# *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/$m^2$. 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 34280was 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 51$^{st}$ 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 ≥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.

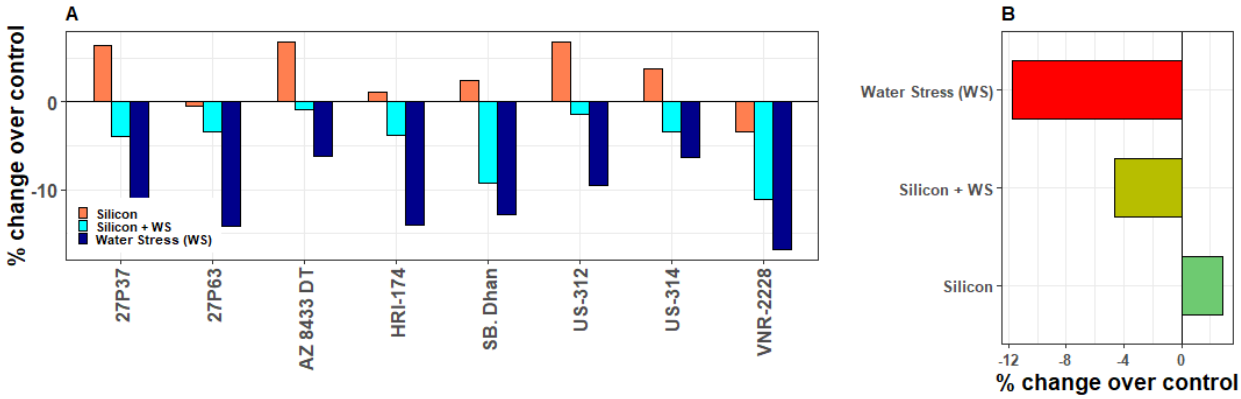



**Fig 6.1.1** *Percentage change in grain number per panicle with respect to control. (A) Mean of all locations (B) Mean of all varieties and locations.*

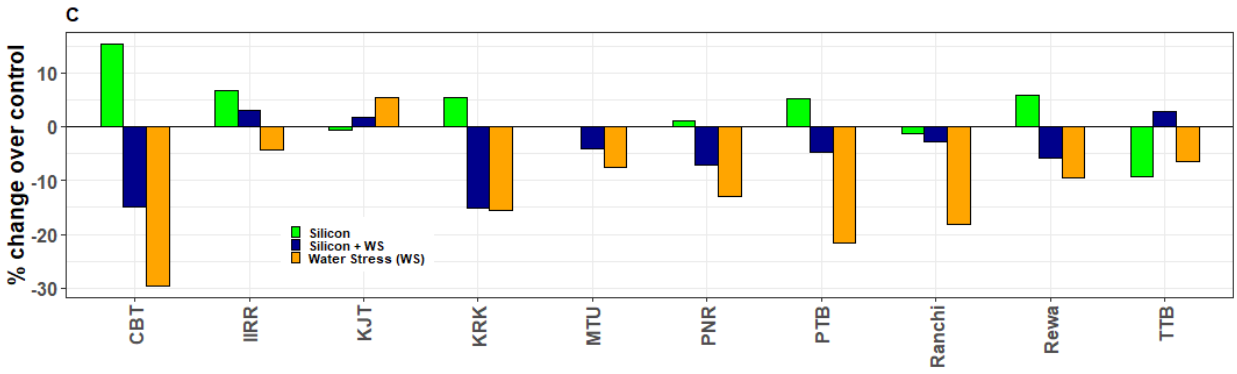



**Fig 6.1.2** *Percentage change in grain number per panicle with respect to control. Each value represents mean of all varieties.*

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/$m^2$ (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.

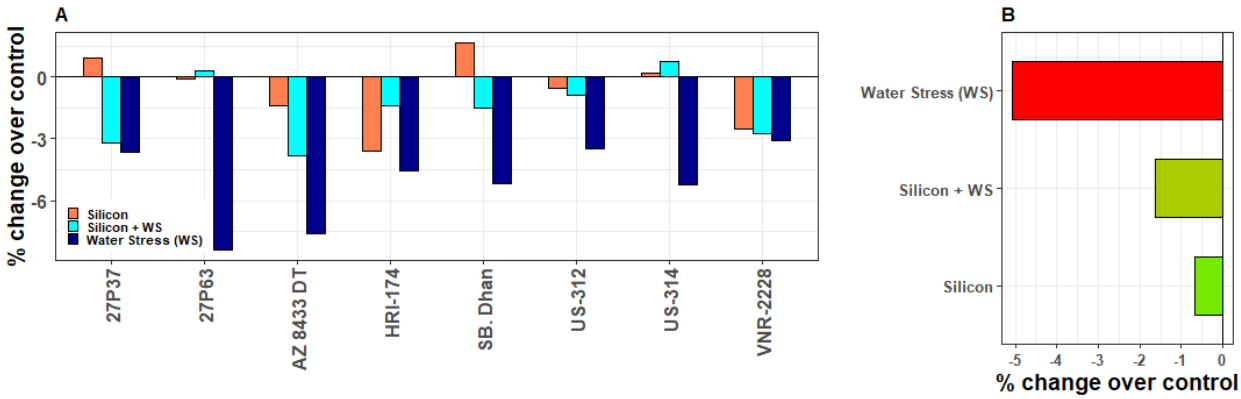



**Fig 6.1.3** *Percentage change in 1000 grain weight with respect to control. (A) Mean of all locations (B) Mean of all varieties and locations.*

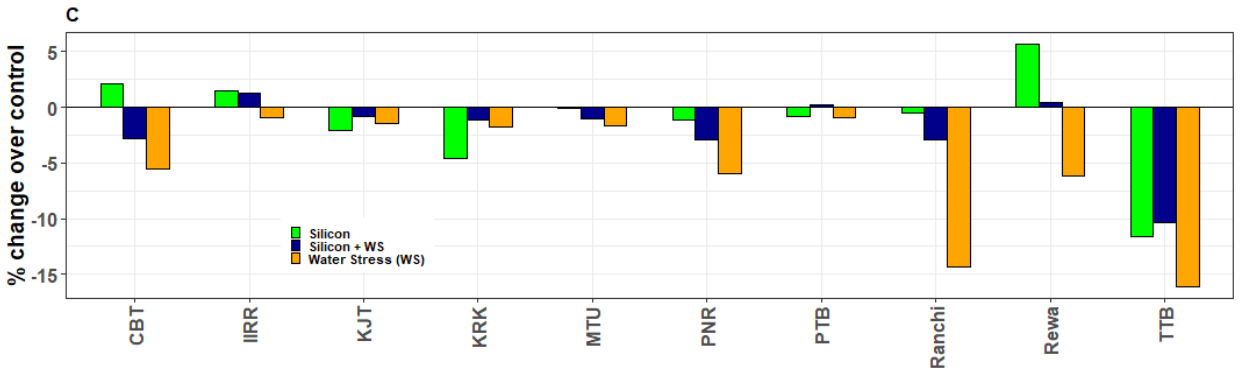



**Fig 6.1.4** *Percentage change in 1000 grain weight with respect to control. Each value represents mean of all varieties.*

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.

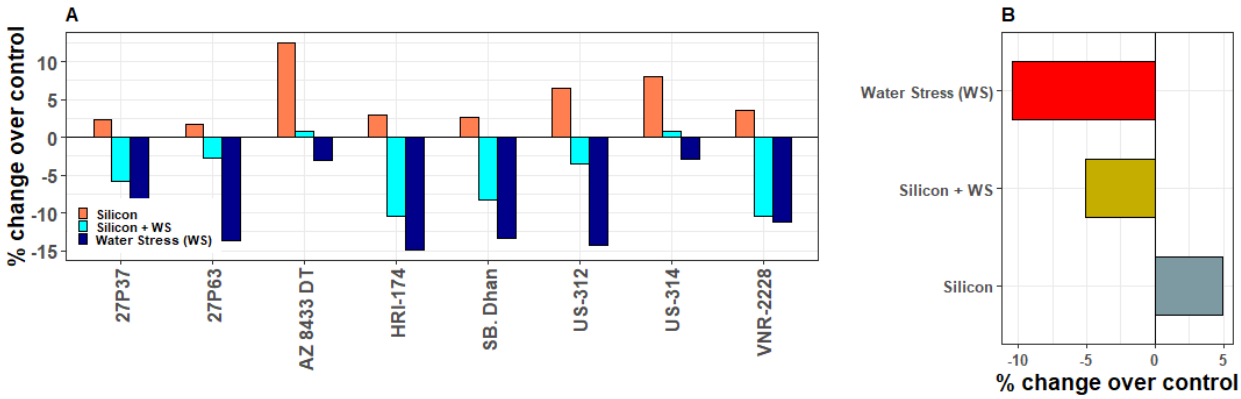



**Fig 6.1.5** *Percentage change in total dry matter (g/m2) at maturity with respect to control. (A) Mean of all locations (B) Mean of all varieties and locations.*

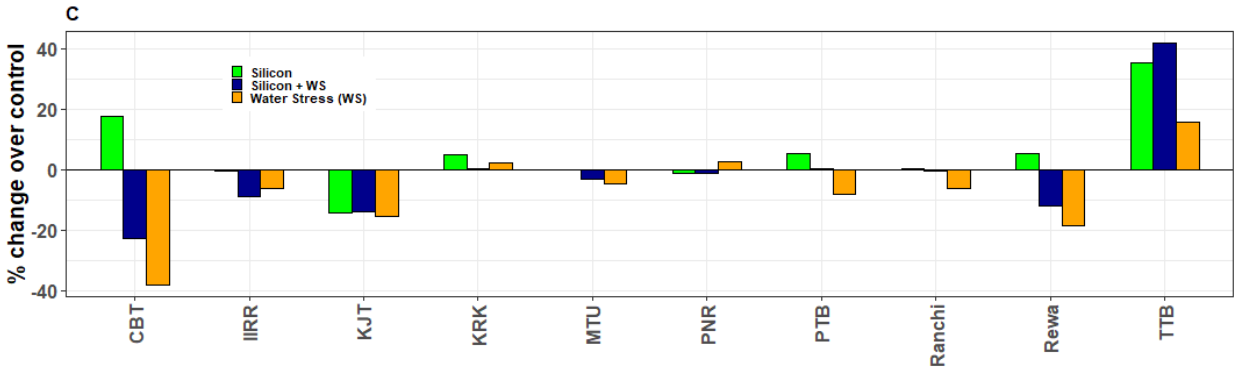



**Fig 6.1.6** *Percentage change in total dry matter (g/m2) at maturity with respect to control. Each value represents mean of all varieties.*

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.

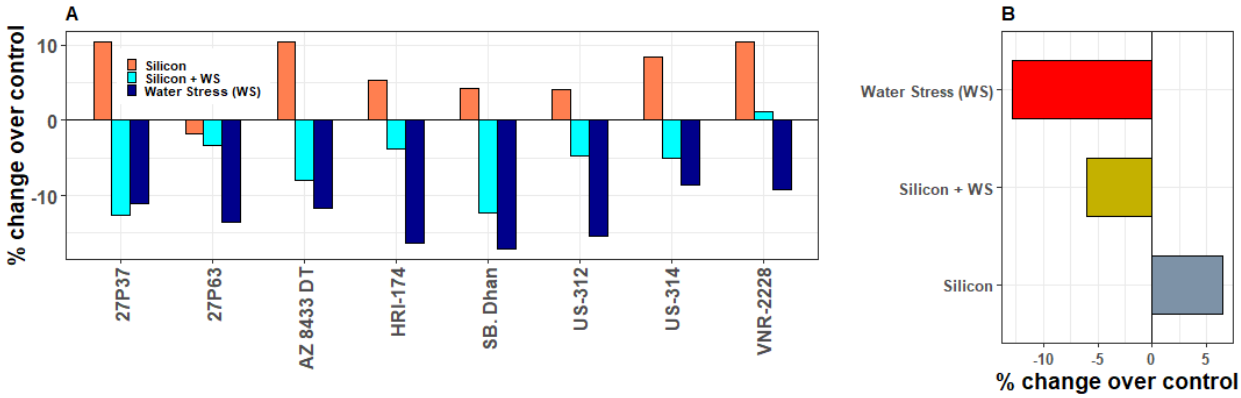



**Fig 6.1.7** *Percentage change in grain yield with respect to control. (A) Mean of all locations (B) Mean of all varieties and locations.*

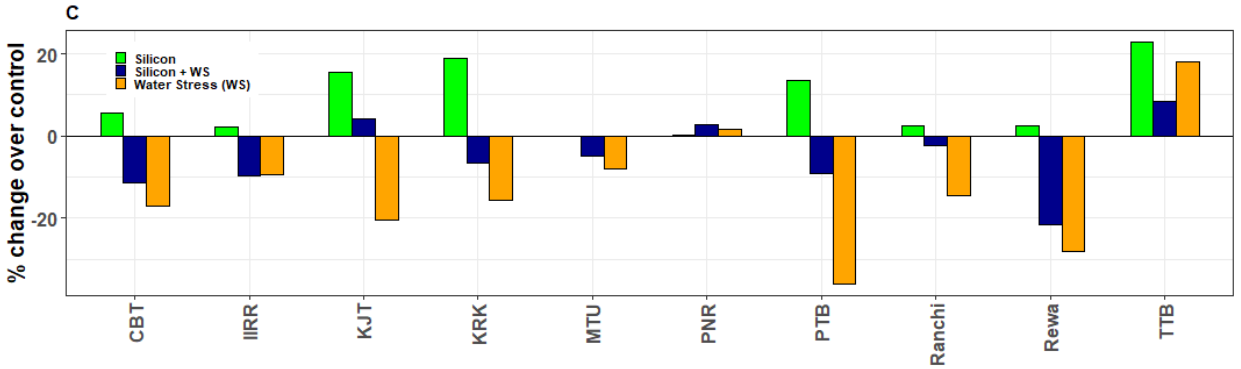



**Fig 6.1.8** *Percentage change in grain yield with respect to control. Each value represents mean of all varieties.*

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.

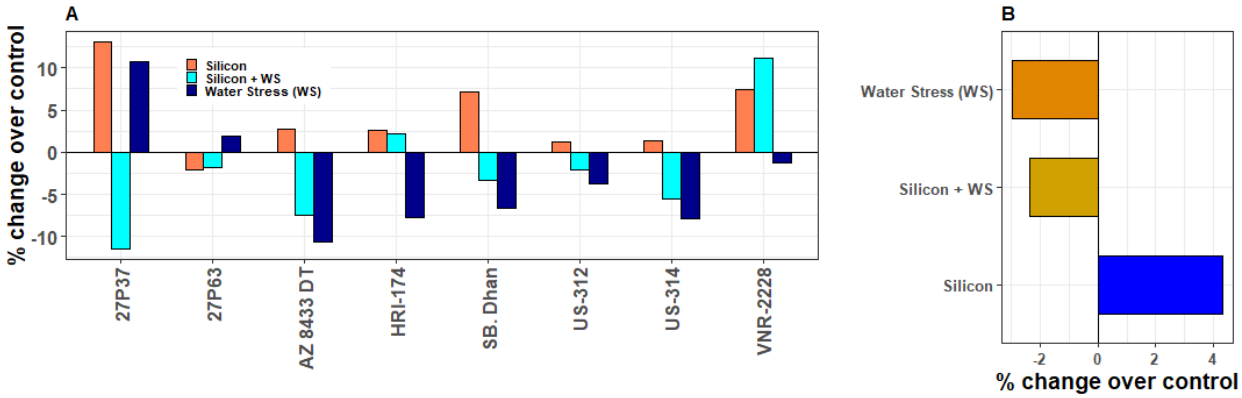



**Fig 6.1.9** *Percentage change in harvest index with respect to control. (A) Mean of all locations (B) Mean of all varieties and locations.*

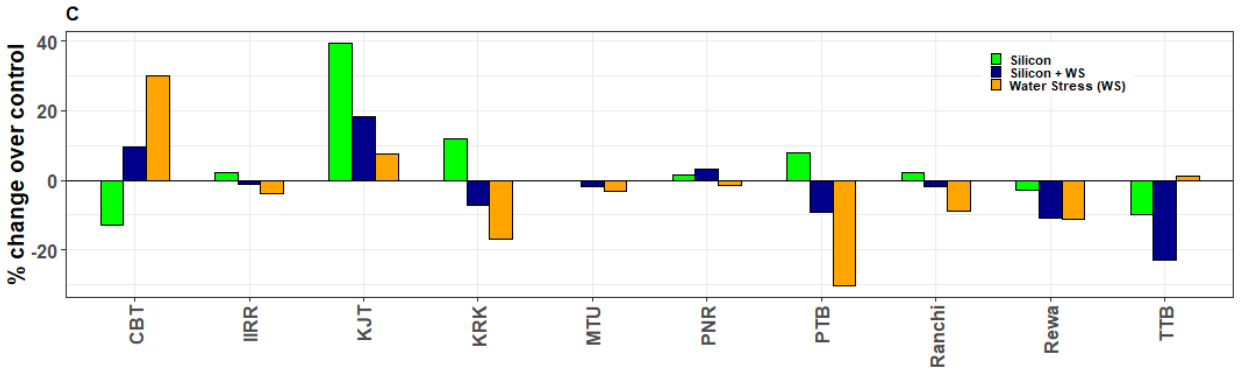



**Fig 6.1.10** *Percentage change in harvest index with respect to control. Each value represents mean of all varieties.*

**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** |
| | | *LSD (Silicon)* | | | | 4.13** | | *LSD (Silicon x Variety)* | | | | | ns |
| | | *LSD (Location x Silicon)* | | | | 13.06** | | *LSD (Location x Silicon x Variety)* | | | | | 28.58** |
| | | *LSD (Variety)* | | | | 3.43* | | *CV(Silicon) %* | | | | | 12.02 |
| | | *LSD (Location x Variety)* | | | | 14.29** | | *CV (Residual) %* | | | | | 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/m$^2$) 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** |
| | | *LSD (Silicon)* | | | | ns | | *LSD (Silicon x Variety)* | | | | | ns |
| | | *LSD (Location x Silicon)* | | | | 165.73** | | *LSD (Location x Silicon x Variety)* | | | | | 355.32** |
| | | *LSD (Variety)* | | | | 42.69* | | *CV(Silicon) %* | | | | | 14.41 |
| | | *LSD (Location x Variety)* | | | | 177.66** | | *CV (Residual) %* | | | | | 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 recourse 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.

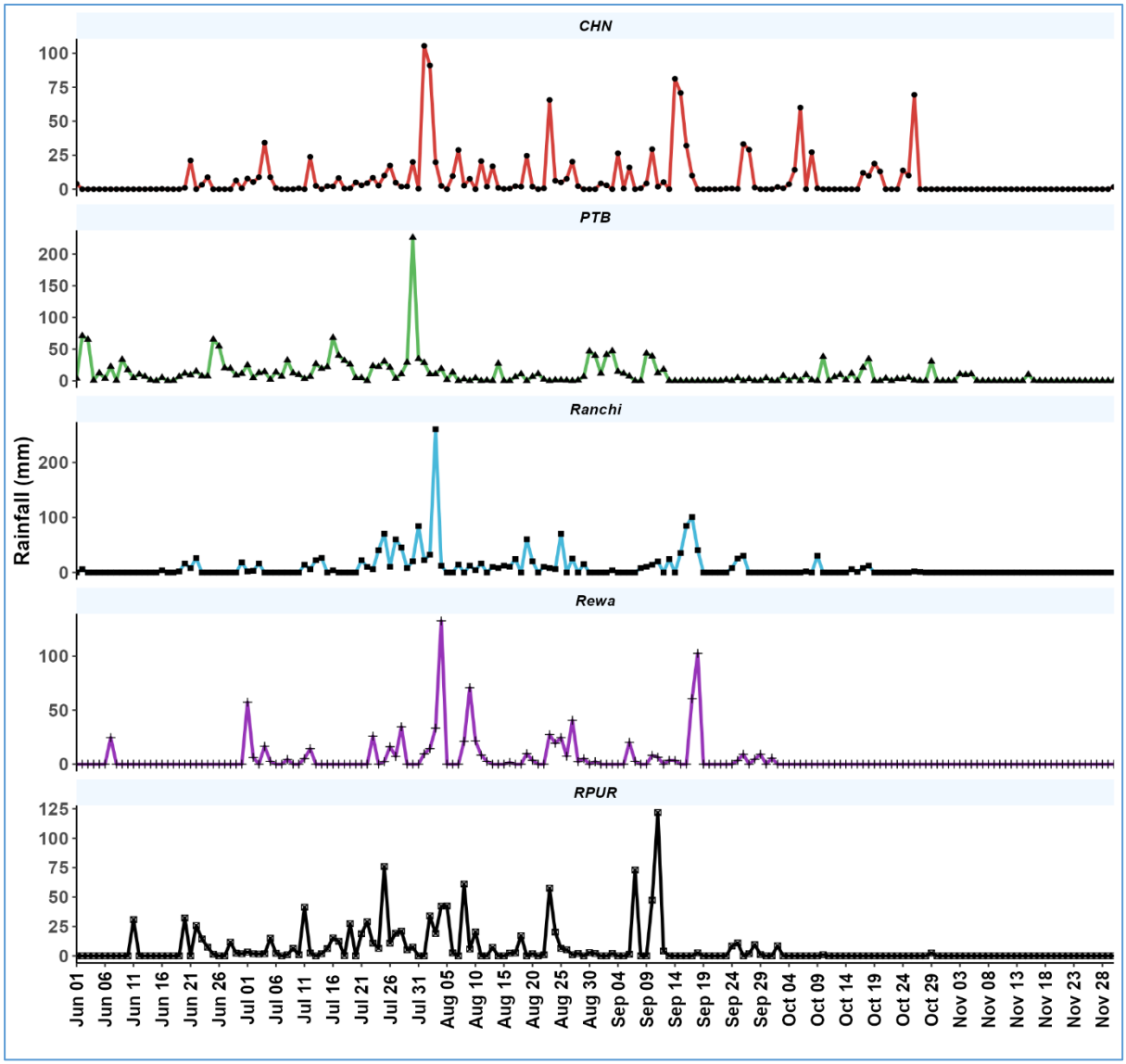



**Fig 6.2.1** *Rainfall pattern under rainfed upland situation (drought) at different locations during Kharif 2024.*

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).

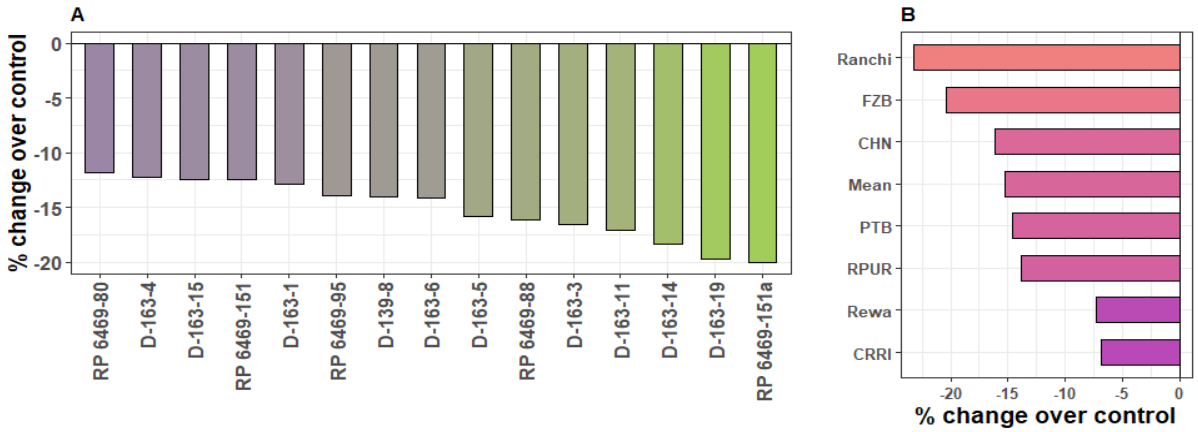



**Fig 6.2.2** *Influence of irrigation regimes on Tiller Number/Plant recorded at maturity in different rice genotypes at different AICRIP centres during kharif-2024. [A] Mean of all locations [B] Mean of all genotypes. Each value represents % change under rainfed treatment in comparison with irrigated 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/m$^2$ (CRRI) to 668 g/m$^2$ (Rewa) with a grand mean of 465 g/m$^2$ in control whereas in drought, it ranged from 263 g/m$^2$ (CRRI) to 548 g/m$^2$ (Rewa) with a grand mean of 384 g/m$^2$. 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/m$^2$ followed by RP 6469-151a at CRRI (256 g/m$^2$) whereas the entry D-163-15 has recorded the highest panicle weight 789 g/m$^2$ followed by RP 6469-88 625 g/m$^2$ both at Rewa. In drought, D-139-8 (CRRI) has recorded the lowest panicle weight of 174 g/m$^2$ followed by RP 6469-95 (Pattambi) with 182 g/m$^2$ and D-163-15 (Rewa) has recorded the highest panicle weight of 679 g/m$^2$ followed by RP 6469-88 (Rewa) with 625 g/m$^2$. 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).

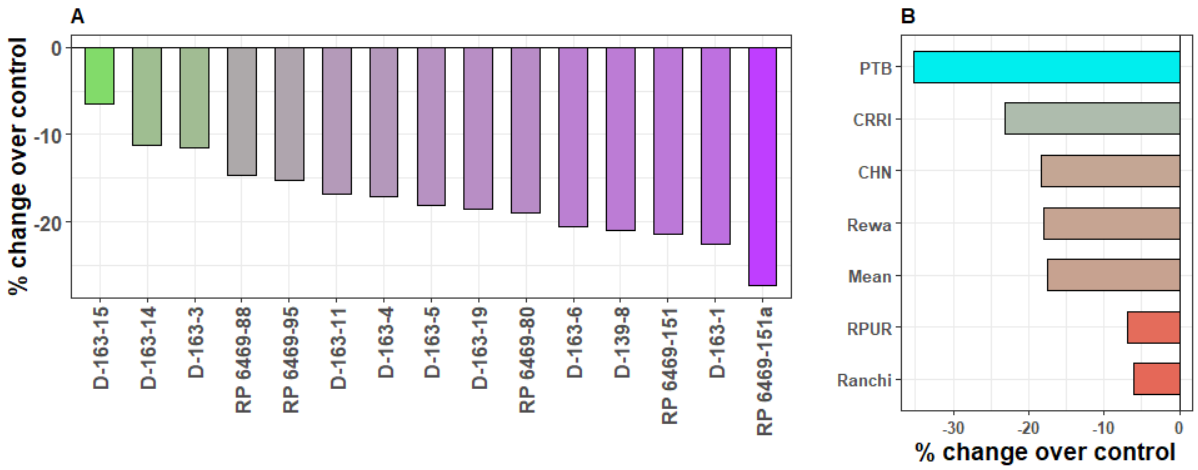



**Fig 6.2.3** *Influence of irrigation regimes on panicle weight/m$^2$ recorded at maturity in different rice genotypes at different AICRIP centres during kharif-2024. [A] Mean of all locations [B] Mean of all genotypes. Each value represents % change under rainfed treatment in comparison with irrigated 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).

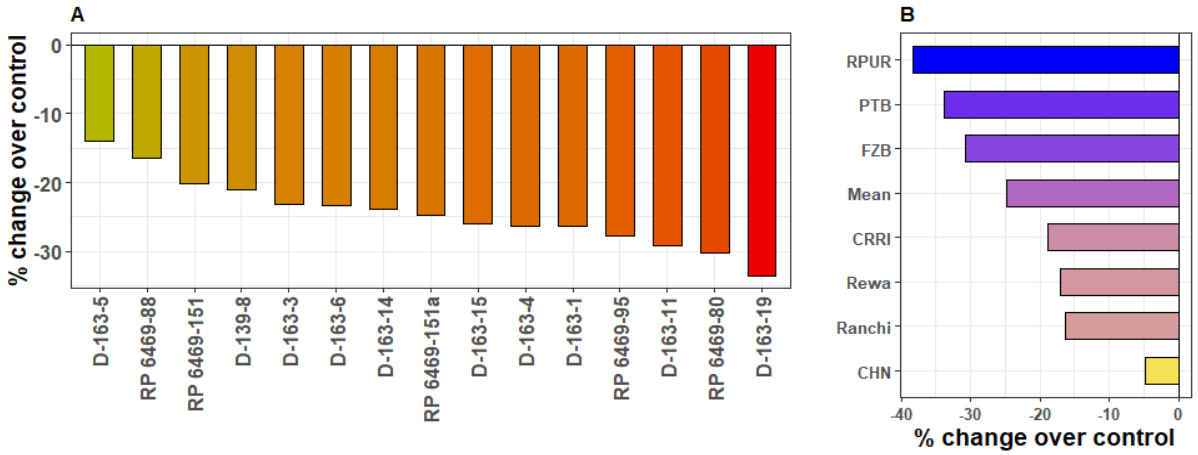



**Fig 6.2.4** *Influence of irrigation regimes on Grain number/Panicle in different rice genotypes at different AICRIP centres during kharif-2024. [A] Mean of all locations [B] Mean of all genotypes. Each value represents % change under rainfed treatment in comparison with irrigated control.*

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 CRRI 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-163-14at 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 CRRI 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).

