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All India Coordinated Research Project on Rice (AICRPR)

भाकृअनुप
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(ENTOMOLOGY AND PLANT PATHOLOGY)

All India Coordinated Research Project on Rice

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PREFACE

Rice is the staple food crop of our country and it's heartening to note that India ranked first in terms of global rice production of 150.18 million tonnes. Despite this achievement, we cannot be complacent as the demands are ever growing with the increase in population and imminent climate change which poses significant challenges to global rice production, impacting growth and yield. The phenomenon has an influence on farming practices which has a cascading effect on crop physiology which also affects pest and disease dynamics. Hence there is a need to constantly work for the management of these issues to ensure national food security. ICAR-Indian Institute of Rice Research has the major mandate of handling the All India Coordinated Research Project on Rice (AICRPR), involving multi-disciplinary and multi-location testing of varietal, crop production and crop protection technologies through their research efforts and has been in the service of the farming community for more than six decades. Nearly 400 scientists, belonging to ICAR - Indian Institute of Rice Research, 45 funded and nearly hundred voluntary centers from State Agricultural Universities, Departments of Agriculture, ICAR Institutes and Private Undertakings work towards progress of rice research under the umbrella of AICRPR.

This volume reports the salient findings of experimental trials in Entomology and Plant Pathology conducted during 2025. The Crop Protection programme of AICRPR focuses on developing eco-friendly, affordable, and farmer-friendly IPM technologies that reduce socio-economic challenges and deliver meaningful benefits to rice growers across the country. The emphasis is on ecologically safe and cost-effective pest management strategies, including host plant resistance, identification of effective and safe molecules, and development of viable solutions for rapid pest control through ecological studies. Key components also involve the use of semio-chemicals, biocontrol agents, and organic compounds for pest management. Additionally, the programme focuses on understanding the influence of agronomic practices, identifying emerging pests and diseases in the rice ecosystems of India, and systematically recording weather parameters to support integrated pest management. Regular monitoring of pest occurrence at various locations across nation is undertaken to know changing pest scenario and to have timely management interventions. The change in virulence pattern of major pests and diseases is also monitored regularly in hot spot locations. Efforts are underway to build decision support systems for assisting farmers' in decision making.

I compliment the efforts of the entire staff of Entomology and Plant Pathology including Principal Investigators, Cooperating Scientists, technical and supporting personnel for their contribution in bringing out this document containing salient findings of this year's research pertaining to studies on various components of crop protection technologies across diverse ecosystems. The findings can be integrated as per the need and implemented for a holistic and effective pest management by the end user.

Date 6.04.2026

(R. M. Sundaram)

ENTOMOLOGY

2. ENTOMOLOGY TRIALS
Kharif 2025

Rabi 2024-25

SUMMARY

All India Coordinated Entomology Programme was organized and conducted during *kharif* 2025 with seven major trials encompassing various aspects of rice Entomology. During *kharif* 2025, 337 experiments were conducted (98.26%) out of 343 experiments at 38 locations (IIRR, 26 funded &11 voluntary centres) in 20 states and one Union Territory. Details of scientists involved in the program at headquarters, cooperating centres and the performance of centres is provided in Appendices I, II and III.

2.1 Host plant resistance studies comprised of six screening experiments involving 1970 entries which included 1610 pre-breeding lines, 99 hybrids, one variety, 6 donors and 254 check varieties. These entries were evaluated against 14 insect pests and panicle mite in 301 valid tests (55 greenhouse reactions and 246 field reactions). The results of these reactions identified 117entries (5.94 % of the tested entries) as promising against various insect pests. Of these promising entries, 41 entries (35.04%) were under retesting. The trial wise summary of the results of the evaluations are given below.

Planthopper Screening trial (PHS): Evaluation of 95 entries in Planthopper screening trial (PHS) against brown planthopper (BPH), and white-backed planthopper (WBPH) under greenhouse conditions; mixed populations of planthoppers under field conditions in 19 valid tests (12 greenhouse tests and 7 field tests in terms damaged tillers (DT) (≤5%), damage score (DS) (≤3), and hopper burn (HB) (≤25%) was carried out at 13 locations. The results identified six entries and three checks as promising in 5 to 11 tests. MTU 2760-2-1-1-1, RGL 2130, RGL-2037-20-2-1, IC 76018, RP 6469-364 were the most promising entries in both greenhouse and field conditions in 5 to 11 tests suggesting varying levels of resistance to planthoppers. CB 22522 exhibited only resistance at seedling stage. With respect to WBPH, four entries *viz.*, WGL 1792, RNR 50684, JGL 49276, and JGL 47953 were found promising with DS ≤ 3.0 in one out of two tests.

In **Gall midge Screening Trial (GMS)** 50 entries were evaluated in 10 field tests against 10 populations of gall midge which helped in identification of 8 entries as promising in 2-4 tests of the 10 valid tests. IBT-WGL-17 (WGL 2150)*, JGL 41652*, WGL 2000* were promising in 4 tests. WGL 1909* was promising in 3 tests. NLR 5942-33-3-3-1-1-1, NLR 5952-*9-1-3-1-1, NLR 5986*-6-3-1-1-2, RNR 48724 in 2 tests each. Of these IBT-WGL-17 (WGL 2150)*, and WGL 2000* JGL 41652*, WGL 2000* were in the second year of retesting.

Field evaluation of 33 entries replicated twice at 20 locations in the **Leaf Folder Screening Trial (LFST)** during Kharif 2025 revealed that 24 entries were promising in 2-5 tests out of 11 valid field tests. In the second year of testing, 0615-PTB-01-28-18 was promising in 5 tests, followed by BPT 3284 and 0627-PTB-2-14-1 which were promising in 4 valid field tests each. Four entries, BPT 3284, RP5490 PTB 1-1-2, and BPT 3507 were found promising for two years in 4-6 valid field tests.

Stem Borer Screening Trial (SBST) : Evaluation of 50 entries in 15 valid field tests for dead hearts damage and 9 valid tests for white ear damage identified 12 entries as most promising in 6 to 8 of the 24 tests in terms of low dead heart (≤10% DH) and white ear damage (≤5% WE). RP5564 PTB 2-4-1-2-2* was promising in 8 tests; NLR 5932-3-2-3-5-5-2*, NLR 3939, HKP-lSM-600-28, NWGR-20066 and RP5587* in 7 tests; 0627-PTB-2-14-1*, HKP-ISM-M8-29*, BK49-76*, RP5517-PTB-1-1-1-1-1, NWGR-19183* and RP6946-HI-22 in 6 tests each. SM92 was promising in 5 tests. Among these, 8 entries were under retesting. These promising entries were also promising in 1 to 5 tests of the 8 valid tests with higher grain yield (≥15.0 g/hill) under infested conditions in reproductive phase suggesting that recovery resistance and tolerance could be the mechanism in these entries as they have good grain yield despite damage.

Multiple Resistance Screening Trial (MRST) constituted with 30 entries which included breeding lines, germplasm accession and check varieties was evaluated at 31 locations against 8 insect pests. Evaluation of 30 entries in 57 valid tests (7 greenhouse and 50 field tests) against 8 insect pests helped in identification of 7 test entries *viz,* RP6167-NPA55-2, RP5977-MS-112, MTU 2721-7-1-2-1, MTU 2720-28-2-1-1, BPT 3194, RP6167-NPA47 and RP6168-SN230 as most promising in 10-14 tests against 3-6 insect pests with a PPR of 7.8 -17.1.The check lines W1263 and RP 2068-18-3-5 were promising in 13 tests each against 6 and 5 pests, with a PPR 17.1 and 12.7, respectively. PTB 33 was promising in 16 tests, 6 pests with a PPR of and 21.1.

National Screening Nurseries (NSN): National Screening Nurseries (NSN) comprised of IIRR- NSN for irrigated ecology and CRRI -NSN for rainfed ecology IRRI-National Screening Nurseries (NSN) comprised of 4 trials -National Screening Nursery 1 (NSN1), National Screening Nursery 2 (NSN2), National Screening Nursery – Hills (NSN hills) and National Hybrid Screening Nursery (NHSN).

IIRR-NSN1: Evaluation of 383 entries at 20 locations in 32 valid tests (7 greenhouse and 25 field tests) against 7 insect pests and a mite identified 14 entries of which 7 were test entries and 7 were checks. IET nos 31714 (H)* was promising in 8 tests (against BPH, field tolerance to planthoppers and stemborer). IET Nos 29860*, 31618*, 31641*, 32518, 32680 and 33995 were promising in 7 tests each of the 32 valid tests. Tolerance to stemborer in check lines like Swarna PTB33 and other long duration entries could be an escape.

IIRR-NSN2: Evaluation of 674 entries along with 54 checks in 28 valid tests (6 greenhouse and 22 field tests) against 6 insect pests identified 11 entries as promising in 6-7 tests against 2-3 pests. IET nos 33570, was promising in 7 tests. IET nos 33530, 33467, 33563, 33392, 33403, 33418, 33699, 33703 and 33882 were promising in 6 tests against 2-3 pests. Aganni was promising in 6 tests.

IIRR- NSN hills: Evaluation of 107 entries(79 entries for hill location along with 18 disease checks and 10 insect checks) at 8 locations (Ludhiana, Pantnagar, Khudwani, Malan, Chatha (Rajouri), Coimbatore, Maruteru and IIRR) against 6 insect pests in 6 greenhouse and 6 field reactions identified IET Nos 32333, 32317, 33335, 33352, 33356 as moderately resistant (DS≤5.0) in 3 of the 4 locations tested and at par with the resistant check, PTB 33.

IIRR-NHSN: In this trial, 99 hybrids along with 35 checks were evaluated in 6 greenhouse and 20 field tests against 7 insect pests at 17 locations in 26 valid tests of the 21 locations where the trial was conducted. The results identified 9 entries as promising. IET Nos 34023, 34025, 34030, were promising in 5 tests. IET Nos 34049, 34050, 34053, 33997, AZ8433DT (NCH) and US314 were promising in 4 tests of the 26 valid tests. PTB33 was promising in 7 valid tests; and RP 2068-18-3-5 were promising in 5 tests 7.

