	43246	37983	26000	56688	43520	32628		
6	IET-31246 (R)	38786	32662	36106	48090	70114	20167	85672	44620	47027	28211	10458	17394	26712	49720	13167	55692	57900	32407		
7	IET-32121	40618	37458	48051	46774	82830	56767	104752	26520	55471	21951	8163	20489	19796	55693	16733	76900	62520	35281		
8	IET-32122	51941	37153	46523	35742	56375	31400	84603	37410	47643	23436	13705	17728	24836	43736	13833	67117	37840	30279		
9	IET-32123	28655	30450	32513	45570	41613	24400	77572	33800	39322	28334	7766	20473	34566	31724	12050	77917	46600	32429		
10	IET-32124	66094	28412	44671	37128	61776	25117	98431	35680	49664	29073	10450	17422	23086	50127	16583	56067	31480	29286		
11	IET-32130	32048	34084	26813	44884	60808	39850	88419	36850	45469	24461	15300	14799	33852	45408	27167	67175	58440	35825		
12	IET-32131	49176	29014	28465	49700	43736	44000	112242	40600	49617	28069	12543	14728	39844	30107	10117	42100	35710	26652		
13	IET-32134	55055	20310	27607	31808	47652	44650	55172	10230	36560	27512	5951	19628	31444	36883	19417	55808	36720	29170		
14	IET-32146	58073	27670	37493	41132	78452	10183	63117	29370	43186	23355	6440	20953	29554	53713	5567	52908	55620	31014		
15	IET-32147	50216	48985	44865	40376	74778	48000	66958	38800	51622	23655	15318	29963	30282	55154	19100	67763	79540	40097		
16	IET-32150	44602	34507	32209	53424	45694	44733	76337	49280	47598	25740	3472	27893	39886	34826	30967	47958	34230	30621		
17	IET-32175	56525	29371	51711	52668	78771	35383	63061	33780	50159	31707	9465	26966	32844	61512	11200	56450	62080	36528		
18	IET-32176	46623	25308	-	42000	53383	39167	60489	-	44495	23366	-	-	18424	36069	26750	38633	-	28648		
19	IET-33261	47331	51785	35364	59262	58399	42717	76858	63900	54452	31317	6647	20929	37548	43186	19267	63258	75000	37144		
20	IET-33262	48606	45988	37693	74648	37070	38200	60867	26620	46211	23879	15876	17856	30912	28677	24300	49433	49480	30052		
21	IET-33263	39604	31182	40452	44912	70763	-	71750	52960	50232	24426	5531	10620	33544	42240	-	65775	38600	31534		
22	IET-33264	45832	37038	28193	48258	47201	28417	86400	46110	45931	24964	20112	22393	27440	40414	12550	57392	40800	30758		
23	IR 8	50726	44446	29047	51352	76461	26750	104117	33000	51987	27127	9661	18135	28546	55462	12367	100442	41700	36680		
24	Karijat-3	46115	30598	24723	53900	44176	30867	72743	38800	42740	27956	3479	24529	42630	30844	17033	60933	63400	33851		
25	Karijat-7	42707	31204	25908	59584	50237	20983	61248	33420	40661	25378	1280	22040	38794	38742	12117	49392	42220	28745		
26	Pooja	43925	31140	45950	35434	-	45067	-	33000	39086	30036	13883	16456	53760	-	20317	-	38820	28879		
27	Pooja (ZC)	41948	32653	26946	41034	-	37333	46867	44800	38797	28008	3437	10522	44744	-	10817	58917	53840	30041		
28	Rajendra Sweta	44064	36184	36217	60984	48829	34667	86296	20530	45971	34948	13809	15291	25242	41525	24500	65508	68820	36205		
29	Ratnagiri-8	44868	40457	41941	45164	94589	31167	77687	47870	52968	28462	6839	25417	42224	61017	13967	60508	42400	35104		
30	Sabour Shree	45339	38302	40343	43582	86636	41300	105019	33120	54205	26504	5309	19875	24094	60621	13183	74242	75020	37356		
31	Swama	56229	35606	42683	61782	-	29983	-	-	45257	31128	8938	24290	34580	-	12200	-	-	22227		
32	Swamaprava	52041	23858	35190	48748	-	38300	-	14430	35428	24457	3340	22542	32648	-	16500	-	41840	23555		
33	Swama-Sub1	38506	41249	37308	60914	64845	16450	102292	26940	48563	19836	7401	11792	27566	47465	11417	101033	40160	33334		
	Mean	46980	34017	36430	48681	61543	34643	76856	34449	46117	26124	9281	19789	32830	44905	16542	61121	52721	32176		
		LSD (Treat)										LSD (Treat x Variety)									
		LSD (Location x Treat)										LSD (Location x Treat x Variety)									
		LSD (Variety)										CV (%) Treat									
		LSD (Location x Variety)																			

Table 6.6.13 Influence of Low-Light Stress on Spikelet number/m² at different locations during Kharif 2024

S.No.	Genotype	Control										Low light stress											
		CHN	CRRI	IIRR	KJT	MTU	PNR	PTB	TTB	Mean	CHN	CRRI	IIRR	KJT	MTU	PNR	PTB	TTB	Mean				
1	CR Dhan 801	48999	32930	43433	65954	66429	64850	55633	33710	51492	20032	11758	30244	28924	54340	26867	51833	108580	41572				
2	CR-6456-1	63531	51764	55379	47628	67573	25033	89128	42860	55362	33565	18711	35235	37268	64691	17150	71742	75600	44245				
3	IET-31204	46503	46693	55070	56210	60973	56767	82083	25820	53765	19363	11813	55236	41440	54725	13150	64600	81540	45008				
4	IET-31220 (R)	56493	40082	44353	57960	77726	36683	68246	32650	51774	29203	28820	35882	35882	69586	18367	50581	64320	41355				
5	IET-31237	57252	37601	37865	45850	60170	47433	60639	25500	46526	26590	9638	24510	47306	49698	33267	62021	54660	38461				
6	IET-31246 (R)	43424	36882	53823	52276	74393	41917	89406	56600	56090	28196	18071	37658	30492	68090	33517	65017	63270	43039				
7	IET-32121	59312	47064	58965	53102	89617	77333	116567	28450	66301	28273	12861	29157	22358	81202	25483	91825	69360	45065				
8	IET-32122	81611	57668	56520	38598	60654	37167	91569	41500	58161	27825	17833	24640	26992	54439	17567	74867	50960	36890				
9	IET-32123	31474	43289	39834	47796	45760	27000	88400	42180	45717	23986	10914	33590	38024	43956	21400	92350	52440	39583				
10	IET-32124	75567	38465	49365	40530	66066	27633	109683	37940	55656	21887	14639	29115	24472	63778	37750	62100	36340	36260				
11	IET-32130	38473	43553	41077	49630	65296	50717	101089	42770	54076	31067	24075	30772	36750	58663	36683	71208	69720	44867				
12	IET-32131	60905	37426	37402	53368	49588	50850	119117	50160	57352	28121	17772	25355	43400	43802	16083	54258	43970	34095				
13	IET-32134	55306	31627	30244	36078	49852	66400	60022	16000	43191	25764	9600	27232	33096	45342	23800	64958	46500	34537				
14	IET-32146	60135	39805	46164	46368	83853	37667	71378	35000	52546	27668	8882	36834	32340	69795	12733	57525	65360	38892				
15	IET-32147	51978	56436	63039	44828	79530	59300	77142	44390	59580	25212	23571	38908	32578	73425	26017	75046	86580	47667				
16	IET-32150	58103	44655	37250	57064	49456	67100	78787	64600	57127	24273	12432	42528	44324	44627	38400	53000	50430	38752				
17	IET-32175	53525	35114	69516	58870	82676	46483	74433	44060	58085	23000	17497	42725	35434	76758	17283	61758	76880	43917				
18	IET-32176	45955	30757	-	47656	58135	62517	67778	-	52133	19130	-	-	20692	51898	46183	50858	-	37752				
19	IET-33261	50216	81062	43056	63210	62238	61933	89972	79020	66338	41451	9367	48032	41412	54824	28933	73417	83440	47609				
20	IET-33262	56183	63755	47672	82600	40678	66800	69333	30180	57150	35702	18971	27660	34552	37752	43367	52667	56800	38684				
21	IET-33263	47873	37008	61086	50344	75504	-	85544	76080	61920	28589	10422	28366	37198	55484	-	74508	50380	40707				
22	IET-33264	58058	50353	50523	51688	51249	38200	111911	49720	57713	30029	30939	34490	30310	49412	16517	73292	47460	39056				
23	IR 8	48074	65952	53353	56742	81114	31900	125000	55400	64692	25406	15959	47434	31710	72534	17417	105883	49140	45685				
24	Karijat-3	49889	63754	34410	57316	46761	49050	107452	45320	56744	26855	18191	49991	47628	40326	29200	67925	73300	44177				
25	Karijat-7	56092	52691	32481	64092	54351	25883	78380	50020	51749	35072	4509	38284	42098	47707	18683	58942	60560	38232				
26	Pooja	55765	40978	55046	38304	-	54067	-	47780	48657	32482	19888	35712	57316	-	28667	-	49940	37334				
27	Pooja (ZC)	45154	38637	48318	45444	-	40000	47400	53350	45472	26876	8880	25922	49420	-	17467	65825	60660	36436				
28	Rajendra Sweta	50348	52543	42072	65296	53394	46600	92271	31050	54197	33051	20607	31383	28868	50699	33850	70788	76920	43271				
29	Ratnagiri-8	52250	48637	54517	50988	98626	34500	88820	52870	60151	29084	9206	35629	45570	72963	28133	66350	55980	42865				
30	Sabour Shree	55340	54520	47169	47502	90948	50150	110367	39640	61954	26397	9472	31588	26362	75141	29017	80725	87610	45789				
31	Swarna	52920	39910	49992	65058	-	41833	-	-	49943	28313	12931	34258	38332	-	19300	-	-	26627				
32	Swarnapraava	46473	37169	47344	52696	-	54200	-	23690	43595	26901	5685	33029	35952	-	29700	-	55620	31148				
33	Swarna-Sub1	45639	47202	55677	65142	69597	37000	110500	38900	58707	21949	8789	35088	30464	64922	21067	111350	61980	44451				
	Mean	53298	46242	48188	53218	65938	47343	87265	43136	54967	27616	14772	34834	36029	58296	26288	69241	63494	40425				
		LSD (Treat)										LSD (Treat x Variety)										ns	
		LSD (Location x Treat)										LSD (Location x Treat x Variety)										17281**	
		LSD (Variety)										CV (%) Treat										23.71	
		LSD (Location x Variety)																					