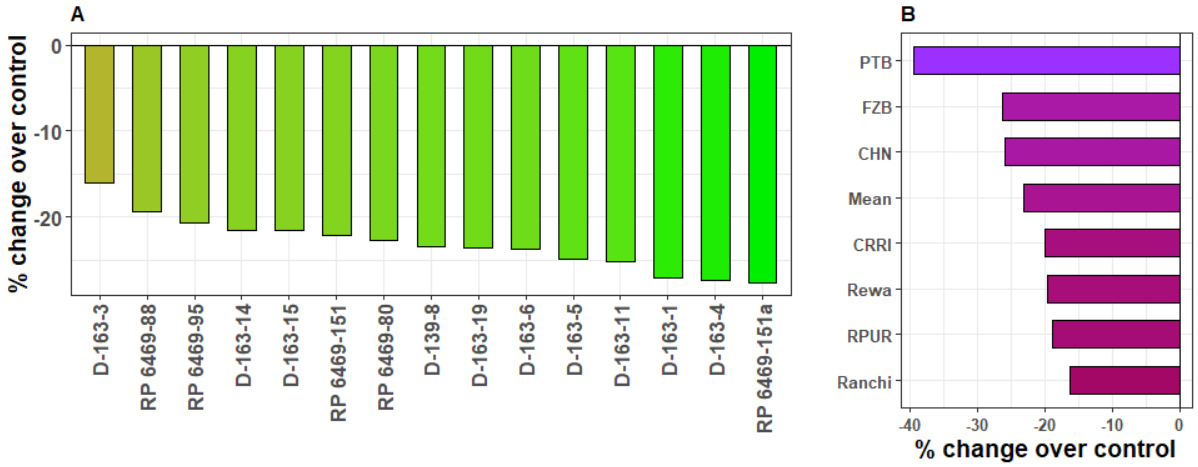



**Fig 6.2.5** *Influence of irrigation regimes on Grain Yield (g/m$^2$) in different rice genotypes at different AICRIP centres during kharif-2024. [A] Mean of all locations [B] Mean of all genotypes. Each value represents % change under rainfed treatment in comparison with irrigated control.*

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).

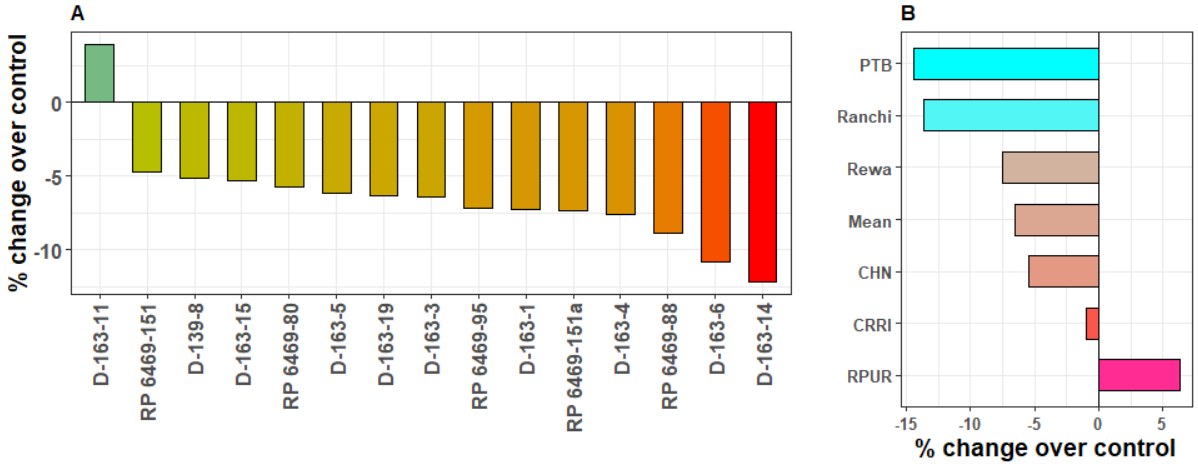



**Fig 6.2.6** *Influence of irrigation regimes on 1000-grain weight (g) in different rice genotypes at different AICRIP centres during kharif-2024. [A] Mean of all locations [B] Mean of all genotypes. Each value represents % change under rainfed treatment in comparison with irrigated control.*

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/m$^2$ at Chinsurah to 1223 g/m$^2$ at Rewa with a grand mean of 1018 g/m$^2$ in control whereas in drought it ranged from 718 g/m$^2$ at CRRI to 1067 g/m$^2$ at Rewa with a grand mean of 857 g/m$^2$.

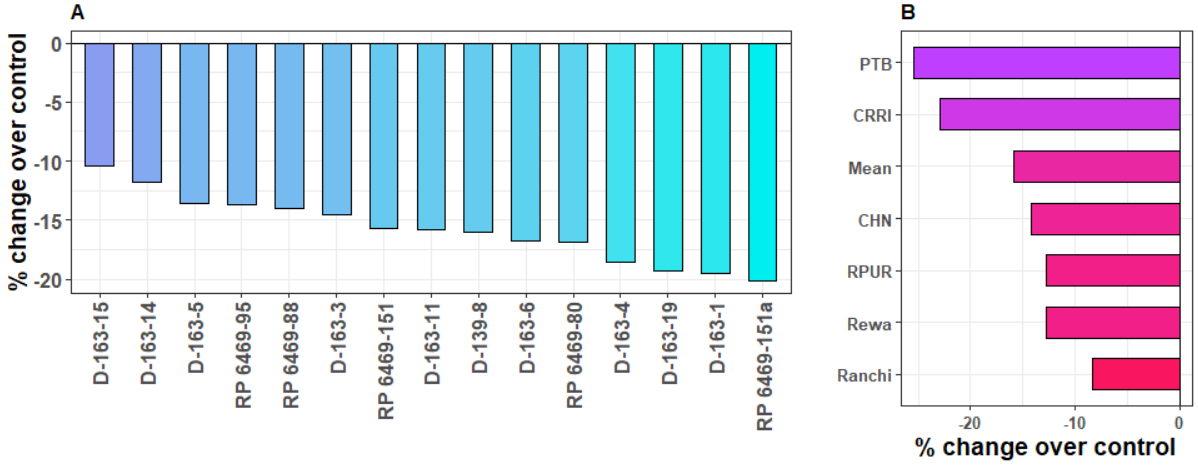



**Fig 6.2.7** *Influence of irrigation regimes on TDM (g/m$^2$) at maturity in different rice genotypes at different AICRIP centres during kharif-2024. [A] Mean of all locations [B] Mean of all genotypes. Each value represents % change under rainfed treatment in comparison with irrigated control.*

Among entries, RP 6469-151a at CRRI recorded the lowest TDM (650 g/m$^2$) followed by RP 6469-88 at Chinsurah (686 g/m$^2$) and D-163-15 at Rewa recorded the highest TDM (1444 g/m$^2$)

followed by RP 6469-88 at Rewa (1329 g/m$^2$) in control. In drought, D-169-8 at CRRI recorded the lowest TDM (582 g/m$^2$) and D-163-15 at Rewa recorded the highest TDM (1308 g/m$^2$). 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).

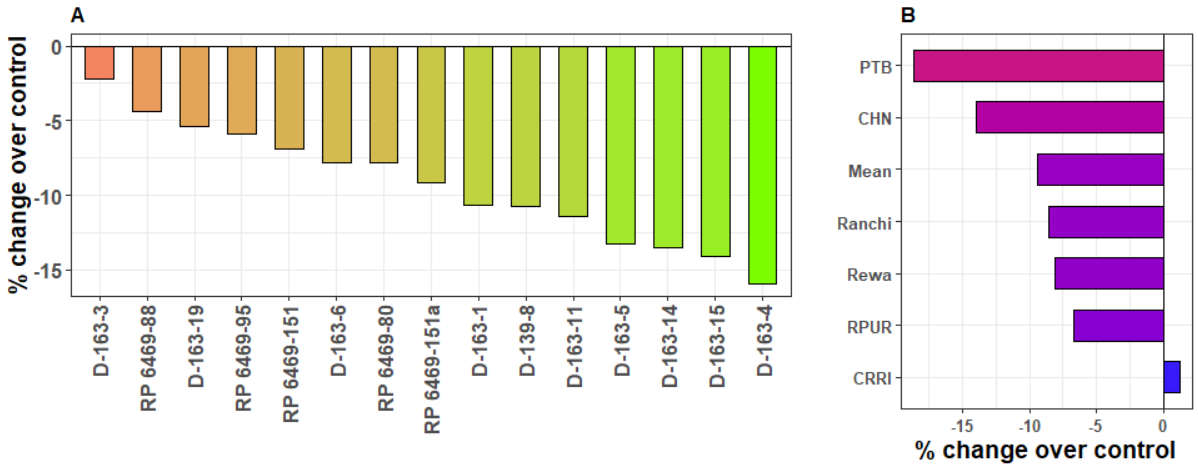



**Fig 6.2.8** *Influence of irrigation regimes Harvest Index (%) in different rice genotypes at different AICRIP centres during kharif-2024. [A] Mean of all locations [B] Mean of all genotypes. Each value represents % change under rainfed treatment in comparison with irrigated control.*

**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.

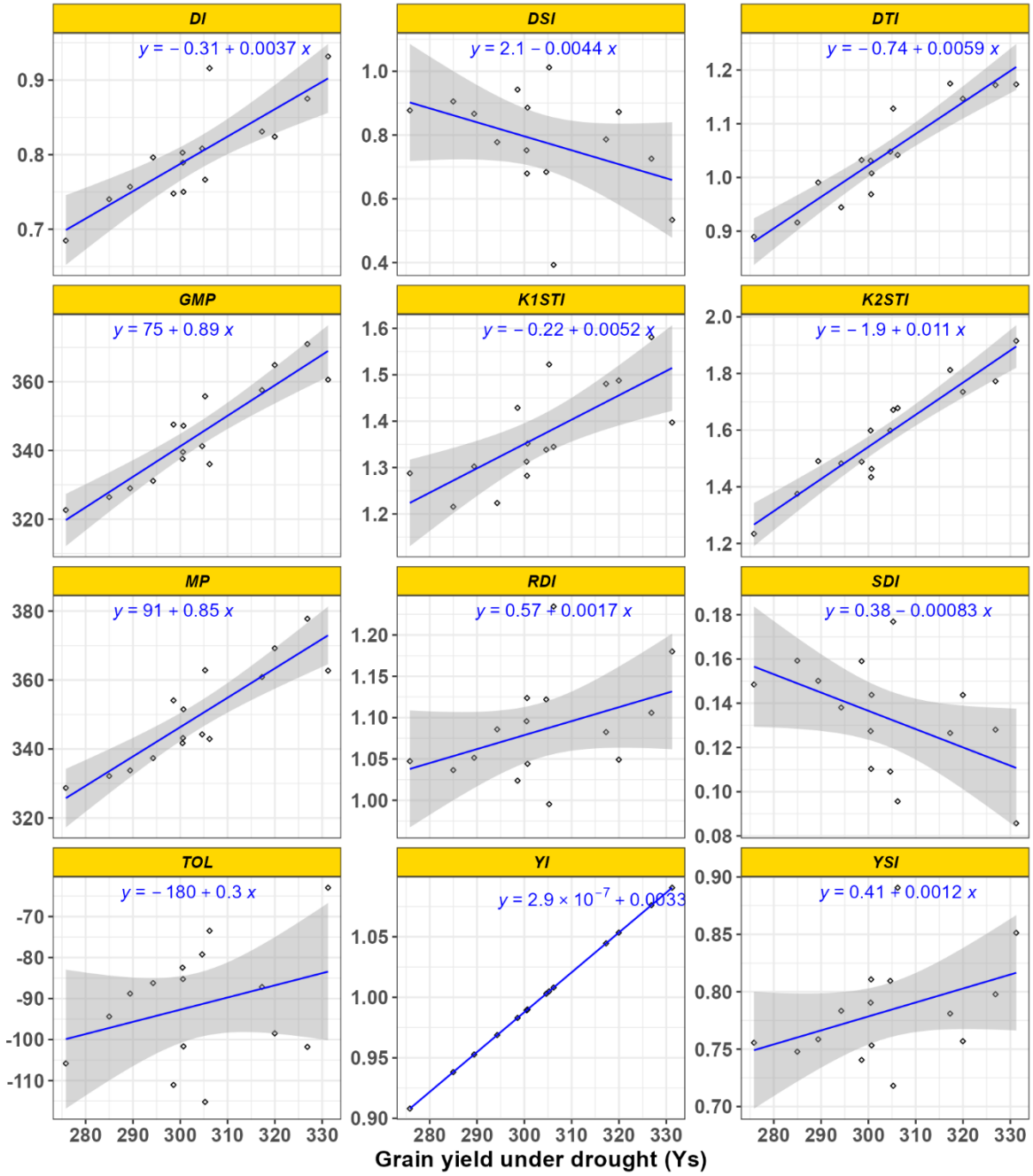



**Fig 6.2.9** *Relationship between grain yield recorded under rainfed condition (drought) and different drought tolerance indices computed from grain yield recorded under both rainfed and irrigated conditions. For computing indices mean grain yield values for all the locations were used.*

**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 | CRRI | FZB | PTB | Ranchi | Rewa | RPUR | | CHN | CRRI | 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) | | | | | | 0.45** | | | LSD (Treat x Variety) | | | | | | | ns |
| | LSD (Location x Treat) | | | | | | 1.21** | | | LSD (Location x Treat x Variety) | | | | | | | 2.17** |
| | LSD (Variety) | | | | | | ns | | | CV (%) Treat | | | | | | | 15.00 |
| | LSD (Location x Variety) | | | | | | 1.53** | | | | | | | | | | |

**Table 6.2.2 Influence of drought on Shoot weight (g/m$^2$) 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) | | | | | 19.98** | | | LSD (Treat x Variety) | | | | | | ns |
| | LSD (Location x Treat) | | | | | 48.94** | | | LSD (Location x Treat x Variety) | | | | | | 108.49** |
| | LSD (Variety) | | | | | 23.78* | | | CV (%) Treat | | | | | | 14.82 |
| | LSD (Location x Variety) | | | | | 76.71** | | | | | | | | | |

**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) | | | | | 5.39* | | | LSD (Treat x Variety) | | | | | | ns |
| | LSD (Location x Treat) | | | | | 18.51** | | | LSD (Location x Treat x Variety) | | | | | | 81.57** |
| | LSD (Variety) | | | | | ns | | | CV (%) Treat | | | | | | 6.76 |
| | LSD (Location x Variety) | | | | | 57.67** | | | | | | | | | |

**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) | | | | | 10.03** | | | LSD (Treat x Variety) | | | | | | ns |
| | LSD (Location x Treat) | | | | | 17.53** | | | LSD (Location x Treat x Variety) | | | | | | 46.25** |
| | LSD (Variety) | | | | | 10.13* | | | CV (%) Treat | | | | | | 15.03 |
| | LSD (Location x Variety) | | | | | 32.71** | | | | | | | | | |

**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 | CRRI | FZB | PTB | Ranchi | Rewa | RPUR | | CHN | CRRI | 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) | | | | | | 3.43* | | | LSD (Treat x Variety) | | | | | | | ns |
| | LSD (Location x Treat) | | | | | | 12.6** | | | LSD (Location x Treat x Variety) | | | | | | | 30.14** |
| | LSD (Variety) | | | | | | ns | | | CV (%) Treat | | | | | | | 18.00 |
| | LSD (Location x Variety) | | | | | | 21.31** | | | | | | | | | | |

**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) | | | | | 2.95* | | LSD (Treat x Variety) | | | | | ns |
| | LSD (Location x Treat) | | | | | 9.41** | | LSD (Location x Treat x Variety) | | | | | ns |
| | LSD (Variety) | | | | | ns | | CV (%) Treat | | | | | 10.85 |
| | LSD (Location x Variety) | | | | | 28.9** | | | | | | | |

**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 | CRRI | PTB | Ranchi | Rewa | RPUR | | CHN | CRRI | 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) | | | | | 1147.59* | | | LSD (Treat x Variety) | | | | | | ns |
| | LSD (Location x Treat) | | | | | 3940.84** | | | LSD (Location x Treat x Variety) | | | | | | 8266.72** |
| | LSD (Variety) | | | | | ns | | | CV (%) Treat | | | | | | 22.75 |
| | LSD (Location x Variety) | | | | | 5845.19** | | | | | | | | | |

**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 | CRRI | PTB | Ranchi | Rewa | | CHN | CRRI | 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) | | | | | 1794.13** | | LSD (Treat x Variety) | | | | | ns |
| | LSD (Location x Treat) | | | | | 4011.81** | | LSD (Location x Treat x Variety) | | | | | 11120.43** |
| | LSD (Variety) | | | | | ns | | CV (%) Treat | | | | | 17.92 |
| | LSD (Location x Variety) | | | | | 7863.33 | | | | | | | |

**Table 6.2.9 Influence of drought on Grain yield (g/m$^2$) 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 | RPUR | | CHN | CRRI | FZB | PTB | Ranchi | Rewa | RPUR | |
| 1 | D-163-1 | 346 | 200 | 569 | 427 | 413 | 595 | 317 | **410** | 238 | 154 | 405 | 185 | 354 | 467 | 287 | **299** |
| 2 | D-163-3 | 280 | 187 | 586 | 321 | 446 | 646 | 294 | **394** | 227 | 204 | 477 | 219 | 373 | 576 | 243 | **331** |
| 3 | D-163-4 | 411 | 256 | 592 | 305 | 414 | 638 | 327 | **420** | 183 | 198 | 487 | 179 | 343 | 521 | 225 | **305** |
| 4 | D-163-5 | 321 | 302 | 592 | 288 | 416 | 478 | 258 | **379** | 273 | 153 | 428 | 141 | 354 | 389 | 258 | **285** |
| 5 | D-163-6 | 260 | 239 | 528 | 527 | 417 | 655 | 374 | **429** | 273 | 234 | 382 | 231 | 339 | 560 | 269 | **327** |
| 6 | D-139-8 | 294 | 221 | 511 | 196 | 439 | 658 | 327 | **378** | 212 | 102 | 393 | 159 | 375 | 475 | 310 | **289** |
| 7 | D-163-11 | 361 | 218 | 532 | 344 | 415 | 567 | 382 | **402** | 250 | 189 | 380 | 253 | 343 | 453 | 238 | **301** |
| 8 | D-163-14 | 377 | 248 | 557 | 166 | 420 | 613 | 300 | **383** | 233 | 163 | 375 | 152 | 348 | 545 | 287 | **300** |
| 9 | D-163-15 | 373 | 240 | 473 | 207 | 417 | 744 | 378 | **404** | 250 | 197 | 366 | 157 | 348 | 628 | 276 | **317** |
| 10 | D-163-19 | 383 | 228 | 576 | 296 | 416 | 610 | 421 | **418** | 253 | 160 | 390 | 253 | 342 | 552 | 290 | **320** |
| 11 | RP 6469-80 | 284 | 185 | 455 | 396 | 441 | 553 | 350 | **380** | 257 | 165 | 345 | 134 | 371 | 479 | 309 | **294** |
| 12 | RP 6469-88 | 146 | 303 | 480 | 450 | 416 | 678 | 185 | **380** | 247 | 277 | 359 | 193 | 347 | 575 | 146 | **306** |
| 13 | RP 6469-95 | 293 | 283 | 545 | 176 | 412 | 662 | 317 | **384** | 216 | 220 | 379 | 158 | 350 | 531 | 280 | **305** |
| 14 | RP 6469-151 | 448 | 235 | 430 | 223 | 415 | 615 | 336 | **386** | 287 | 217 | 315 | 205 | 348 | 440 | 293 | **301** |
| 15 | RP 6469-151a | 346 | 189 | 473 | 207 | 438 | 631 | 388 | **382** | 248 | 194 | 343 | 130 | 371 | 331 | 314 | **276** |
| | **Mean** | **328** | **236** | **526** | **302** | **422** | **623** | **330** | **395** | **243** | **188** | **388** | **183** | **354** | **501** | **268** | **304** |
| | LSD (Treat) | | | | | | 8.32** | | | LSD (Treat x Variety) | | | | | | | ns |
| | LSD (Location x Treat) | | | | | | 22.02** | | | LSD (Location x Treat x Variety) | | | | | | | 59.46** |
| | LSD (Variety) | | | | | | ns | | | CV (%) Treat | | | | | | | 10.04 |
| | LSD (Location x Variety) | | | | | | 42.04** | | | | | | | | | | |

**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) | | | | | ns | | | LSD (Treat x Variety) | | | | | | ns |
| | LSD (Location x Treat) | | | | | 0.82** | | | LSD (Location x Treat x Variety) | | | | | | 3.37** |
| | LSD (Variety) | | | | | 0.97** | | | CV (%) Treat | | | | | | 6.75 |
| | LSD (Location x Variety) | | | | | 2.38** | | | | | | | | | |

**Table 6.2.11 Influence of drought on total dry matter (g/m$^2$) 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 | 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) | | | | | 23.33** | | | LSD (Treat x Variety) | | | | | | ns |
| | LSD (Location x Treat) | | | | | 57.15** | | | LSD (Location x Treat x Variety) | | | | | | 149.90** |
| | LSD (Variety) | | | | | ns | | | CV (%) Treat | | | | | | 9.46 |
| | LSD (Location x Variety) | | | | | 105.99** | | | | | | | | | |

**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) | | | | | 0.92* | | | LSD (Treat x Variety) | | | | | | ns |
| | LSD (Location x Treat) | | | | | 2.26* | | | LSD (Location x Treat x Variety) | | | | | | 7.65** |
| | LSD (Variety) | | | | | ns | | | CV (%) Treat | | | | | | 14.26 |
| | LSD (Location x Variety) | | | | | 5.41** | | | | | | | | | |

**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/m2) | Yield Rank (Yn) | Adj-rank | Adjustment to Yield Rank (Yn) | Stability Variance (σi2) | 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.

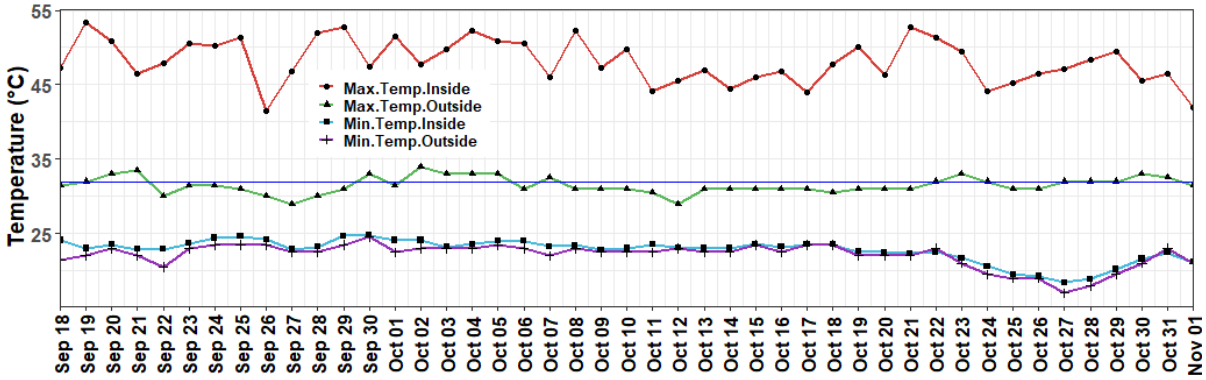



**Fig 6.3.1** *Maximum and minimum temperatures recorded between PI and maturity stages of rice crop inside and outside of the polythene tunnel at IIRR, Hyderabad during Kharif 2024. Horizontal blue line represents the threshold high temperature (32°C) for rice.*

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.

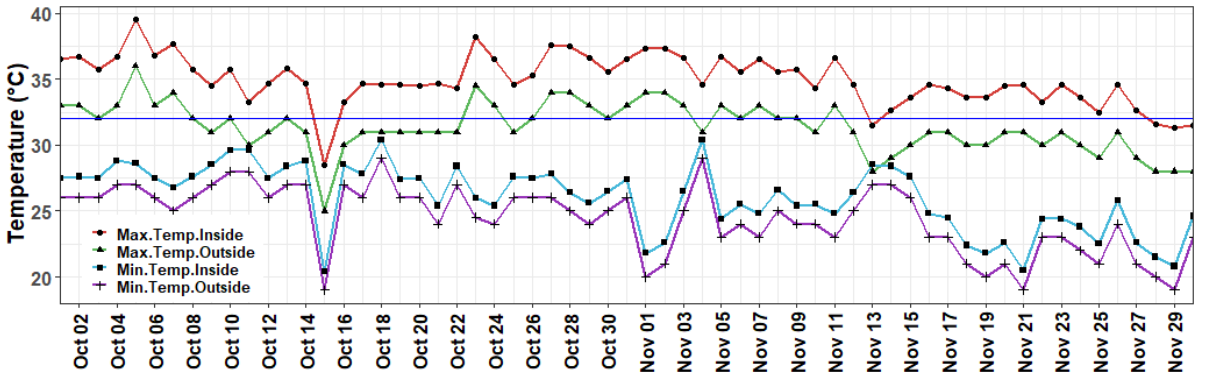



**Fig 6.3.2** *Maximum and minimum temperatures recorded between PI and maturity stages of rice crop inside and outside of the polythene tunnel at Maruteru during Kharif 2024. Horizontal blue line represents the threshold high temperature (32°C) for rice.*

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.

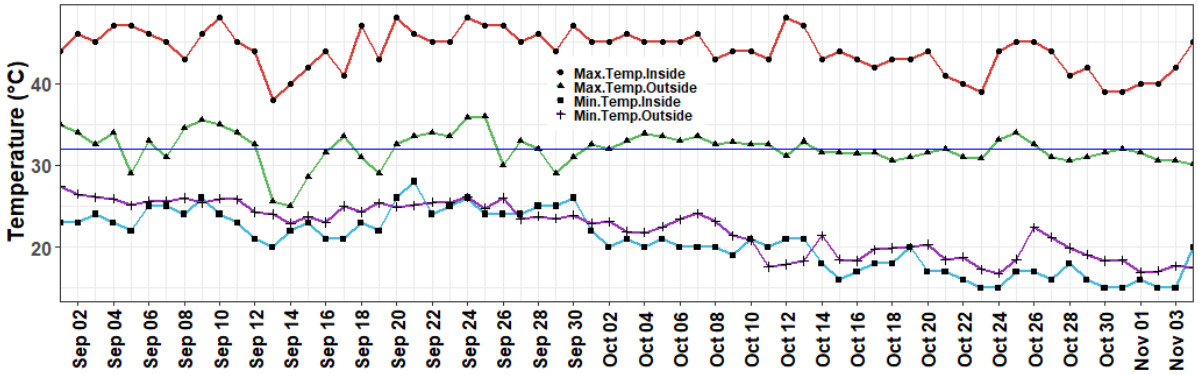



**Fig 6.3.3** *Maximum and minimum temperatures recorded between PI and maturity stages of rice crop inside and outside of the polythene tunnel at Pantnagar during Kharif 2024. Horizontal blue line represents the threshold high temperature (32°C) for rice.*

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.

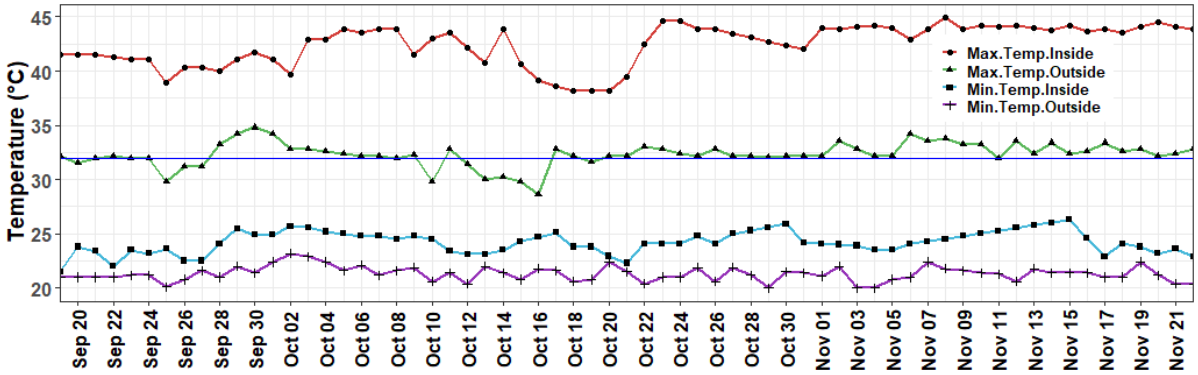



**Fig 6.3.4** *Maximum and minimum temperatures recorded between PI and maturity stages of rice crop inside and outside of the polythene tunnel at Pattambi, Kerala during Kharif 2024. Horizontal blue line represents the threshold high temperature (32°C) for rice.*

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.

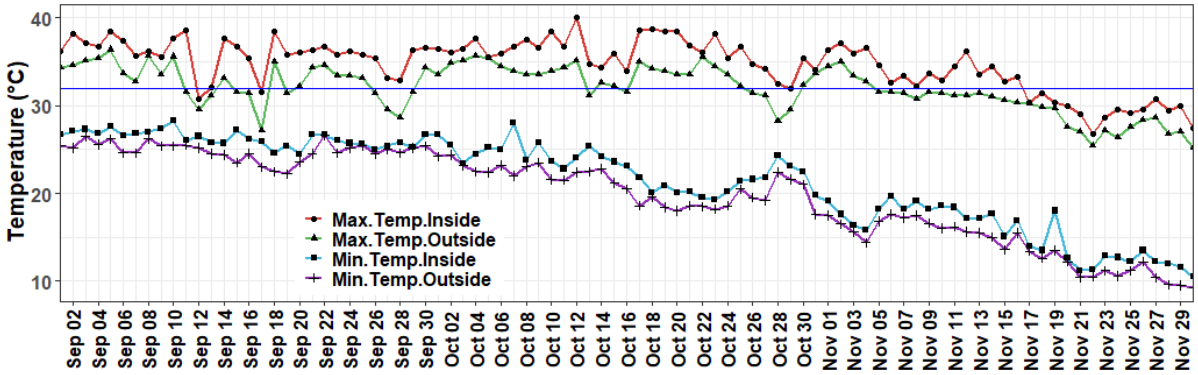



**Fig 6.3.5** *Maximum and minimum temperatures recorded between PI and maturity stages of rice crop inside and outside of the polythene tunnel at Rewa during Kharif 2024. Horizontal blue line represents the threshold high temperature (32ºC) for rice.*

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

$g/m^2$ at Maruteru followed by 113 $g/m^2$ at Titabar, 152 $g/m^2$ at IIRR to 169 $g/m^2$ at Rewa followed by with an overall mean of 122 $g/m^2$. Heat stress treatment did not significantly influenced the panicle weight of entries.