CRRI-NSN1**:** Evaluation of 72 entries in NSN-1 in 6 greenhouse and 38 field tests against 7 insect pests in 43 valid tests helped in identification of IET No 32150, 32087 and 33216 as promising in one test for BPH. PTB 33, CR Dhan 317, CR Dhan 805 exhibited resistant reaction (SES DS≤ 3) in 3 tests and Salkathi in 2 tests in SSST under greenhouse conditions of the 5 valid tests. The IET NO. 31246 and 33150 recorded nil damage (% silver shoot formation) at ABP and JDP, respectively. The resistant check, W1263 exhibited nil damage at JDP.

CRRI-NSN2**:** Evaluation of 286 entries in NSN-2 in 5 greenhouse and 26 field tests against 6 insect pests in 30 valid tests was done at 16 locations. The IET line 34144 found promising (DS≤ 3) in CBT and GNV against BPH. The IET lines 34066, 34111, 34144 and 34179 found promising (SES DS ≤3) against white-backed planthopper at CBT under greenhouse conditions.

2.2 Insect biotype studies included four trials 1. Gall midge biotype trial (GMBT) and 2) Gall midge population monitoring trial (GMPM). 3. Planthopper Special Screening Trial (PHSS) 4. Planthopper population monitoring (PHPM) trial.

Gall Midge Biotype Trial (GMBT) was constituted with a set of 20 gene differentials categorized into 6 groups, along with the susceptible check TN1. Of these, four lines with *Gm1*, *gm3, Gm8 and Gm4+ Gm8* genes in the background of Improved Samba Mahsuri were included in the 6th group. The trial was conducted at 17 locations in 9 States of India. Evaluation of the gene differentials in 15 field tests at 14 locations identified Aganni (*Gm8*) and INRC 3021(*Gm8*) as promising in 9 of the 15 valid tests based on per cent plant damage. INRC17470 was promising in 7 tests; W1263 and RP5925-24 in 6 tests each. Kavya was promising in 5 tests. The results suggest that donors with *Gm8* and *Gm1* genes confer resistance to gall midge across most of the test locations.

Virulence composition of gall midge populations was monitored in **Gall Midge Population Monitoring (GMPM) trial** at six locations *viz.*, Jagtial, Warangal, Ragolu Gangavathi, Moncompu, and Pattambi spread across four southern states in India through single female progeny tests in a set of three gene differentials with susceptible variety. The results suggest that Aganni (*Gm8*) holds promise at Jagtial, and Ragolu with low susceptibility at Warangal, Moncompu and Gangavavthi. Except at Warangal all the locations recorded low silver shoot damage against W1263 (Gm1). Low virulence was recorded at Jagtial and Moncompu towards IBTGm2 (with *Gm4* + *Gm8*). However, a close monitoring of the virulence pattern in endemic areas is important.

Planthopper Special Screening Trial (PHSS): Evaluation of 20 sources of resistance in PHSS trial against brown planthopper at 12 locations identified six rice differentials *viz.,* IC76013, IC76057, IC75975, RP 2068-18-3-5, PTB 33, and IC 216735 as promising with damage score <=3.0. While, RP 2068-18-3-5 was the sole promising entry against WBPH at Coimbatore. In field screening, IC76057, IC75975, and RP4918-22 maintained the lowest pest population through the critical panicle stage. In mechanisms study gene differentials were assessed for four parameters; honeydew excretion, nymphal survival, days to wilt and probing behaviour. RP-2068-18-3-5 is the superior entry with low honey dew excretion, nymphal survival and more days to wilt. IC76013 and IC76057 were characterised by low honey dew excretion and low nymphal survival.

In **Planthopper Population Monitoring (PHPM**) trial, Assessment of brown planthopper (BPH) virulence using four gene differentials *viz.*, PTB 33 (with *bph2*, *Bph3*, and *Bph32*), RP 2068-18-3-5 (with Bph33(t)), IC76013 and IC75975 and TN1 (with no R gene) was carried out with populations at Gangavathi, IARI, Pantnagar and Ludhiana. Results revealed that the Gangavathi population was the most virulent, characterized by significantly higher fecundity and nymphal hatching with a lower proportion of males.

Seed Treatment for Management of Early season insect Pests of rice (STEP) a replicated field trial was conducted at 9 locations *viz.*, ADT, CBT, PTB, CHP, GNV, JDP, KRK, MTU, and RNR during 2025 Kharif season with Carbosulfan 25% DS, Chlorantraniliprole 50% W/W FS, Thiamethoxam 70% WS, Imidacloprid 48% W/W FS applied and Sedaxane 12.61% w/w + Azoxystrobin 3.15% w/w + Thiamethoxam 22.06% w/w as seed treatments with Untreated Control. For gall midge, carbosulfan 25% DS, chlorantraniliprole 50 WS, thiamethoxam 70% WS and imidacloprid 48 FS were effective with 39.5% to 49.7% reduction in SS over the untreated control. For yellow stem borer, chlorantraniliprole 50 FS and carbosulfan 25 DS were significantly superior as compared to rest of the treatments with 60.3 and 52.9 per cent reduction in DH. Whereas, with respect to WE carbosulfan 25 DS followed by chlorantraniliprole 50 FS were superior with 45.3 and 31.9 per cent reduction over the untreated control. For whorl maggot treatment effects were not significant. For hispa, chlorantraniliprole 50 FS showed superior efficacy. For leaf folder, chlorantraniliprole 50 FS was significantly superior with 40.5% reduction in damage as compared to untreated control. Seed treatment chemicals did not show significant adverse impact on the coccinellids, spider and mirid populations.

Evaluation of Drones for spraying of Agrochemicals (herbicides, insecticides and fungicides) in rice Pest Management (EDAPM): The trial was conducted to evaluate the efficacy of method of spraying agrochemicals through drones in comparison with Battery operated knapsack sprayer and untreated control. The trial was conducted at seven locations namely, Ludhiana, Navsari, Nawagam, Chinsurah, Raipur, Gangavathi, and Rajendranagar. Stem borer, leaf blast, sheath blight, grain discolouration and weeds were the target biotic stresses. Both the spraying methods, application by drone and battery operated knapsack sprayer minimised the damage caused by stem borers, gall midge, leaf folder and white backed planthopper significantly as compared to untreated control. For the management of yellow stem borer, drone spraying was superior achieving a 52.3% reduction in DH and a 41.0% reduction in WE. Drone application was the most effective treatment against gall midge reducing SS incidence by 52.5% at GNV.

Insecticide spray reduced mirid populations irrespective of the method of spraying (52.9% to 61.8%). While both methods decreased spider counts, the differences between them were not statistically significant. No phytotoxicity was observed with pesticides applied through drone or battery operated knapsack sprayer.

Spraying of fungicides with drone, clearly outperformed battery operated spraying in the management of leaf blast, neck blast, sheath blight and grain discolouration. With respect to leaf blast, drone spraying was superior over the knapsack spraying with 49.94% and 48.76% reduction at maximum tillering and boot leaf stages, respectively. For neck blast drone spray was most effective with 50.65% reduction in the disease incidence. With respect to sheath blight, drone spray outperformed battery operated knapsack spray with 44.44% and 47.94% reduction in the disease incidence at maximum tillering and booting stage, respectively. Same trend was found in case of grain discolouration drone spray outperforming knapsack spray with 69.78% reduction in the disease incidence.

With respect to grain yield, drone and battery operated knapsack insecticide spraying were statistically at par and significantly outperformed the untreated control. Drone spraying resulted in a 48.7% increase, while knapsack spraying provided a 38.5% increase over the untreated control.

Evaluation of Entomopathogens against Lepidopteran Pests (EELP) was taken up in fifteen locations to test the effectiveness of different strains of the entomopathogens, *Bacillus albus, Bacillus thuringiensis* two strains of *Beauveria bassiana* and three strains of *Metarhizium anisopliae*, in comparison with chemical and untreated control. While chemical control consistently provided the lowest pest damage of stem borer and leaf folder and highest yield across all locations (6433–7567 kg/ha), it significantly reduced natural enemy populations of mirids, spiders and coccinellids. The entomopathogenic treatments consistently reduced lepidopteran pest damage and supported natural enemy abundance compared to untreated control. Among the entomopathogens, *B. bassiana* NRRI TF 6, *B. albus* NBAIR-BATP and *M anisopliae* NRRI TF 9 were found to be the most effective treatments. *B. bassiana* NRRI TF 6 (1 x 10^8 cfu/ml) 2 g/ L of water or 1kg/ha in 500 l of water) was particularly effective in reducing stem borer damage and performed well at Brahmavar, Moncompu and Navsari. *B albus* NBAIR-BATP 1 x 10^8cfu/ml) @ 10ml/L was also effective in reducing leaf folder damage and performed well at Karjat and Brahmavar. *M. anisopliae* NRRI TF 9 @ 2g/ L of water or 1kg/ha in 500 L of water was next best and recorded moderate reduction in stem borer and leaf folder damage at Ludhiana. Overall, the tested entomopathogens offered sustainable, eco-friendly alternatives with varying but promising efficacy across locations.

Evaluation of Entomopathogens, *Beauvaria bassiana* against Sucking Pests of rice (EESP) was taken up in five locations to test the effectiveness of the entomopathogen, *Beauveria bassiana* (VKA 01 isolate) in comparison with Malathion 50 EC 500 g a.i per ha, Azadirachtin 0.005% and an untreated control. Across all locations, application of Malathion 50 EC recorded significantly lower numbers of gundhi bug and planthopper population and higher grain yield compared to *Beauveria bassiana* treatment. *Beauveria bassiana* was more effective in reducing pest population and recorded higher grain yield compared to Azadirachtin in most locations. Natural enemy population, which included spiders, coccinellids and carabids was higher in *B. bassiana* and Azadirachtin treatments compared to Malathion across locations. Untreated control recorded highest pest population and lowest yield.