Table 6.6.14 Influence of Low-Light Stress on Grain yield (g/m²) at different locations during Kharif 2024

S.No.	Genotype	Control						Low light stress											
		CHN	CRRI	IIRR	KJT	MTU	PNR	PTB	TTB	Mean	CHN	CRRI	IIRR	KJT	MTU	PNR	PTB	TTB	Mean
1	CR Dhan 801	559	242	659	487	531	503	767	544	536	289	53	245	130	391	321	768	254	306
2	CR-6456-1	568	551	883	261	543	626	1092	600	640	293	50	344	177	452	161	1040	289	351
3	IET-31204	517	535	843	509	608	548	742	843	643	233	103	494	85	456	208	673	400	332
4	IET-31220 (R)	543	548	855	298	564	447	1117	611	623	275	157	551	117	438	306	804	266	364
5	IET-31237	529	436	742	411	564	559	917	614	596	291	64	528	105	441	232	825	358	356
6	IET-31246 (R)	479	495	736	226	563	641	858	672	584	269	122	295	240	452	326	877	375	369
7	IET-32121	550	466	942	314	571	634	1192	654	665	257	71	359	158	383	218	780	255	310
8	IET-32122	532	508	969	400	550	636	1127	735	682	277	60	318	87	404	364	997	419	366
9	IET-32123	500	344	591	262	568	546	892	409	514	233	42	335	90	371	233	942	188	304
10	IET-32124	481	263	793	261	585	340	1067	546	542	265	67	292	172	521	165	815	283	323
11	IET-32130	595	468	528	260	527	572	1167	558	584	324	35	256	130	330	347	770	287	310
12	IET-32131	497	412	553	406	564	884	842	628	598	241	113	258	148	292	184	833	363	304
13	IET-32134	554	335	865	305	537	660	825	543	578	301	49	567	92	415	233	1038	309	375
14	IET-32146	603	291	781	211	526	513	992	656	572	266	59	336	131	377	170	873	290	313
15	IET-32147	573	571	734	249	592	613	1067	750	643	299	143	519	140	455	166	1114	449	411
16	IET-32150	542	479	743	330	523	577	1167	690	631	304	40	624	147	391	214	777	300	350
17	IET-32175	502	516	1071	228	555	626	892	864	657	211	50	526	181	425	247	825	295	345
18	IET-32176	482	244	-	222	582	454	775	-	460	217	-	-	214	452	214	723	-	364
19	IET-33261	578	453	535	346	619	922	792	530	597	228	80	242	286	474	310	841	226	336
20	IET-33262	440	303	753	300	531	635	792	592	543	211	49	290	259	458	393	971	164	349
21	IET-33263	597	418	709	298	545	-	1117	554	605	300	48	149	155	460	-	802	205	303
22	IET-33264	538	487	525	278	594	619	942	439	553	255	98	409	151	548	331	908	289	374
23	IR 8	542	397	506	272	619	517	767	563	523	254	57	306	169	490	251	708	177	301
24	Karjat-3	526	313	530	321	560	577	817	555	525	222	33	490	153	544	216	698	184	318
25	Karjat-7	588	229	570	257	561	518	767	235	466	246	28	461	169	494	119	558	117	274
26	Pooja	581	455	1124	252	-	806	-	617	639	197	115	283	162	-	342	-	257	226
27	Pooja (ZC)	523	418	503	153	-	582	742	640	509	209	30	159	153	-	206	708	255	246
28	Rajendra Sweta	491	427	461	327	616	676	817	466	535	204	80	203	317	573	332	692	200	325
29	Rathagiri-8	500	418	684	242	603	573	1017	659	587	278	46	381	119	560	261	963	285	362
30	Sabour Shree	576	404	766	379	531	628	1092	670	631	313	94	308	154	458	341	1060	311	380
31	Swarna	508	485	1153	251	-	680	-	-	616	241	111	599	114	-	235	-	-	260
32	Swarnaprava	550	426	875	267	-	440	-	361	486	313	40	583	164	-	225	-	235	260
33	Swarna-Sub1	523	418	677	396	550	415	928	551	557	280	61	179	216	441	216	887	248	316
	Mean	535	417	739	302	565	593	936	592	579	260	70	372	160	446	253	842	275	327
		LSD (Treat)						LSD (Treat x Variety)						ns					
		LSD (Location x Treat)						LSD (Location x Treat x Variety)						118.68**					
		LSD (Variety)						CV (%) Treat						25.06					
		LSD (Location x Variety)																	

Table 6.6.15 Influence of Low-Light Stress on Total dry matter (g/m²) at maturity at different locations during Kharif 2024