Mean total dry matter at different locations ranged from 526 $g/m^2$ at Maruteru to 992 $g/m^2$ at Rewa with a grand mean of 591 $g/m^2$ in control (Table 6.3.7). In heat stress, it ranged from 465 $g/m^2$ at Maruteru followed by 548 $g/m^2$ at Pantnagar, 913 $g/m^2$ at IIRR to 964 $g/m^2$ at Rewa with a grand mean of 668 $g/m^2$. 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 ($g/m^2$) ranged from 447 $g/m^2$ at Titabar to 1102 $g/m^2$ at Pattambi with a grand mean of 693 $g/m^2$ whereas in heat stress, it ranged from 370 $g/m^2$ at Titabar to 1002 $g/m^2$ at Pattambi with a grand mean of 613 $g/m^2$ (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).

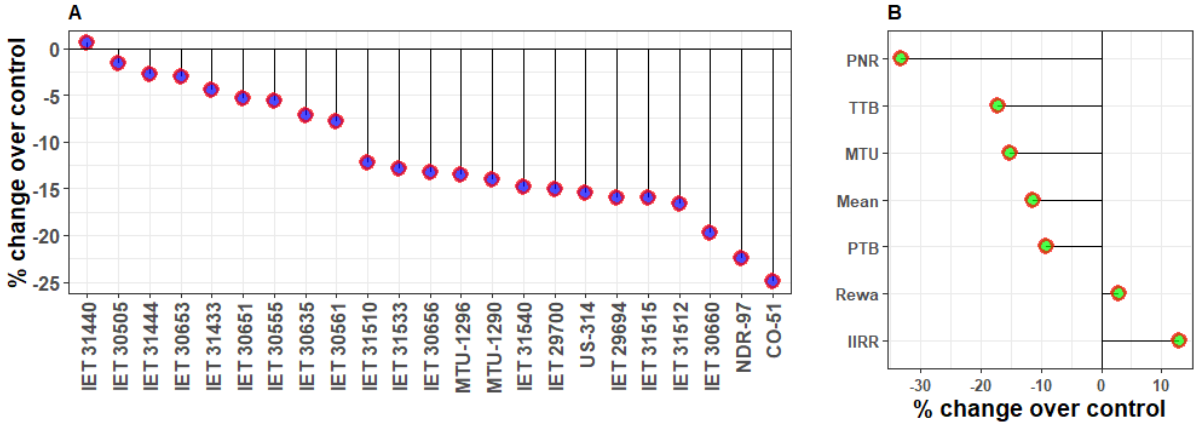



**Fig 6.3.6** *Influence of elevated temperature on shoot weight (g/m$^2$) recorded at maturity. Each bar represents percent change in shoot weight under elevated temperature in comparison with control (A) mean of all locations, (B) mean of all genotypes.*

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%).

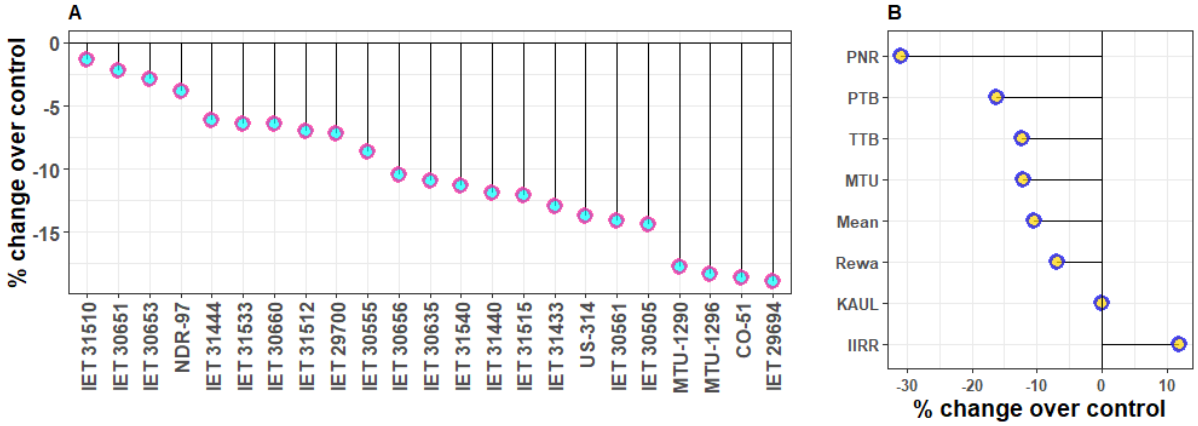



**Fig 6.3.7** *Influence of elevated temperature on panicle number/m$^2$ recorded at maturity. Each bar represents percent change in panicle number under elevated temperature in comparison with control (A) mean of all locations, (B) mean of all genotypes.*

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).

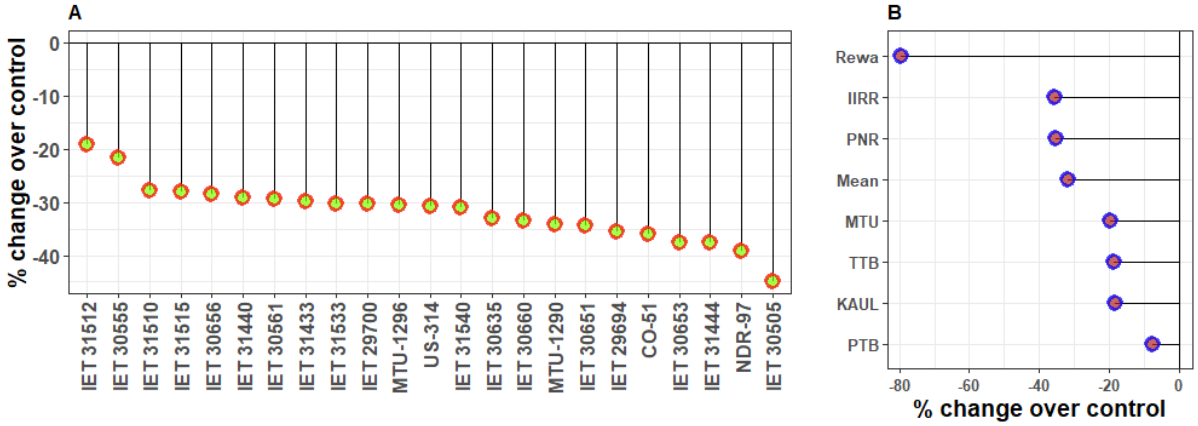



**Fig 6.3.8** *Influence of elevated temperature on grain number per/panicle recorded at maturity. Each bar represents percent change in grain number under elevated temperature in comparison with control (A) mean of all locations, (B) mean of all genotypes.*

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).

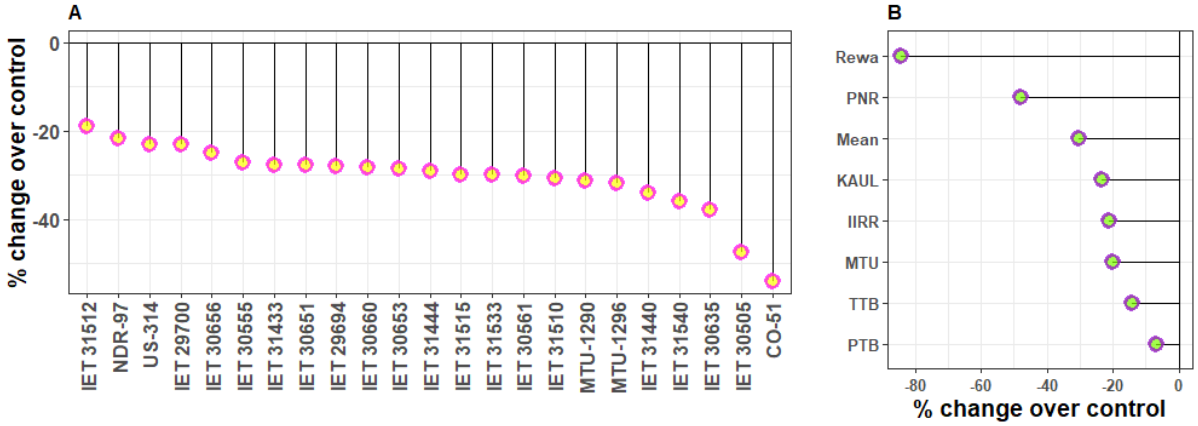



**Fig 6.3.9** *Influence of elevated temperature on grain yield (g/m$^2$) recorded at maturity. Each bar represents percent change in grain yield under elevated temperature in comparison with control (A) mean of all locations, (B) mean of all genotypes.*

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 mater 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 mater change with heat stress over control followed by Kaul (about -15%) whereas Pantnagar has recorded about -38% total dry mater change over control followed by Rewa (-33%) (Fig 6.3.10B).

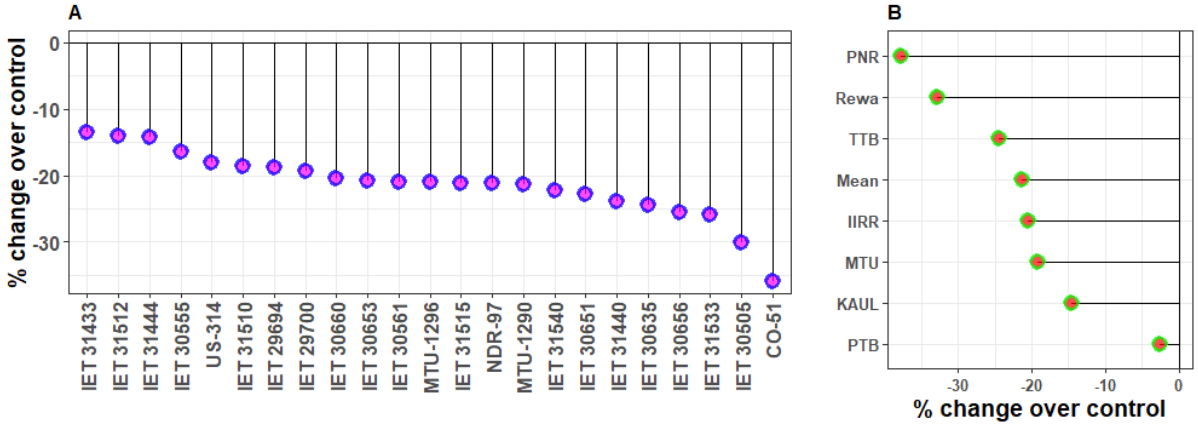



**Fig 6.3.10** *Influence of elevated temperature on total dry matter (g/m$^2$) recorded at maturity. Each bar represents percent change in total dry matter under elevated temperature in comparison with control (A) mean of all locations, (B) mean of all genotypes.*

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).

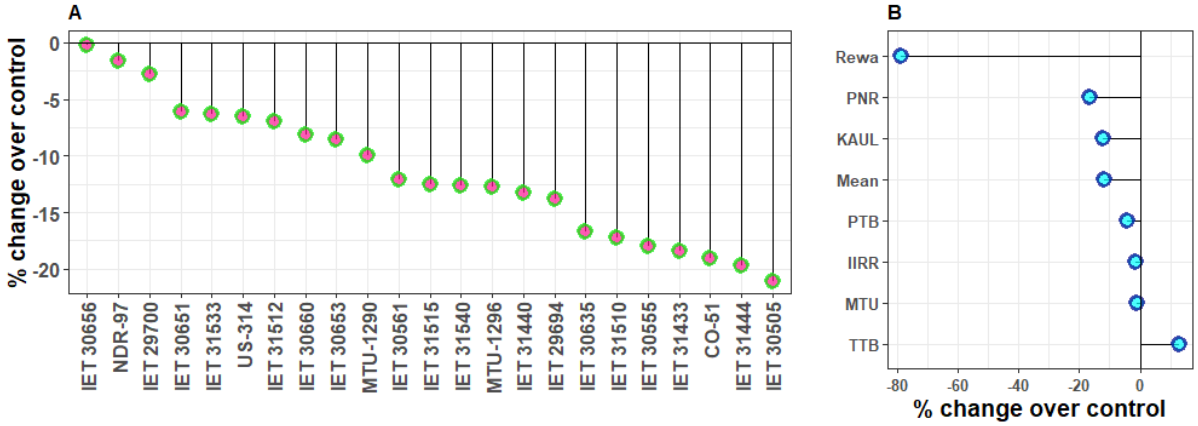



**Fig 6.3.11** *Influence of elevated temperature on harvest index (%) recorded at maturity. Each bar represents percent change in harvest index under elevated temperature in comparison with control (A) mean of all locations, (B) mean of all genotypes.*

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 Ys, 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 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 can be selected as they produced relatively higher yield under heat stress condition and showed a lower variation.

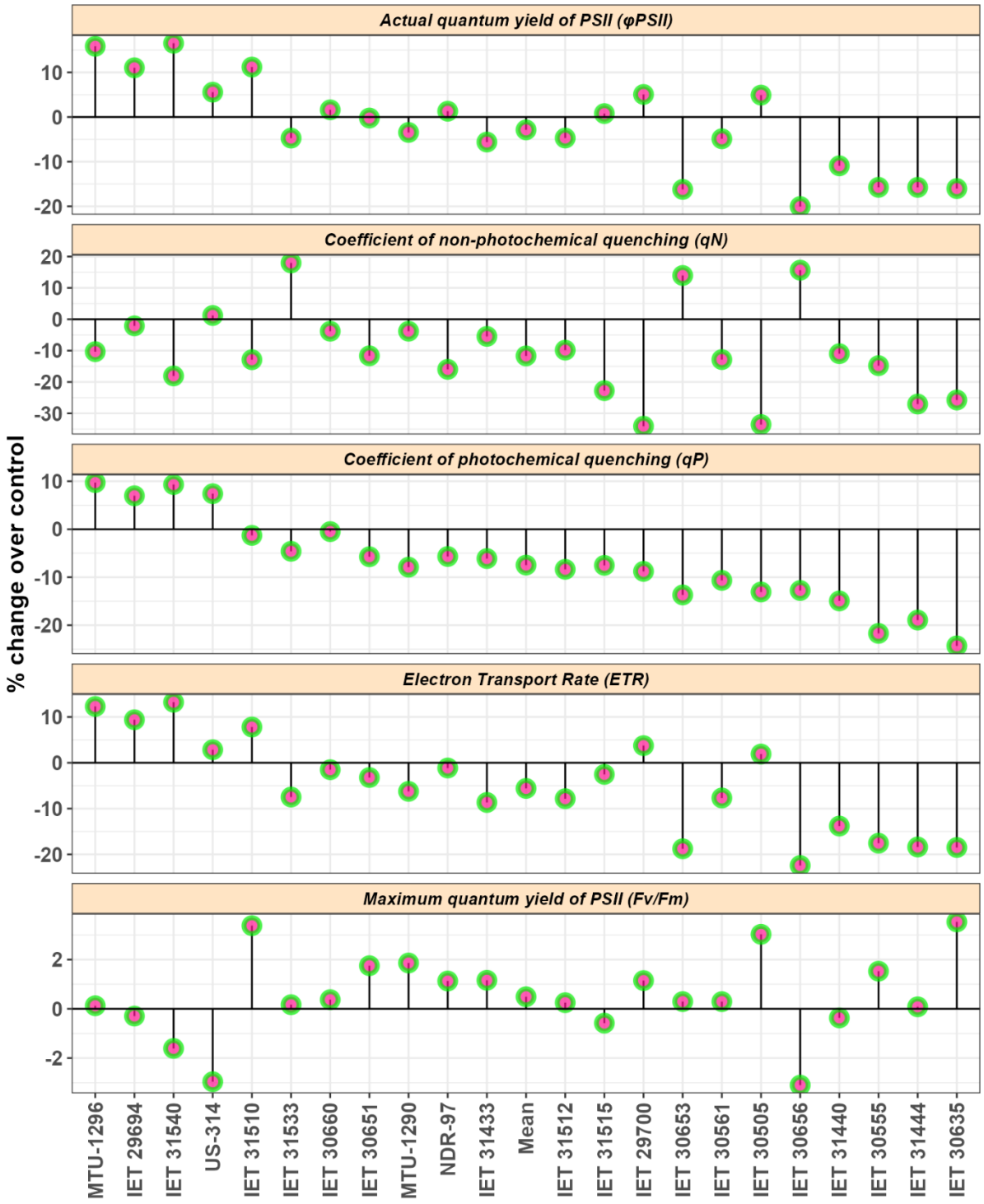



**Fig 6.3.12** *Percentage change in chlorophyll fluorescence traits under heat stress with respect to control at IIRR during Kharif 2024.*

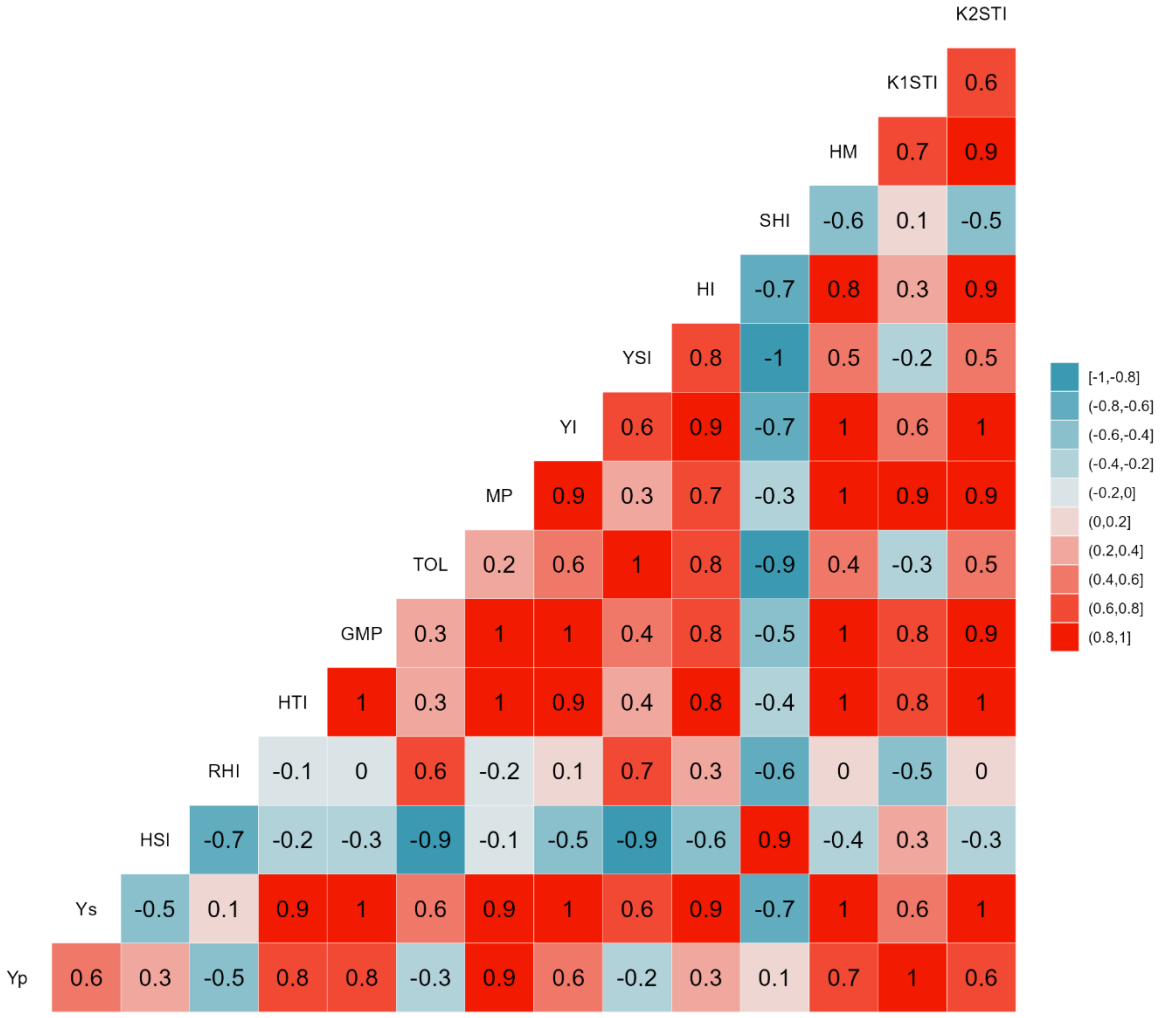



**Fig 6.3.13** *Correlation between grain yield recorded under control and elevated temperature condition and heat indices computed from grain yield recorded under both control and elevated temperature condition. Mean yield data from all locations was used for computing the correlation coefficients.*

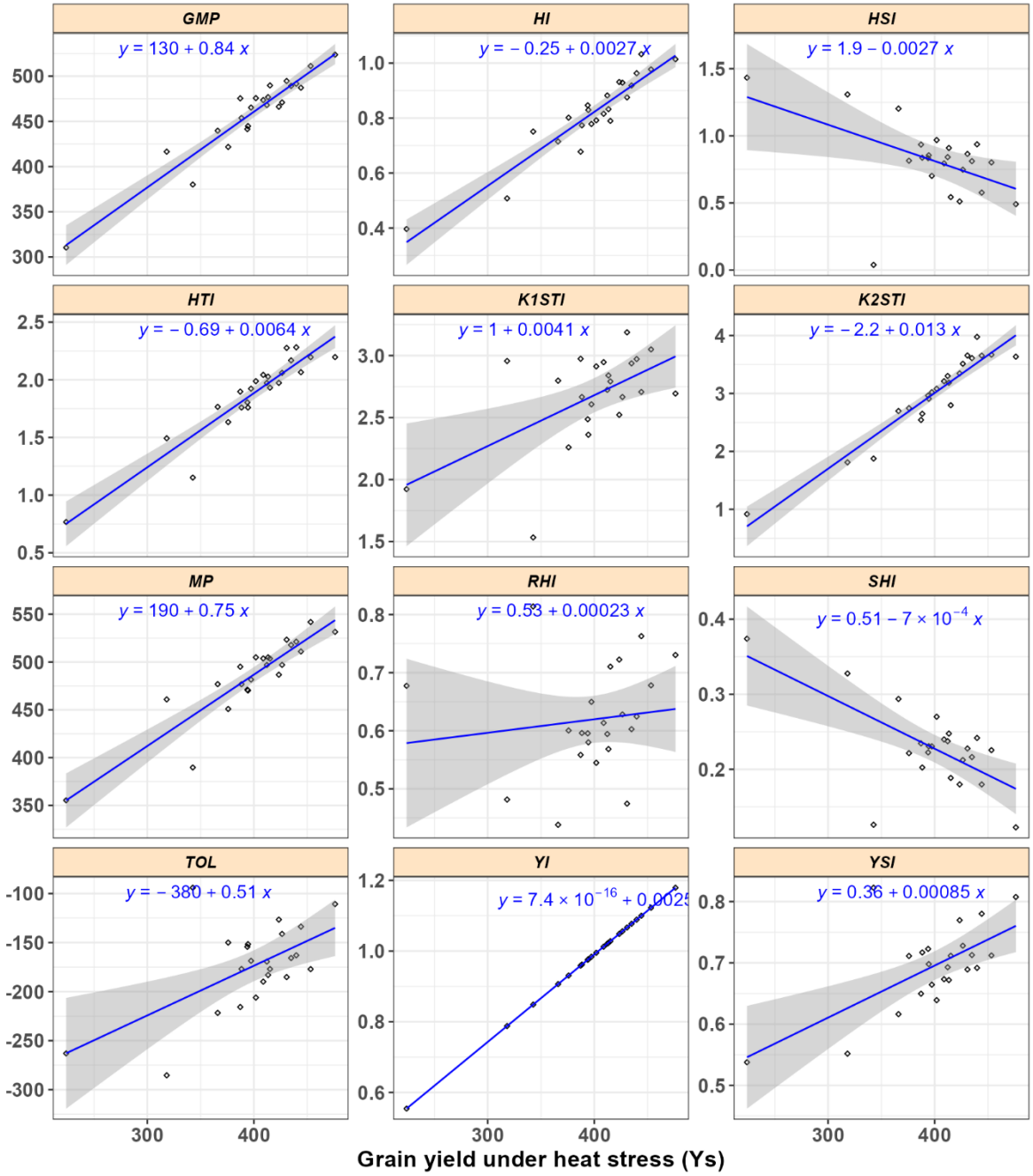



**Fig 6.3.14** *Relationship between heat stress indices and grain yield recorded under elevated temperature (Ys). Mean of grain yield recorded at different locations was used for regression analysis.*

**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) | | | | ns | | | LSD (Treat x Variety) | | | | | ns | |
| | | LSD (Location x Treat) | | | | 0.38** | | | LSD (Location x Treat x Variety) | | | | | 1.95** | |
| | | LSD (Variety) | | | | 0.56** | | | CV (%) Treat | | | | | 0.88 | |
| | | LSD (Location x Variety) | | | | 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) | | | | 0.07* | | | LSD (Treat x Variety) | | | | | 0.65* | |
| | | LSD (Location x Treat) | | | | 0.27** | | | LSD (Location x Treat x Variety) | | | | | 2.09** | |
| | | LSD (Variety) | | | | 0.60** | | | CV (%) Treat | | | | | 0.44 | |
| | | LSD (Location x Variety) | | | | 1.48** | | | | | | | | | |

**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 | TTB | | IIRR | KAUL | MTU | PNR | PTB | Rewa | TTB | |
| 1 | CO-51 | - | - | - | 99 | - | 112 | 78 | **96** | - | - | - | 91 | - | 121 | 88 | **100** |
| 2 | IET 29694 | 100 | 111 | 114 | 110 | 134 | 111 | 95 | **111** | 102 | 111 | 112 | 102 | 132 | 110 | 108 | **111** |
| 3 | IET 29700 | 98 | 103 | 127 | 109 | 91 | 114 | 93 | **105** | 91 | 102 | 126 | 103 | 110 | 115 | 115 | **109** |
| 4 | IET 30505 | 103 | 100 | 137 | 108 | 115 | 110 | 115 | **113** | 105 | 99 | 137 | 99 | 130 | 117 | 114 | **114** |
| 5 | IET 30555 | 93 | 110 | 127 | 108 | 94 | 116 | 101 | **107** | 99 | 111 | 125 | 103 | 126 | 118 | 109 | **113** |
| 6 | IET 30561 | 98 | 106 | 136 | 107 | 101 | 113 | 112 | **110** | 102 | 105 | 135 | 99 | 122 | 112 | 116 | **113** |
| 7 | IET 30635 | 106 | 112 | 143 | 107 | 111 | 125 | 105 | **115** | 105 | 111 | 140 | 98 | 140 | 119 | 104 | **117** |
| 8 | IET 30651 | 94 | 110 | 127 | 112 | 113 | 120 | 116 | **113** | 99 | 108 | 125 | 104 | 131 | 117 | 123 | **115** |
| 9 | IET 30653 | 97 | 92 | 129 | 109 | 99 | 116 | 99 | **106** | 100 | 93 | 128 | 96 | 122 | 118 | 109 | **109** |
| 10 | IET 30656 | 102 | 93 | 140 | 107 | 98 | 114 | 112 | **109** | 105 | 92 | 139 | 101 | 128 | 121 | 112 | **114** |
| 11 | IET 30660 | 100 | 100 | 120 | 105 | 102 | 115 | 99 | **106** | 105 | 98 | 119 | 95 | 116 | 120 | 97 | **107** |
| 12 | IET 31433 | 97 | 82 | 123 | 108 | 97 | 117 | 98 | **103** | 96 | 81 | 122 | 98 | 120 | 118 | 104 | **106** |
| 13 | IET 31440 | 103 | 93 | 136 | 117 | 121 | 118 | 114 | **115** | 105 | 92 | 135 | 108 | 139 | 121 | 109 | **115** |
| 14 | IET 31444 | 102 | 101 | 123 | 113 | 97 | 118 | 101 | **108** | 102 | 101 | 122 | 102 | 130 | 119 | 110 | **112** |
| 15 | IET 31510 | 101 | 100 | 118 | 106 | 102 | 115 | 110 | **107** | 92 | 100 | 116 | 97 | 134 | 120 | 111 | **110** |
| 16 | IET 31512 | 87 | 84 | 113 | 102 | 96 | 116 | 101 | **100** | 91 | 85 | 111 | 94 | 109 | 119 | 102 | **101** |
| 17 | IET 31515 | 106 | 110 | 143 | 110 | 118 | 113 | 122 | **117** | 107 | 109 | 140 | 100 | 138 | 111 | 111 | **117** |
| 18 | IET 31533 | 102 | 95 | 137 | 109 | 115 | 117 | 105 | **112** | 105 | 95 | 136 | 104 | 138 | 116 | 105 | **114** |
| 19 | IET 31540 | 100 | 97 | 126 | 109 | 108 | 116 | 106 | **109** | 95 | 96 | 124 | 103 | 115 | 118 | 106 | **108** |
| 20 | MTU-1290 | 98 | 93 | 113 | 107 | 99 | 118 | 97 | **104** | 99 | 92 | 112 | 98 | 108 | 118 | 105 | **105** |
| 21 | MTU-1296 | 96 | 82 | 118 | 98 | 99 | 116 | 96 | **101** | 91 | 83 | 116 | 86 | 114 | 118 | 104 | **102** |
| 22 | NDR-97 | 80 | 97 | 108 | - | 97 | - | 111 | **99** | 85 | 95 | 106 | - | 103 | - | 115 | **101** |
| 23 | US-314 | 89 | 97 | 130 | 118 | 96 | 119 | 90 | **106** | 93 | 97 | 128 | 112 | 112 | 124 | 99 | **109** |
| | **Mean** | **98** | **99** | **127** | **108** | **105** | **116** | **103** | **107** | **99** | **98** | **125** | **100** | **123** | **118** | **108** | **110** |
| | | LSD (Treat) | | | | | ns | | | LSD (Treat x Variety) | | | | | | ns | |
| | | LSD (Location x Treat) | | | | | 1.87** | | | LSD (Location x Treat x Variety) | | | | | | 7.79** | |
| | | LSD (Variety) | | | | | 2.08** | | | CV (%) Treat | | | | | | 3.52 | |
| | | LSD (Location x Variety) | | | | | 5.51** | | | | | | | | | | |