Influence of crop Establishment Methods on Pest incidence (IEMP), a collaborative trial with the Agronomy discipline was conducted at eight locations during Kharif 2025. Across the locations, normal transplanting recorded low incidence of dead hearts (7.7%) while puddled direct seeding recorded high incidence (12.7% DH). White ear heads were low in normal transplanting (7.6% WE) and high in aerobic rice (13.7% WE). Unpuddled direct seeding recorded low gall midge incidence (8.6% SS) whereas high incidence was found in mechanical transplanting (21% SS) followed by normal transplanting (18.5% SS). The incidence of leaf folder was low in unpuddled direct seeding (5.3% LFDL) followed by aerobic rice (6% LFDL) and high in normal transplanting (11% LFDL). High incidence of whorl maggot (7.7% WMDL) and hispa (6.3% HDL) was recorded in unpuddled direct seeding, while puddled direct seeding recorded high caseworm incidence (11.5% CWDL). The incidence of BPH was low in puddled direct seeding (13.1/ hill) and WBPH in unpuddled direct seeding (1.2/hill). Overall, the incidence of insect pests was similar in puddled direct seeding, normal transplanting and mechanical transplanting methods of crop establishment and relatively low in unpuddled direct seeding and aerobic rice.

Pest Incidence in Natural Farming (PINF) was conducted at 12 locations during Kharif 2025. This is a collaborative trial with soil science and Agronomy. Across locations, the incidence of stem borer, gall midge, leaf folder, whorl maggot, hispa, thrips, caseworm, grasshopper, rice skipper, BPH, WBPH and GLH was observed in all the treatments. The incidence of thrips was observed only at Titabar, the incidence of grass hopper and rice skipper was observed only at Khudwani. Overall, the incidence of pests was low in T5 – Integrated crop management with need-based pesticides and high in T1 – control. However, in majority of the locations the incidence in T2 – Complete natural farming, T3 – AI-NPOF package and T4 – Integrated crop management with NF was between T1 – control and T5 – Integrated crop management with need-based pesticides and needs to be studied in depth in relation to the inputs used and the time and frequency of application.

Evaluation of Pheromone Blends for Insect pests of rice (EPBI) trial was conducted at 14 locations during Kharif 2025 and two locations during Rabi 2024-2025. The field trial included two formulations, namely normal (N) and slow-release (SR), for monitoring the yellow stem borer (YSB), and the rice leaf folder (RLF). The mean cumulative catches of YSB/season across locations were significantly higher in slow-release formulations (14 ± 1.2) as compared to normal formulations (8 ± 0.8). Across locations and formulations, YSB catch was generally higher under slow-release formulations compared to normal formulations at 11 locations, with pronounced catches per trap at PSA (49), LDN (37), CHN (23), PTB (20) and TTB (18). The overall mean cumulative catch/season in RLFSR (8.92 ± 0.68) was significantly higher than RLFN (6.63 ± 0.62) across locations. RLF catch was significantly higher in slow-release formulations at PSA (26) and CHN (17), whereas at RNR (21), JDP (16) and TTB (11), the catch was significantly higher in normal formulations. At all other locations, the RLF catch was at par in both the formulations. Field population assessments were carried out through visual counts for yellow stem borer, the disturb-and-count method (DCM) for leaf folder, and sweep net and light trap (LT) catches for both pests.

Integrated Pest Management in Direct Seeded Rice (IPM-DSR) trials with zone - specific practices were conducted at 12 locations across 22 farmers' fields in a participatory manner during Kharif 2025. The results indicated that IPM practices effectively reduced the incidence of major insect pests compared to farmers' practice (FP) in most zones. In Zone III (eastern areas), stem borer damage in terms of dead hearts and white ear heads was higher under FP, while in other zones the incidence remained low under both treatments. In Zone VII (southern areas), gall midge incidence was relatively higher in IPM plots; however, rice hispa damage was considerably lower under IPM than FP. The incidence of leaf folder, whorl maggot, thrips, BPH, and WBPH was generally lower in IPM plots across zones, indicating better pest suppression under IPM. Grain yield was consistently higher in IPM plots across locations. Economic analysis further revealed that IPM reduced cost of cultivation and increased gross and net returns, resulting in a higher benefit–cost ratio compared to FP. This study also provided proof of concept, where many of the eco-friendly components, such as seed treatments, bund crops, bird perches, pheromone traps, and the release of egg parasitoids, etc., were deployed and validated in farmers' fields, reaffirming the integration of various components for the management of insect pests.

The adoption of IPM practices reduced the disease progression of leaf blast, sheath blight, bacterial blight, brown spot and false smut in Zone II. In Zone IV, IPM practices reduced the disease development of sheath blight, bacterial blight and brown spot. In Zone VI, IPM practices reduced the AUDPC values of sheath blight and sheath rot. In Zone VII, the AUDPC values of leaf blast, neck blast, sheath blight and bacterial blight were low in IPM plots compared to FP plots, indicating that the IPM practices were effective in managing these diseases. However, the values of false smut were low in both IPM and farmers practices.

Weed population and weed dry biomass were significantly lower in IPM plots as compared to FP plots across the locations. In IPM-adopted fields, the mean weed population reduction across the Zones ranged from 6.87% in Zone VII at Gangavathi to 66.60% in Zone III at Chinsurah at active tillering stage while it varied from 6.79% t 63.70% at panicle initiation stage. The weed biomass was reduced from 10.22% (Zone VII, Aduthurai) to 87.53% at Chinsurah in Zone III at active tillering stage and from 13.59% to 68.18% at panicle initiation stage. This indicates that IPM improved productivity through a combination of better yield attributes and reduced weed competition.

Grain yields were significantly high in IPM-implemented plots, resulting in high gross returns. Overall, the IPM-DSR approach proved effective in minimizing pest damage, enhancing productivity, and improving profitability (B:C ratio of 1.7-3.1) across different rice-growing zones.

Assessment of Insect population dynamics in rice ecosystems reports on the salient findings of the insect population dynamics in rice crop during *kharif* 2025 which was monitored and recorded across various zones in India along with the meteorological data through two major trials, 1. Population dynamics of insect pests and natural enemies in rice ecosystem (PDPNE) where pest damage of major insect pests and natural enemies incidence were recordedand correlated with weather parameters and 2. Monitoring of populations of rice insect pests and natural enemies through light trap catches (MPNELT).

Studies on the **Population Dynamics of Insect Pests and Natural Enemies in the rice ecosystem (PDPNE**) were conducted across 30 locations representing seven AICRPR zones of India. The study aimed to understand the fluctuations in pest populations in relation to weather parameters, crop phenology, growing season, and cropping systems, as this information is essential for developing ecologically sound and economically viable pest management strategies. During the *Kharif* 2025 season, yellow stem borer, planthoppers, leaf folder, and gall midge were identified as the major insect pests of rice across different regions of the country. In addition, rice hispa and whorl maggot were recorded as minor pests in the rice ecosystem at several locations.

Zone I: Pest incidence at Khudwani started from 25^{th} SMW, dominated by grasshoppers with peak damage of 33.46% DL (32^{nd} SMW). Rice skipper remained low (max 2.53% DL). Spider population peaked at 1.16/hill, while braconids reached 0.96/hill, showing mid-season natural enemy activity.

Zone II: Pest activity began from 30^{th} SMW. Stem borer dead heart peaked at 13.81% (38^{th} SMW) and leaf folder at 8.51%DL (37^{th} SMW). Planthopper (BPH/WBPH) showed severe outbreak with maximum 101.35/hill (40^{th} SMW) at Ludhiana. White ears damage reached peak in 43^{rd} SMW (19.48%WE). Natural enemies (spiders, mirids, parasitoids) were higher during 38-40 SMW.

Zone III: Incidence started from 33^{rd} SMW. Gall midge peaked at 19.08% (40^{th} SMW), stem borer at 14.14% DH (40^{th} SMW) and leaf folder at 9.73%DL (37^{th} SMW), highest %DL was recorded at Pusa. Planthopper (BPH/WBPH) reached 11.40/hill, while white ears peaked at 12.05% (46^{th} SMW) at Chiplima. Natural enemies (spiders, coccinellids, mirids) were abundant during peak pest period.

Zone IV: Pest incidence at Titabar initiated from 32^{nd} SMW. Gall midge reached 6.86%, stem borer 6.30% and leaf folder 5.25%. Whorl maggot peaked at 4.58%. White ears appeared late with maximum 9.79% (48th SMW). Spider population ranged from 0.44–1.00/hill.

Zone V: Pest activity began from 34^{th} SMW. Gall midge was severe with maximum 72.00% DP (38^{th} & 40^{th} SMW) at Jagdalpur. Stem borer peaked at 16.44% (41^{st} SMW). Planthopper (BPH/WBPH) reached 4.78/hill. Maximum damage of white ears was recorded up to 12.23% (43^{rd} SMW). Natural enemies (spiders, coccinellids) peaked during high pest incidence.

Zone VI: Pest incidence started from 36^{th} SMW. Stem borer dead heart damage peaked at 6.98% (42^{nd} SMW) and leaf folder at 15.23% (40^{th} SMW). Planthopper (BPH/WBPH) reached 13.92/hill (40^{th} SMW). White ears appeared late with maximum 9.63% (45^{th} SMW).

Zone VII: Pest incidence commenced from 30^{th} SMW, with major pests including gall midge (59.22% of DP and 14.03% SS), stem borer (14.25 DH %), leaf folder (16.68%) and Planthopper (BPH/WBPH) (28.35 No./hill) showing peak activity between 32^{nd} - 46^{th} SMW. Whorl maggot and rice hispa remained minor pests throughout the season. White ear incidence appeared at later stages, reaching 16.67% (46^{th} SMW). Natural enemies such as spiders (5.88/hill), coccinellids (4.96/hill) and mirids (5.81/hill) were abundant during peak pest periods, indicating their role in pest regulation.

Overall, the study revealed that major rice pests such as stem borer (%DH), leaf folder (%DL), planthoppers (No./hill) and gall midge (%DP/%SS) exhibited distinct seasonal peaks across AICRPR zones, largely influenced by favourable weather conditions and crop growth stages. Natural enemies including spiders, mirids, coccinellids and parasitoids increased during peak pest incidence, highlighting their role in regulating pest populations.