S.No.	Genotype	Control										Low light stress									
		CHN	CRRI	IIRR	KJT	MTU	PNR	PTB	TTB	Mean	CHN	CRRI	IIRR	KJT	MTU	PNR	PTB	TTB	Mean		
1	CR Dhan 801	1253	948	1440	1164	688	1392	1778	1323	1248	793	374	566	1275	603	1027	1586	1486	964		
2	CR-6456-1	1047	1692	1868	1335	754	1577	2401	1308	1498	840	736	767	1125	670	487	2217	1157	1000		
3	IET-31204	1337	1498	1819	1440	810	1311	1609	1517	1418	808	660	1149	945	669	824	1689	1284	1003		
4	IET-31220 (R)	942	1438	1805	1058	817	1434	2170	1255	1365	711	615	1164	990	696	874	1589	1019	957		
5	IET-31237	1127	1076	1586	1050	800	1267	1756	1705	1296	876	411	1126	915	684	815	1922	1014	970		
6	IET-31246 (R)	1141	1309	1623	615	772	1657	2014	1334	1308	804	564	670	915	665	933	2064	1258	984		
7	IET-32121	1041	1289	1688	1163	745	1611	2538	1489	1445	656	426	762	780	655	721	2117	1097	902		
8	IET-32122	1028	1305	2058	1148	754	1454	2311	1312	1421	710	424	801	675	672	992	2150	975	925		
9	IET-32123	1309	959	1268	1170	766	1469	2021	957	1240	931	269	746	990	596	896	2367	953	968		
10	IET-32124	1164	1097	1654	1260	748	1008	2270	1359	1320	678	490	638	735	730	669	2264	1065	909		
11	IET-32130	1132	1483	1158	1485	781	1532	2500	1660	1466	739	592	592	930	536	1090	2053	1371	988		
12	IET-32131	1354	1488	1198	855	720	2099	2023	1462	1400	697	663	587	1590	466	1187	1642	937	971		
13	IET-32134	1246	934	1791	1170	722	1745	1845	1125	1322	865	431	1215	825	684	899	1973	973	983		
14	IET-32146	1215	910	1653	1208	733	2038	1785	1082	1328	958	353	775	915	596	1096	1906	1082	960		
15	IET-32147	1432	1745	1619	1095	817	2070	2109	1237	1516	979	704	1125	1215	680	822	2360	713	1075		
16	IET-32150	1337	1392	1643	1455	695	1441	2370	1433	1471	867	469	1341	615	586	673	2078	1043	959		
17	IET-32175	1036	1811	2304	1080	773	1700	2193	1468	1546	718	541	1181	1290	666	954	1674	1095	1015		
18	IET-32176	1170	767	-	1073	807	1381	2365	-	1260	769	-	-	1125	658	774	2032	-	1072		
19	IET-33261	1283	1183	1110	938	871	2538	2088	1524	1442	802	398	581	1185	743	1040	2207	1206	1020		
20	IET-33262	1166	1057	1612	1013	756	1642	2329	1353	1366	765	280	648	1275	736	1267	2078	687	967		
21	IET-33263	1171	1077	1530	1185	792	-	2471	1120	1335	723	252	356	795	711	-	2117	521	782		
22	IET-33264	1028	1627	1183	1410	788	1593	2317	1654	1450	693	794	886	1290	788	1202	2338	1025	1127		
23	IR 8	1221	934	1137	1283	828	2099	1911	1247	1333	910	317	728	1242	715	1387	1842	810	994		
24	Karijat-3	1167	1005	1127	998	803	1557	1975	1273	1238	704	318	1094	855	837	940	1736	1041	941		
25	Karijat-7	1041	756	1217	1215	704	1249	1477	1109	1096	730	139	1036	690	657	600	1263	914	754		
26	Pooja	1226	1500	2395	1140	-	2337	-	1567	1694	930	640	675	1185	-	1383	-	1100	986		
27	Pooja (ZC)	1262	1379	1153	1223	-	1344	1566	1331	1323	731	379	402	1620	-	607	1875	997	944		
28	Rajendra Sweta	1041	1110	982	1028	833	1989	2034	1440	1307	717	430	465	1425	823	1274	2361	1509	1126		
29	Ratnagiri-8	1312	1061	1459	923	809	1416	2166	1133	1285	873	328	825	795	773	705	2061	1037	925		
30	Sabour Shree	1229	1118	1622	1088	738	1768	2309	1294	1396	700	456	699	900	701	1322	2277	1309	1045		
31	Swarna	1244	1185	2420	1020	-	1562	-	-	1486	775	383	1282	1125	-	806	-	-	874		
32	Swarnaprava	1178	904	1950	1155	-	1463	-	1043	1282	831	220	1267	840	-	903	-	1129	865		
33	Swarna-Sub1	1076	1145	1500	840	782	1191	2104	1318	1245	810	321	482	825	644	857	1861	731	816		
	Mean	1181	1218	1580	1130	773	1623	2093	1336	1368	791	449	832	1027	677	938	1990	1050	963		
		LSD (Treat)										LSD (Treat x Variety)									
		LSD (Location x Treat)										LSD (Location x Treat x Variety)									
		LSD (Variety)										CV (%) Treat									
		LSD (Location x Variety)																			

Table 6.6.16 Influence of Low-Light Stress on 1000 grain weight (g) at different locations during Kharif 2024

S.No.	Genotype	Control										Low light stress									
		CHN	CRRI	IIRR	KJT	MTU	PNR	PTB	TTB	Mean	CHN	CRRI	IIRR	KJT	MTU	PNR	PTB	TTB	Mean		
1	CR Dhan 801	22.0	21.1	23.8	19.6	15.4	14.1	15.9	20.8	19.1	17.6	17.0	18.8	20.7	13.8	16.3	18.2	25.3	18.5		
2	CR-6456-1	25.8	19.3	19.3	19.8	19.3	14.2	18.7	14.0	18.8	19.7	15.2	17.2	21.0	17.9	11.7	18.5	17.7	17.4		
3	IET-31204	23.1	20.0	20.9	22.1	18.6	17.5	19.6	21.3	20.4	22.2	17.8	20.0	21.7	16.3	15.2	19.2	22.2	19.3		
4	IET-31220 (R)	20.5	21.6	21.9	22.3	22.2	20.3	20.2	20.7	21.1	21.1	19.0	20.8	26.5	18.5	19.9	19.9	25.4	21.4		
5	IET-31237	26.1	27.1	27.3	30.2	22.1	28.0	24.9	28.0	26.7	19.6	23.9	29.2	31.8	19.8	24.0	26.9	28.7	25.5		
6	IET-31246 (R)	22.1	17.5	20.4	20.6	19.0	14.5	18.4	23.8	19.5	20.0	15.9	17.0	21.1	16.3	12.7	18.6	25.0	18.3		
7	IET-32121	26.8	19.3	19.6	22.2	18.8	17.6	19.1	19.6	20.4	20.5	16.6	17.5	22.5	15.1	15.7	18.9	24.0	18.8		
8	IET-32122	21.1	19.5	20.8	20.6	17.4	18.7	15.9	17.8	19.0	19.9	17.4	17.9	24.4	14.2	19.3	18.9	26.4	19.8		
9	IET-32123	23.6	18.3	18.2	17.8	15.5	24.0	16.3	16.6	18.8	22.0	14.0	16.4	18.2	13.9	23.3	16.0	21.1	18.1		
10	IET-32124	21.0	17.7	17.9	19.1	22.1	34.1	16.2	20.1	21.0	19.7	14.7	16.6	17.8	21.3	33.2	17.2	17.9	19.8		
11	IET-32130	20.5	22.0	19.7	15.7	23.0	30.5	19.8	22.5	21.7	23.9	18.7	17.2	17.8	22.1	29.4	19.2	24.3	21.6		
12	IET-32131	22.6	18.8	19.4	17.8	20.4	23.0	18.4	21.7	20.3	22.2	16.9	17.5	17.5	18.1	21.8	18.1	21.9	19.3		
13	IET-32134	19.1	27.8	31.3	30.1	22.2	22.1	28.6	29.3	26.3	17.6	22.7	28.9	35.6	19.0	10.6	28.4	30.5	24.2		
14	IET-32146	22.3	15.6	20.8	18.8	20.7	22.3	19.6	25.7	20.7	24.0	16.6	16.7	18.9	20.6	11.9	22.1	25.5	19.5		
15	IET-32147	23.6	17.0	16.4	15.4	18.1	20.3	17.1	19.5	18.4	20.4	13.8	17.3	18.1	17.0	21.3	18.0	19.7	18.2		
16	IET-32150	23.7	23.5	23.1	23.5	21.4	23.4	19.7	21.7	22.5	20.5	16.4	22.4	26.7	18.7	18.2	19.4	22.8	20.6		
17	IET-32175	22.4	22.2	20.8	18.4	22.0	24.4	20.1	24.1	21.8	21.5	17.1	19.5	20.2	20.4	12.9	21.8	26.4	20.0		
18	IET-32176	22.4	17.9	-	17.5	20.3	21.1	21.6	-	20.1	25.7	-	-	16.5	18.8	18.7	21.3	-	20.2		
19	IET-33261	22.4	14.6	15.1	14.6	13.0	22.5	12.6	14.4	16.2	18.4	10.8	11.6	17.5	11.3	22.9	13.7	16.9	15.4		
20	IET-33262	20.5	11.9	20.0	19.8	18.1	32.4	19.9	17.6	20.0	18.7	11.0	16.2	23.6	16.0	32.0	11.7	23.4	19.1		
21	IET-33263	21.0	16.7	17.5	21.8	13.6	-	18.0	16.1	17.8	19.8	13.8	14.0	17.7	11.9	-	17.8	18.8	16.3		
22	IET-33264	22.8	18.5	18.6	16.2	21.1	21.1	20.1	23.8	20.3	18.3	15.6	18.3	16.0	20.5	21.0	18.8	24.2	19.1		
23	IR 8	19.0	17.0	17.5	18.9	18.1	16.4	15.2	17.0	17.4	20.3	15.0	16.9	18.5	16.1	14.0	16.4	18.7	17.0		
24	Karijat-3	21.9	21.0	21.4	22.1	19.0	17.7	17.8	18.5	19.9	19.5	17.5	20.0	26.2	17.1	17.5	19.0	19.7	19.6		
25	Karijat-7	19.7	20.6	22.0	23.0	19.0	21.2	18.3	17.4	20.1	21.5	9.3	20.9	24.5	17.2	20.9	20.6	17.6	19.1		
26	Pooja	21.1	17.2	24.5	17.1	-	21.2	-	19.9	20.2	20.4	17.0	17.1	17.8	-	21.0	-	21.2	19.1		
27	Pooja (ZC)	21.9	18.5	18.6	19.5	-	27.0	18.8	20.7	20.7	22.7	18.3	15.1	17.8	-	26.7	18.0	20.9	19.9		
28	Rajendra Sweta	19.8	18.2	12.7	18.3	12.8	21.7	17.9	11.2	16.6	18.3	15.6	13.6	14.5	12.0	21.8	17.6	15.5	16.1		
29	Ratnagiri-8	19.8	16.9	16.3	18.7	16.4	26.3	16.3	16.6	18.4	18.7	13.3	14.9	19.8	15.5	25.8	15.5	20.3	18.0		
30	Sabour Shree	23.1	16.8	19.0	19.8	17.2	32.6	16.5	18.6	20.4	20.7	14.7	15.6	22.8	15.1	32.3	17.1	20.0	19.8		
31	Swarna	22.8	19.7	27.0	19.6	-	21.9	-	-	22.2	21.2	14.9	24.7	15.6	-	21.0	-	-	19.5		
32	Swarnapraya	19.8	25.8	24.8	25.7	-	18.8	-	22.8	22.9	19.2	23.9	26.0	27.8	-	16.7	-	24.4	23.0		
33	Swarna-Sub1	23.6	17.9	18.1	12.6	17.3	16.8	16.6	21.0	18.0	21.9	13.7	15.1	12.4	15.1	14.0	17.2	18.3	16.0		
	Mean	22.1	19.3	20.5	19.9	18.8	22.1	18.6	20.1	20.2	20.5	16.2	18.5	20.9	16.9	20.1	18.8	22.1	19.3		
		LSD (Treat)										LSD (Treat x Variety)									
		LSD (Location x Treat)										LSD (Location x Treat x Variety)									
		LSD (Variety)										CV (%) Treat									
		LSD (Location x Variety)																			
		ns										ns									
		0.35**										3.43**									
		0.85**										4.59									
		2.43**																			