**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) | | | | ns | | | LSD (Treat x Variety) | | | | | ns | |
| | | LSD (Location x Treat) | | | | 9.18** | | | LSD (Location x Treat x Variety) | | | | | 49.32** | |
| | | LSD (Variety) | | | | ns | | | CV (%) Treat | | | | | 10.32 | |
| | | LSD (Location x Variety) | | | | 34.87** | | | | | | | | | |

**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 | TTB | |
| 1 | CO-51 | - | - | 425 | - | 531 | 205 | **387** | - | - | 189 | - | 509 | 163 | **287** |
| 2 | IET 29694 | 565 | 374 | 498 | 361 | 556 | 313 | **445** | 660 | 319 | 375 | 341 | 581 | 290 | **427** |
| 3 | IET 29700 | 568 | 314 | 513 | 250 | 509 | 362 | **419** | 541 | 303 | 315 | 375 | 479 | 223 | **373** |
| 4 | IET 30505 | 661 | 361 | 287 | 564 | 535 | 314 | **454** | 663 | 328 | 227 | 450 | 513 | 281 | **410** |
| 5 | IET 30555 | 693 | 369 | 486 | 328 | 505 | 257 | **439** | 627 | 307 | 361 | 492 | 487 | 237 | **418** |
| 6 | IET 30561 | 656 | 382 | 411 | 294 | 570 | 220 | **422** | 555 | 368 | 275 | 314 | 582 | 218 | **385** |
| 7 | IET 30635 | 737 | 350 | 507 | 517 | 517 | 411 | **506** | 663 | 314 | 329 | 628 | 513 | 309 | **459** |
| 8 | IET 30651 | 630 | 401 | 526 | 583 | 511 | 336 | **498** | 447 | 366 | 380 | 422 | 497 | 224 | **389** |
| 9 | IET 30653 | 498 | 362 | 365 | 383 | 568 | 262 | **407** | 485 | 343 | 247 | 225 | 566 | 213 | **347** |
| 10 | IET 30656 | 549 | 341 | 345 | 478 | 550 | 306 | **428** | 570 | 325 | 271 | 378 | 538 | 263 | **391** |
| 11 | IET 30660 | 608 | 331 | 325 | 372 | 546 | 206 | **398** | 667 | 331 | 206 | 400 | 537 | 178 | **386** |
| 12 | IET 31433 | 633 | 384 | 481 | 467 | 522 | 290 | **463** | 510 | 305 | 286 | 431 | 528 | 309 | **395** |
| 13 | IET 31440 | 610 | 386 | 303 | 578 | 576 | 269 | **454** | 653 | 285 | 225 | 525 | 544 | 312 | **424** |
| 14 | IET 31444 | 733 | 416 | 578 | 333 | 526 | 321 | **485** | 574 | 320 | 436 | 417 | 511 | 321 | **430** |
| 15 | IET 31510 | 630 | 317 | 329 | 417 | 555 | 302 | **425** | 393 | 276 | 204 | 556 | 506 | 216 | **358** |
| 16 | IET 31512 | 479 | 411 | 343 | 317 | 534 | 259 | **391** | 521 | 346 | 217 | 267 | 531 | 236 | **353** |
| 17 | IET 31515 | 642 | 365 | 577 | 444 | 528 | 251 | **468** | 621 | 362 | 247 | 206 | 542 | 242 | **370** |
| 18 | IET 31533 | 482 | 350 | 357 | 333 | 487 | 264 | **379** | 502 | 311 | 307 | 389 | 491 | 216 | **369** |
| 19 | IET 31540 | 461 | 397 | 612 | 533 | 485 | 321 | **468** | 555 | 366 | 466 | 269 | 501 | 213 | **395** |
| 20 | MTU-1290 | 543 | 362 | 248 | 400 | 496 | 270 | **386** | 510 | 343 | 176 | 358 | 472 | 248 | **351** |
| 21 | MTU-1296 | 564 | 338 | 394 | 372 | 519 | 286 | **412** | 547 | 324 | 336 | 342 | 509 | 243 | **384** |
| 22 | NDR-97 | 659 | 376 | - | 344 | - | 291 | **418** | 369 | 307 | - | 233 | - | 247 | **289** |
| 23 | US-314 | 494 | 386 | 438 | 478 | 569 | 332 | **450** | 623 | 280 | 337 | 278 | 576 | 307 | **400** |
| | **Mean** | **595** | **367** | **425** | **416** | **532** | **289** | **435** | **557** | **324** | **291** | **377** | **523** | **248** | **382** |
| | | LSD (Treat) | | | | 10.42* | | | LSD (Treat x Variety) | | | | | ns | |
| | | LSD (Location x Treat) | | | | 35.80** | | | LSD (Location x Treat x Variety) | | | | | 104.36** | |
| | | LSD (Variety) | | | | 30.12** | | | CV (%) Treat | | | | | 17.38 | |
| | | LSD (Location x Variety) | | | | 73.79** | | | | | | | | | |

**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 | TTB | |
| 1 | CO-51 | - | - | 163 | - | 122 | 131 | **139** | - | - | 78 | - | 126 | 61 | **88** |
| 2 | IET 29694 | 185 | 53 | 184 | 200 | 135 | 227 | **164** | 200 | 48 | 109 | 94 | 133 | 110 | **116** |
| 3 | IET 29700 | 175 | 45 | 235 | 233 | 238 | 245 | **195** | 218 | 41 | 139 | 183 | 241 | 98 | **153** |
| 4 | IET 30505 | 123 | 50 | 129 | 206 | 204 | 114 | **138** | 137 | 47 | 105 | 178 | 208 | 81 | **126** |
| 5 | IET 30555 | 184 | 50 | 214 | 161 | 205 | 157 | **162** | 153 | 45 | 105 | 89 | 207 | 179 | **130** |
| 6 | IET 30561 | 156 | 52 | 256 | 128 | 202 | 106 | **150** | 160 | 49 | 174 | 75 | 205 | 107 | **128** |
| 7 | IET 30635 | 129 | 48 | 206 | 267 | 151 | 123 | **154** | 114 | 45 | 124 | 200 | 153 | 121 | **126** |
| 8 | IET 30651 | 118 | 54 | 231 | 358 | 131 | 106 | **167** | 102 | 51 | 174 | 267 | 134 | 124 | **142** |
| 9 | IET 30653 | 105 | 51 | 159 | 331 | 130 | 147 | **154** | 129 | 48 | 102 | 58 | 134 | 119 | **98** |
| 10 | IET 30656 | 151 | 48 | 144 | 261 | 144 | 137 | **147** | 126 | 46 | 108 | 61 | 148 | 158 | **108** |
| 11 | IET 30660 | 146 | 47 | 117 | 178 | 156 | 184 | **138** | 167 | 45 | 97 | 117 | 161 | 103 | **115** |
| 12 | IET 31433 | 230 | 54 | 161 | 189 | 146 | 97 | **146** | 196 | 45 | 113 | 219 | 149 | 167 | **148** |
| 13 | IET 31440 | 152 | 53 | 206 | 144 | 211 | 171 | **156** | 183 | 40 | 98 | 133 | 217 | 96 | **128** |
| 14 | IET 31444 | 235 | 59 | 184 | 150 | 205 | 113 | **158** | 187 | 47 | 121 | 172 | 210 | 114 | **142** |
| 15 | IET 31510 | 158 | 47 | 145 | 117 | 157 | 218 | **140** | 66 | 41 | 110 | 344 | 160 | 122 | **140** |
| 16 | IET 31512 | 141 | 59 | 137 | 233 | 145 | 109 | **137** | 135 | 51 | 97 | 144 | 149 | 140 | **119** |
| 17 | IET 31515 | 134 | 53 | 184 | 161 | 147 | 109 | **131** | 160 | 51 | 130 | 56 | 149 | 116 | **110** |
| 18 | IET 31533 | 162 | 51 | 141 | 244 | 96 | 110 | **134** | 162 | 45 | 138 | 183 | 99 | 70 | **116** |
| 19 | IET 31540 | 160 | 55 | 178 | 278 | 137 | 107 | **153** | 180 | 51 | 117 | 114 | 139 | 99 | **117** |
| 20 | MTU-1290 | 137 | 51 | 122 | 100 | 161 | 125 | **116** | 139 | 48 | 97 | 125 | 164 | 92 | **111** |
| 21 | MTU-1296 | 128 | 48 | 172 | 283 | 224 | 211 | **178** | 139 | 45 | 133 | 111 | 228 | 86 | **124** |
| 22 | NDR-97 | 134 | 54 | - | 350 | - | 108 | **162** | 113 | 42 | - | 94 | - | 75 | **81** |
| 23 | US-314 | 114 | 58 | 212 | 211 | 203 | 126 | **154** | 182 | 42 | 123 | 44 | 206 | 172 | **128** |
| | **Mean** | **153** | **52** | **176** | **217** | **166** | **143** | **151** | **152** | **46** | **118** | **139** | **169** | **113** | **122** |
| | | LSD (Treat) | | | | ns | | | LSD (Treat x Variety) | | | | | ns | |
| | | LSD (Location x Treat) | | | | 21.20** | | | LSD (Location x Treat x Variety) | | | | | 64.26** | |
| | | LSD (Variety) | | | | 18.55** | | | CV (%) Treat | | | | | 30.88 | |
| | | LSD (Location x Variety) | | | | 45.44** | | | | | | | | | |

**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) | | | | ns | | | LSD (Treat x Variety) | | | | | ns | |
| | | LSD (Location x Treat) | | | | 45.89** | | | LSD (Location x Treat x Variety) | | | | | 157.99** | |
| | | LSD (Variety) | | | | 45.60** | | | CV (%) Treat | | | | | 12.62 | |
| | | LSD (Location x Variety) | | | | 111.71** | | | | | | | | | |

**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 | | | Grand Mean | Heat Stress | | | Grand Mean | Control | | | Grand Mean | Heat Stress | | | Grand Mean |
| | | IIRR | KAUL | Rewa | | 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 | TTB | |
| 1 | CO-51 | - | - | 797 | - | 569 | 349 | **572** | - | - | 432 | - | 602 | 254 | **429** |
| 2 | IET 29694 | 467 | 917 | 667 | 872 | 632 | 489 | **674** | 606 | 686 | 498 | 576 | 638 | 393 | **566** |
| 3 | IET 29700 | 432 | 832 | 675 | 1078 | 545 | 540 | **684** | 545 | 620 | 566 | 825 | 564 | 361 | **580** |
| 4 | IET 30505 | 543 | 904 | 719 | 967 | 586 | 387 | **684** | 722 | 786 | 484 | 992 | 593 | 461 | **673** |
| 5 | IET 30555 | 456 | 808 | 678 | 1239 | 567 | 445 | **699** | 595 | 608 | 542 | 1272 | 577 | 362 | **659** |
| 6 | IET 30561 | 482 | 846 | 660 | 1233 | 645 | 362 | **705** | 634 | 705 | 458 | 1077 | 670 | 351 | **649** |
| 7 | IET 30635 | 561 | 797 | 745 | 1294 | 567 | 597 | **760** | 769 | 597 | 493 | 1296 | 592 | 485 | **705** |
| 8 | IET 30651 | 531 | 824 | 805 | 1278 | 563 | 538 | **757** | 834 | 792 | 557 | 1139 | 583 | 391 | **716** |
| 9 | IET 30653 | 445 | 707 | 592 | 806 | 615 | 405 | **595** | 506 | 594 | 438 | 1027 | 634 | 261 | **577** |
| 10 | IET 30656 | 557 | 897 | 637 | 1250 | 603 | 476 | **737** | 563 | 780 | 344 | 1004 | 612 | 530 | **639** |
| 11 | IET 30660 | 556 | 777 | 737 | 1078 | 604 | 340 | **682** | 521 | 726 | 363 | 788 | 607 | 278 | **547** |
| 12 | IET 31433 | 474 | 856 | 699 | 1239 | 577 | 462 | **718** | 634 | 740 | 585 | 1122 | 602 | 432 | **686** |
| 13 | IET 31440 | 471 | 898 | 794 | 733 | 580 | 352 | **638** | 568 | 754 | 429 | 1068 | 597 | 434 | **642** |
| 14 | IET 31444 | 529 | 746 | 760 | 828 | 587 | 444 | **649** | 506 | 651 | 576 | 1004 | 613 | 437 | **631** |
| 15 | IET 31510 | 533 | 900 | 828 | 1189 | 578 | 472 | **750** | 698 | 813 | 519 | 1024 | 582 | 312 | **658** |
| 16 | IET 31512 | 431 | 839 | 723 | 1239 | 577 | 436 | **707** | 389 | 805 | 360 | 995 | 625 | 365 | **590** |
| 17 | IET 31515 | 552 | 786 | 672 | 1355 | 600 | 402 | **728** | 555 | 639 | 395 | 1056 | 611 | 412 | **611** |
| 18 | IET 31533 | 491 | 772 | 868 | 1089 | 551 | 372 | **691** | 530 | 743 | 550 | 956 | 563 | 270 | **602** |
| 19 | IET 31540 | 538 | 802 | 740 | 1114 | 557 | 480 | **705** | 537 | 681 | 533 | 994 | 571 | 288 | **601** |
| 20 | MTU-1290 | 543 | 818 | 721 | 1197 | 555 | 429 | **710** | 567 | 671 | 438 | 1088 | 565 | 336 | **611** |
| 21 | MTU-1296 | 509 | 864 | 622 | 1183 | 582 | 476 | **706** | 528 | 727 | 460 | 1025 | 593 | 328 | **610** |
| 22 | NDR-97 | 430 | 752 | - | 727 | - | 505 | **603** | 263 | 574 | - | 653 | - | 379 | **467** |
| 23 | US-314 | 542 | 824 | 917 | 1250 | 634 | 518 | **781** | 432 | 706 | 711 | 1060 | 660 | 390 | **660** |
| | **Mean** | **503** | **826** | **730** | **1102** | **585** | **447** | **693** | **568** | **700** | **488** | **1002** | **602** | **370** | **613** |
| | | LSD (Treat) | | | | ns | | | LSD (Treat x Variety) | | | | | ns | |
| | | LSD (Location x Treat) | | | | 25.72** | | | LSD (Location x Treat x Variety) | | | | | 153.03** | |
| | | LSD (Variety) | | | | 44.17** | | | CV (%) Treat | | | | | 7.79 | |
| | | LSD (Location x Variety) | | | | 108.21** | | | | | | | | | |

**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 | TTB | | IIRR | KAUL | PNR | PTB | Rewa | TTB | |
| 1 | CO-51 | - | - | 615 | - | 721 | 253 | **530** | - | - | 243 | - | 225 | 172 | **213** |
| 2 | IET 29694 | 1146 | 90 | 528 | 1009 | 789 | 577 | **690** | 1051 | 68 | 218 | 1080 | 183 | 466 | **511** |
| 3 | IET 29700 | 711 | 97 | 488 | 1145 | 924 | 795 | **693** | 798 | 79 | 307 | 1043 | 312 | 239 | **463** |
| 4 | IET 30505 | 909 | 64 | 468 | 1118 | 1056 | 414 | **671** | 448 | 40 | 268 | 747 | 241 | 221 | **328** |
| 5 | IET 30555 | 1084 | 82 | 482 | 1123 | 783 | 294 | **641** | 755 | 74 | 225 | 1254 | 233 | 499 | **507** |
| 6 | IET 30561 | 1124 | 73 | 333 | 1156 | 902 | 480 | **678** | 722 | 61 | 241 | 1236 | 247 | 393 | **483** |
| 7 | IET 30635 | 829 | 87 | 436 | 1203 | 804 | 648 | **668** | 375 | 86 | 272 | 925 | 183 | 652 | **415** |
| 8 | IET 30651 | 793 | 61 | 518 | 861 | 579 | 596 | **568** | 602 | 49 | 321 | 925 | 150 | 166 | **369** |
| 9 | IET 30653 | 791 | 52 | 393 | 1011 | 750 | 526 | **587** | 643 | 50 | 282 | 1005 | 155 | 183 | **386** |
| 10 | IET 30656 | 1040 | 64 | 423 | 1135 | 699 | 1076 | **739** | 867 | 53 | 274 | 1100 | 168 | 235 | **449** |
| 11 | IET 30660 | 812 | 63 | 541 | 1132 | 654 | 315 | **586** | 730 | 59 | 261 | 906 | 176 | 160 | **382** |
| 12 | IET 31433 | 1038 | 94 | 443 | 1017 | 840 | 613 | **674** | 843 | 78 | 320 | 1198 | 180 | 761 | **563** |
| 13 | IET 31440 | 946 | 71 | 623 | 1168 | 734 | 628 | **695** | 730 | 47 | 290 | 1065 | 254 | 292 | **446** |
| 14 | IET 31444 | 1074 | 62 | 542 | 805 | 844 | 609 | **656** | 981 | 52 | 253 | 978 | 246 | 472 | **497** |
| 15 | IET 31510 | 950 | 66 | 611 | 1022 | 732 | 586 | **661** | 835 | 48 | 263 | 912 | 187 | 433 | **446** |
| 16 | IET 31512 | 803 | 67 | 597 | 833 | 824 | 455 | **597** | 768 | 59 | 267 | 778 | 541 | 481 | **482** |
| 17 | IET 31515 | 934 | 62 | 388 | 1113 | 650 | 429 | **596** | 796 | 24 | 215 | 826 | 285 | 315 | **410** |
| 18 | IET 31533 | 923 | 73 | 663 | 900 | 1116 | 418 | **682** | 615 | 26 | 346 | 781 | 669 | 313 | **458** |
| 19 | IET 31540 | 1063 | 76 | 593 | 1121 | 745 | 422 | **670** | 769 | 45 | 362 | 952 | 266 | 262 | **443** |
| 20 | MTU-1290 | 1071 | 53 | 398 | 1025 | 1046 | 331 | **654** | 812 | 49 | 272 | 669 | 267 | 265 | **389** |
| 21 | MTU-1296 | 980 | 81 | 357 | 1159 | 891 | 399 | **644** | 832 | 46 | 223 | 804 | 265 | 295 | **411** |
| 22 | NDR-97 | 380 | 66 | - | 587 | - | 689 | **431** | 428 | 23 | - | 532 | - | 356 | **335** |
| 23 | US-314 | 1123 | 48 | 662 | 922 | 742 | 749 | **708** | 933 | 31 | 477 | 785 | 249 | 416 | **482** |
| | **Mean** | **933** | **71** | **504** | **1026** | **810** | **535** | **640** | **742** | **52** | **282** | **932** | **258** | **350** | **429** |
| | | LSD (Treat) | | | | 20.54* | | | LSD (Treat x Variety) | | | | | ns | |
| | | LSD (Location x Treat) | | | | 70.56** | | | LSD (Location x Treat x Variety) | | | | | 192.62** | |
| | | LSD (Variety) | | | | 55.60** | | | CV (%) Treat | | | | | 26.04 | |
| | | LSD (Location x Variety) | | | | 136.20** | | | | | | | | | |

**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 | TTB | |
| 1 | CO-51 | - | - | - | 317 | - | 255 | 430 | **334** | - | - | - | 250 | - | 235 | 330 | **272** |
| 2 | IET 29694 | 280 | 263 | 418 | 383 | 489 | 231 | 260 | **332** | 303 | 265 | 341 | 267 | 329 | 213 | 168 | **269** |
| 3 | IET 29700 | 317 | 256 | 451 | 267 | 567 | 236 | 330 | **346** | 360 | 253 | 385 | 200 | 528 | 221 | 302 | **321** |
| 4 | IET 30505 | 307 | 287 | 473 | 317 | 530 | 283 | 405 | **372** | 350 | 285 | 385 | 217 | 411 | 268 | 311 | **318** |
| 5 | IET 30555 | 313 | 273 | 484 | 283 | 417 | 238 | 387 | **342** | 343 | 277 | 385 | 183 | 400 | 222 | 378 | **313** |
| 6 | IET 30561 | 320 | 277 | 473 | 333 | 539 | 262 | 353 | **365** | 337 | 276 | 462 | 183 | 422 | 257 | 259 | **314** |
| 7 | IET 30635 | 230 | 262 | 506 | 333 | 428 | 258 | 344 | **337** | 280 | 264 | 451 | 217 | 311 | 244 | 336 | **301** |
| 8 | IET 30651 | 323 | 296 | 462 | 283 | 361 | 178 | 310 | **316** | 397 | 295 | 429 | 217 | 356 | 153 | 321 | **310** |
| 9 | IET 30653 | 313 | 288 | 418 | 267 | 383 | 183 | 344 | **314** | 383 | 286 | 396 | 183 | 383 | 165 | 336 | **305** |
| 10 | IET 30656 | 370 | 278 | 506 | 267 | 489 | 222 | 370 | **357** | 373 | 279 | 429 | 183 | 417 | 230 | 330 | **320** |
| 11 | IET 30660 | 277 | 284 | 506 | 333 | 467 | 167 | 353 | **341** | 300 | 287 | 473 | 217 | 439 | 148 | 369 | **319** |
| 12 | IET 31433 | 357 | 247 | 484 | 367 | 525 | 255 | 337 | **367** | 410 | 245 | 429 | 217 | 400 | 242 | 295 | **320** |
| 13 | IET 31440 | 343 | 296 | 495 | 333 | 389 | 265 | 312 | **348** | 310 | 295 | 418 | 233 | 367 | 250 | 270 | **306** |
| 14 | IET 31444 | 327 | 277 | 473 | 383 | 311 | 250 | 353 | **339** | 363 | 276 | 407 | 267 | 367 | 240 | 311 | **319** |
| 15 | IET 31510 | 333 | 264 | 495 | 317 | 417 | 254 | 362 | **349** | 377 | 265 | 484 | 233 | 456 | 232 | 362 | **344** |
| 16 | IET 31512 | 327 | 286 | 462 | 317 | 333 | 200 | 362 | **327** | 390 | 286 | 451 | 217 | 328 | 185 | 270 | **304** |
| 17 | IET 31515 | 303 | 293 | 473 | 283 | 494 | 218 | 337 | **343** | 363 | 294 | 451 | 217 | 306 | 196 | 286 | **302** |
| 18 | IET 31533 | 283 | 274 | 473 | 250 | 156 | 260 | 256 | **279** | 273 | 275 | 363 | 200 | 256 | 232 | 228 | **261** |
| 19 | IET 31540 | 320 | 275 | 495 | 317 | 433 | 255 | 330 | **346** | 380 | 276 | 396 | 233 | 311 | 224 | 330 | **307** |
| 20 | MTU-1290 | 337 | 286 | 484 | 333 | 517 | 268 | 311 | **362** | 353 | 282 | 429 | 233 | 317 | 252 | 220 | **298** |
| 21 | MTU-1296 | 340 | 277 | 473 | 267 | 572 | 255 | 288 | **353** | 357 | 278 | 396 | 183 | 317 | 234 | 254 | **289** |
| 22 | NDR-97 | 310 | 267 | 451 | - | 583 | - | 362 | **395** | 417 | 267 | 396 | - | 522 | - | 296 | **380** |
| 23 | US-314 | 327 | 279 | 429 | 367 | 517 | 181 | 454 | **365** | 363 | 278 | 374 | 233 | 378 | 171 | 403 | **314** |
| | **Mean** | **316** | **277** | **472** | **314** | **451** | **235** | **346** | **345** | **354** | **277** | **415** | **217** | **378** | **219** | **303** | **309** |
| | | LSD (Treat) | | | | | ns | | | LSD (Treat x Variety) | | | | | | ns | |
| | | LSD (Location x Treat) | | | | | 23.49** | | | LSD (Location x Treat x Variety) | | | | | | 82.6** | |
| | | LSD (Variety) | | | | | 22.10** | | | CV (%) Treat | | | | | | 14.74 | |
| | | LSD (Location x Variety) | | | | | 58.47** | | | | | | | | | | |

**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 | **131** | - | - | - | 137 | - | 28 | 87 | **84** |
| 2 | IET 29694 | 194 | 103 | 190 | 234 | 119 | 153 | 131 | **161** | 124 | 98 | 131 | 112 | 119 | 19 | 121 | **103** |
| 3 | IET 29700 | 76 | 123 | 145 | 180 | 146 | 130 | 119 | **131** | 81 | 121 | 121 | 67 | 138 | 27 | 84 | **91** |
| 4 | IET 30505 | 84 | 68 | 123 | 159 | 117 | 161 | 74 | **112** | 30 | 51 | 100 | 117 | 79 | 12 | 44 | **62** |
| 5 | IET 30555 | 132 | 117 | 116 | 132 | 149 | 113 | 65 | **118** | 73 | 114 | 98 | 117 | 166 | 11 | 66 | **92** |
| 6 | IET 30561 | 120 | 98 | 131 | 110 | 128 | 134 | 93 | **116** | 61 | 87 | 112 | 79 | 144 | 13 | 76 | **82** |
| 7 | IET 30635 | 119 | 121 | 140 | 110 | 130 | 111 | 101 | **119** | 35 | 121 | 114 | 100 | 99 | 11 | 77 | **80** |
| 8 | IET 30651 | 87 | 96 | 112 | 154 | 102 | 140 | 97 | **112** | 46 | 77 | 89 | 117 | 105 | 12 | 71 | **74** |
| 9 | IET 30653 | 100 | 65 | 174 | 85 | 118 | 162 | 64 | **110** | 49 | 68 | 142 | 72 | 87 | 12 | 50 | **68** |
| 10 | IET 30656 | 124 | 94 | 130 | 125 | 124 | 129 | 114 | **120** | 86 | 92 | 109 | 105 | 97 | 10 | 102 | **86** |
| 11 | IET 30660 | 114 | 92 | 117 | 179 | 129 | 162 | 70 | **123** | 89 | 89 | 89 | 120 | 95 | 11 | 80 | **82** |
| 12 | IET 31433 | 98 | 122 | 111 | 142 | 114 | 131 | 98 | **117** | 61 | 100 | 87 | 128 | 148 | 13 | 37 | **82** |
| 13 | IET 31440 | 89 | 99 | 151 | 160 | 126 | 111 | 128 | **124** | 70 | 72 | 122 | 98 | 125 | 15 | 111 | **88** |
| 14 | IET 31444 | 143 | 83 | 157 | 220 | 102 | 112 | 175 | **142** | 99 | 82 | 129 | 79 | 110 | 12 | 107 | **88** |
| 15 | IET 31510 | 104 | 89 | 136 | 168 | 120 | 112 | 99 | **118** | 76 | 63 | 123 | 104 | 109 | 13 | 111 | **85** |
| 16 | IET 31512 | 97 | 87 | 117 | 180 | 138 | 167 | 86 | **124** | 70 | 86 | 98 | 94 | 107 | 130 | 120 | **101** |
| 17 | IET 31515 | 120 | 84 | 168 | 192 | 183 | 129 | 87 | **138** | 95 | 47 | 138 | 118 | 153 | 51 | 91 | **99** |
| 18 | IET 31533 | 140 | 124 | 173 | 225 | 179 | 161 | 150 | **165** | 83 | 71 | 138 | 118 | 190 | 116 | 86 | **115** |
| 19 | IET 31540 | 176 | 148 | 233 | 153 | 192 | 116 | 101 | **160** | 91 | 111 | 173 | 77 | 166 | 39 | 114 | **110** |
| 20 | MTU-1290 | 145 | 99 | 150 | 144 | 129 | 160 | 114 | **134** | 85 | 91 | 109 | 119 | 98 | 29 | 87 | **88** |
| 21 | MTU-1296 | 109 | 101 | 120 | 147 | 132 | 130 | 89 | **118** | 101 | 78 | 100 | 101 | 108 | 13 | 74 | **82** |
| 22 | NDR-97 | 52 | 132 | 111 | - | 57 | - | 115 | **93** | 45 | 47 | 95 | - | 66 | - | 31 | **57** |
| 23 | US-314 | 152 | 88 | 166 | 171 | 109 | 137 | 64 | **127** | 106 | 56 | 130 | 130 | 114 | 17 | 61 | **88** |
| | **Mean** | **117** | **102** | **144** | **162** | **129** | **135** | **101** | **127** | **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) | | | | | 6.53** | | | 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) | | | | ns | | | LSD (Treat x Variety) | | | | | ns | |
| | | LSD (Location x Treat) | | | | 5.51** | | | LSD (Location x Treat x Variety) | | | | | 31.25** | |
| | | LSD (Variety) | | | | 9.02** | | | CV (%) Treat | | | | | 7.41 | |
| | | LSD (Location x Variety) | | | | 22.09** | | | | | | | | | |