Across zones, temperature (Tmax/Tmin) showed a consistent positive correlation with major pests such as stem borer (%DH), leaf folder (%DL) and gall midge (%DP/%SS) in Zones II, III, IV, V, VI and VII with r values ranging from 0.26 to 0.85*, and also with natural enemies (spiders, coccinellids and mirids) across Zones II–V (r = 0.17 to 0.74). Sunshine hours (SSH) positively influenced leaf folder (%DL) and planthoppers (No./hill) in Zones II, VI and VII, with r values ranging from 0.24 to 0.57. In contrast, evening relative humidity (RHEV) and rainfall (RF mm) mostly showed negative or variable associations in Zones II, VI and VII, with r values ranging from -0.18 to -0.84*, particularly reducing No. of planthopper and leaf folder (%DL). Overall, temperature remained the most consistent positive factor across zones, whereas humidity, rainfall and wind exhibited suppressive or inconsistent effects.

Monitoring of insect Pests and Natural Enemies through Light Trap catches (MPNELT) at 27 locations revealed that yellow stem borer, leaf folder, and hoppers continued to be the most important pests in terms of numbers as well as spread across the locations. Gall midge continues to be an endemic pest. However, case worm, and gundhi bug showed an increase in the spread and intensity of incidence posing concern for future. White stem borer was reported from MNC and TTB; Pink stem borer was reported from RPR and RNR. Black bug was reported from five locations: ADT, RPR, MNC, MTU, and TTB. Zigzag leafhopper was found in six locations: MTU, JDP, GNV, CBT, BPT, KRK, BRH and WGL. White grub was a concern at KHD and CHT. Grasshoppers were regular pests at CHT and was also recorded at TTB and JDP. Regarding natural enemies green mirid bugs, coccinellids, rove beetles and ground beetles were recorded. Patterns in seasonal incidence and population build up based on light trap catches indicates that the key pests are reaching their peak levels in the month of October in the kharif season and in the late January or early February during *rabi* season. Therefore, strategies are to be timed accordingly for the effective management of insect pests in rice.

ENTOMOLOGY

INTRODUCTION

This year the rice production during *kharif* 2025 is estimated at record 124.5 million tonnes (MT), which is 1.7 MT (over 1%) last year. It was boosted by the normal rainfall from the southwest monsoon (June-September) that was 106% of the long-period average (LPA) across India, though there were significant regional variations. Cyclone *Montha* had affected the crop stand in some of the coastal areas. Real Time Pest Survey Reports were continued to be generated at fortnightly interval from AICRPR Centres, during 2025. Information was received from Tamilnadu, Kerala, Odisha, West Bengal, Maharashtra, Uttarakhand, Gujarat, Haryana, and Jammu. Stem borers, Brown planthopper, Black bug, Leaf folder, GLH resulting in tungro disease, case worm and Leaf mite occurred in moderate to severe form in various locations. The salient findings of the reports are summarised in the table below:

Salient findings from pest survey reports, 2025

Reporting Centre	Locations : area surveyed	Severity of pest incidence	Varieties grown
January 2025			
Aduthurai	Thiruvarur, Thiruvarur block Nannilam, Thiruneelakudi, Tamil nadu	BPH damage upto 30-40% at harvesting stage	CO51
April 2025			
Chinsurah	Tarakeswar block , WB (30 ha surveyed)	Stem borer 2-6% at 60-65 DAT	Satabdi (IET 4786)
May – June 2025			
Aduthurai	**Villages:** Vayalur, Elantharai, Koodalloor, Madakudi, Alangudi, Swamimalai, Parravakarai, Rajagopalapuram, Palakudi, Kelluthhur, Nannilam, Aduthurai, Puthur, Ammankudi, Thirupurampiyam, Konthagai, Chithambaranathapuram, Melamarathurai, ravancheri. **Block:** Thiruvidaimaruthur, Mayiladuthurai, Kollumangudi, Nannilam, Kuthalam and Alangudi District: Thiruvarur, Thanjavur, Nagapattinam	Leaf mite, *Oligonychus oryzae* – 45-45 % leaf damage at 50 DAS	ADT-45, TPS5, CO-55, ADT51
July 2025			
Chatha	Jagatpur, District Kathua, jammu	Suspected dwarfing symptoms in with presence of WBPH	PR 113
Karjat	Aanjap, Tal. Karjat, Dist. Raigad, Maharashtra – 3.5 acre	Severe incidence of Case worm > 20% damage at 15 DAT	Suprim Sona, Avani
Aduthurai	Surveyed Villages : Kasinathan Kumbakonam, Kannan Kothangudi, Hussaein Aduthurai, Manikandan Maharajapuram, Yuvaraj Melamaruthuvakudi, Viswanathan, Thirukodokaval Block: Thiruvidaimaruthur, Mayiladuthurai, Kollumangudi, Nannilam, Kuthalam and Alangudi District: Thiruvarur, Thanjavur, Nagapattinam	10 % damage by leaf folder at vegetative phase in 25 acres surveyed	ADT 53, CO 51, CR 1009
August 2025			
Aduthurai	40 ac In Mayiladuthurai, dist Mayiladuthurai, Alangudi, Kuthalam, Thanjavur dist	Black bug 20- 25% damage At reprodutive phase	CO 51

	Pullichakadi,of Thiruvarur dist, Tamil Nadu		
Moncompu	Uppunkal, Ambalappuzha South, Alappuzha, Kerala. 3 ha of surveyed fields	20-30 % case worm damage	Uma
Chinsurah	District: East Burdwan (Purba Bardhaman) Block: Ketugram 1 Village: Komarpur (30ha)	Severe incidence of Tungro disease at 35-40 DAT. 5-8 GLH adults/hill	MTU 7029
September 2025			
Aduthurai	Vadugacherry, Orathur road, Aaziyur,Keelvelur Sikkal, Keelvelur, Nagapattinam	Brown planthopper 50-70% damage at harvest	TPS 5
October 2025			
Chiplima	Block: Kolabira, Dist: Jharsuguda, Odisha- 130 ha	Moderate incidence of BPH and YSB	Jamuna, Swarna, Pratiksha, MTU 1156, Padmaja,
	Village: Kapasira, Block: Tilaibani Dist: Deogarh Odisha; 100ha	Moderate incidence of BPH and YSB	Swarna, Puja, Ramchandi, Jamuna
Kaul	Harayana: Village: Rasina, Sakra, District: Kaithal; Kunjpura, Rasulpur, Nagla Megha, District: Karnal	BPH/WBPH incidence upto 0.5-1% (in 10-55 hopper/hill); 12 ha of field surveyed. @ out of 10 fields surveyed. Incidence of SRBSDV was observed in 2 out of 10 examined fields	PR 128, PR131, PR114 Sava 7301, 7501, 127, & PB 1509, 1692, 1885
Moncompu	Puthenkary, Nedumudy, Alappuzha, 3 ha surrveyed	25-50% damage by Stem borer at 84DAS. Severe in padasekharams	Uma
November 2025			
Moncompu	Kannitta B, Alappuzha 4 ha	60-70% damage by Stem borer at 105 DAS	Uma
December 2025			
Aduthurai	Govindhapuram, Balakudi, Alangudi, Thirupananthal, Tiruvarur and Thanjavur district.Tamil Nadu (100 acres surveyed)	45-50% damage at reproductive phase from Oct – Dec 2025 by leaf folder	ADT 53, CO 51, CR 1009

Though severe pest damage was reported as reflected in the above table it was limited to small pockets and no widespread pest outbreaks were reported during main *kharif* season of the crop this year.

Coordinated Entomology programme continued its focus on the host plant resistance, with emphasis on evaluation of breeding material and germplasm against major insect pests in pest specific trials, monitoring of virulence and characterization of both brown planthopper and gall midge populations. Multi-location evaluation for multiple insect pest injury was carried out for all the entries in National Screening Nurseries for irrigated and rainfed ecology and germplasm accessions to identify the promising material.

Under chemical control studies two trials that were initiated last year *viz.*, 'Seed treatment for management of early season insect pests of rice' to address the need for identification of effective molecules for early stage pest control; and "Evaluation of drones for spraying of agrochemicals (herbicides, insecticides and fungicides) in rice pest management' to explore the utility of this novel technology for pesticide application were continued with an additional treatment in each trial.

The trial on “Evaluation of entomopathogens against lepidopteran pests of rice (EELP)” that was initiated last year was continued and another new trial on “Evaluation of entomopathogen, *Beauvaria bassiana* against sucking pests of rice (EESP)” was formulated this year under Biocontrol and Biodiversity studies, so as to explore the efficacy of bioagents and harness the possible benefits to strengthen organic farming in rice.

Investigations are also being made to study the underlying impact of climate change on shift in cultivation practices and the resultant alterations in pest profile dynamics thereof. Under Ecological studies “Influence of establishment methods on pest incidence” is continued in collaboration with agronomists at different cooperating centres. The trial on “Evaluation of pheromone blends for Insect pests of rice” is continued with emphasis on the blends and their formulations for *Scirpophaga incertulas* and *Cnaphalocrocis medinalis*. The trial on “Pest Incidence in natural farming” which was initiated last year is continued in collaboration with the agronomists and soil scientists as Natural farming is the key focus of government policies.

The trial on “Integrated pest management in Direct seeded rice” is continued. This trial involved the integration of efforts from the disciplines of Entomology, Pathology and Agronomy for the holistic on farm biotic stress management was initiated through farmers’ participatory approach wherein IPM practices were compared with Farmers practice and demonstrated the benefits of IPM adoption in direct seeded rice.

Assessment of pest and natural enemy dynamics through quantification of field incidence and monitoring of populations of rice insect pests and natural enemies through light trap catches are being continued to discern short term fluctuations and long term trends in pest incidence.

This report summarizes the significant findings from the multilocation testing under greenhouse studies, field trials at research stations and farmers’ fields carried out at ICAR- IIRR and its cooperating centres under AICRPR during kharif 2025.