Table 6.6.17 Influence of Low-Light Stress on Harvest Index (%) at different locations during Kharif 2024

S.No.	Genotype	Control										Low light stress																			
		CHN	CRRI	IIRR	KJT	MTU	PNR	PTB	TTB	Mean	CHN	CRRI	IIRR	KJT	MTU	PNR	PTB	TTB	Mean												
1	CR Dhan 801	38.0	25.4	45.6	32.1	43.4	36.1	43.2	41.2	38.1	42.9	14.0	43.2	35.9	39.3	31.3	48.7	17.2	34.1												
2	CR-6456-1	44.2	32.5	47.3	34.0	41.9	39.7	45.5	46.2	41.4	46.5	6.6	44.2	35.7	40.2	33.1	46.9	25.0	34.8												
3	IET-31204	43.3	35.9	46.4	34.6	42.9	41.7	46.2	55.6	43.3	40.9	15.7	43.0	34.4	40.4	25.2	39.9	32.5	34.0												
4	IET-31220 (R)	43.7	38.1	47.4	35.2	40.9	31.2	51.5	49.0	42.1	41.8	25.5	47.3	33.5	38.7	34.6	50.6	26.3	37.3												
5	IET-31237	38.6	37.3	46.8	32.7	41.3	44.1	52.6	36.1	41.2	44.3	15.7	46.9	34.8	39.2	28.4	43.1	35.6	36.0												
6	IET-31246 (R)	40.9	37.2	45.3	32.0	42.3	38.7	42.7	50.5	41.2	48.0	20.5	43.9	34.2	40.4	34.9	42.5	21.1	35.7												
7	IET-32121	50.9	36.2	34.1	33.0	43.4	39.3	47.0	44.0	41.0	43.2	16.7	47.0	33.9	36.9	30.3	36.9	23.3	33.5												
8	IET-32122	44.7	38.9	47.1	30.8	42.1	43.7	48.8	56.0	44.0	47.8	14.2	34.0	34.7	37.6	36.6	46.5	43.3	36.8												
9	IET-32123	43.0	35.7	46.6	34.2	42.6	37.3	44.1	44.6	41.0	39.7	15.2	45.0	35.2	38.4	25.8	39.8	20.1	32.4												
10	IET-32124	45.7	24.1	48.0	29.9	43.9	33.7	47.0	40.3	39.1	48.7	13.5	45.6	33.5	41.8	24.6	36.1	26.7	33.8												
11	IET-32130	48.8	31.6	45.6	33.3	40.3	37.4	46.7	33.7	39.7	47.9	5.8	43.5	33.0	38.2	31.9	37.5	21.0	32.4												
12	IET-32131	46.6	27.8	46.2	31.0	43.9	42.1	41.6	42.9	40.3	43.8	17.2	44.1	36.8	38.2	15.4	51.6	39.5	35.8												
13	IET-32134	41.7	36.0	48.3	36.9	42.4	37.8	44.8	49.6	42.2	48.6	11.4	46.6	33.2	37.8	25.9	52.8	32.0	36.0												
14	IET-32146	39.5	31.9	47.2	33.2	41.9	25.2	55.5	61.2	42.0	47.2	15.1	43.2	30.2	39.4	15.6	45.9	26.8	32.9												
15	IET-32147	35.2	32.8	45.3	34.9	42.2	29.6	50.6	60.6	41.4	49.3	19.8	46.1	32.9	40.1	20.3	47.2	58.1	39.2												
16	IET-32150	44.2	34.4	45.3	32.5	42.9	40.0	49.2	48.1	42.1	49.3	8.6	46.6	35.0	40.1	32.0	37.4	29.1	34.8												
17	IET-32175	39.5	28.5	46.4	34.8	41.8	36.9	40.7	59.5	41.0	36.7	9.1	44.6	34.4	38.9	25.8	49.3	27.0	33.2												
18	IET-32176	32.3	31.0	-	33.9	42.0	32.9	32.8	-	34.1	41.6	-	-	33.8	40.7	27.6	35.5	-	35.8												
19	IET-33261	47.1	38.5	48.2	32.4	41.5	36.3	37.9	34.8	39.6	40.9	18.6	42.0	31.9	39.0	29.8	38.1	19.0	32.4												
20	IET-33262	32.8	28.2	46.7	35.1	41.3	38.7	34.0	43.8	37.6	43.1	12.6	44.7	34.6	38.3	31.1	46.8	24.6	34.5												
21	IET-33263	43.2	38.9	46.4	35.0	40.8	-	45.2	50.5	42.8	47.3	18.5	41.6	34.7	39.3	-	37.9	39.6	37.0												
22	IET-33264	42.6	30.1	44.4	33.5	43.0	38.9	40.7	26.6	37.5	38.6	12.6	46.3	33.5	41.1	27.5	38.8	28.3	33.3												
23	IR 8	41.6	42.5	44.1	33.6	42.7	24.7	40.4	45.2	39.3	41.3	18.0	42.0	35.0	40.7	18.1	38.5	22.4	32.0												
24	Karijat-3	47.5	31.4	47.0	33.6	40.9	37.2	41.3	43.6	40.3	39.6	9.8	44.9	32.7	39.3	22.6	40.6	17.8	30.9												
25	Karijat-7	47.0	30.3	46.9	33.8	44.1	41.6	51.9	21.6	39.7	43.3	20.0	44.5	36.7	42.2	19.9	44.2	12.9	33.0												
26	Pooja	44.1	30.3	46.9	37.3	-	34.5	-	39.6	38.8	37.8	18.1	41.8	35.8	-	24.7	-	23.5	30.3												
27	Pooja (ZC)	43.0	30.3	43.6	35.6	-	43.3	47.5	48.1	41.6	39.2	7.6	39.6	33.8	-	34.0	37.8	26.0	31.2												
28	Rajendra Sweta	38.5	38.8	46.9	33.0	42.5	34.0	40.1	32.3	38.3	41.7	18.3	43.4	35.2	41.2	26.0	29.3	13.2	31.0												
29	Rahagiri-8	44.6	39.3	47.0	36.6	42.6	40.5	47.0	58.4	44.5	43.1	13.6	46.0	31.9	42.2	37.1	46.7	27.5	36.0												
30	Sabour Shree	51.0	36.2	47.2	33.5	41.8	35.6	47.3	51.9	43.1	49.9	20.1	44.1	35.4	39.7	25.7	46.6	24.1	35.7												
31	Swarna	42.2	41.1	47.6	32.1	-	43.8	-	-	41.3	41.5	29.2	46.6	34.2	-	29.0	-	-	36.1												
32	Swanaprava	39.0	47.2	44.9	34.2	-	30.4	-	34.7	38.4	47.6	16.4	46.0	33.5	-	24.9	-	21.0	31.6												
33	Swarna-Sub1	41.4	36.6	45.0	33.0	41.2	34.9	44.1	42.0	39.8	46.9	19.5	37.3	31.3	40.6	25.2	47.8	34.6	35.4												
	Mean	42.6	34.4	46.0	33.7	42.2	36.9	44.9	44.9	40.5	43.9	15.5	43.9	34.1	39.6	27.3	42.7	27.1	34.2												
		LSD (Treat)										LSD (Treat x Variety)										ns									
		LSD (Location x Treat)										LSD (Location x Treat x Variety)										8.33**									
		LSD (Variety)										CV (%) Treat										17.21									
		LSD (Location x Variety)																													