**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 | | IIRR | KAUL | MTU | PNR | PTB | Rewa | TTB | |
| 1 | CO-51 | - | - | - | 62433 | - | 26777 | 35668 | **41626** | - | - | - | 34250 | - | 5316 | 28475 | **22680** |
| 2 | IET 29694 | 54383 | 3408 | 79629 | 89717 | 58119 | 33433 | 33926 | **50373** | 37651 | 3219 | 44847 | 29900 | 38903 | 2928 | 20395 | **25406** |
| 3 | IET 29700 | 24478 | 4046 | 65428 | 48100 | 82400 | 28956 | 39588 | **41857** | 29658 | 4004 | 46728 | 13400 | 72668 | 4644 | 24856 | **27994** |
| 4 | IET 30505 | 25680 | 2251 | 58047 | 50350 | 61899 | 43432 | 28846 | **38643** | 10377 | 1690 | 38621 | 25333 | 32263 | 1773 | 13516 | **17653** |
| 5 | IET 30555 | 41322 | 3863 | 56078 | 37450 | 62150 | 25208 | 24576 | **35807** | 25304 | 3777 | 37873 | 21500 | 65994 | 1243 | 24866 | **25794** |
| 6 | IET 30561 | 38420 | 3230 | 61666 | 36600 | 68498 | 33145 | 32855 | **39202** | 20527 | 2884 | 51656 | 14600 | 60593 | 2091 | 19093 | **24492** |
| 7 | IET 30635 | 27429 | 3991 | 70840 | 36833 | 55435 | 26915 | 34049 | **36499** | 9080 | 4000 | 51557 | 21550 | 30694 | 1488 | 26169 | **20648** |
| 8 | IET 30651 | 28298 | 3170 | 51062 | 43617 | 35430 | 23385 | 30060 | **30717** | 18228 | 2550 | 38082 | 25367 | 37489 | 1004 | 22813 | **20790** |
| 9 | IET 30653 | 31092 | 2156 | 72611 | 22767 | 44920 | 28038 | 22282 | **31981** | 18906 | 2233 | 56353 | 13183 | 33302 | 1072 | 17232 | **20326** |
| 10 | IET 30656 | 46418 | 3111 | 65780 | 33667 | 59752 | 26885 | 42133 | **39678** | 32267 | 3027 | 47091 | 19150 | 40589 | 1207 | 33564 | **25271** |
| 11 | IET 30660 | 30480 | 3040 | 59092 | 59733 | 60450 | 25347 | 24781 | **37561** | 26205 | 2948 | 42152 | 26050 | 41615 | 913 | 29597 | **24211** |
| 12 | IET 31433 | 34688 | 4039 | 53768 | 52300 | 59506 | 31565 | 33136 | **38429** | 25360 | 3285 | 37334 | 27933 | 58989 | 1805 | 10932 | **23663** |
| 13 | IET 31440 | 30573 | 3254 | 74910 | 53567 | 48439 | 27523 | 40049 | **39759** | 22617 | 2387 | 50754 | 22733 | 45722 | 2448 | 30341 | **25286** |
| 14 | IET 31444 | 45686 | 2750 | 74371 | 84200 | 31457 | 26290 | 60512 | **46467** | 36196 | 2699 | 52162 | 21067 | 40061 | 1663 | 33432 | **26754** |
| 15 | IET 31510 | 35790 | 2941 | 67452 | 53100 | 49963 | 26712 | 35888 | **38835** | 28884 | 2086 | 59477 | 24283 | 49669 | 1768 | 40149 | **29474** |
| 16 | IET 31512 | 31718 | 2864 | 53955 | 56883 | 45376 | 31555 | 31141 | **36213** | 26941 | 2849 | 44198 | 20300 | 34544 | 22534 | 32012 | **26197** |
| 17 | IET 31515 | 36322 | 2765 | 79596 | 54467 | 90257 | 26445 | 28973 | **45547** | 34167 | 1555 | 62216 | 25683 | 46339 | 8806 | 25993 | **29251** |
| 18 | IET 31533 | 39559 | 4081 | 82093 | 56250 | 26830 | 39845 | 38283 | **40992** | 22538 | 2336 | 50105 | 23533 | 47898 | 25251 | 19535 | **27314** |
| 19 | IET 31540 | 56733 | 4877 | 115280 | 48383 | 82881 | 27823 | 33278 | **52751** | 33974 | 3678 | 68640 | 18033 | 51505 | 7409 | 37575 | **31545** |
| 20 | MTU-1290 | 48764 | 3267 | 72831 | 47900 | 66539 | 40897 | 35141 | **45048** | 29898 | 2992 | 46695 | 27850 | 30009 | 5948 | 18994 | **23198** |
| 21 | MTU-1296 | 36984 | 3340 | 56969 | 39000 | 75102 | 31199 | 25880 | **38353** | 35954 | 2587 | 39490 | 18483 | 33083 | 1844 | 18903 | **21478** |
| 22 | NDR-97 | 15914 | 4369 | 49874 | - | 33172 | - | 41635 | **28993** | 18185 | 1557 | 37488 | - | 34406 | - | 9328 | **20193** |
| 23 | US-314 | 49708 | 2904 | 71940 | 62850 | 55667 | 23189 | 29204 | **42209** | 38051 | 1859 | 48444 | 30383 | 42919 | 2048 | 23649 | **26765** |
| | **Mean** | **36838** | **3351** | **67876** | **51371** | **57011** | **29753** | **33995** | **39893** | **26408** | **2736** | **47817** | **22935** | **44057** | **4782** | **24409** | **24625** |
| | | LSD (Treat) | | | | | 1135.30** | | | LSD (Treat x Variety) | | | | | | ns | |
| | | LSD (Location x Treat) | | | | | 3003.73** | | | LSD (Location x Treat x Variety) | | | | | | 10626.65** | |
| | | LSD (Variety) | | | | | 2840.09** | | | CV (%) Treat | | | | | | 19.02 | |
| | | LSD (Location x Variety) | | | | | 7514.18** | | | | | | | | | | |

**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 | 46881 | 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) | | | | ns | | | LSD (Treat x Variety) | | | | | ns | |
| | | LSD (Location x Treat) | | | | 4387** | | | LSD (Location x Treat x Variety) | | | | | 14107** | |
| | | LSD (Variety) | | | | 4072** | | | CV (%) Treat | | | | | 17.96 | |
| | | LSD (Location x Variety) | | | | 9975** | | | | | | | | | |

**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 | TTB | |
| 1 | CO-51 | - | - | - | 555 | - | 563 | 343 | **487** | - | - | - | 204 | - | 104 | 363 | **224** |
| 2 | IET 29694 | 823 | 648 | 623 | 485 | 723 | 647 | 464 | **630** | 739 | 498 | 475 | 182 | 726 | 55 | 499 | **453** |
| 3 | IET 29700 | 563 | 657 | 561 | 441 | 774 | 610 | 438 | **578** | 618 | 564 | 394 | 250 | 748 | 76 | 458 | **444** |
| 4 | IET 30505 | 701 | 514 | 609 | 428 | 788 | 724 | 459 | **604** | 312 | 357 | 433 | 220 | 493 | 38 | 374 | **318** |
| 5 | IET 30555 | 791 | 616 | 538 | 442 | 817 | 528 | 487 | **603** | 563 | 574 | 392 | 175 | 918 | 31 | 426 | **440** |
| 6 | IET 30561 | 806 | 568 | 598 | 297 | 875 | 637 | 530 | **616** | 542 | 475 | 444 | 199 | 878 | 47 | 430 | **431** |
| 7 | IET 30635 | 670 | 626 | 565 | 397 | 799 | 568 | 489 | **588** | 218 | 638 | 419 | 224 | 670 | 34 | 358 | **366** |
| 8 | IET 30651 | 631 | 521 | 575 | 484 | 658 | 465 | 490 | **546** | 435 | 433 | 488 | 281 | 714 | 21 | 388 | **394** |
| 9 | IET 30653 | 645 | 451 | 504 | 354 | 718 | 574 | 434 | **526** | 486 | 439 | 376 | 219 | 739 | 26 | 347 | **376** |
| 10 | IET 30656 | 754 | 505 | 590 | 396 | 778 | 513 | 438 | **568** | 653 | 441 | 482 | 205 | 743 | 25 | 435 | **426** |
| 11 | IET 30660 | 670 | 519 | 556 | 485 | 783 | 520 | 305 | **548** | 590 | 490 | 493 | 214 | 640 | 21 | 309 | **394** |
| 12 | IET 31433 | 781 | 642 | 574 | 408 | 757 | 606 | 436 | **601** | 589 | 540 | 469 | 275 | 784 | 36 | 352 | **435** |
| 13 | IET 31440 | 716 | 596 | 576 | 568 | 713 | 507 | 578 | **608** | 519 | 411 | 473 | 242 | 736 | 42 | 390 | **402** |
| 14 | IET 31444 | 804 | 497 | 549 | 483 | 618 | 555 | 565 | **582** | 727 | 427 | 440 | 217 | 667 | 40 | 367 | **412** |
| 15 | IET 31510 | 722 | 496 | 602 | 534 | 773 | 512 | 534 | **596** | 601 | 378 | 548 | 217 | 638 | 32 | 480 | **413** |
| 16 | IET 31512 | 674 | 543 | 583 | 534 | 605 | 614 | 555 | **587** | 620 | 493 | 537 | 218 | 602 | 397 | 466 | **476** |
| 17 | IET 31515 | 683 | 521 | 548 | 342 | 719 | 493 | 654 | **566** | 632 | 212 | 424 | 179 | 710 | 140 | 483 | **397** |
| 18 | IET 31533 | 690 | 570 | 559 | 567 | 538 | 756 | 464 | **592** | 416 | 213 | 449 | 303 | 598 | 546 | 381 | **415** |
| 19 | IET 31540 | 769 | 584 | 571 | 518 | 818 | 570 | 391 | **603** | 590 | 374 | 474 | 312 | 506 | 131 | 323 | **387** |
| 20 | MTU-1290 | 774 | 439 | 553 | 354 | 710 | 700 | 427 | **565** | 621 | 416 | 446 | 206 | 489 | 108 | 432 | **388** |
| 21 | MTU-1296 | 743 | 616 | 596 | 319 | 783 | 646 | 487 | **599** | 688 | 389 | 463 | 192 | 673 | 43 | 414 | **409** |
| 22 | NDR-97 | 322 | 508 | 512 | - | 378 | - | 464 | **437** | 365 | 194 | 399 | - | 379 | - | 377 | **343** |
| 23 | US-314 | 804 | 399 | 573 | 579 | 662 | 513 | 318 | **550** | 712 | 257 | 468 | 446 | 658 | 48 | 374 | **423** |
| | **Mean** | **706** | **547** | **569** | **453** | **718** | **583** | **467** | **573** | **556** | **419** | **454** | **235** | **669** | **93** | **401** | **399** |
| | | LSD (Treat) | | | | | 7.73* | | | LSD (Treat x Variety) | | | | | | ns | |
| | | LSD (Location x Treat) | | | | | 28.40** | | | LSD (Location x Treat x Variety) | | | | | | 103.09** | |
| | | LSD (Variety) | | | | | 27.55** | | | CV (%) Treat | | | | | | 11.87 | |
| | | LSD (Location x Variety) | | | | | 72.89** | | | | | | | | | | |

**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 | TTB | |
| 1 | CO-51 | - | - | - | 1413 | - | 1542 | 652 | **1202** | - | - | - | 674 | - | 1069 | 566 | **770** |
| 2 | IET 29694 | 1892 | 1497 | 1104 | 1195 | 1868 | 1696 | 1054 | **1472** | 1838 | 1293 | 842 | 715 | 1707 | 1070 | 905 | **1196** |
| 3 | IET 29700 | 1312 | 1555 | 991 | 1163 | 1868 | 1722 | 1335 | **1421** | 1423 | 1371 | 657 | 873 | 1823 | 1127 | 746 | **1146** |
| 4 | IET 30505 | 1720 | 1142 | 1057 | 1187 | 1872 | 1847 | 829 | **1379** | 761 | 962 | 786 | 753 | 1738 | 1073 | 672 | **963** |
| 5 | IET 30555 | 1873 | 1391 | 895 | 1160 | 1914 | 1600 | 791 | **1375** | 1368 | 1330 | 690 | 767 | 1978 | 1039 | 864 | **1148** |
| 6 | IET 30561 | 1886 | 1247 | 1008 | 993 | 1900 | 1771 | 954 | **1394** | 1293 | 1107 | 770 | 699 | 1905 | 1157 | 786 | **1103** |
| 7 | IET 30635 | 1565 | 1396 | 965 | 1181 | 1928 | 1692 | 1245 | **1425** | 593 | 1381 | 724 | 765 | 1880 | 1086 | 1105 | **1076** |
| 8 | IET 30651 | 1474 | 1127 | 1043 | 1323 | 1909 | 1398 | 1127 | **1343** | 1046 | 1001 | 872 | 878 | 1852 | 974 | 637 | **1037** |
| 9 | IET 30653 | 1498 | 935 | 875 | 985 | 1817 | 1644 | 953 | **1244** | 1146 | 912 | 659 | 720 | 1860 | 1040 | 560 | **985** |
| 10 | IET 30656 | 1846 | 1108 | 1054 | 1060 | 1919 | 1644 | 1615 | **1464** | 1572 | 969 | 834 | 617 | 1850 | 1019 | 765 | **1089** |
| 11 | IET 30660 | 1560 | 1136 | 1019 | 1277 | 1882 | 1626 | 673 | **1310** | 1364 | 1103 | 908 | 624 | 1694 | 1113 | 494 | **1043** |
| 12 | IET 31433 | 1858 | 1412 | 1009 | 1142 | 1851 | 1755 | 1053 | **1440** | 1452 | 1261 | 862 | 905 | 1903 | 1114 | 1217 | **1245** |
| 13 | IET 31440 | 1774 | 1273 | 1054 | 1417 | 1875 | 1595 | 1022 | **1430** | 1275 | 1046 | 810 | 719 | 1912 | 1107 | 738 | **1087** |
| 14 | IET 31444 | 1858 | 1039 | 926 | 1302 | 1633 | 1703 | 1033 | **1356** | 1736 | 939 | 767 | 829 | 1864 | 1107 | 907 | **1164** |
| 15 | IET 31510 | 1756 | 1135 | 989 | 1439 | 1871 | 1559 | 1048 | **1399** | 1481 | 983 | 1016 | 782 | 1850 | 1005 | 854 | **1139** |
| 16 | IET 31512 | 1541 | 1180 | 997 | 1320 | 1878 | 1673 | 964 | **1365** | 1445 | 1097 | 973 | 627 | 1772 | 1433 | 866 | **1173** |
| 17 | IET 31515 | 1700 | 1112 | 995 | 1060 | 1925 | 1578 | 1066 | **1348** | 1475 | 682 | 798 | 610 | 1849 | 1213 | 809 | **1062** |
| 18 | IET 31533 | 1689 | 1231 | 988 | 1531 | 1849 | 1866 | 837 | **1427** | 1032 | 770 | 794 | 896 | 1736 | 1491 | 675 | **1056** |
| 19 | IET 31540 | 1804 | 1273 | 981 | 1332 | 1904 | 1601 | 903 | **1400** | 1404 | 990 | 825 | 895 | 1860 | 1087 | 563 | **1089** |
| 20 | MTU-1290 | 1883 | 979 | 958 | 1119 | 1880 | 1807 | 783 | **1344** | 1493 | 941 | 728 | 710 | 1757 | 1087 | 688 | **1058** |
| 21 | MTU-1296 | 1812 | 1391 | 1041 | 979 | 1909 | 1735 | 932 | **1400** | 1585 | 1097 | 789 | 683 | 1796 | 1106 | 690 | **1107** |
| 22 | NDR-97 | 702 | 1098 | 953 | - | 1313 | - | 1228 | **1059** | 802 | 733 | 694 | - | 1185 | - | 757 | **834** |
| 23 | US-314 | 1891 | 858 | 991 | 1579 | 1875 | 1683 | 1267 | **1449** | 1745 | 689 | 883 | 1188 | 1812 | 1177 | 806 | **1186** |
| | **Mean** | **1677** | **1205** | **995** | **1234** | **1847** | **1670** | **1016** | **1367** | **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) | | | | | 70.87** | | | 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 | TTB | |
| 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 | 20.0 | 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 | 18.4 | 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 | 21.9 | 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 | 24.2 | 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 | 23.2 | 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 | 22.7 | 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 | 19.4 | 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 | 22.1 | 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 | 22.0 | **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 | 25.4 | **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 | 22.0 | **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 | 21.5 | **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 | 23.5 | **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 | 22.0 | **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 | 21.6 | **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 | 21.2 | **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 | 24.7 | **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 | 20.4 | **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 | 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 | 20.4 | **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 | - | 19.6 | **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 | 21.2 | **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** | **21.7** | **21.2** |
| | | LSD (Treat) | | | | | 0.33** | | | LSD (Treat x Variety) | | | | | | ns | |
| | | LSD (Location x Treat) | | | | | 0.87** | | | LSD (Location x Treat x Variety) | | | | | | 3.74** | |
| | | LSD (Variety) | | | | | 0.99** | | | CV (%) Treat | | | | | | 7.99 | |
| | | LSD (Location x Variety) | | | | | 2.64** | | | | | | | | | | |

**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) | | | | | ns | | | LSD (Treat x Variety) | | | | | | ns | |
| | | LSD (Location x Treat) | | | | | 1.81** | | | LSD (Location x Treat x Variety) | | | | | | 7.05** | |
| | | LSD (Variety) | | | | | 1.88** | | | CV (%) Treat | | | | | | 9.07 | |
| | | LSD (Location x Variety) | | | | | 4.99** | | | | | | | | | | |

**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 (φPSII) | | | 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/m2) | Yield Rank (Yn) | Adj-rank | Adjustment to Yield Rank (Yn) | Stability Variance (σi2) | 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 diving 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).

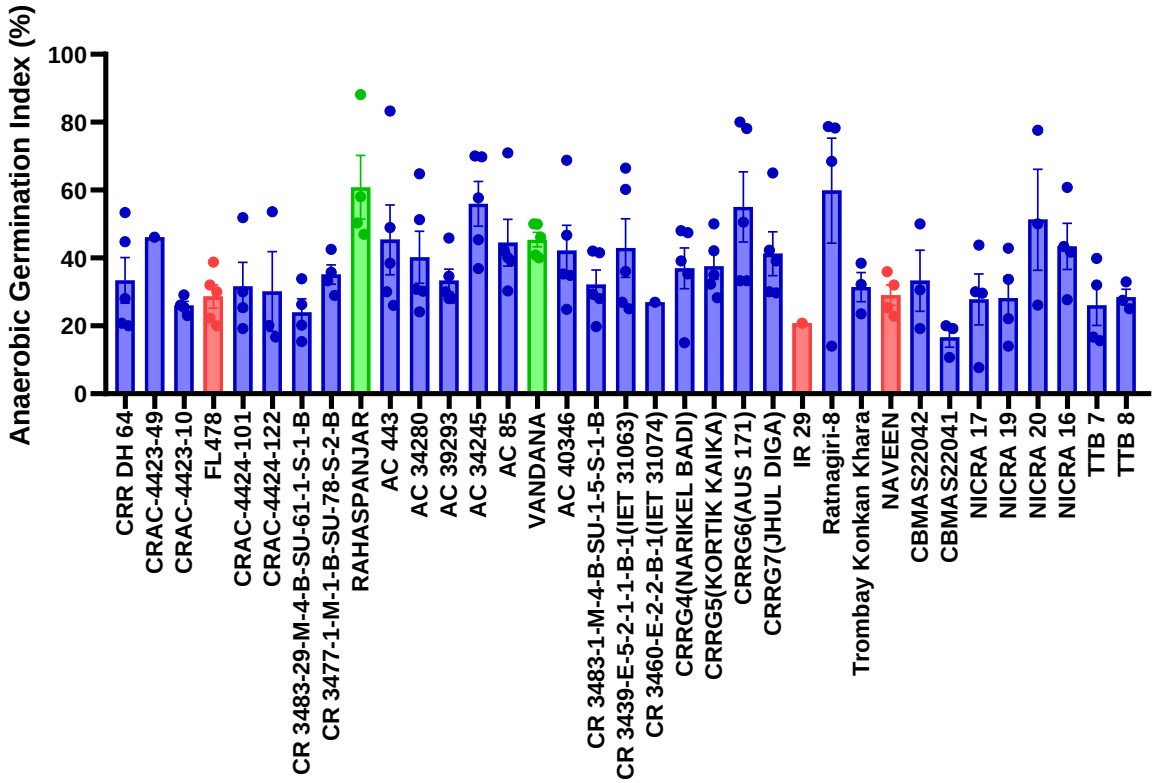



**Fig. 6.4.1** *Mean AGI (%) of rice genotypes recorded after 21 days of germination stage under anaerobic condition tested across different locations. Error bars representing SE (mean) of all locations and scattered dots are representing mean of individual location.*

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.

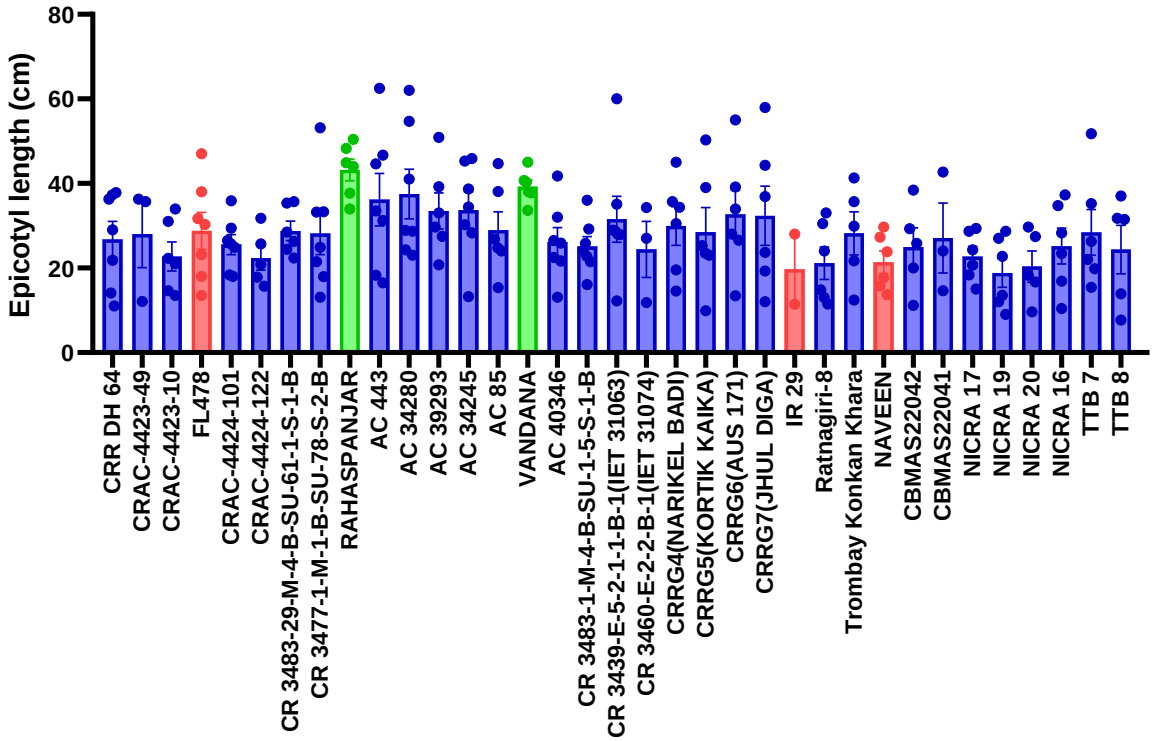



**Fig. 6.4.2** *Mean length of epicotyl (cm) of rice genotypes recorded after 21 days of germination stage under anaerobic condition across different locations. Error bars representing SE (mean) of all locations and scattered dots are representing mean of individual location.*

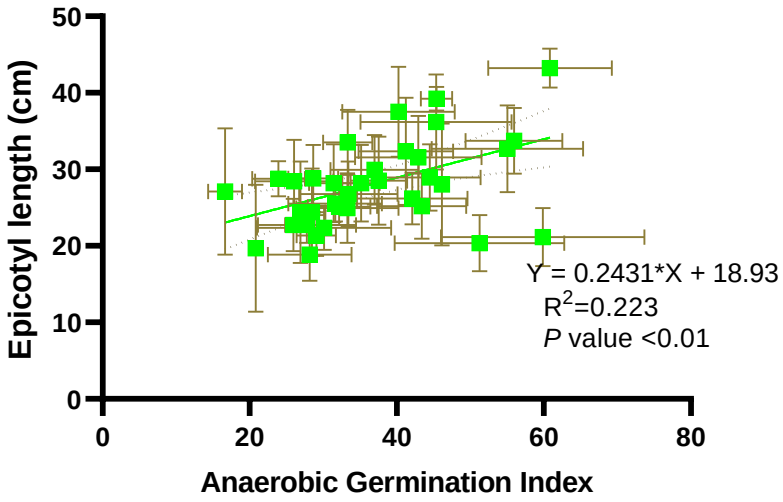



**Fig. 6.4.3** *An XY-scatter plot showing simple linear regression between anaerobic germination potential and epicotyl length of rice genotypes after 21 days of germination under anaerobic condition tested across different locations. Error bars representing SE (mean) of all locations.*

**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).

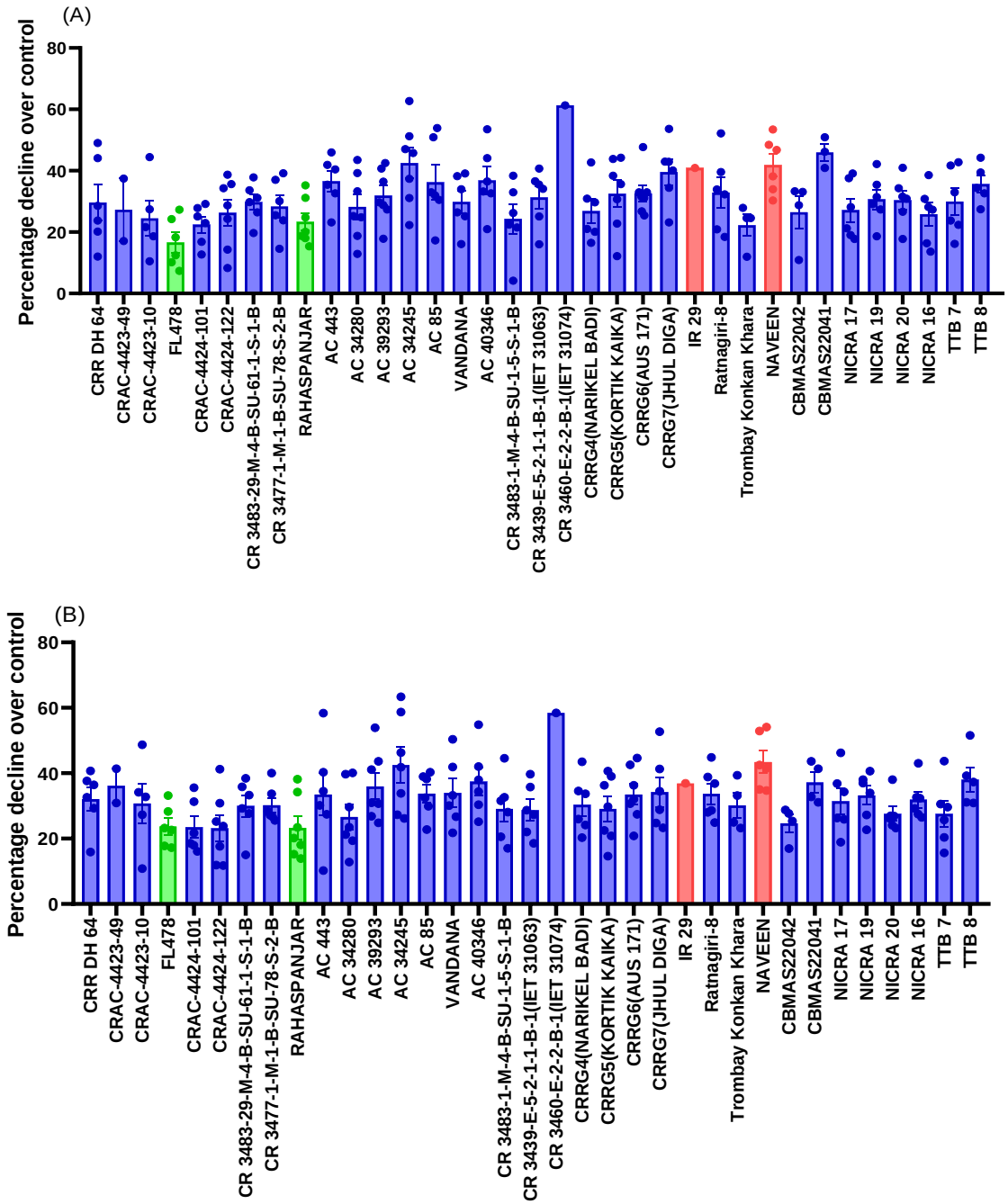



**Fig. 6.4.4** *Changes in root length (A) and shoot length (B) of 35 rice genotypes (mean of all locations) in response to 12 dS $m^{-1}$ salinity stress imposed at seedling stage tested across distinct locations. Error bars representing SE (mean) of all locations and scattered dots are representing 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).