2.1 HOST PLANT RESISTANCE STUDIES

Host plant resistance trials were conducted with the main objective of identifying new sources of resistance to major insect pests from land races and breeding lines To achieve these objectives, six trials *viz.*, i) Planthopper screening trial (PHS) ii) Gall midge screening trial (GMS), iii) Leaf folder screening trial (LFST), iv) Stem borer screening trial (SBST) v) Multiple resistance screening trial (MRST), and vi) National screening nurseries (NSN) were constituted and conducted. The results are summarized and discussed trial wise. **In all 1970 entries were evaluated at 38 locations against 14 insect pests and panicle mite in various trials and 117 (5.94%) entries were identified as promising which included checks also**. The reaction of the entries to insect pests in each trial are tabulated in a separate volume **"Screening Nurseries: Vol. II –Diseases & Insect Pests".** The results are discussed trial wise:

2.1.1 Planthopper Screening Trial (PHS)

The planthopper screening trial was conducted to identify promising germplasm and breeding lines to rice planthoppers *i.e.*, brown planthopper and white-backed planthopper. The trial was constituted with 95 entries comprising of 5 breeding lines developed at RARS, Aduthurai, TNAU; 11 breeding lines developed at RRS, Bapatla, ANGRAU; 8 breeding lines developed at TNAU, Coimbatore; 18 breeding lines developed at RARS, Warangal, PJTAU; 3 breeding lines developed at RRU, Rajendra Nagar, PJTAU; 4 breeding lines developed at RARS, Jagtial, PJTAU; 3 breeding lines developed at IRRI; 22 breeding lines developed at ICAR-IIRR, Hyderabad. PTB 33 (BPH), RP 2068-18-3-5 (BPH) and MO1 (WBPH), BM71 (BPH field resistance) and TN1 (susceptible check) were the checks. Eight entries were under retesting. The entries were evaluated at 12 locations in 21 valid tests against brown planthopper (BPH), white-backed planthopper (WBPH) and mixed populations of planthoppers under field and greenhouse conditions.

Brown planthopper: Under greenhouse conditions in 10 tests MTU 2721-7-1-2-1* in eight tests, RGL2130, RGL 2037-20-2-1 and KS 370 in 3 tests; IC76018 in four tests were promising with a DS ≤ 3.0. MTU 2760-2-1-1-1, RGL 2130, and RGL-2037-20-2-1 were under retesting. Whereas, under field conditions, five entries (AD 20516, BPT 3372, JGL 44230, and KS 66, and MT 82) were promising with DS ≤ 3.0 in one valid test at RNR .

***White- backed planthopper*:** Under greenhouse conditions, two tests were conducted at IIRR, Hyderabad and TNAU, Coimbatore. Five entries *viz.*, WGL 1792, RNR 50684, JGL 49276, N22 4963 and JGL 47953 were found promising with DS ≤ 3.0 at IIRR. None was found promising at CBT.

***Mixed population of planthoppers under field conditions*:** The entries were screened under mixed populations of brown planthopper and white-backed planthopper at GNV, RPR, SKL, and WGL. Average planthopper load was 422, 201, 159, and 124 with a BPH to WBPH ratio of 2.8:1, 23.5:1, 3.2:1, and 55.8:1, respectively.

In terms of per cent damaged tillers (DT) 18 entries (MTU 2760-2-1-1-1, RP 6469-364, AD22211, AD22115, RP 6830-1536-70-4-2-1-3*, AD22135, AD-GP-5, WGL 2000*, WGL 2058, WGL 2125, RNR 50684, JGL 41652, JGL 49276, JDL 47953, N22-4963, PTB33, RP2068-18-3-5, MO 1) were found promising with ≤ 5.0 %DT in one out of 3 tests. Whereas, two entries (IR19X1022 and Sinna sivappu) were promising in two out of three tests.

In terms of damage score (DS), 40 entries (AD22211, AD22115, RGL 2130, RGL-2037-20-2-1, WGL 2019, RP 6830-1536-70-4-2-1-3*, AD-GP-3, AD-GP-5, BPT 2858, BPT 3284, BPT 3354, BPT 3372, BPT 3548, CB 22156, CB 22127, RP 6789-45-9-23-83, WGL 2000*, WGL 2058, WGL 2078, WGL 2125, RNR 48727, RNR 50684, RNR 52261, JGL 41652, JGL 49276, JDL 47953, JGL 44230, IR22 X1009, IR23X1022, N22-4963, RP 4918 230S, KS70, MSM99, MT 82, MSM83,WGL 2058, WGL 2078, WGL 2125, RP 6842, and RP 6846) were found promising at one out of two locations with DS ≤ 3.0. Whereas, five entries (RP 6469-364, MTU 2760-2-1-1-1, AD22135, AD22196, WGL 2045, and IR19X1002) were promising at two out of two locations with DS≤ 3.0. The checks PTB 33 and RPP 2068-18-3-5 were promising at one out of two locations. Another check, MO 1 was promising at two out of two locations. BM 71 was not promising at two out of two locations.

Percent hopper burn (HB) was recorded at GNV. In six entries (RP 6469-364, AD22211, AD22115, RP 6469-364, AD20516, and BPT 3082) no hopper burn developed. Average hopper burn in the checks; TN1, PTB 33, RP 2068-18-3-5, MO-1, and BM 71 was 100, 0, 19.3, 100, and 25 per cent respectively.

In the field screening in terms DT (<=5%), DS (<=3), and HB (<=25%), six entries *viz.*, RP 6469-364, MTU 2760-2-1-1-1, RP 6469-364, AD22211, RP 6830-1536-70-4-2-1-3*, and JGL 49276 were found promising.

Overall reaction: *Ninety-five entries were evaluated at 13 locations in 19 valid tests (10 greenhouse and 7 field tests) against brown planthopper (BPH), white-backed planthopper (WBPH) and mixed populations of planthoppers under field and greenhouse conditions.*

For BPH, under greenhouse conditions out of 10 tests, MTU 2760-2-1-1-1 in eight tests, CB 22522 was promising in five tests; IC76018 in four tests; RGL 2130, RGL 2037-20-2-1 and KS 370 in 3 tests were found promising with a DS ≤ 3.0. MTU 2760-2-1-1-1, RGL 2130, and RGL-2037-20-2-1 were under retesting. With respect to WBPH, four entries viz., WGL 1792, RNR 50684, JGL 49276, and JGL 47953 were found promising with DS ≤ 3.0 in one out of two tests.

Five entries (AD 20516, BPT 3372, JGL 44230, and KS 66, and MT 82) were found promising for BPH under field conditions with DS ≤ 3.0 in one valid test at RNR. Under field conditions, with mixed populations, in terms DT (≤5%), DS (≤3), and HB (≤25%), six entries viz., RP 6469-364, MTU 2760-2-1-1-1, RP 6469-364, AD22211, RP 6830-1536-70-4-2-1-3, and JGL 49276 were found promising.*

MTU 2760-2-1-1-1, RGL 2130, RGL-2037-20-2-1, IC 76018, RP 6469-364 were the most promising entries in both greenhouse and field conditions in 5 to 11 tests suggesting varying levels of resistance. CB 22522 exhibited only resistance at seedling stage. (Table 2.1.1)

Table. 2.1.1. Reaction of most promising cultures to planthoppers in PHS, kharif 2025

S.No.	Designation	Cross	Greenhouse Reaction													
			BPH											WBPH		
			IIRR	ADT	CBT	LDN	MND	RNR	RPR	WGL	PNT	CTC	BPH NPT(10)	CBT	IIRR	WBPH NPT(2)
4	MTU 2760-2-1-1-1	Samba Sub/Swarna	8.7	3.0	2.8	2.6	3.0	3.0	0.3	2.2	2.9	9.0	8	5.0	4.3	0
5	RGL 2130	Parijatham x RGL 10098	8.1	3.7	2.0	6.6	3.0	5.0	1.1	5.1	5.0	9.0	3	5.5	4.5	0
6	RGL-2037-20-2-1	MTU-1290/MTU-1121	5.3	8.3	3.3	4.8	3.0	5.0	1.6	2.7	5.1	9.0	3	5.0	7.4	0
71	IC 76018		5.5	3.0	2.0	3.4	3.0	7.0	0.2	7.0	5.6	9.0	4	7.2	3.7	0
31	CB 22522	CB12588/RP 2068-18-8-5	5.1	3.0	3.3	2.3	3.0	7.0	1.9	1.5	7.4	9.0	5	9.0	4.2	0
1	RP 6469-364		7.9	3.7	5.0	6.1	5.0	9.0	0.6	4.9	6.9	9.0	1	7.3	3.3	0
	Checks															
95	PTB 33		1.2	9.0	NG	3.0	3.0	NG	9.0		2.5	NG	4	NG	2.9	1
70	RP2068-18-3-5		3.0	3.7	2.2	3.0	3.0	7.0	0.2	6.1	3.3	9.0	5	5.0	3.1	0
66	RP2068-18-3-5		6.0	7.0	2.0	2.2	3.0	9.0	0.4	6.7	3.8	9.0	4	5.3	4.9	0
10	PTB33		8.6	9.0	NG	NG	5.0	NG	9.0	0.7	3.0	NG	2	NG	3.0	1
65	PTB33		8.6	7.7	8.6	2.4	5.0	9.0	0.8	8.9	2.7	9.0	3	8.0	4.8	0
50	PTB33		6.7	9.0	NG	8.7	5.0	9.0	0.5	4.9	2.7	NG	2	NG	3.1	0
86	RP 2068-18-3-5		8.1	3.0	3.0	8.1	3.0	7.0	0.1	4.8	4.8	9.0	4	7.6	3.7	0
94	MO 1		7.0	9.0	2.0	8.7	9.0	9.0	0.6	8.7	6.7	9.0	2	5.6	2.9	1
Total tested			95	97	83	92	94	87	95	94	95	84		82	94	
Max. damage in the trial			9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0		9.0	9.0	
Min. damage in the trial			1.2	3.0	2.0	2.1	3.0	3.0	0.1	0.7	2.5	7.0		5	1.8	
Average in the trial			7.7	7.2	7.0	7.4	6.9	8.5	6.5	8.0	6.6	9.0		7.2	5.8	
Average in TN1			8.4	8.0	9.0	8.2	9.0	9.0	9.0	9.0	8.4	9.0		8.8	6.3	
Average in PTB 33			5.6	7.5	2.5	5.9	4.3	7.0	6.2	3.1	2.7	NG		NG	3.0	
Average in RP 2068-18-3-5			5.3	3.2	3.4	4.4	3.0	6.3	0.2	5.5	4.2	9.0		6.0	3.2	
MO1			7.3	8.3	5.0	8.5	7.0	8.0	2.4	8.9	5.9	9.0		6.2	2.8	
Promising level			3	3	3	3	3	3	3	3	3	3		3	3	
No. promising			2	6	9	8	13	2	24	4	5	0		0	10	

Contd...