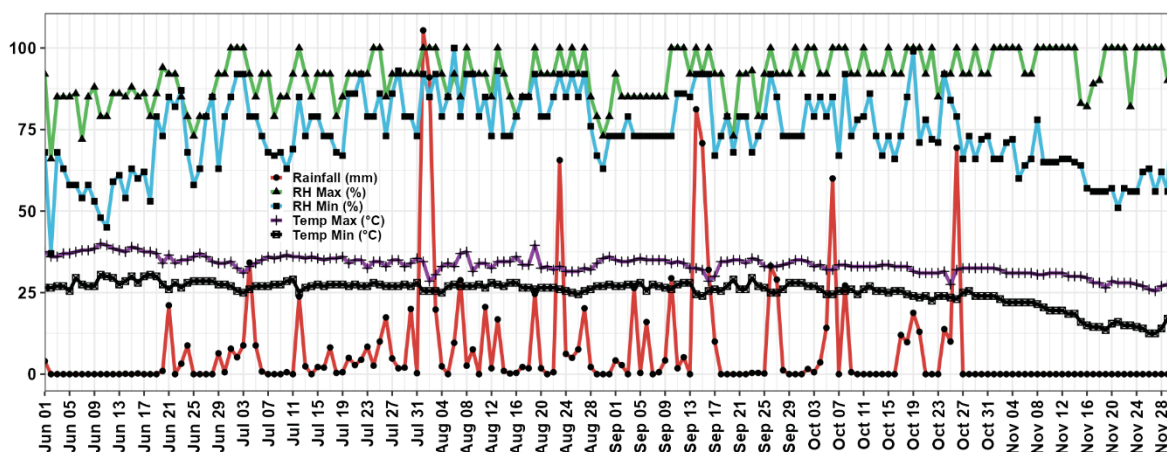
Table 6.6.18A Influence of Low Light Stress on chlorophyll fluorescence traits at IIRR during *Kharif* 2024

S.No.	Genotype	Actual quantum yield of PSII (ϕ PSII)			Electron Transport Rate (ETR)			Maximum quantum yield of PSII (Fv/Fm)		
		Control	Low Light Stress	Mean	Control	Low Light Stress	Mean	Control	Low Light Stress	Mean
1	CR Dhan 801	0.349	0.357	0.353	22.2	21.8	22.0	0.823	0.811	0.817
2	CR-6456-1	0.371	0.350	0.361	23.5	21.7	22.6	0.816	0.803	0.810
3	IET-31204	0.432	0.422	0.427	27.6	25.7	26.7	0.800	0.803	0.802
4	IET-31220 (R)	0.372	0.404	0.388	23.6	25.0	24.3	0.829	0.813	0.821
5	IET-31237	0.472	0.430	0.451	30.4	26.1	28.3	0.824	0.805	0.815
6	IET-31246 (R)	0.394	0.348	0.371	25.0	21.5	23.3	0.800	0.806	0.803
7	IET-32121	0.357	0.358	0.358	22.7	22.4	22.6	0.821	0.816	0.818
8	IET-32122	0.353	0.332	0.343	22.4	20.8	21.6	0.812	0.816	0.814
9	IET-32123	0.375	0.421	0.398	23.7	26.4	25.1	0.804	0.811	0.807
10	IET-32124	0.445	0.340	0.393	28.2	21.2	24.7	0.836	0.834	0.835
11	IET-32130	0.394	0.371	0.383	24.9	23.1	24.0	0.806	0.809	0.807
12	IET-32131	0.370	0.330	0.350	23.4	20.6	22.0	0.810	0.813	0.812
13	IET-32134	0.418	0.424	0.421	26.6	26.2	26.4	0.771	0.805	0.788
14	IET-32146	0.385	0.415	0.400	24.5	25.5	25.0	0.827	0.818	0.822
15	IET-32147	0.394	0.456	0.425	25.0	28.0	26.5	0.810	0.820	0.815
16	IET-32150	0.375	0.326	0.351	23.8	20.1	21.9	0.815	0.817	0.816
17	IET-32175	0.369	0.424	0.397	23.6	25.9	24.8	0.815	0.805	0.810
18	IET-33261	0.375	0.393	0.384	23.6	24.5	24.0	0.817	0.808	0.812
19	IET-33262	0.359	0.342	0.350	22.7	21.4	22.1	0.768	0.817	0.792
20	IET-33263	0.372	0.272	0.322	23.5	17.0	20.3	0.832	0.812	0.822
21	IET-33264	0.319	0.281	0.300	20.2	17.6	18.9	0.830	0.813	0.822
22	IR 8	0.422	0.405	0.413	26.9	24.8	25.9	0.783	0.802	0.793
23	Karjat-3	0.377	0.306	0.342	23.9	18.9	21.4	0.814	0.814	0.814
24	Karjat-7	0.364	0.361	0.363	23.1	22.4	22.7	0.797	0.802	0.800
25	Pooja	0.363	0.334	0.349	23.2	20.6	21.9	0.815	0.810	0.813
26	Pooja (ZC)	0.388	0.382	0.385	24.6	23.8	24.2	0.818	0.805	0.812
27	Rajendra Sweta	0.390	0.350	0.370	24.6	21.8	23.2	0.800	0.814	0.807
28	Ratnagiri-8	0.324	0.401	0.363	20.6	24.8	22.7	0.818	0.808	0.813
29	Sabour Shree	0.371	0.308	0.339	23.4	19.2	21.3	0.818	0.816	0.817
30	Swarna	0.370	0.417	0.394	23.4	26.1	24.7	0.806	0.816	0.811
31	Swarnaprava	0.452	0.369	0.410	28.8	22.7	25.8	0.795	0.794	0.795
32	Swarna-Sub1	0.388	0.428	0.408	24.7	26.4	25.5	0.810	0.818	0.814
	Mean	0.383	0.371	0.377	24.3	22.9	23.6	0.811	0.811	0.811
	LSD (Treat)			ns			1.24*			ns
	LSD (Variety)			0.05**			3.35**			0.02**
	LSD (Treat x Variety)			0.07**			4.73**			ns
	CV(%) Treat			8.75			8.47			0.83

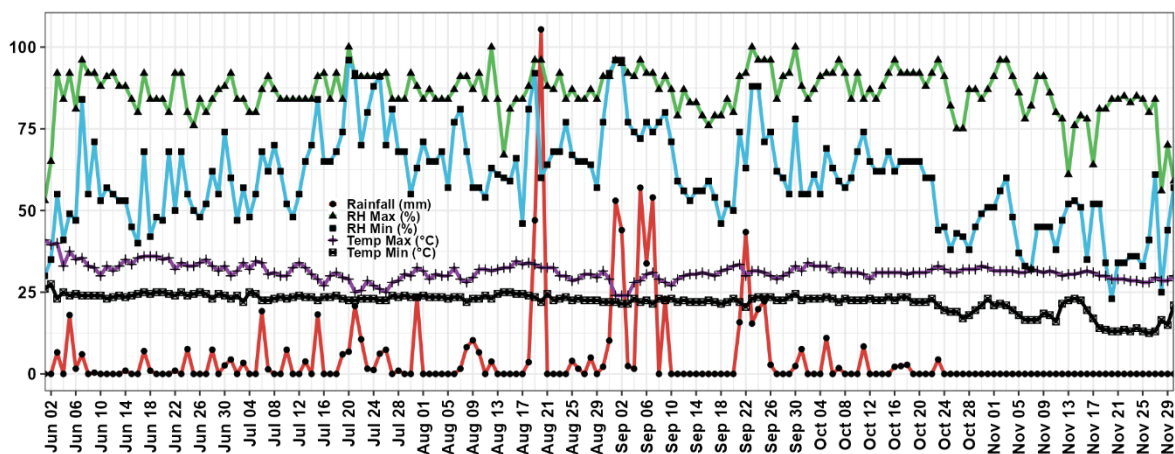
Table 6.6.18B Influence of Low Light Stress on chlorophyll fluorescence traits at IIRR during Kharif 2024