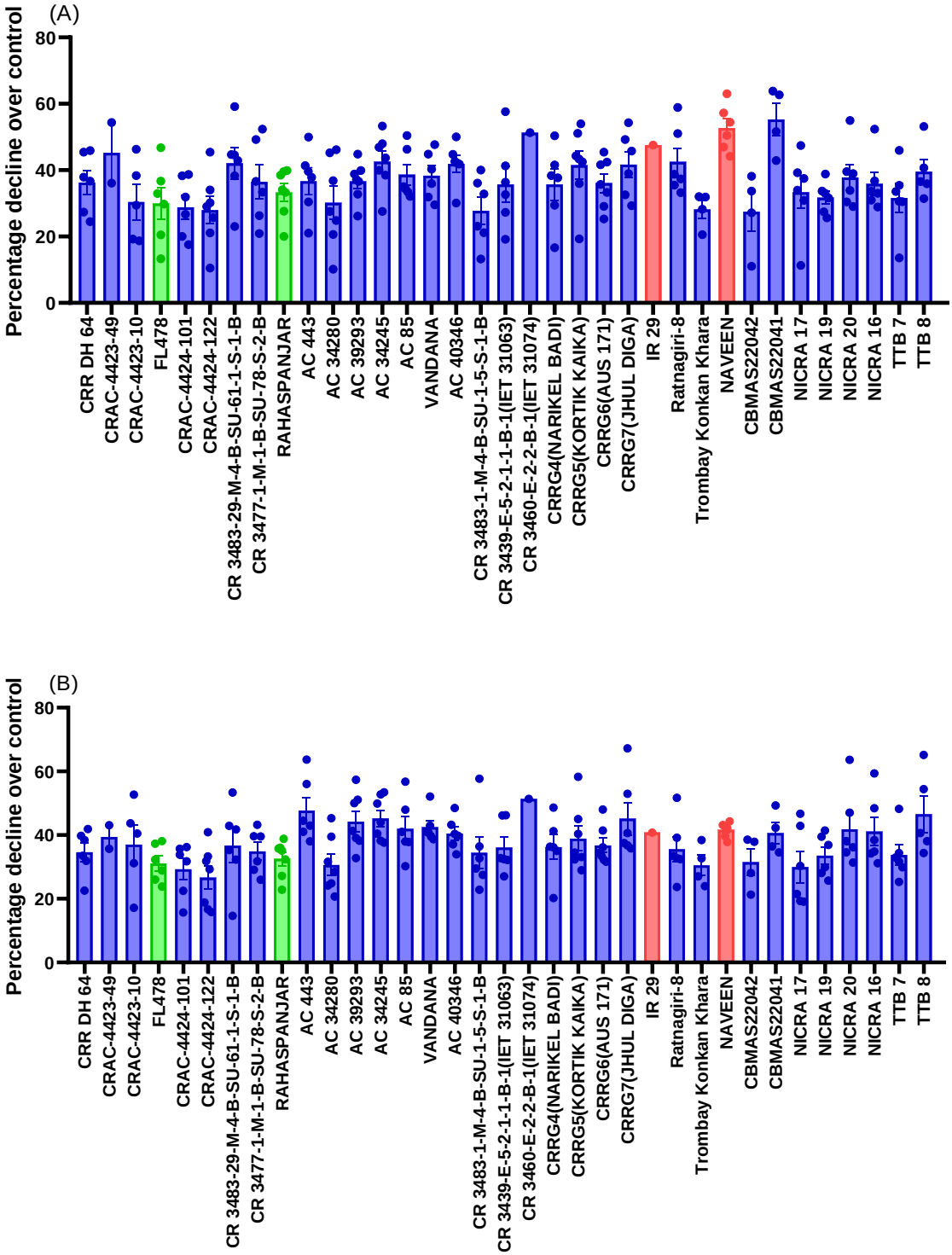



**Fig. 6.4.5** *Changes in root dry weight (A) and shoot dry weight (B) of 35 rice genotypes (mean of all locations) in response to 12 dS $m^{-1}$ salinity stress imposed at seedling stage tested across distinct locations. Error bars representing SE (mean) of all locations and scattered dots are representing mean of individual location.*

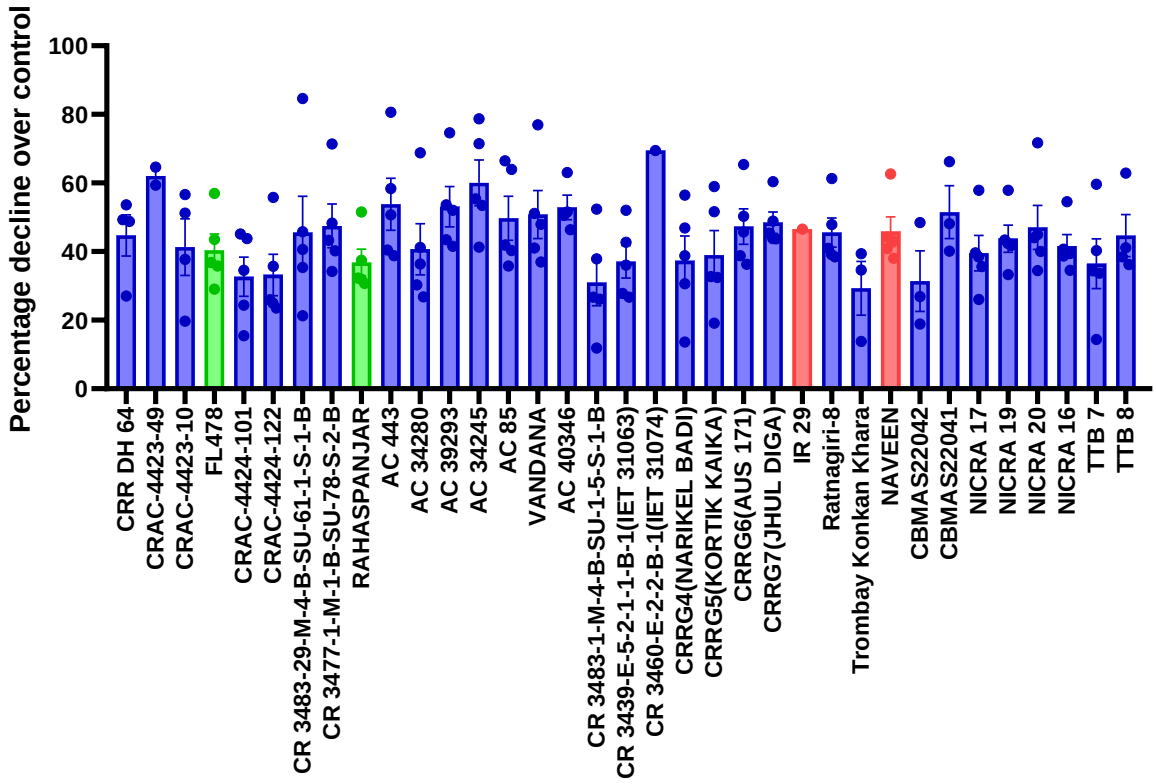



**Fig. 6.4.6** *Changes in total chlorophyll content of the leaf of 35 rice genotypes (mean of all locations) in response to 12 dS $m^{-1}$ salinity stress imposed at seedling stage tested across different locations. Error bars representing SE (mean) of all locations and scattered dots are representing 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).

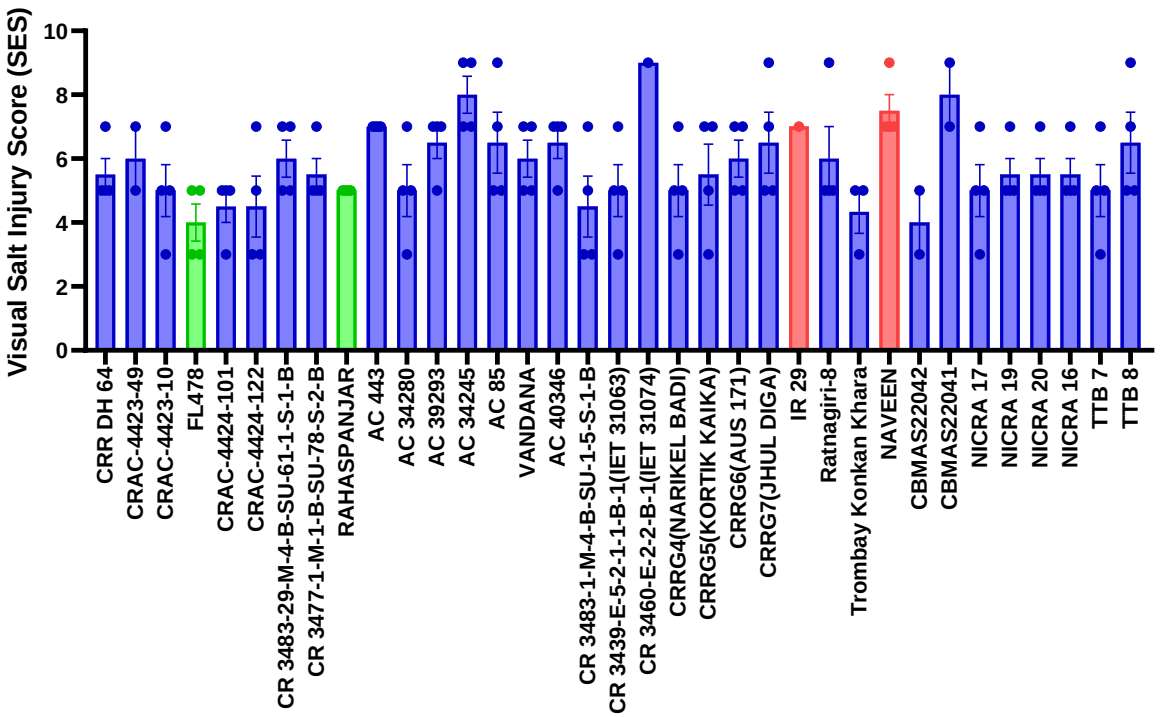



**Fig. 6.4.7** *Visual salt injury (VSI) score (mean of all locations) in response to 12 dS $m^{-1}$ salinity stress imposed at seedling stage tested across different locations. Error bars representing SE (mean) of all biological replicates. Error bars representing SE (mean) of all locations and scattered 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).

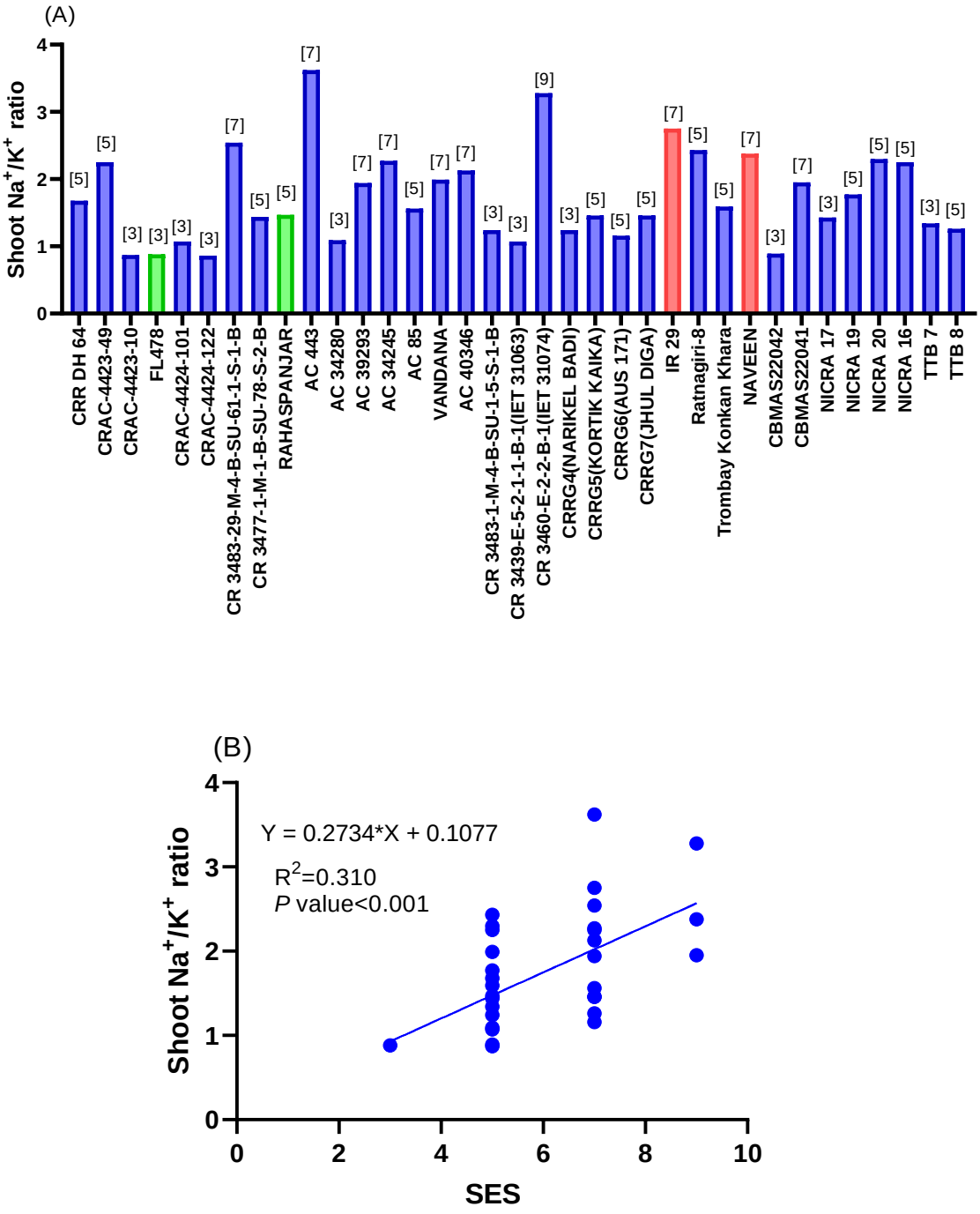



**Fig. 6.4.8** *Changes in shoot $Na^+/K^+$ ratio and visual salt injury (VSI) score (A) and XY-scatter plot showing simple linear regression between shoot $Na^+/K^+$ ratio and visual salt injury (VSI) score (B) of 35 rice entries (mean of all locations) in response to 12 dS $m^{-1}$ salinity stress 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.

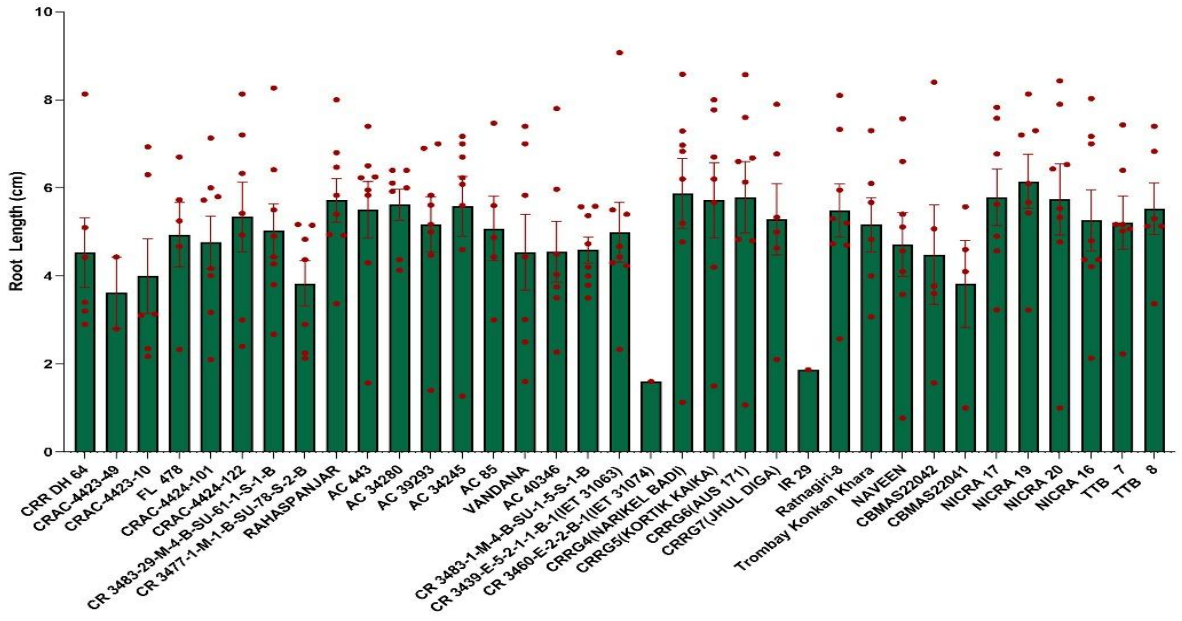



**Fig. 6.4.9** *Root length of the 35 rice entries grown under 2 % mannitol osmotic stress imposed at the seedling stage across different locations. The error bars represent the standard error mean (SEM) of all locations, and scattered dots represent the means of the individual location.*

**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.

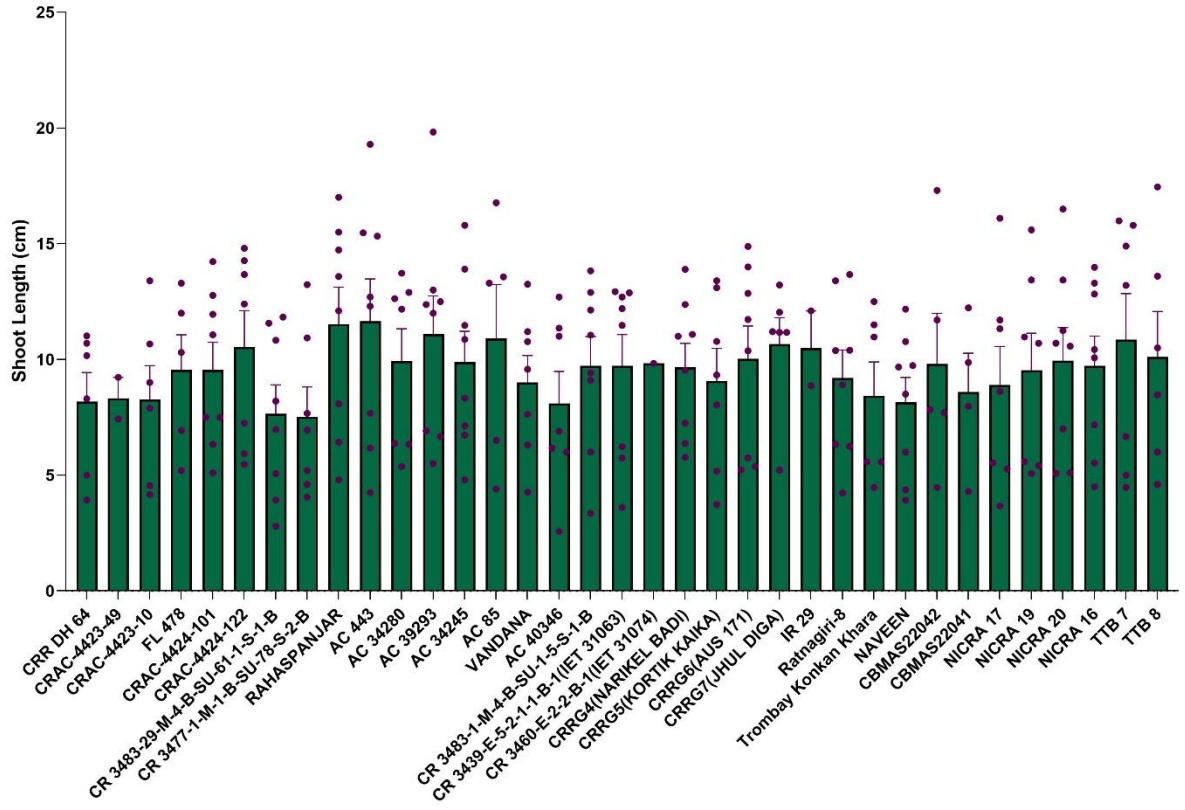



**Fig. 6.4.10** *Shoot length of the 35 rice entries grown under 2 % mannitol osmotic stress imposed at the seedling stage across different locations. The error bars represent the standard error mean (SEM) of all locations, and scattered dots represent the means of the individual location.*

**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.

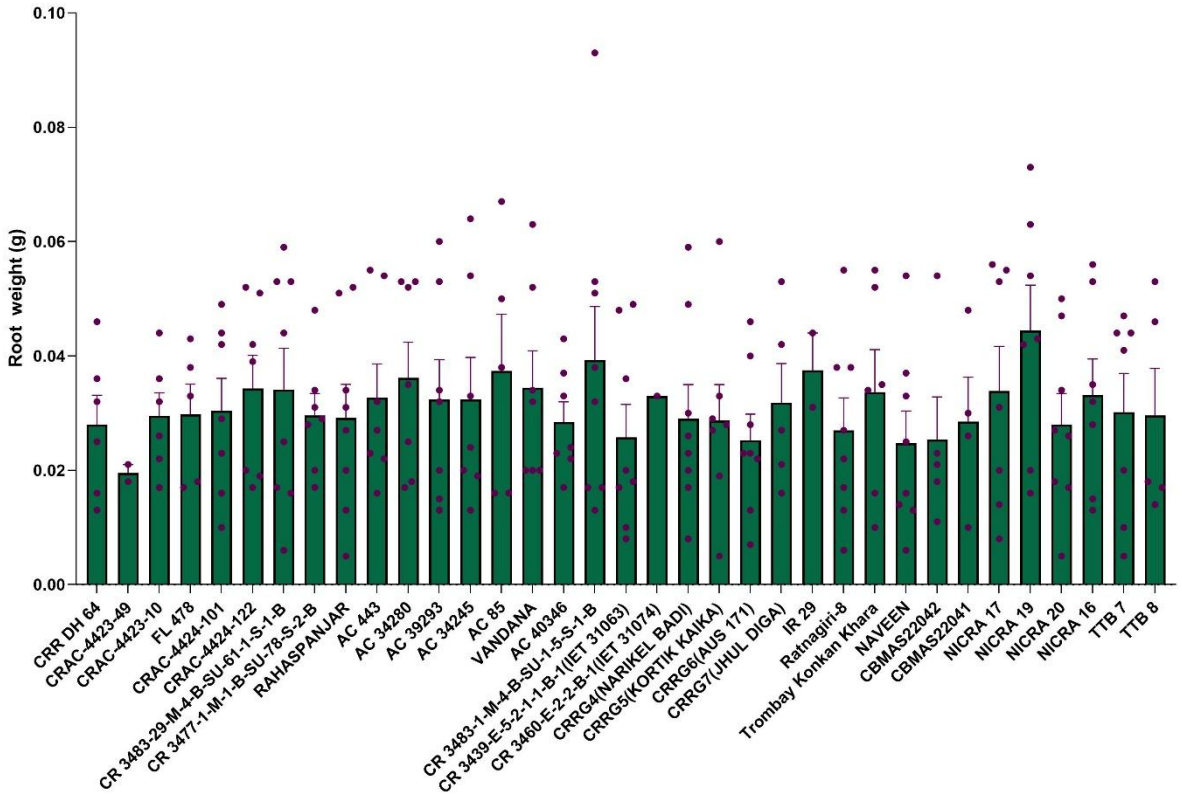



**Fig. 6.4.11** *Root dry weight of the 35 rice entries grown under 2 % mannitol osmotic stress imposed at the seedling stage across different locations. The error bars represent the standard error mean (SEM) of all locations, and scattered dots represent the means of the individual location.*

**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.

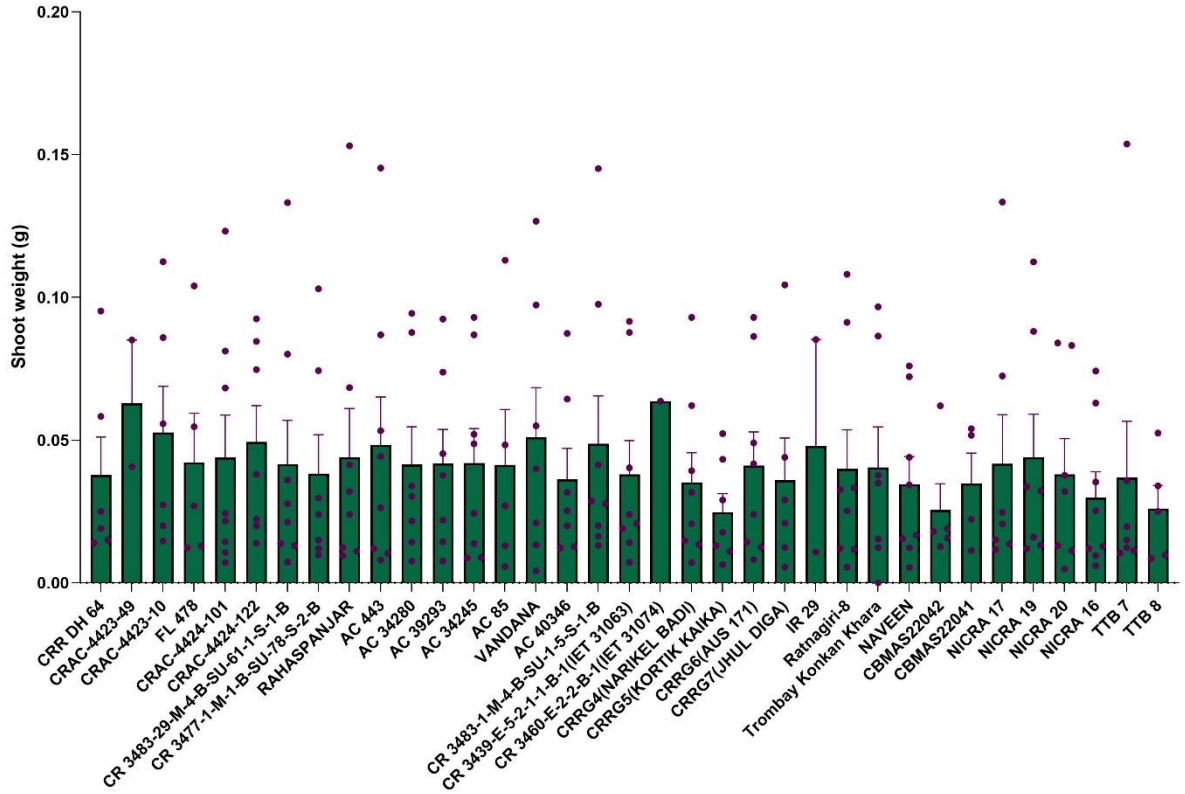



**Fig. 6.4.12** *Shoot dry weight of the 35 rice entries grown under 2 % mannitol osmotic stress imposed at the seedling stage across different locations. The error bars represent the standard error mean (SEM) of all locations, and scattered dots represent the means of the individual location.*

**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.

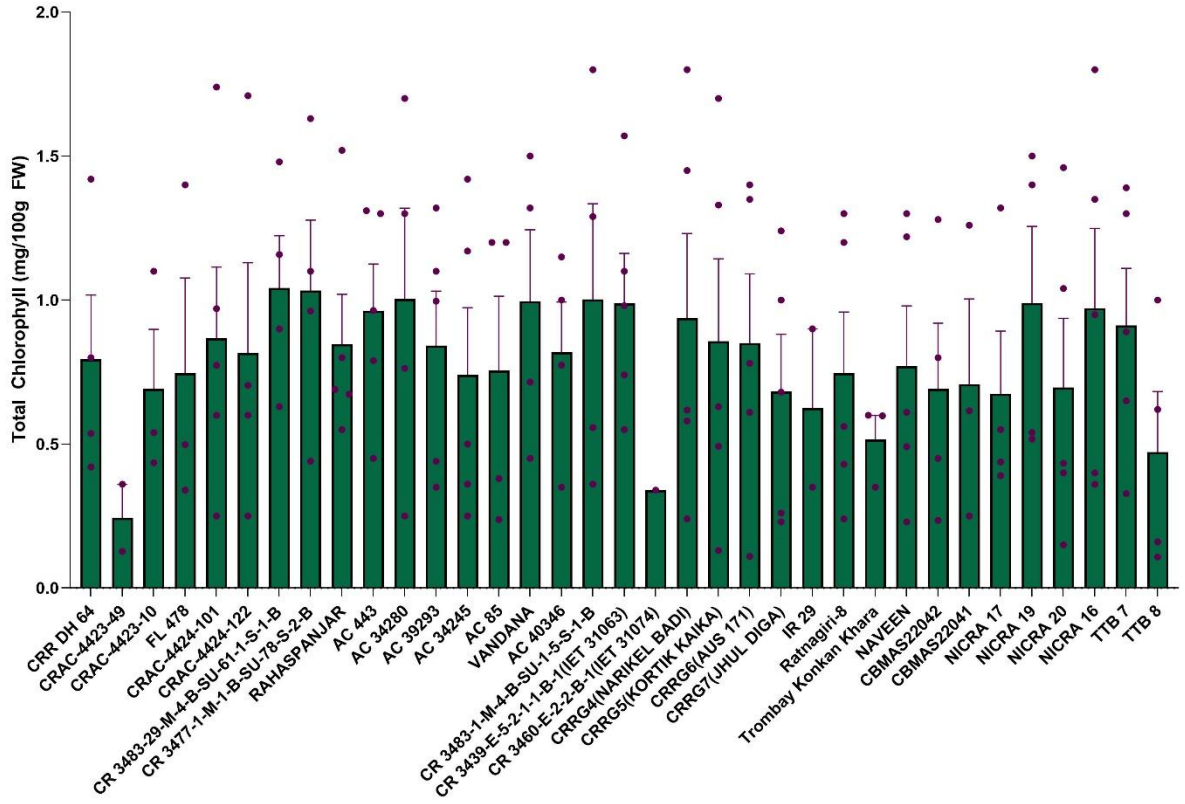



**Fig. 6.4.13** *Total Chlorophyll Content (mg/100 g FW) of the 35 rice entries grown under 2 % mannitol osmotic stress imposed at the seedling stage across different locations. The error bars represent the standard error mean (SEM) of all locations, and scattered dots represent the means of the individual 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.