Table. 2.1.1. Reaction of most promising cultures to planthoppers in PHS, kharif 2025

S. No.	Designation	Cross	Field Reaction to Planthoppers																										No.of promising tests (NPT)			Overall NPT
			No./10 hill			Mixed Population (No./10 hills)																Percent damaged tillers			Damage Score			Hopper burn(%)	%DT	DS	%HB	
			BPH		WBPH	GNV				RPR				SKL				WGL				Mixed Population			Mixed populatio		BPH	GNV	3	3	1	19
4	MTU 2760-2-1-1-1	Samba Sub/Swarna	22	361.5	30	134	48	182	2.8	162	10	172	16.2	100	38	138	2.6	65.5	2.5	68.0	26.2	38	35.8	2.9	1.0	5.0	5.0	15.0	1	1	1	11
5	RGL 2130	Parijatham x RGL 10098	20	349.5	45	37	19	56	1.9	218	7	225	31.1	101	45	146	2.2	69.5	3.5	73.0	19.9	10	32.8	0.6	1.0	1.0	5.0	0.0	1	2	1	7
6	RGL-2037-20-2-1	MTU-1290/MTU-1121	91	390.5	37	96	56	152	1.7	271	8	279	33.9	104	34	138	3.1	71.5	2.5	74.0	28.6	34	8.5	1.2	1.0	5.0	7.0	15.0	1	1	1	6
71	IC 76018		35	326	74	116	60	176	1.9	210	10	220	21.0	114	24	138	4.8	40.0	0.0	40.0		41	40.0	5.2	3.0	5.0	7.0	18.0	0	1	1	6
31	CB 22522	CB12588/RP 2068-18-8-5	20	315.5	92	480	148	628	3.2	209	10	219	20.9	120	39	159	3.1	81.5	1.5	83.0	54.3	100	10.9	27.2	5.0	9.0	9.0	100.0	0	0	0	5
1	RP 6469-364		15	355	36	92	32	124	2.9	280	8	288	35.0	102	30	132	3.4	41.5	2.3	43.8	18.4	25	53.8	3.8	3.0	3.0	9.0	0.0	1	2	1	5
	Checks																															
95	PTB 33		95		119	48	24	72	2.0	208	14	222	14.9	123	35	158	3.5	34.5	1.5	36.0	23.0	14	10.3	5.8	3.0	1.0	NG	0.0	0	2	1	8
70	RP2068-18-3-5		37	326.5	85	132	84	216	1.6	225	17	242	13.2	118	33	151	3.6	52.0	0.5	52.5	104.0	48	16.4	4.2	3.0	5.0	5.0	20.0	1	1	1	8
66	RP2068-18-3-5		87	337	69	128	68	196	1.9	238	9	247	26.4	117	30	147	3.9	38.5	1.0	39.5	38.5	35	33.9	0.0	0.0	5.0	7.0	18.0	1	1	1	7
10	PTB33		110	366.5	43	32	29	61	1.1	233	9	242	25.9	113	36	149	3.1	88.0	2.0	90.0	44.0	18	26.7	4.1	3.0	1.0	3.0	0.0	1	2	1	7
65	PTB33		80	345	96	48	21	69	2.3	253	7	260	36.1	116	40	156	2.9	35.0	1.5	36.5	23.3	15	15.5	0.0	0.0	1.0	3.0	0.0	1	2	1	7
50	PTB33		105	289.5	35	44	20	64	2.2	145	7	152	20.7	123	36	159	3.4	46.0	0.0	46.0		14	34.4	3.7	3.0	1.0	3.0	0.0	1	2	1	6
86	RP 2068-18-3-5		20	365.5	100	146	68	214	2.1	156	17	173	9.2	120	29	149	4.1	57.0	1.0	58.0	57.0	46	35.9	9.2	3.0	5.0	7.0	21.0	0	1	1	6
94	MO 1		125	356	64	556	121	677	4.6	153	5	158	30.6	120	37	157	3.2	49.5	0.0	49.5	only BPH	100	19.6	4.9	3.0	9.0	9.0	100.0	1	1	0	5
Total tested			94.0	92.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	94.0	94.0	95.0	94.0	94.0	94.0	94.0	91.0	95.0	94.0	94.0	94.0	95.0	92.0	95.0				
Max. damage in the trial			125.0	398.5	132.0	654.0	289.0	796.0	11.7	280.0	20.0	299.0	115.0	130.0	45.0	166.0	4.8	311.5	9.5	312.5	606.0	100.0	53.8	33.1	5.0	9.0	9.0	100.0				
Min. damage in the trial			15.0	233.0	28.0	32.0	16.0	56.0	0.7	117.0	2.0	125.0	8.1	100.0	24.0	0.0	2.2	34.5	0.0	36.0	9.6	10.0	3.6	0.0	0.0	1.0	3.0	0.0				
Average in the trial			79.7	346.8	72.3	306.7	115.5	422.2	2.8	191.8	9.6	201.4	23.5	115.4	35.9	149.7	3.2	121.1	3.0	124.1	56.4	72.8	24.5	10.4	3.5	6.8	6.6	63.0				
Average in TN1			86.0	347.3	100.7	397.7	216.3	614.0	1.8	193.3	11.7	205.0	18.4	115.3	37.7	153.0	3.1	200.7	5.3	206.0	39.2	100.0	24.9	9.7	3.7	9.0	9.0	100.0				
Average in PTB 33			97.5	333.7	73.3	43.0	23.5	66.5	1.9	209.8	9.3	219.0	24.4	118.8	36.8	155.5	3.2	50.9	1.3	52.1	30.1	15.3	21.7	3.4	2.3	1.0	3.0	0.0				
Average in RP 2068-18-3-5			45	333	82	131	68	199	2	207	13	221	17	121	33	153	4	57	1	58	56	44	27	6	3	5	6	19				
MO1			125	356	64	556	121	677	5	153	5	158	31	120	37	157	3	50	0	50	63	100	20	5	3	9	9	100				
Promising level																						5	5	5	3	3	3	25				
No. promising																						0	2	24	53	10	8	30				

2.1.2 Gall Midge Screening Trial (GMS)

The objective of this trial was to evaluate the performance of the donors and breeding lines developed from known sources of gall midge resistance against various populations of gall midge. The trial was constituted with 50 entries (40 breeding lines, one variety and 9 insect checks). Of these 6 entries were under retesting. The nominations included breeding lines that were developed from 29 crosses bred at 6 centres, *viz.,* four from RARS, Aduthurai, two from CPMB, TNAU*;* one from RARS Jagtial; 12 from RARS Warangal; one from RRU, Rajendranagar, and 20 from ARS Nellore where gall midge is an endemic pest. All the 50 entries were evaluated at 14 locations from 9 states across the country against the prevailing gall midge populations. Reaction was recorded at 30 DAT, 50 DAT and 75 DAT as % DP and %SS. The reaction of the entries to various populations of gall midge from different locations in 11 valid tests is discussed as under:

***Reaction at Chiplima*:** WGL 2075 was the only entry that recorded nil plant damage.

***Reaction at Ambikapur*:** JGL 41652*, NLR 5942-33-3-3-1-1-1, NLR 5952-9-1-3-1-1, NLR 5986-6-3-1-1-2, RNR 48724, WGL 1909*, WGL 1946, WGL 2000* and Akshayadhan PYL recorded nil damage.

Reaction at Jagtial: IBT-WGL-17 (WGL 2150), JGL 41652*, RNR 48724, WGL 1909*, WGL 2000*, RP 2068-18-3-5 Aganni and Akshayadhan PYL recorded nil damage.

***Reaction at Sakoli*:** IBT-WGL-17 (WGL 2150), JGL 41652*, NLR 5942-33-3-3-1-1-1, NLR 5952-9-1-3-1-1 RNR 48724, WGL 2000*, Karma Mahsuri, Aganni, Akshayadhan PYL and RP 2068-18-3-5 recorded nil damage.

***Reaction at Warangal*:** IBT-WGL-17 (WGL 2150), JGL 41652*, Aganni, WGL 1909* and WGL 2000* recorded nil damage.

Reaction at Maruteru: IBT-WGL-17 (WGL 2150), NLR 5986-6-3-1-1-2, AD20362, Kavya Akshayadhan PYL*recorded nil damage at this location.

All the test entries exhibited were susceptibility at Jagdalpur, Gangavathi, Pattambi and Moncompu.

The results revealed that there is a variation in the performance of the lines which could be attributed to the variation in the virulence of the populations as reported in the other gall midge trials.

Overall reaction: Evaluation of 50 entries in 10 field tests against 10 populations of gall midge helped in identification of 8 entries as promising in 2-4 tests of the 10 valid tests (Table 2.1.2). IBT-WGL-17 (WGL 2150)*, JGL 41652*, WGL 2000* were promising in 4 tests. WGL 1909* was promising in 3 tests. NLR 5942-33-3-3-1-1-1, NLR 5952-9-1-3-1-1, NLR 5986-6-3-1-1-2, RNR 48724 in 2 tests each. Of these IBT-WGL-17 (WGL 2150)*, and WGL 2000* JGL 41652*, WGL 2000* are in the second year of retesting.

Table 2.1.2 Reaction of entries to gall midge population in GMS trial, kharif 2025.