S.No.	Genotype	Coefficient of photochemical quenching (qP)			Coefficient of non-photochemical quenching (qN)		
		Control	Low Light Stress	Mean	Control	Low Light Stress	Mean
1	CR Dhan 801	0.560	0.531	0.545	0.310	0.248	0.279
2	CR-6456-1	0.583	0.551	0.567	0.300	0.275	0.288
3	IET-31204	0.721	0.659	0.690	0.334	0.314	0.324
4	IET-31220 (R)	0.588	0.600	0.594	0.309	0.278	0.294
5	IET-31237	0.713	0.647	0.680	0.268	0.291	0.279
6	IET-31246 (R)	0.650	0.528	0.589	0.329	0.281	0.305
7	IET-32121	0.567	0.539	0.553	0.323	0.279	0.301
8	IET-32122	0.586	0.502	0.544	0.367	0.288	0.328
9	IET-32123	0.609	0.625	0.617	0.319	0.263	0.291
10	IET-32124	0.669	0.503	0.586	0.260	0.262	0.261
11	IET-32130	0.614	0.556	0.585	0.308	0.309	0.308
12	IET-32131	0.575	0.486	0.530	0.296	0.267	0.282
13	IET-32134	0.704	0.660	0.682	0.346	0.320	0.333
14	IET-32146	0.607	0.628	0.617	0.322	0.278	0.300
15	IET-32147	0.646	0.699	0.673	0.358	0.259	0.308
16	IET-32150	0.604	0.505	0.555	0.337	0.310	0.324
17	IET-32175	0.567	0.624	0.595	0.285	0.260	0.273
18	IET-33261	0.577	0.591	0.584	0.281	0.259	0.270
19	IET-33262	0.611	0.525	0.568	0.347	0.274	0.311
20	IET-33263	0.552	0.410	0.481	0.234	0.253	0.244
21	IET-33264	0.471	0.428	0.449	0.249	0.283	0.266
22	IR 8	0.731	0.656	0.693	0.368	0.381	0.375
23	Karjat-3	0.612	0.490	0.551	0.334	0.377	0.356
24	Karjat-7	0.583	0.556	0.570	0.312	0.295	0.303
25	Pooja	0.553	0.516	0.534	0.272	0.305	0.289
26	Pooja (ZC)	0.582	0.566	0.574	0.264	0.269	0.266
27	Rajendra Sweta	0.612	0.528	0.570	0.278	0.247	0.262
28	Ratnagiri-8	0.521	0.637	0.579	0.307	0.326	0.316
29	Sabour Shree	0.603	0.493	0.548	0.353	0.319	0.336
30	Swarna	0.665	0.660	0.663	0.431	0.337	0.384
31	Swarnaprava	0.761	0.622	0.691	0.360	0.438	0.399
32	Swarna-Sub1	0.601	0.647	0.624	0.285	0.259	0.272
	Mean	0.612	0.568	0.590	0.314	0.294	0.304
	LSD (Treat)			0.03*			ns
	LSD (Variety)			0.09**			0.06**
	LSD (Treat x Variety)			0.09*			0.06*
	CV(%) Treat			9.25			15.28

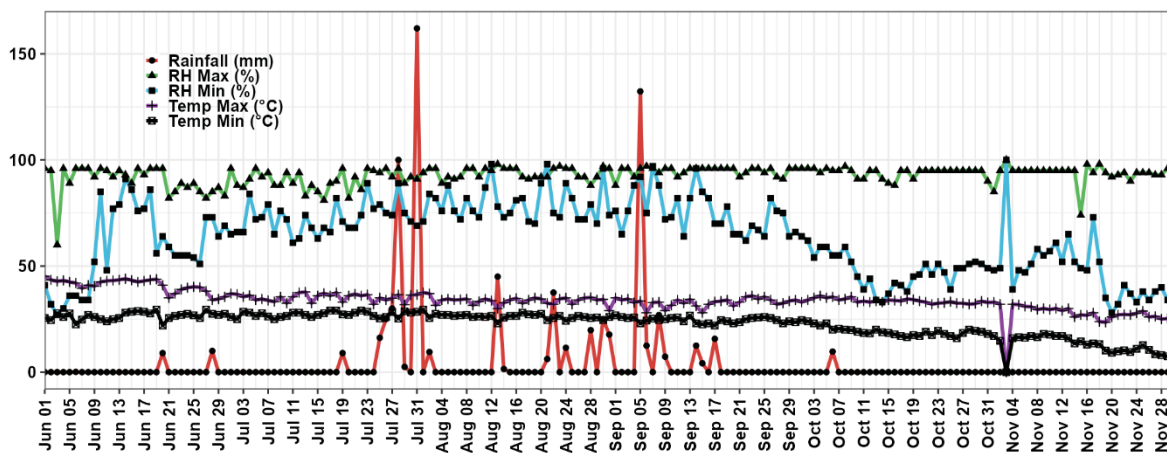
Weather graphs



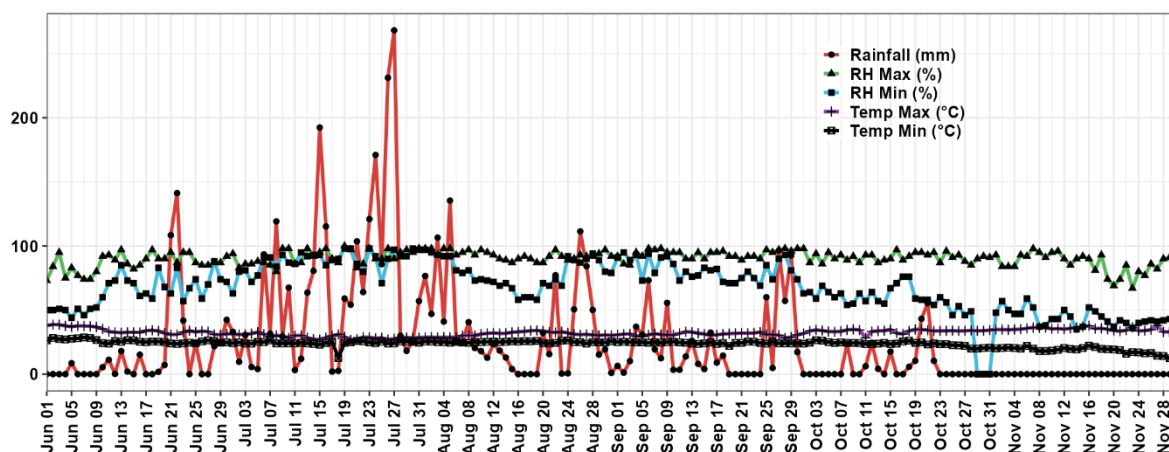
Temperature, Relative Humidity and Rainfall recorded at Chinsura (CHN) centre during 2024



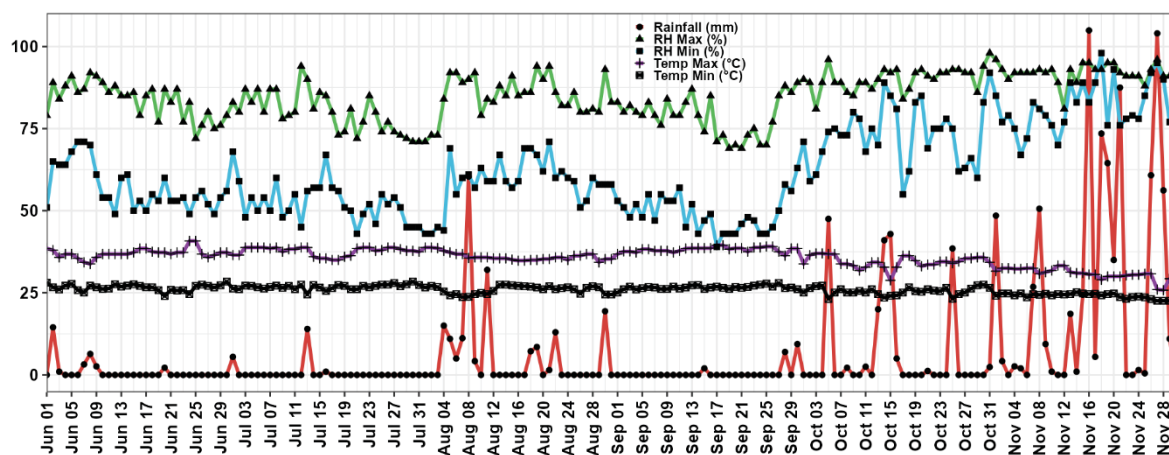
Temperature, Relative Humidity and Rainfall recorded at IIRR, Hyderabad centre during 2024