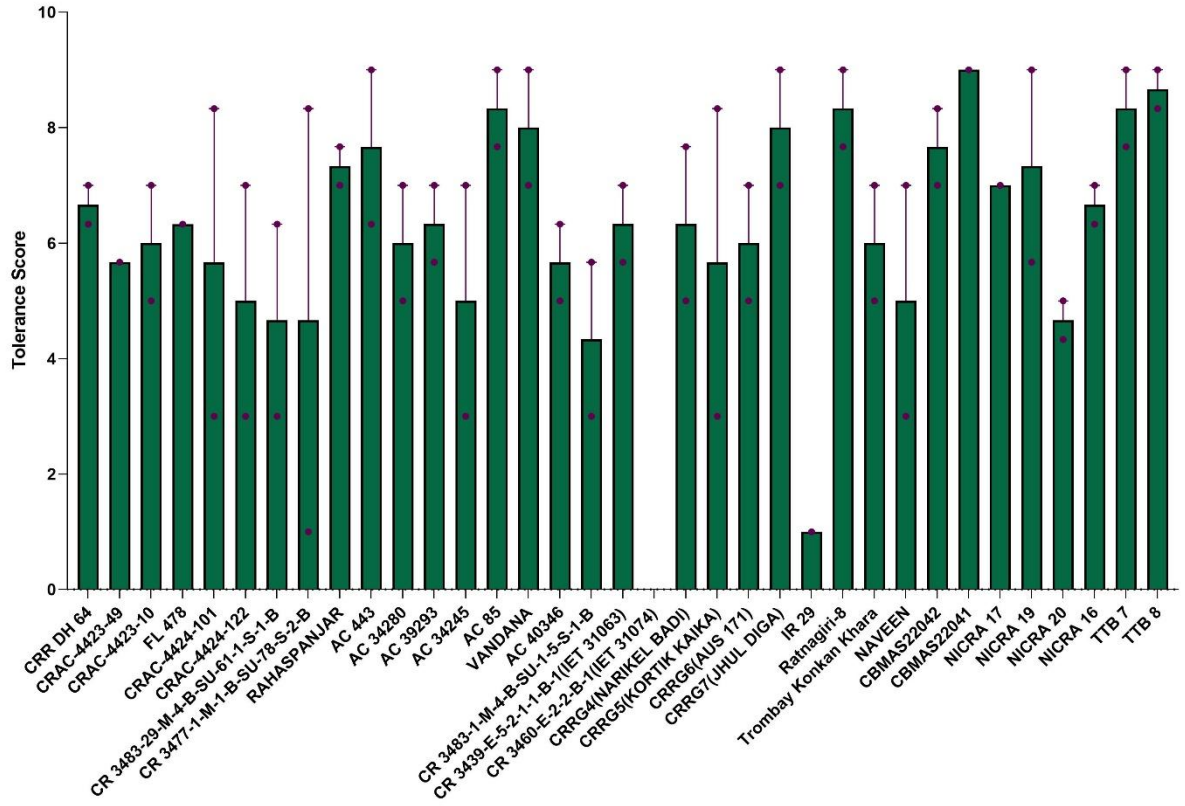



**Fig. 6.4.14** *Tolerance Score of the 35 rice entries grown under 2 % mannitol osmotic stress imposed at the seedling stage across locations. The error bars represent the standard error mean (SEM) of all locations, and scattered dots represent the means of the individual location.*

**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.

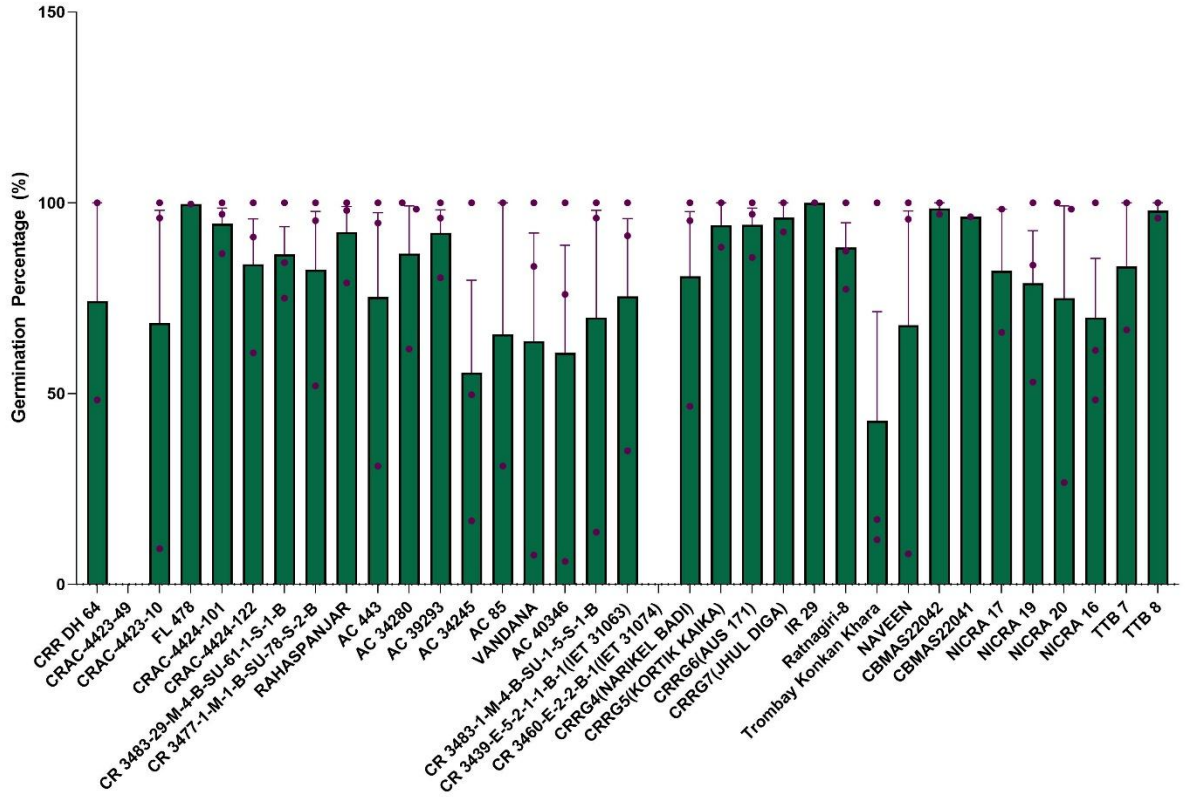



**Fig. 6.4.15** *Germination percentage (%) of the 35 rice entries grown under 2 % mannitol osmotic stress imposed at the seedling stage across different locations. The error bars represent the standard error mean (SEM) of all locations, and scattered dots represent the means of the individual location.*

**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 | CRRI | 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 | CRRI | 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 | CRRI | 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 | CRRI | 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 | CRRI | 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).

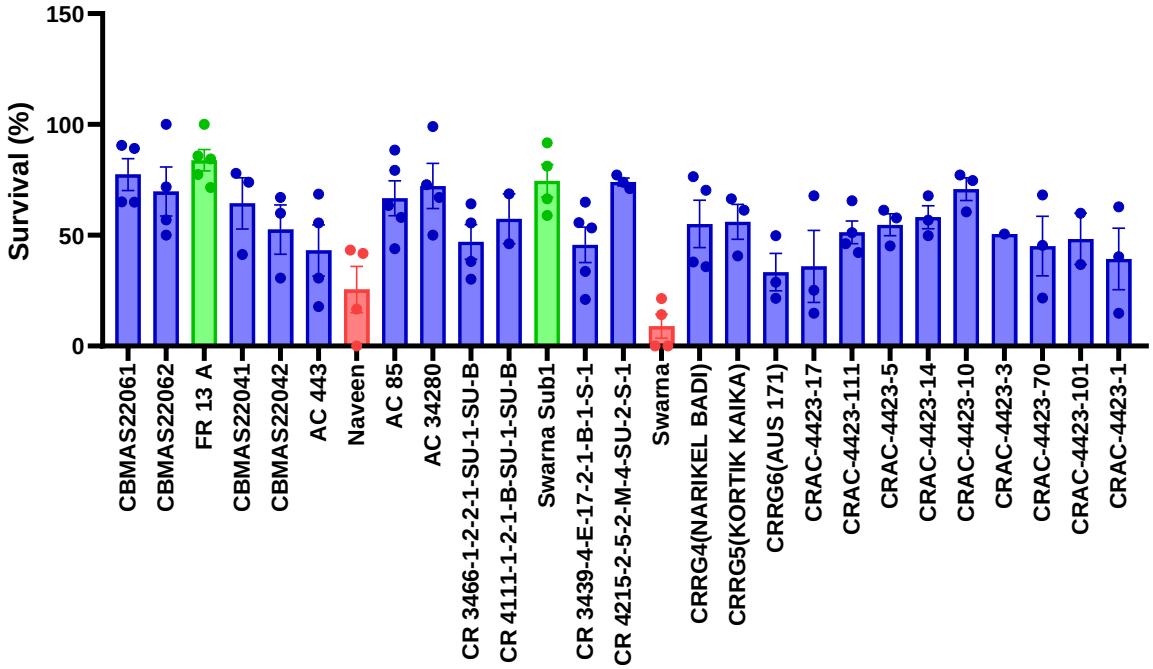



**Fig. 6.5.1** *Mean survival rate (%) of rice genotypes under 14 days of complete submergence stress. Error bars representing SE (mean) of all locations and scattered dots are representing mean of individual location.*

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.

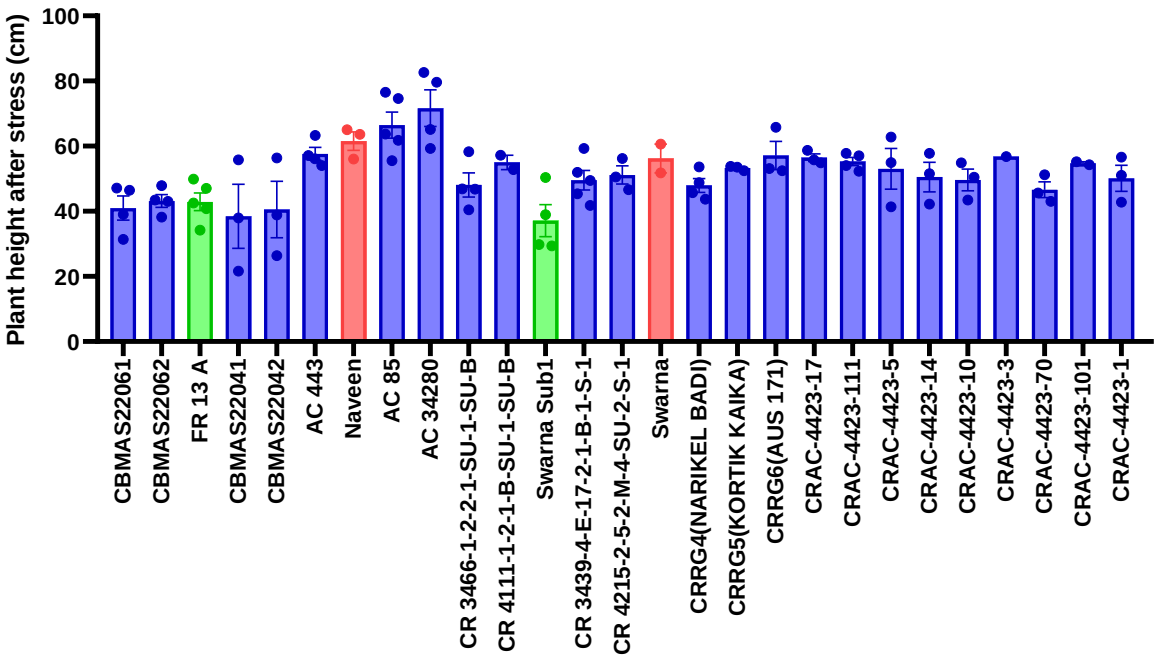



**Fig. 6.5.2** *Mean plant height (cm) of rice genotypes under 14 days of complete submergence tested across different locations. Error bars representing SE (mean) of all locations and scattered dots are representing mean of individual location.*

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.

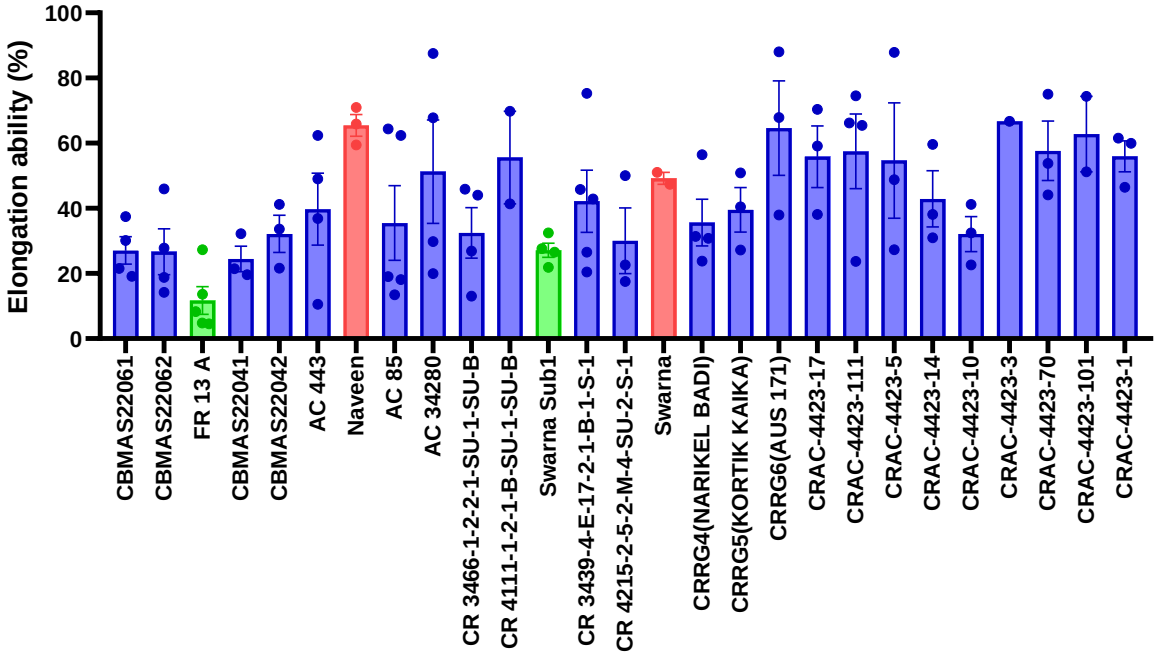



**Fig. 6.5.3** *Mean elongation ability (%) of rice genotypes under 14 days of complete submergence tested across different locations. Error bars representing SE (mean) of all locations and scattered dots are representing mean of individual location.*

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.

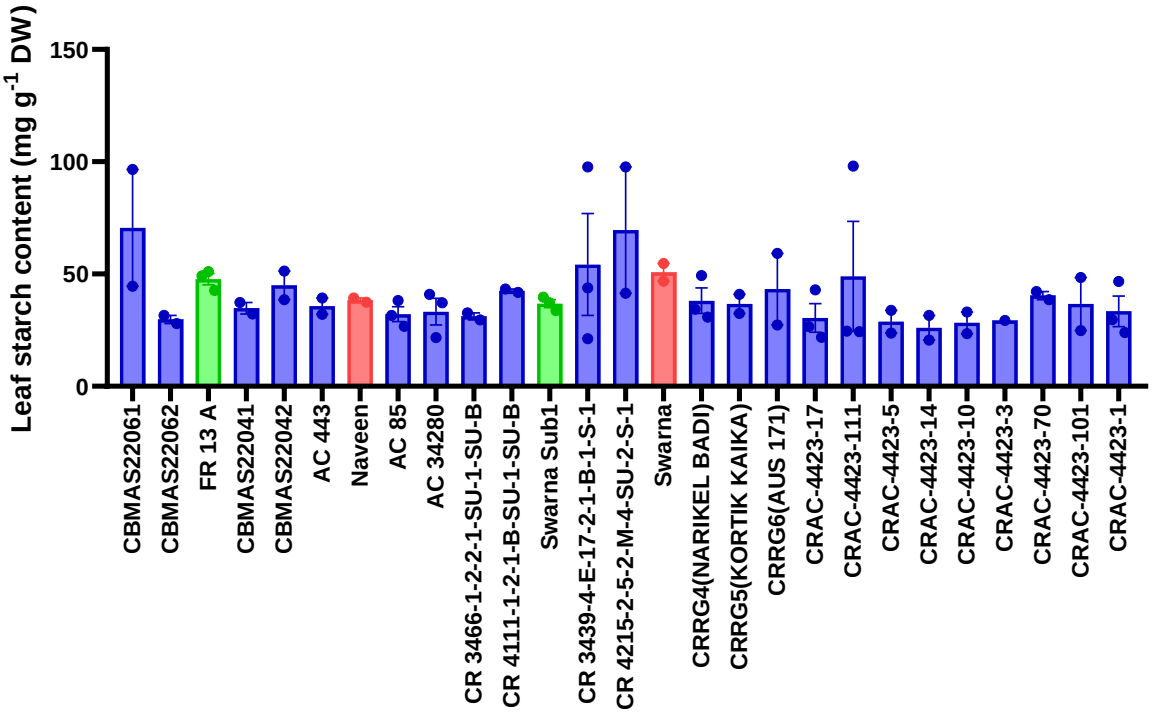



**Fig. 6.5.4** *Mean starch content (mg $g^{-1}$ DW) of rice genotypes under 14 days of complete submergence tested across different locations. Error bars representing SE (mean) of all locations and scattered dots are representing mean of individual location.*

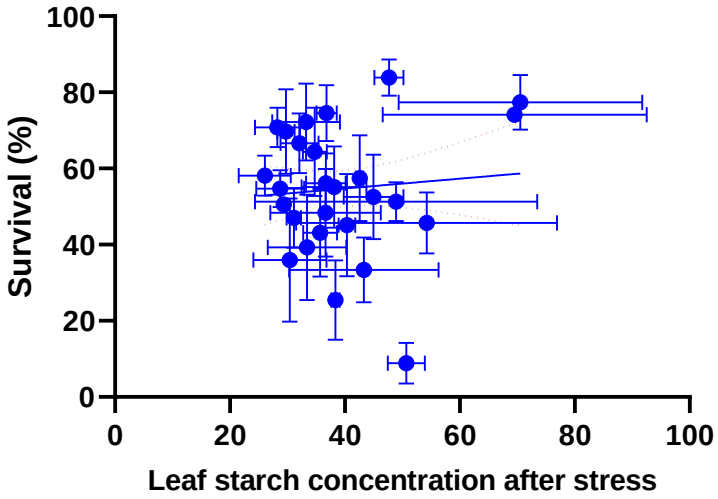



**Fig. 6.5.5** *An XY-scatter plot showing simple linear regression between survival rate and elongation ability of rice genotypes under 14 days of complete submergence tested across different locations. Error bars representing SE (mean) of all locations.*

**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 34280was 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 | CRRI | 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, it's 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 (200-300 cal $cm^{-2}day^{-1}$) that prevails for only a few hours (~4 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 trail 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 ($g/m^2$) was significant ($p<0.01$) (Table No. 6.6.8). However, variation of Panicle weight ($g/m^2$) 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/$m^2$ was significant ($p<0.05$) (Table No. 6.6.9). Likewise, variation of Panicle number/$m^2$ 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 ≤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).

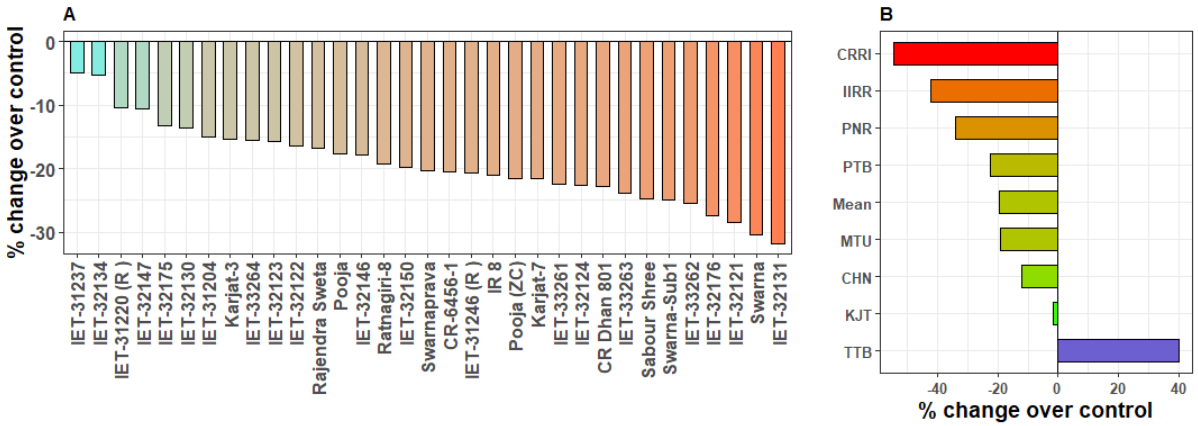



**Fig 6.6.1** *Influence of Low-Light Stress on grain number per panicle: a) mean of all locations b) mean of all genotypes.*

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/$m^2$ was significant ($p<0.01$) (Table No. 6.6.12). Likewise, variation of grain number/$m^2$ 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/$m^2$ was significant ($p<0.05$) (Table No. 6.6.13). Simultaneously, variation of spikelet number/$m^2$ 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/$m^2$) was significant ($p<0.01$) (Table No. 6.6.14). Consecutively, variation of grain yield (g/$m^2$) 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/$m^2$) over control was negative in all the varieties. The reduction in grain yield (g/$m^2$) 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/$m^2$) over control than low light stress tolerant check (Swarna Prabha). The percent change in grain yield (g/$m^2$) 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/$m^2$) over control was observed at Pattambi and CRRI locations respectively (Fig 6.6.2b).

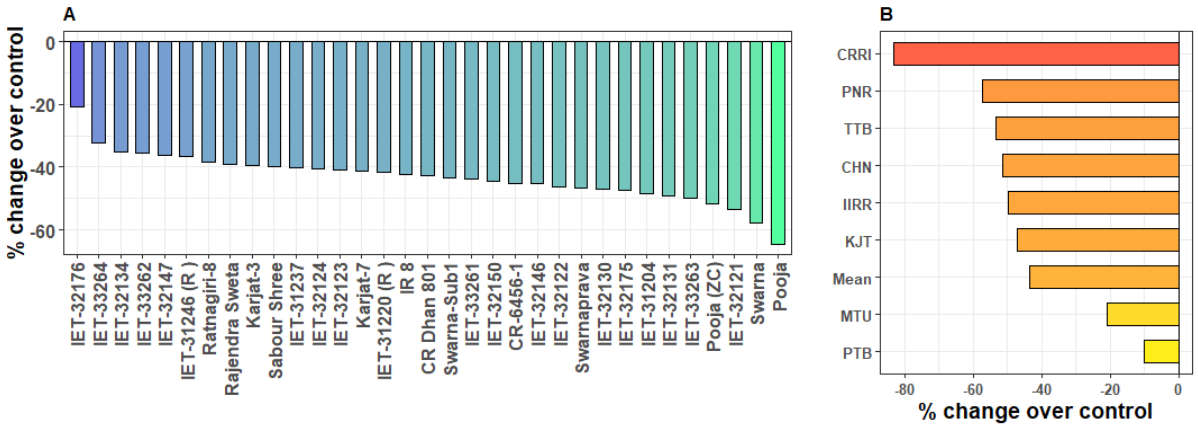



**Fig 6.6.2** *Influence of Low-Light Stress on grain yield (g/m2): a) mean of all locations b) mean of all genotypes.*

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).

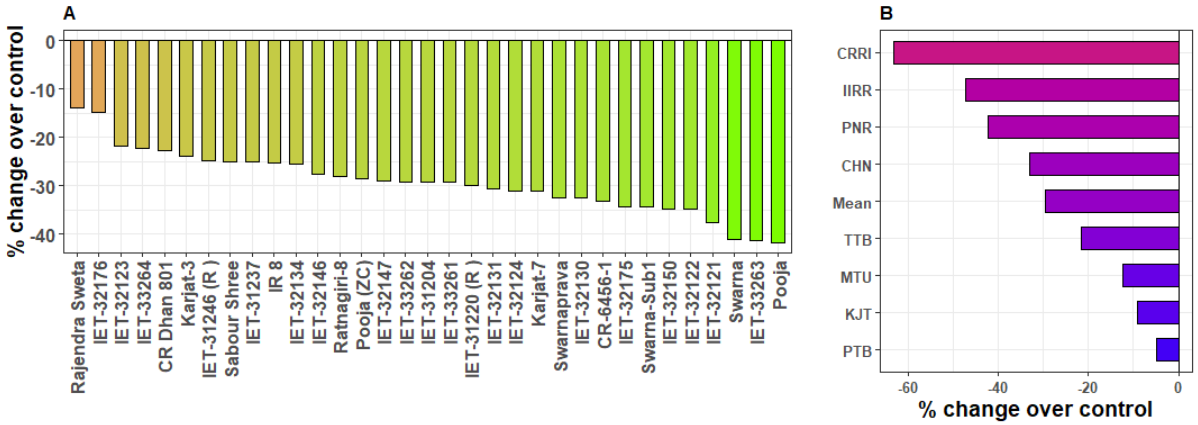



**Fig 6.6.3** *Influence of Low-Light Stress on total dry matter (g/m2) at maturity: a) mean of all locations b) mean of all genotypes.*

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).

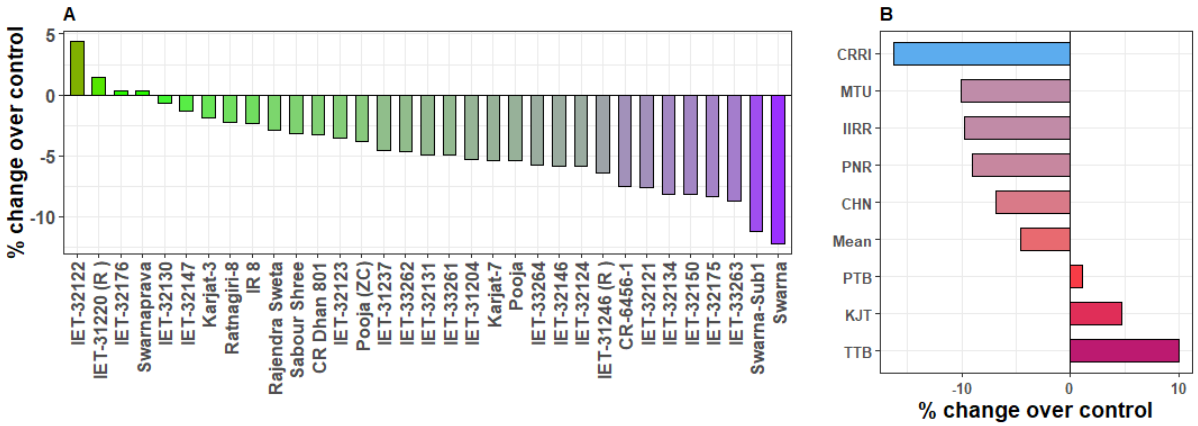



**Fig 6.6.4** *Influence of Low-Light Stress on 1000 grain weight (g): a) mean of all locations b) mean of all genotypes.*

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).

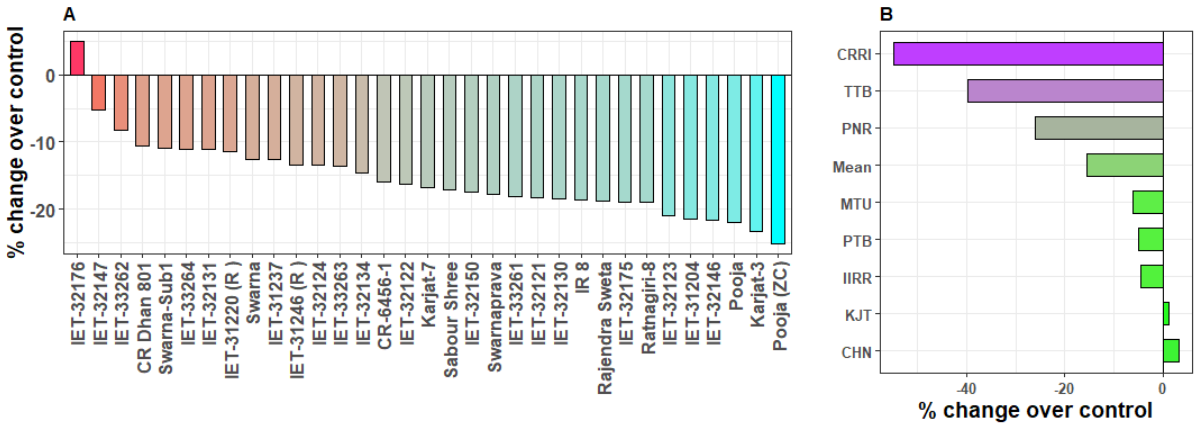



**Fig 6.6.5** *Influence of Low-Light Stress on harvest index (%): a) mean of all locations b) mean of all genotypes.*

**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 (ΦPSII), 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/$m^2$, grain number/$m^2$, spikelet number/$m^2$, 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.