GMS No.	Designation	Cross combination	Per cent plant damage											Per cent silver shoots										
			GMB1	GMB	GMB1	GMB3	GMB4	GMB4M	GMB5	GMB	GMB	GMB	GMS	GMB1	GMB	GMB1	GMB3	GMB4	GMB4M	GMB5	GMB	GMB	GMB	GMS
			CHP	ABP	JDP	JGT	SKL	WGL	PTB	MNC	GNV	MTU	Overall	CHP	ABP	JDP	JGT	SKL	WGL	PTB	GNV	MNC	MTU	Overall
			30DT	50DT	75DT	50DT	50DT	50DT	50DT	30DT	50DT	50DT	NPT	30DT	50DT	75DT	50DT	50DT	50DT	50DT	50DT	31DT	50DT	NPT
			%DP	%DP	%DP	%DP	%DP	%DP	%DP	%DP	%DP	%DP	10	%SS	%SS	%SS	%SS	%SS	%SS	%SS	%SS	%SS	%SS	10
7	IBT-WGL-17(WGL 2150)*	MTU-IL-1/RMSGM 3	20.0	10.0	10.0	0.0	0.0	0.0	61.9	40.0	75.0	0.0	4	2.1	3.6	2.6	0.0	0.0	0.0	19.6	18.9	26.7	0.0	4
8	JGL 41652*	MTU1010 (219 A)/Akshayadhan NIL	20.0	0.0	30.0	0.0	0.0	0.0	85.7	20.0	85.0	35.0	4	1.6	0.0	4.7	0.0	0.0	0.0	23.2	50.4	14.3	6.0	4
42	WGL 2000*	KNM 1638/WGL 1127	20.0	0.0	30.0	0.0	0.0	0.0	76.2	20.0	100.0	10.0	4	1.7	0.0	7.2	0.0	0.0	0.0	14.8	31.6	11.1	1.9	4
21	NLR 5942-33-3-3-1-1-1	NLR 33892/JGL 17004	10.0	0.0	30.0	100.0	0.0	50.0	33.3	10.0	95.0	35.0	2	1.1	0.0	7.7	86.3	0.0	8.0	11.5	42.0	7.7	6.0	2
23	NLR 5952-9-1-3-1-1	NLR 9674/BPT 5204	30.0	0.0	40.0	100.0	0.0	100.0	33.3	20.0	90.0	NG	2	6.0	0.0	7.4	63.9	0.0	11.1	14.7	59.6	12.5	NG	2
28	NLR 5986-6-3-1-1-2	NLR 9674/TP 16228-32	30.0	0.0	60.0	30.0	65.0	30.0	38.1	10.0	100.0	0.0	2	4.4	0.0	24.4	9.3	7.5	3.6	11.7	71.4	7.1	0.0	2
36	RNR 48724	IGBY 9-31-11	40.0	0.0	40.0	0.0	0.0	5.0	76.2	10.0	100.0	5.0	3	3.3	0.0	7.1	0.0	0.0	0.6	18.4	65.7	5.9	1.5	3
38	WGL 1909*	UPR 3667-2-1-7/WGL 1003	40.0	0.0	50.0	0.0	30.0	0.0	90.5	10.0	95.0	5.0	3	5.3	0.0	11.4	0.0	4.4	0.0	24.2	32.4	7.1	0.9	3
	Checks																							
35	Akshayadhan PYL		20.0	0.0	20.0	0.0	0.0	5.0	81.0	50.0	95.0	0.0	4	1.9	0.0	3.1	0.0	0.0	0.6	27.4	21.1	26.3	0.0	4
20	Aganni		30.0	10.0	90.0	0.0	0.0	0.0	61.9	40.0	70.0	5.0	3	2.9	1.0	22.9	0.0	0.0	0.0	23.8	35.9	25.0	0.7	3
45	RP 2068-18-3-5		50.0	20.0	20.0	0.0	0.0	5.0	81.0	40.0	90.0	5.0	2	5.9	2.1	2.4	0.0	0.0	0.5	24.5	33.3	22.2	0.8	2
Total tested			50	50	50	50	50	51	50	50	52	48		50	50	50	50	50	51	50	52	50	48	
Max.Damage in the trial			100.0	80.0	100.0	100.0	100.0	100.0	90.5	70.0	100.0	75.0		14	32	41	89	31	22	27	83	41	18	
Min. Damage in the trial			0.0	0.0	10.0	0.0	0.0	0.0	19.1	10.0	65.0	0.0		0	0	2	0	0	0	5	13	5	0	
Ave. damage in the trial			39.2	30.2	61.0	79.0	60.7	47.0	63.3	21.0	93.8	30.1		6	6	17	60	11	7	18	48	14	6	
Damage in TN1			70.0	65.0	100.0	100.0	100.0	46.7	59.5	60.0	92.5	60.0		10.4	8.6	35.7	80.4	17.3	9.7	20.7	53.5	34.5	12.6	
Promising level			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0	0	0	0	0	0	0	0	1	0	
No. promising			1	9	0	8	10	5	0	0	0	4		1	9	0	8	10	5	0	0	0	4	
* Entry under retesting																								

*Entry under retesting; Field Reactions from Nellore, Brahmavar and IIRR were not considered for analysis

2.1.3 Leaf Folder Screening Trial (LFST)

Leaf Folder Screening Trial (LFST) comprising 33 nominated entries was conducted across multiple locations to identify promising sources of resistance to the rice leaf folder**,** *Cnaphalocrocis medinalis*. The trial comprised of 10 nominations from Rice Research Unit, Acharya NG Ranga Agricultural University, Bapatla, 4 nominations from Main Rice Research Station, Anand Agricultural University, Nawagam, 2 nominations from Tamil Nadu Rice Research Institute, Aduthurai, 8 nominations from Regional Agricultural Research Station (RARS) Pattambi, 5 nominations from Institute of Rice Research, PJTAU, Rajendranagar, 4 back-cross inbred lines (BILs) of Swarna/*Oryza nivara* from IIRR along with a susceptible check (TN1) and resistant check (W 1263).

During Kharif 2025, the trial was conducted at 20 locations in a replicated trial. The leaf folder damage across test locations was low to moderate, with a mean damage of 12.1 to 49.3% LFDL. The maximum damage in the trial ranged between 21.1 and 84.2% (**Table 2.1.3)**. Based on 11 valid field tests, several entries exhibited promising resistance to rice leaf folder. Among the test entries, 0615-PTB-01-28-18 was promising in 5 tests, followed by BPT 3284 and 0627-PTB-2-14-1, which were promising in 4 valid field tests each.

Eight entries RP5564 PTB 2-4-1-2-2, RP5490 PTB 1-1-2, RNR 44306, RNR 37919, NWGR 15028, BPT 3507, ADT 21255 and RP5517-PTB-1-1-1-1were promising in 3 valid field tests each. Thirteen entries were promising in 2 valid field tests out of 11. The resistant check W 1263 performed best and was promising in 8 out of 11 tests.

Field evaluation of 33 entries replicated twice at 20 locations in the ***Leaf Folder Screening Trial (LFST)*** *during Kharif 2025 revealed that 24 entries were promising in 2-5 tests out of 11 valid field tests. In the second year of testing, 0615-PTB-01-28-18 was promising in 5 tests, followed by BPT 3284 and 0627-PTB-2-14-1, which were promising in 4 valid field tests each. Eight entries were found promising in 3 tests, and 13 entries in 2 valid field evaluations. Three entries, BPT 3284, RP5490 PTB 1-1-2, and BPT 3507 were found promising in both years in 4-6 valid field tests.*

Table 2.1.3 Performance of promising entries against leaf folder in LFST, ***Kharif*** 2025

S.No	Designation	Parentage	Leaf folder damaged leaves (% LFDL)											NPT
			ADT	CHN	CHT	KRK	KUL	LDN	NLR	NVS	NWG	PTB	RNR	
			80 DAT	84 DAT	68 DAT	60 DAT	44 DAT	80 DAT	80 DAT	80 DAT	80 DAT	75 DAT	89 DAT	11
LFST 35	W 1263	Resistant check	9.0	14.9	19.1	0.5	10.0	17.7	15.2	4.5	33.7	13.8	5.4	8
LFST 24	0615-PTB-01-28-18	Pranava x Chettadi	2.0	15.5	18.9	27.7	22.3	16.7	29.2	6.5	18.0	35.0	3.4	5
LFST 3	BPT 3284	BPT 2270/BPT 2605	5.5	17.6	18.8	7.9	21.4	20.9	4.1	12.2	18.5	51.2	17.2	4
LFST 22	0627-PTB-2-14-1	Swetha x Kuruka	9.7	10.8	20.5	25.2	20.2	16.3	32.8	10.8	20.0	28.6	6.9	4
LFST 20	RP5564 PTB 2-4-1-2-2	RP Bio226 x IRGC 71598 x MTU 1010	16.9	16.7	18.9	37.6	22.6	15.3	33.9	5.2	20.7	55.4	5.6	3
LFST 21	RP5490 PTB 1-1-2	Sampada /IRGC 11010 x Sampada	2.4	13.9	19.6	15.7	20.8	22.3	17.8	6.6	21.8	24.1	16.6	3
LFST 28	RNR 44306	NPT 14-5/RNR 31451	13.2	22.8	20.0	27.9	24.6	19.3	23.9	8.3	30.1	45.3	7.7	3
LFST 29	RNR 37919	AAGP 9772/NLR 34449	16.3	12.7	19.7	28.8	19.9	18.4	26.2	9.3	28.7	41.3	24.3	3
LFST 11	NWGR 15028	GR 11/MTU 1010	17.9	21.3	21.1	17.3	20.1	18.1	28.3	4.7	23.6	20.3	8.4	3
LFST 9	BPT 3507	Cult.01120305/Cult. 0910025-7	44.3	22.3	17.8	20.8	21.6	18.5	20.4	9.8	19.8	49.4	13.0	3
LFST 16	ADT 21255	BPT 2270/ AD 13116	6.7	15.1	18.2	19.1	29.4	23.0	14.0	8.7	29.5	36.7	10.0	3
LFST 17	RP5517-PTB-1-1-1-1	Sampada/IRGC3938/Triguna	22.8	14.9	19.5	25.7	24.6	19.7	32.0	NG	19.4	65.9	11.7	3
LFST 34	TN 1	Susceptible check	8.6	17.4	19.1	16.6	25.2	21.7	35.9	12.4	41.7	47.8	40.2	
Minimum damage			2.0	10.8	17.8	7.9	17.2	15.3	4.1	4.2	18.0	20.3	3.4	
Maximum damage			44.3	23.0	21.1	47.6	35.7	26.6	49.0	21.6	41.7	84.2	51.0	
Mean damage in trial			14.4	17.6	19.3	22.0	23.8	20.0	27.9	12.1	25.7	49.3	15.5	
Promising level			10	15	10	10	10	20	10	10	20	15	10	
Number Promising			11	6	0	1	0	19	1	14	7	0	13	
Total entries tested			35	35	35	35	35	35	35	35	35	35	35	

Data from Arundhuthinagar, Bapatla, Brahmavar, Cuttack, Jagdalpur, Karjat, Moncompu, Rewa and Titabar were not considered for analysis due to low pest pressure