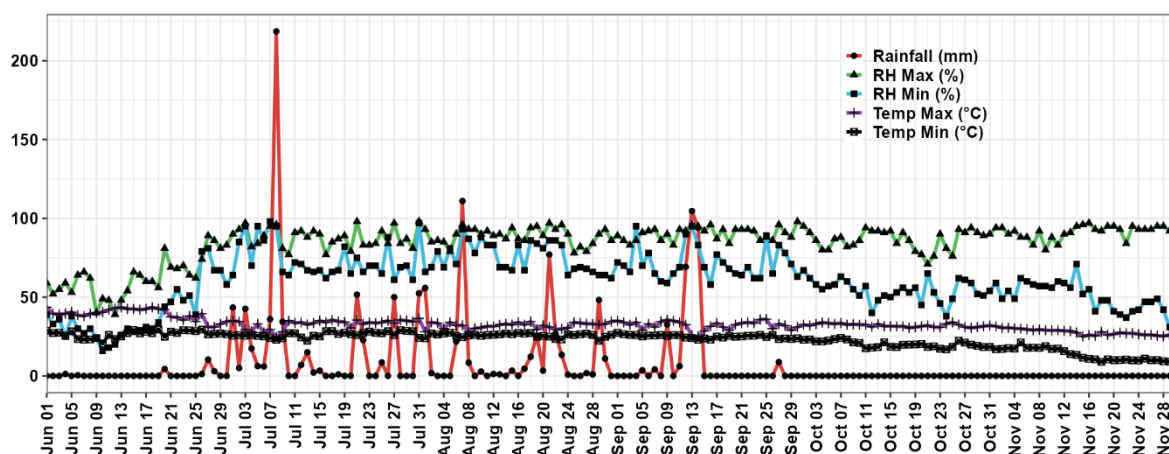
Temperature, Relative Humidity and Rainfall recorded at KAUL centre during 2024



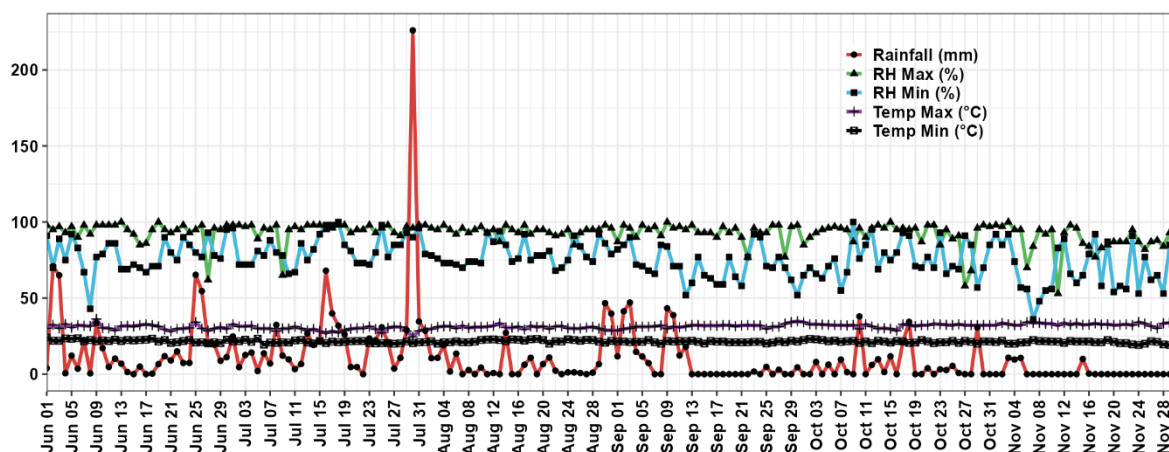
Temperature, Relative Humidity and Rainfall recorded at Karjat (KJT) centre during 2024



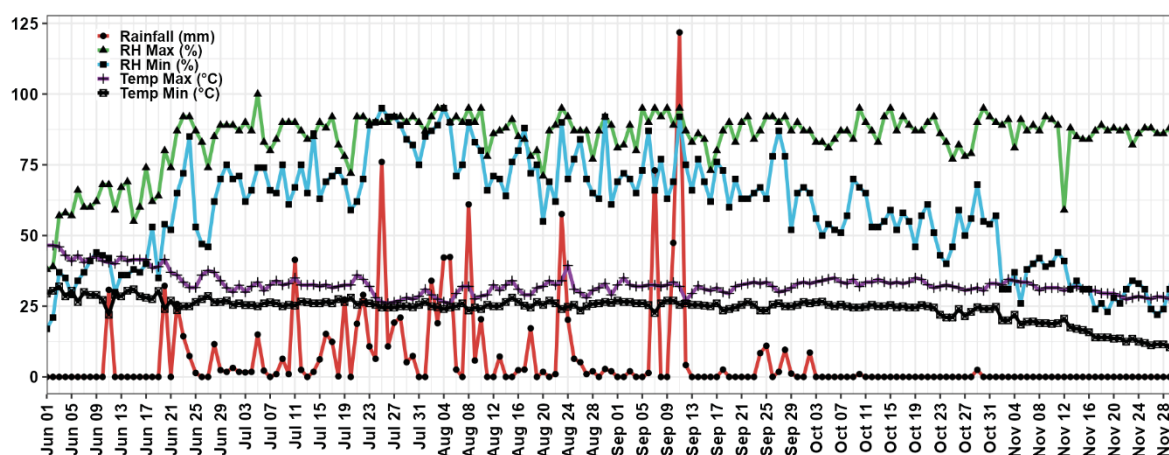
Temperature, Relative Humidity and Rainfall recorded at Karaikal (KRK) centre during 2024



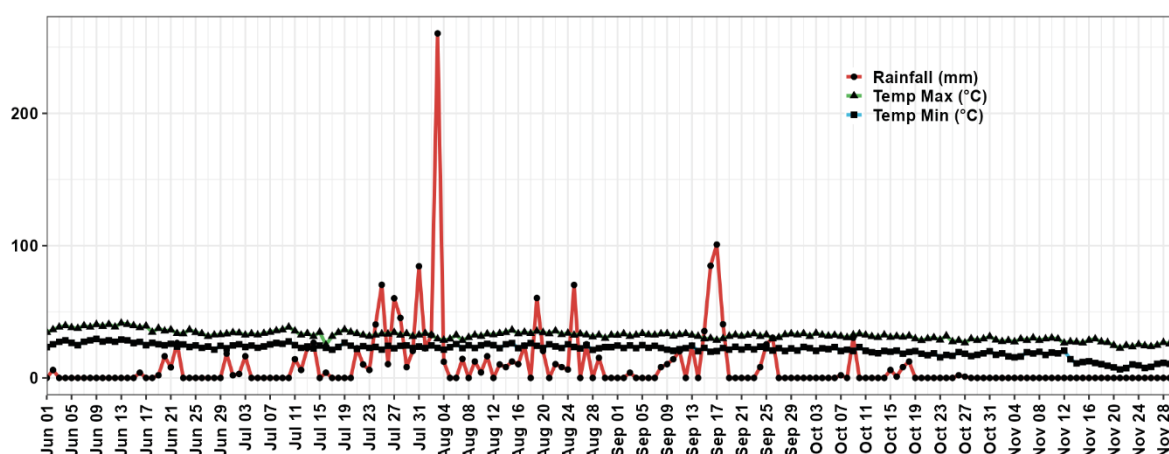
Temperature, Relative Humidity and Rainfall recorded at Pantnagar (PNR) centre during 2024



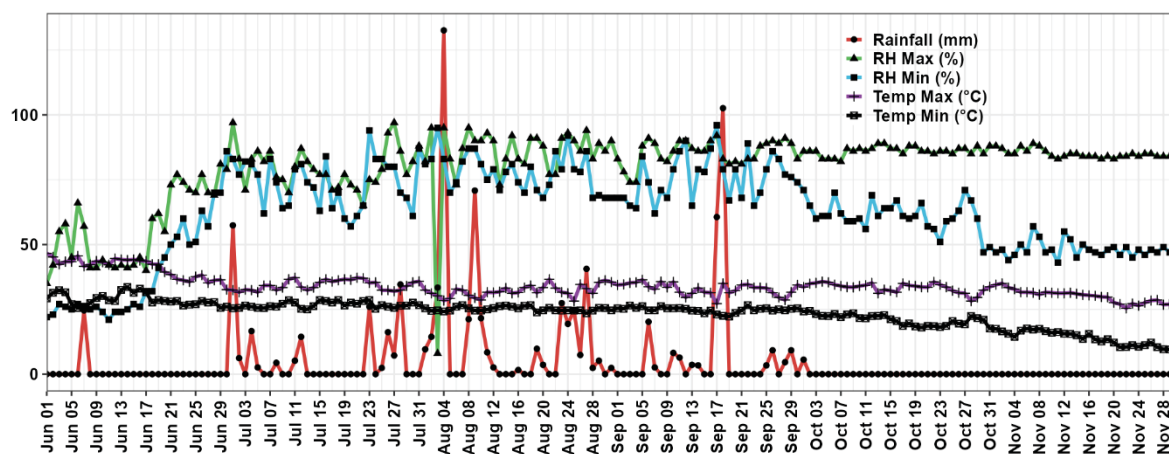
Temperature, Relative Humidity and Rainfall recorded at Pattambi (PTB) centre during 2024