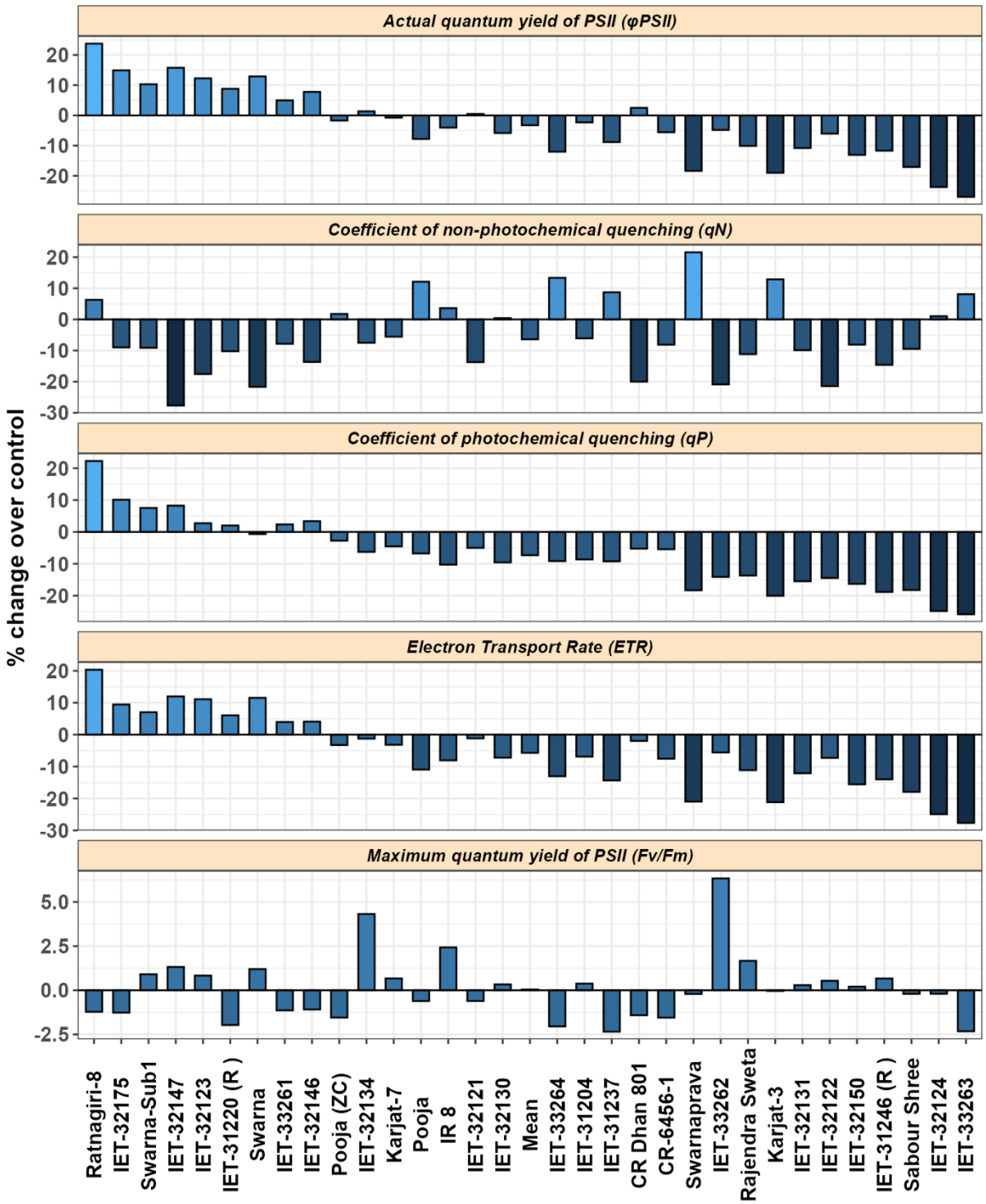



**Fig 6.6.6** *Percentage change in chlorophyll fluorescence traits under low light stress with respect to control at IIRR during Kharif 2023.*

**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** |

| 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** |
| 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 | Karjat-3 | 99 | 94 | 88 | 93 | 119 | 103 | 78 | 98 | **97** | 100 | 91 | 95 | 66 | 113 | 118 | 75 | 100 | **95** |
| 25 | Karjat-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 | Ratnagiri-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 | Swarnaprava | 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) | | | | | ns | | | | LSD (Treat x Variety) | | | | | | ns | | |
| | | LSD (Location x Treat) | | | | | 2.32** | | | | LSD (Location x Treat x Variety) | | | | | | 11.21** | | |
| | | LSD (Variety) | | | | | 2.8** | | | | CV (%) Treat | | | | | | 5.2 | | |
| | | LSD (Location x Variety) | | | | | 7.92** | | | | | | | | | | | | |

**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 | CRRI | KJT | PNR | PTB | Mean | CHN | CRRI | 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 | CRRI | KJT | MTU | PNR | PTB | Mean | CHN | CRRI | 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/m$^2$) at flowering 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 | 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 | 468 | 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** |

| 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** |
| 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 | Ratnagiri-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 | **589** |
| 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** |

| 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 |
| 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 | Karjat-3 | 847 | 560 | 503 | 585 | 803 | 907 | 1077 | 720 | **750** | 524 | 248 | 477 | 448 | 837 | 649 | 853 | 732 | **596** |
| 25 | Karjat-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/m$^2$) 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** |

| 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** |
| 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 | Karjat-3 | 569 | 445 | 597 | 413 | 577 | 650 | 898 | 552 | **588** | 339 | 69 | 604 | 307 | 563 | 291 | 883 | 309 | **421** |
| 25 | Karjat-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 | Ratnagiri-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) | | | | | 13.2** | | | | LSD (Treat x Variety) | | | | | | ns | | |
| | | LSD (Location x Treat) | | | | | 37.57** | | | | LSD (Location x Treat x Variety) | | | | | | 151.86** | | |
| | | LSD (Variety) | | | | | ns | | | | CV (%) Treat | | | | | | 17.19 | | |
| | | LSD (Location x Variety) | | | | | 107.38** | | | | | | | | | | | | |

**Table 6.6.9 Influence of Low-Light Stress on Panicle number/m$^2$ in different rice varieties during *Kharif* 2023 at different centers**

| 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** |

| 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** |
| 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 | Karjat-3 | 318 | 345 | 387 | 308 | 451 | 300 | 594 | 390 | **387** | 234 | 205 | 403 | 294 | 418 | 200 | 575 | 420 | **344** |
| 25 | Karjat-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 | Swarnaprava | 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) | | | | | 4.3* | | | | LSD (Treat x Variety) | | | | | | ns | | |
| | | LSD (Location x Treat) | | | | | 16.75** | | | | LSD (Location x Treat x Variety) | | | | | | 81.4** | | |
| | | LSD (Variety) | | | | | 20.35** | | | | CV (%) Treat | | | | | | 13.38 | | |
| | | LSD (Location x Variety) | | | | | 57.56** | | | | | | | | | | | | |

**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** |

| 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** |
| 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 | Swarnaprava | 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** |

| 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 |
| 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 | Karjat-3 | 157 | 186 | 90 | 186 | 103 | 163 | 180 | 117 | **148** | 115 | 89 | 124 | 162 | 96 | 147 | 118 | 173 | **128** |
| 25 | Karjat-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) | | | | | ns | | | | LSD (Treat x Variety) | | | | | | ns | | |
| | | LSD (Location x Treat) | | | | | 10.53** | | | | LSD (Location x Treat x Variety) | | | | | | 39.45** | | |
| | | LSD (Variety) | | | | | 9.86** | | | | CV (%) Treat | | | | | | 17.56 | | |
| | | LSD (Location x Variety) | | | | | 27.89** | | | | | | | | | | | | |

**Table 6.6.12 Influence of Low-Light Stress on Grain number/m$^2$ 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** |

| 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 |
| 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 | Karjat-3 | 46115 | 30598 | 24723 | 53900 | 44176 | 30867 | 72743 | 38800 | **42740** | 27956 | 3479 | 24529 | 42630 | 30844 | 17033 | 60933 | 63400 | **33851** |
| 25 | Karjat-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 | Swarna | 56229 | 35606 | 42683 | 61782 | - | 29983 | - | - | **45257** | 31128 | 8938 | 24290 | 34580 | - | 12200 | - | - | **22227** |
| 32 | Swarnaprava | 52041 | 23858 | 35190 | 48748 | - | 38300 | - | 14430 | **35428** | 24457 | 3340 | 22542 | 32648 | - | 16500 | - | 41840 | **23555** |
| 33 | Swarna-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) | | | | | 781* | | | | LSD (Treat x Variety) | | | | | | ns | | |
| | | LSD (Location x Treat) | | | | | 3047** | | | | LSD (Location x Treat x Variety) | | | | | | 15110** | | |
| | | LSD (Variety) | | | | | 3777** | | | | CV (%) Treat | | | | | | 19.48 | | |
| | | LSD (Location x Variety) | | | | | 10684** | | | | | | | | | | | | |

**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 | 31350 | 64600 | 81540 | **45008** |
| 4 | IET-31220 (R) | 56493 | 40082 | 44353 | 57960 | 77726 | 36683 | 68246 | 32650 | **51774** | 29203 | 28820 | 34082 | 35882 | 69586 | 18367 | 50581 | 64320 | **41355** |
| 5 | IET-31237 | 57252 | 37601 | 37865 | 45850 | 60170 | 47433 | 60539 | 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 | 58800 | **38684** |
| 21 | IET-33263 | 47873 | 37008 | 61086 | 50344 | 75504 | - | 85544 | 76080 | **61920** | 28589 | 10422 | 28366 | 37198 | 55484 | - | 74508 | 50380 | **40707** |

| 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 |
| 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 | Karjat-3 | 49889 | 63754 | 34410 | 57316 | 46761 | 49050 | 107452 | 45320 | **56744** | 26855 | 18191 | 49991 | 47628 | 40326 | 29200 | 67925 | 73300 | **44177** |
| 25 | Karjat-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 | Swarnaprava | 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) | | | | | 1158* | | | | LSD (Treat x Variety) | | | | | | ns | | |
| | | LSD (Location x Treat) | | | | | 4516** | | | | LSD (Location x Treat x Variety) | | | | | | 17281** | | |
| | | LSD (Variety) | | | | | 4320** | | | | CV (%) Treat | | | | | | 23.71 | | |
| | | LSD (Location x Variety) | | | | | 12220** | | | | | | | | | | | | |

**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** |

| 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 |
| 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 | Ratnagiri-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) | | | | | 15.99** | | | | LSD (Treat x Variety) | | | | | | ns | | |
| | | LSD (Location x Treat) | | | | | 45.23** | | | | LSD (Location x Treat x Variety) | | | | | | 118.68** | | |
| | | LSD (Variety) | | | | | 29.67** | | | | CV (%) Treat | | | | | | 25.06 | | |
| | | LSD (Location x Variety) | | | | | 83.92** | | | | | | | | | | | | |

**Table 6.6.15 Influence of Low-Light Stress on Total dry matter (g/m$^2$) 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** |

| 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** |
| 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 | Karjat-3 | 1167 | 1005 | 1127 | 998 | 803 | 1557 | 1975 | 1273 | **1238** | 704 | 318 | 1094 | 855 | 837 | 940 | 1736 | 1041 | **941** |
| 25 | Karjat-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) | | | | | 34.48** | | | | LSD (Treat x Variety) | | | | | | ns | | |
| | | LSD (Location x Treat) | | | | | 97.53** | | | | LSD (Location x Treat x Variety) | | | | | | 298.18** | | |
| | | LSD (Variety) | | | | | 56.68* | | | | CV (%) Treat | | | | | | 21.08 | | |
| | | LSD (Location x Variety) | | | | | 210.84** | | | | | | | | | | | | |

**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 | 21.3 | 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** |

| 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 |
| 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 | Karjat-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 | Karjat-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 | Swarnaprava | 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) | | | | | ns | | | | LSD (Treat x Variety) | | | | | | ns | | |
| | | LSD (Location x Treat) | | | | | 0.35** | | | | LSD (Location x Treat x Variety) | | | | | | 3.43** | | |
| | | LSD (Variety) | | | | | 0.85** | | | | CV (%) Treat | | | | | | 4.59 | | |
| | | LSD (Location x Variety) | | | | | 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** |

| 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 |
| 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 | Karjat-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 | Karjat-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 | Ratnagiri-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 | Swarnaprava | 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) | | | | | ns | | | | LSD (Treat x Variety) | | | | | | ns | | |
| | | LSD (Location x Treat) | | | | | 2.55** | | | | LSD (Location x Treat x Variety) | | | | | | 8.33** | | |
| | | LSD (Variety) | | | | | 2.08** | | | | CV (%) Treat | | | | | | 17.21 | | |
| | | LSD (Location x Variety) | | | | | 5.89** | | | | | | | | | | | | |

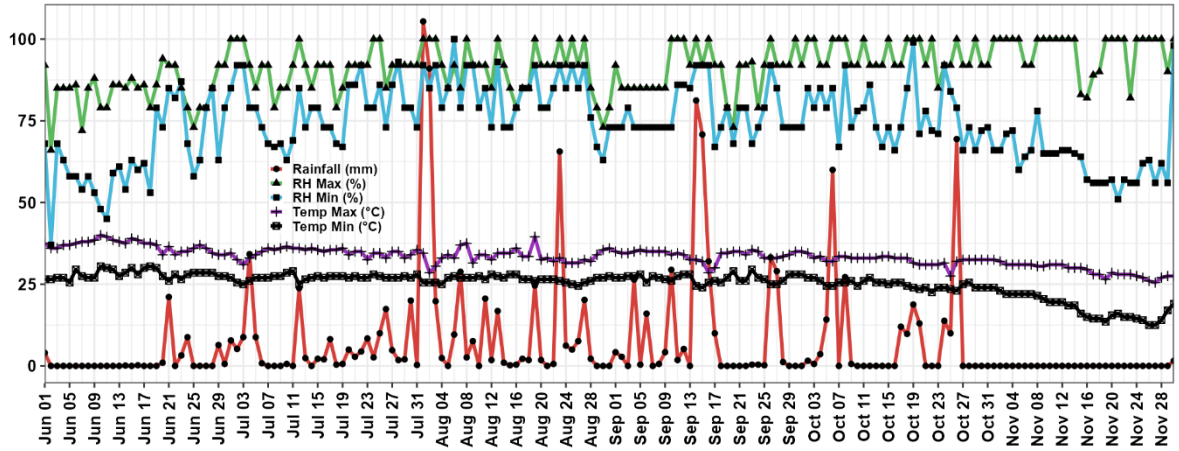
**Table 6.6.18A Influence of Low Light Stress on chlorophyll fluorescence traits at IIRR during *Kharif* 2024**

| S.No. | Genotype | Actual quantum yield of PSII (φPSII) | | | 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 |

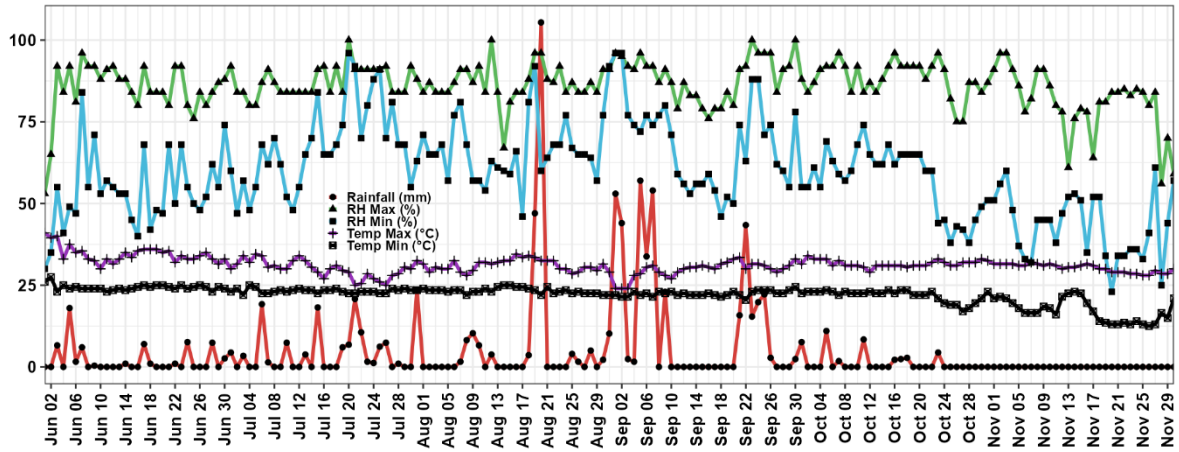
**Table 6.6.18B Influence of Low Light Stress on chlorophyll fluorescence traits at IIRR during *Kharif* 2024**

| 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 |

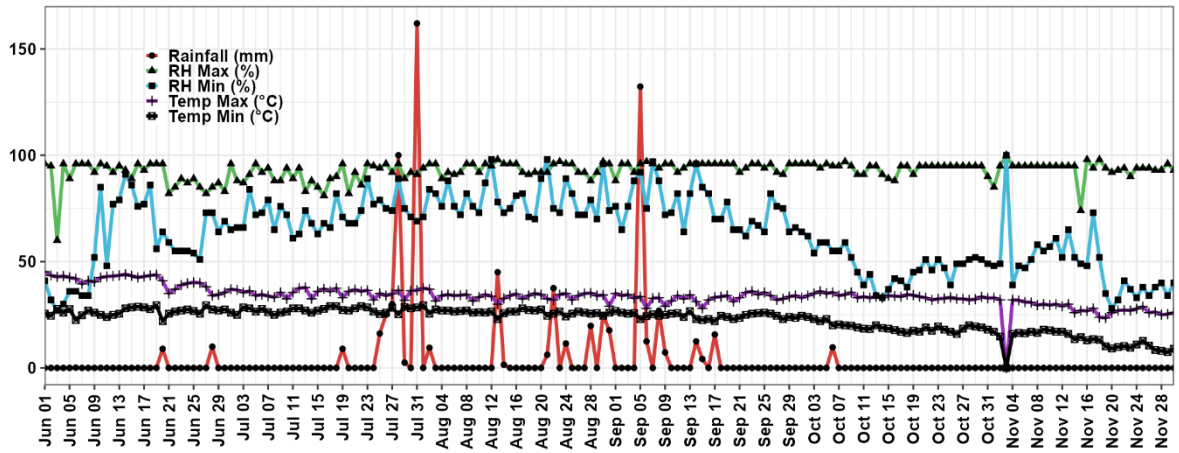
## Weather graphs



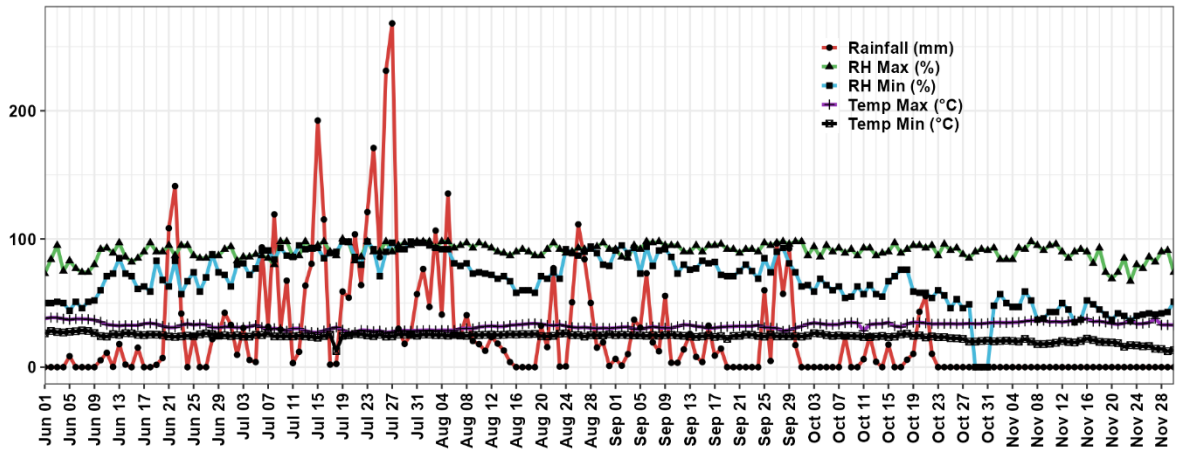

Temperature, Relative Humidity and Rainfall recorded at Chinsura (CHN) centre during 2024



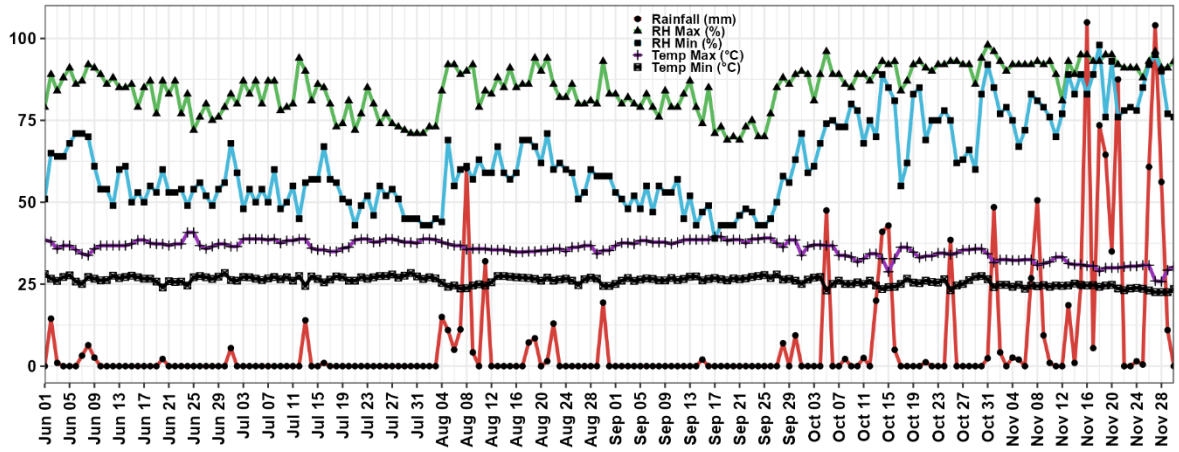

Temperature, Relative Humidity and Rainfall recorded at IIRR, Hyderabad centre during 2024



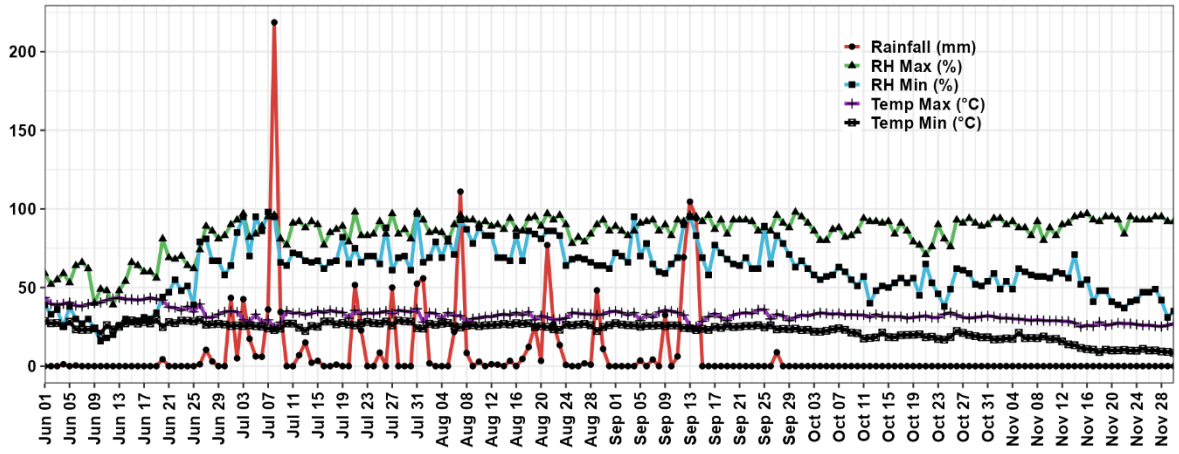

Temperature, Relative Humidity and Rainfall recorded at KAUL centre during 2024



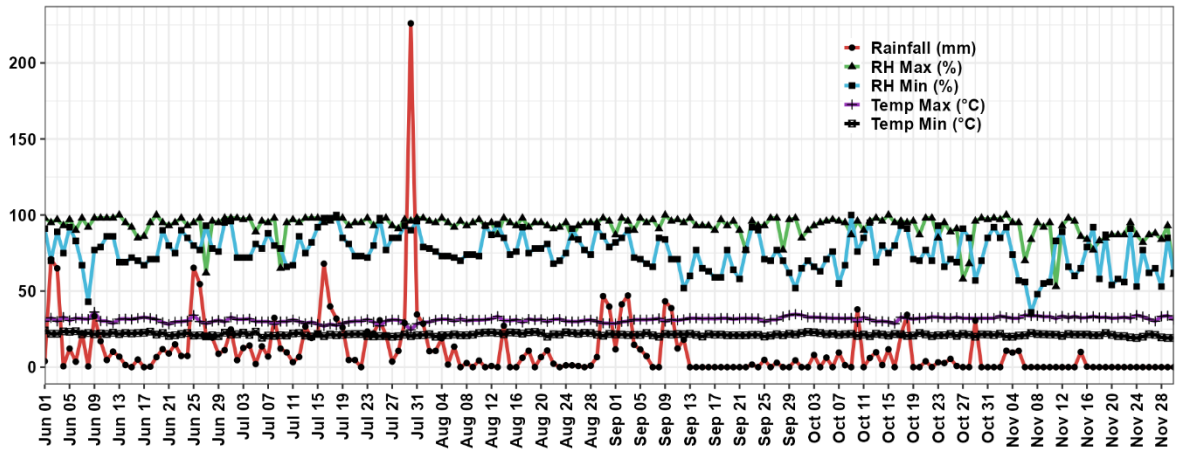

Temperature, Relative Humidity and Rainfall recorded at Karjat (KJT) centre during 2024



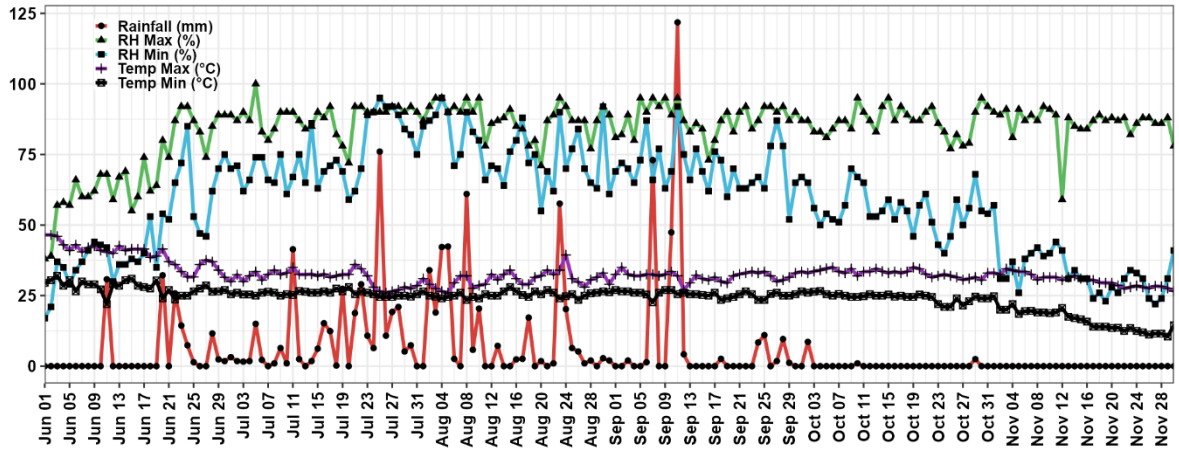

Temperature, Relative Humidity and Rainfall recorded at Karaikal (KRK) centre during 2024



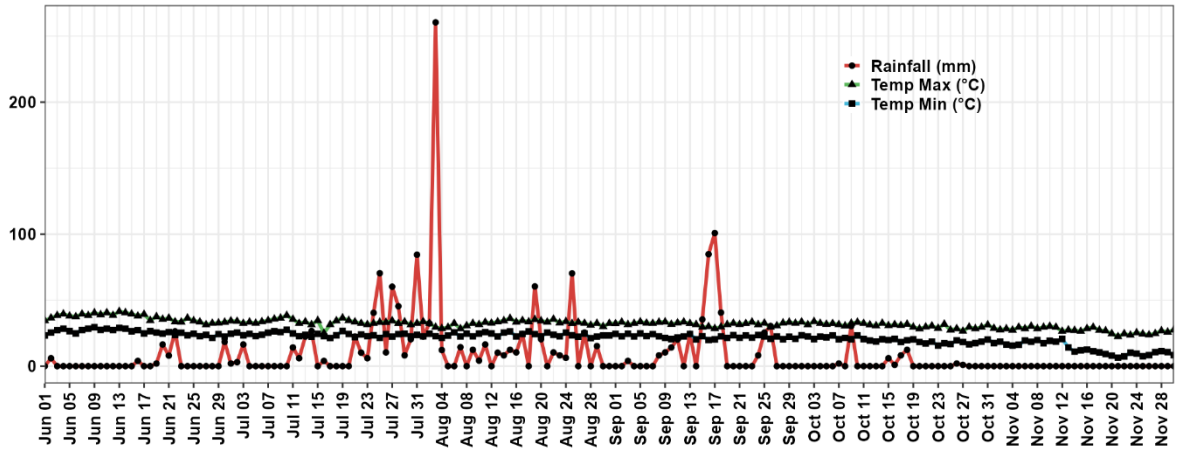

Temperature, Relative Humidity and Rainfall recorded at Pantnagar (PNR) centre during 2024



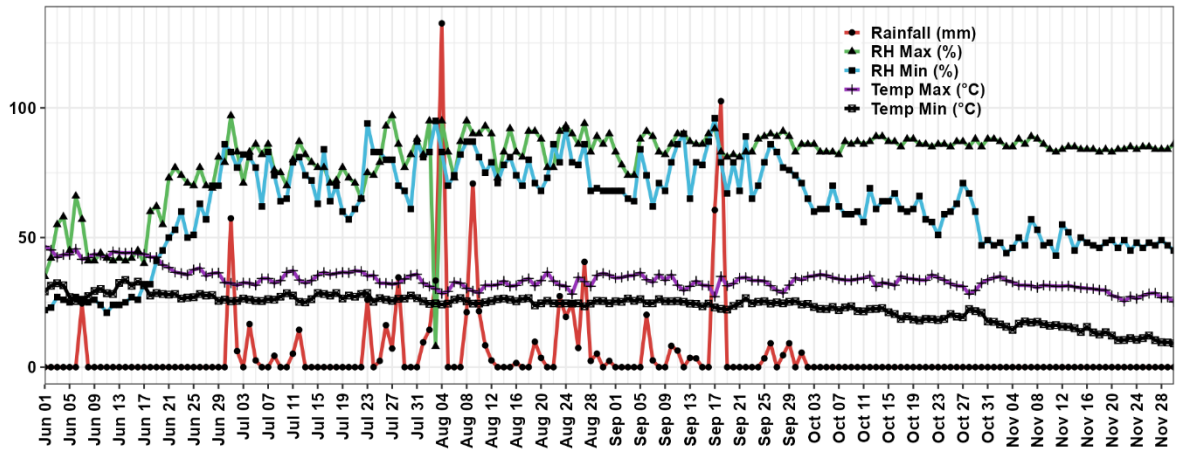

Temperature, Relative Humidity and Rainfall recorded at Pattambi (PTB) centre during 2024




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

**A P P E N D I X - 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-SU-B | 10 | IET-32124 |
| | | 11 | RP 6469-80 | 11 | IET 30660 | 11 | AC 34280 | 11 | CR 4111-1-2-1-B-SU-1-SU-B | 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 | Karjat-3 |
| | | | | | | 25 | Ratnagiri-8 | 25 | CRAC-4423-70 | 25 | Karjat-7 |
| | | | | | | 26 | Trombay Konkan 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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