Temperature, Relative Humidity and Rainfall recorded at IGKV, Raipur centre during 2024



Temperature and Rainfall recorded at BAU, Ranchi centre during 2024



Temperature, Relative Humidity and Rainfall recorded at Rewa centre during 2024

APPENDIX - II
Rice cultures of Physiology for Kharif 2024

Silicon		RFU/Drought		High Temperature		Multiple Abiotic Stress		Submergence tolerance		Low Light Stress	
S.No	Entries	S.No	Entries	S.No	Entries	S.No.	Entries	S.No.	Entries	S.No	Entries
1	27P37	1	D-163-1	1	CO-51	1	CRR DH 64	1	CBMAS22061	1	CR Dhan 801
2	27P63	2	D-163-3	2	IET 29694	2	CRAC-4423-49	2	CBMAS22062	2	CR-6456-1
3	AZ 8433 DT	3	D-163-4	3	IET 29700	3	CRAC-4423-10	3	FR 13 A	3	IET-31204
4	HRI-174	4	D-163-5	4	IET 30505	4	FL 478	4	CBMAS22041	4	IET-31220 (R)
5	SB. Dhan	5	D-163-6	5	IET 30555	5	CRAC-4424-101	5	CBMAS22042	5	IET-31237
6	US-312	6	D-139-8	6	IET 30561	6	CRAC-4424-122	6	AC 443	6	IET-31246 (R)
7	US-314	7	D-163-11	7	IET 30635	7	CR 3483-29-M-4-B-SU-61-1-S-1-B	7	Naveen	7	IET-32121
8	VNR-2228	8	D-163-14	8	IET 30651	8	CR 3477-1-M-1-B-SU-78-S-2-B	8	AC 85	8	IET-32122
		9	D-163-15	9	IET 30653	9	RAHASPANJAR	9	AC 34280	9	IET-32123
		10	D-163-19	10	IET 30656	10	AC 443	10	CR 3466-1-2-2-1-SU-1-SUB	10	IET-32124
		11	RP 6469-80	11	IET 30660	11	AC 34280	11	CR 4111-1-2-1-B-SU-1-SUB	11	IET-32130
		12	RP 6469-88	12	IET 31433	12	AC 39293	12	Swarna Sub1	12	IET-32131
		13	RP 6469-95	13	IET 31440	13	AC 34245	13	CR 3439-4-E-17-2-1-B-1-S-1	13	IET-32134
		14	RP 6469-151	14	IET 31444	14	AC 85	14	CR 4215-2-5-2-M-4-SU-2-S-1	14	IET-32146
		15	RP 6469-151a	15	IET 31510	15	VANDANA	15	Swarna	15	IET-32147
				16	IET 31512	16	AC 40346	16	CRRG4(NARIKEL BADI)	16	IET-32150
				17	IET 31515	17	CR 3483-1-M-4-B-SU-1-5-S-1-B	17	CRRG5(KORTIK KAIKA)	17	IET-32175
				18	IET 31533	18	CR 3439-E-5-2-1-1-B-1(IET 31063)	18	CRRG6(AUS 171)	18	IET-32176
				19	IET 31540	19	CR 3460-E-2-2-B-1(IET 31074)	19	CRAC-4423-17	19	IET-33261
				20	MTU-1290	20	CRRG4(NARIKEL BADI)	20	CRAC-4423-111	20	IET-33262
				21	MTU-1296	21	CRRG5(KORTIK KAIKA)	21	CRAC-4423-5	21	IET-33263
				22	NDR-97	22	CRRG6(AUS 171)	22	CRAC-4423-14	22	IET-33264
				23	US-314	23	CRRG7(JHUL DIGA)	23	CRAC-4423-10	23	IR 8
						24	IR 29	24	CRAC-4423-3	24	Kariat-3
						25	Ratnagiri-8	25	CRAC-4423-70	25	Kariat-7
						26	Trombay Konkarn Khara	26	CRAC-4423-101	26	Pooja
						27	NAVEEN	27	CRAC-4423-1	27	Pooja (ZC)
						28	CBMAS22042			28	Rajendra Sweta
						29	CBMAS22041			29	Ratnagiri-8
						30	NICRA 17			30	Sabour Shree
						31	NICRA 19			31	Swarna
						32	NICRA 20			32	Swarnaprabha
						33	NICRA 16			33	Swarna-Sub1
						34	TTB 7				
						35	TTB 8				

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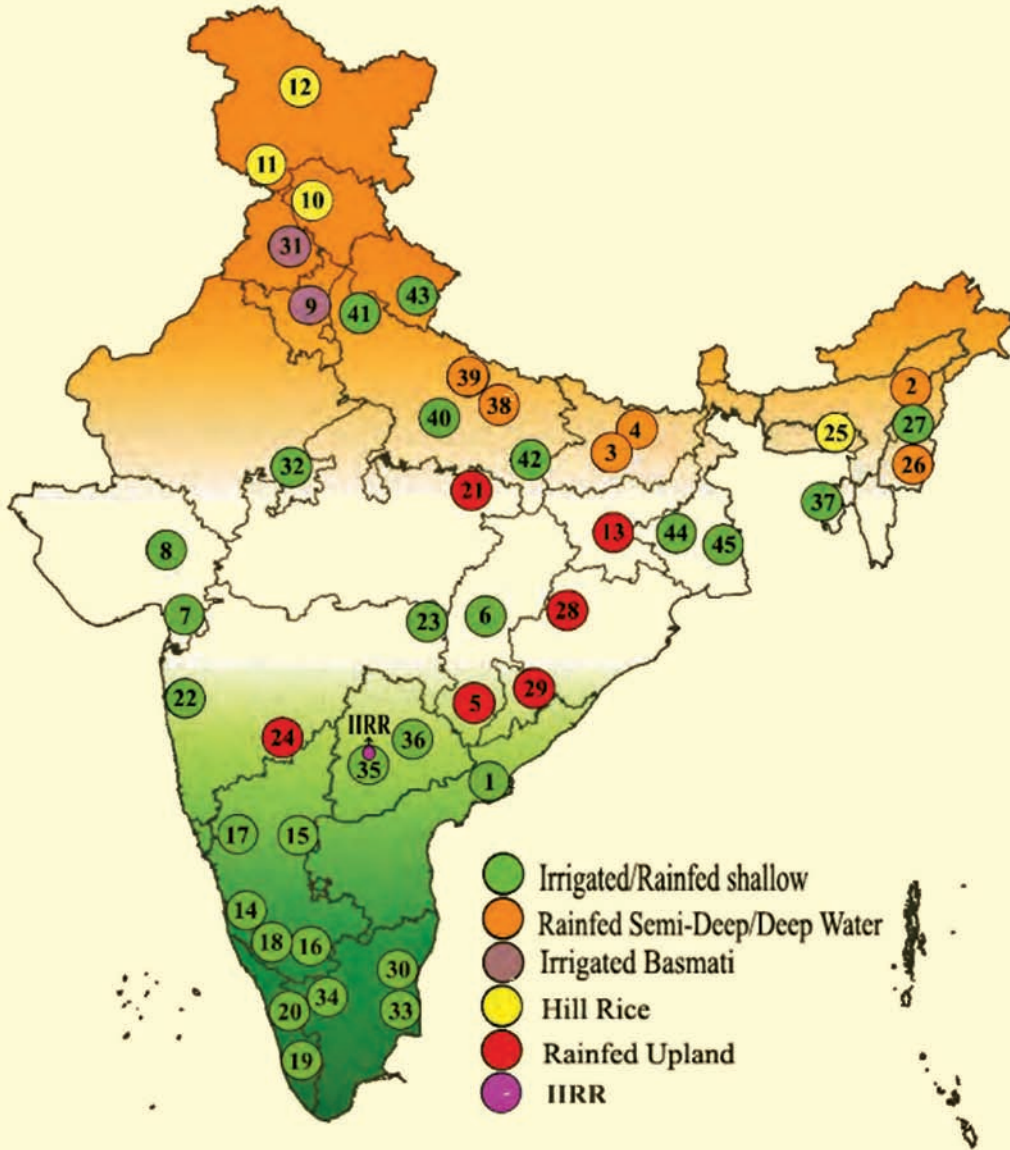
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