2.1.4 Stem Borer Screening Trial (SBST)

To identify novel sources of tolerance to stem borer damage in rice, **Stem borer Screening trial** (**SBST**) was conducted during kharif 2025 with 50 entries which included 7 nominations from ICAR-IIRR; 6 nominations from PTB; two from Nawagam, 6 from TNRRI, Aduthurai, 12 from ARS, Nellore, 2 from RRU, Rajendranagar, 5 from CCMB along with 10 checks. Of these, 16 entries were under retesting. The entries were evaluated at 23 locations. For effective screening, two staggered sowings were taken up at NVS, PNT, CHN, TTB, RNR and IIRR. At IIRR, infestation was supplemented through pinning of yellow stem borer egg masses. At each location, observations were recorded on dead heart damage in vegetative phase and white ear damage in reproductive phase, grain yield in the infested plant and the larval survival in the stubbles at harvest. In all the locations tested, damage by yellow stem borer was observed with few exceptions where other species also were recorded. At Titabar, both yellow stem borer and white stem borer were recorded in the ratio of 60:40: At Navsari *S. incertulas*, white stem borer, *Scirpophaga* sp. and pink stem borer, *Sesamia inferens* were observed. At Chiplima, *S. incertulas*, white stem borer, *Scirpophaga* sp., pink stem borer, *Sesamia inferens* and *Chilo* sp. were observed. Traces of pink stem borer were observed in stubbles at RRU, Rajendranagar farm. *S. incertulas, Chilo suppressalis and Sesamia inferens* were recorded at Gerua. The results of the evaluation from the valid tests are discussed below**.**

Dead heart damage**:** The dead heart damage in the trial varied from 0.0 to 93.62% with an average damage of 18.18% DH across 14 locations in 15 valid tests. Evaluation of entries for dead heart damage at 30, 50 DAT and at 84 DAT in two staggered sowings at vegetative phase helped in identification of 18 entries as most promising with a damage ≤10% DH (DS1.0).HKP-lSM-600-28, RP6749-HI-22, and RP5587 were promising in 6 tests; 0627-PTB-2-14-1*, AD-GP-4, NWGR-19183*, NWGR-20066, BK49-76 were promising in 5 tests; NLR 5932-3-2-3-5-5-2 in 6 tests; RP5564 PTB 2-4-1-2-2*, NLR 5932-3-2-3-5-5-2*, HKP-ISM-M8-29* RP5517-PTB-1-1-1-1, NLR 3784, NLR 3981, RP6907 FBR-19-97-4 , RP6908 FBR-9-94, RP5588 and SM92 were promising in 4 tests each.

White ear damage**:** The white ear damage across 9 locations in 10 valid tests varied from 0.0 to 92.3% with a mean of 19.2% WE in the trial. Evaluation of entries identified 17 entries as promising in 2 to 4 tests of the 9 valid tests with ≤5% WE (DS1.0). RP5564 PTB 2-4-1-2-2* and NLR 3939 were promising in 4 tests; NLR 5932-3-2-3-5-5-2*, NLR 5960-14-1-1-2, IET 32031* and RP5517-PTB-1-1-1-1-1 were promising in 3 tests each. The larval survival in the stubble of each entry across 12 locations in 17 tests varied from 0.0 to 21 larvae/hill with a mean of 1.0 larvae/hill. *Grain yield:* NLR 3978 and SM92 were promising in 6 of the 8 valid tests; RP5517-PTB-1-1-1-1, NWGR-19183*, RNR 41760*, RP6914 FBR-17-12-2, HWR17 X ISM, RP6907 FBR-19-97-4, RP6909 FBR-12-166-2-2, RP5588*, RP5587 in 5 valid tests with grain yield of ≥15g/hill despite white ear damage. Another 11 entries were promising in 4 tests each.

Overall reaction: Evaluation of entries in 15 valid field tests for dead hearts damage and 9 valid tests for white ear damage identified 12 entries as most promising in 6 to 8 of the 24 tests in terms of low dead heart (≤10% DH) and white ear damage (≤5% WE). RP5564 PTB 2-4-1-2-2* was promising in 8 tests; NLR 5932-3-2-3-5-5-2*, NLR 3939, HKP-lSM-600-28, NWGR-20066 and RP5587* in 7 tests; 0627-PTB-2-14-1*, HKP-ISM-M8-29*, BK49-76*, RP5517-PTB-1-1-1-1-1, NWGR-19183* and RP6946-HI-22 in 6 tests each. SM92 was promising in 5 tests. Among these, 8 entries were under retesting. These promising entries were also promising in 1 to 5 tests of the 8 valid tests with higher grain yield (≥15.0 g/hill) under infested conditions in reproductive phase suggesting that recovery resistance and tolerance could be the mechanism in these entries as they have good grain yield despite damage (Table 2.1.4.1).

Table 2.1.4: Reaction of most promising cultures to stem borer in SBST,kharif 2025

Entry No	Designation	No. of Promising tests				Overall	Mean no. /hill
		SBDH	SBWE	SBDH+SBWE	GY	SB NPT	
		15	9	24	8		17
4	RP5564 PTB 2-4-1-2-2*	4	4	8	2	10	0.81
8	NLR 5932-3-2-3-5-5-2*	4	3	7	3	10	0.84
12	NLR 3939	3	4	7	3	10	0.58
31	HKP-ISM-600-28	6	1	7	3	10	0.91
41	NWGR-20066	5	2	7	4	11	1.96
45	RP5587*	6	1	7	5	12	1.21
2	0627-PTB-2-14-1*	5	1	6	2	8	0.47
28	HKP-ISM-M8-29*	4	2	6	1	7	0.37
30	BK49-76*	5	1	6	3	9	0.80
33	RP5517-PTB-1-1-1-1-1	3	3	6	4	10	0.51
39	NWGR-19183*	5	1	6	5	11	0.80
46	RP6946-HI-22	6	0	6	5	11	0.97
50	SM92*	4	1	5	6	11	0.93

* Entry under retesting

Valid data considered for analysis in SBST, kharif 2025

Parameters	Locations tested															Total tests
Dead heart damage (%)	NVS2	NVS1	AND	CBT	CHN	MNC	NLR	PSA	PTB	RPR	PNT2	BRH	ABP	LDN	IIRR*	15
	50DAT	51DAT	57DAT	55DAT	62DAT	50DAT	30DAT	31DAT	50DAT	71 DAT	51DAT	50DAT	67DAT	64DAT	84DAT	
White ear damage (%)	IIRR*	CHN2	MNC	PNT I	PTB	RPR	TTB2	ABP	LDN							9
Grain yield (g/hill)	IIRR	CHN2	MNC	PNT I	PTB	RPR	ABP	LDN								8
Larval survival in stubbles	NVS2-ANS	NVS1-NS	ADT	CTC	GER	RNR1	RNR2	RPR	TTB1	TTB2	PNT I	PNT 2	BRH	LDN1	LDN2	17
	IIRR	CHN2														
*- Augmented release																

*Infestation augmented; 1 and 2 refer to the staggered sowings in a location

Data on dead heart damage from ADT, ARD, CBT,CHN, LDN, MNC, MND , NVS1, RNR1,2,NWG1,2, TTB1,2; white ear damage from ADT, IIRR-2, MNC,NVS1,RNR1,2 TTB-1,2,ARN, RNR,CHN,MND and NLR not considered for analysis due to low pest pressure.

2.1.5 Multiple Resistance Screening Trial (MRST)

This trial was constituted with the objective to identify the reaction of entries that were found promising in pest specific trials to other pests and also to evaluate the reaction of advanced breeding lines to insect pests. The trial was constituted with 30 entries consisting of two lines promoted from SBST trial promising for stem borer, three entries from GMS trial, seven from PHS trial, six entries under retesting from MRST 2024; six new nominations from ICAR-IIRR; with five resistant and one susceptible check. The entries were evaluated against 10 insect pests and panicle mite at 31 locations for their reaction. The valid data pertaining to reaction of entries to 8 insect pests and panicle mite from various locations are discussed pest wise:

BPH: Entries were evaluated in five greenhouse tests at seedling stage and two field reactions at Rajendra Nagar against BPH. Field screening was augmented by releasing insects periodically to ensure population build- up at RNR. BPT 3194, MTU 2720-28-2-1-1 and MTU 2721-7-1-2-1 were promising in 2-3 tests of the 7 valid tests. The resistant checks, RP2068-18-3-5 was promising in 3 tests and PTB33 in two tests with a DS of ≤3.0 of the 7 valid tests.

WBPH: Entries were evaluated in greenhouse at IIRR, Coimbatore and at Nawagam in field. RP5977-MS-112 recorded DS ≤5.0 in both the greenhouse reactions. Field reaction at Nawagam suggested that RP5977-MS-112, RP6740-SP-M-MS-70, JGL 38935, MTU 2716-28-2-1-2, MTU 2716-28-2-2-2, MTU 2721-7-1-2-1, W1263 and PTB33 supported ≤50 hoppers /hill at 46 DAT.

Mixed population of Planthoppers: Field evaluation of entries was carried out IARI and three entries *viz.*, MTU 2716-28-2-1-2, BPT 3194 and RP 2068-18-3-5 had only 10 hoppers/ hills.

Gall midge: Entries were evaluated in 10 field tests which identified W1263 and RP6504-50 as promising in 3 tests. WGL1909 and PTB 33 were promising in 2 tests each.

Stem borer: Entries were evaluated against stem borer at vegetative phase for dead heart damage in 9 valid tests with ≤10% DH damage. The mean damage in the trial was 15.8%DH. NPA47 was promising in 6 tests. RP5977-MS-112 was promising in 5 tests. W1263, MTU 2721-7-1-2-1, WGL 1909, Suraksha, RP6168-SN 87, RP6168-SN116 were promising in 3 tests for dead heart damage. Field evaluation at reproductive phase identified MTU 2720-28-2-1-1 and RP 2068-18-3-5 as promising in 6 tests of the 11 valid tests for white ear damage with a promising level of ≤5% WE. PTB33, MTU 2721-7-1-2-1, RP6168-SN230 were promising in 5 tests. RP5977-MS-112, BPT 3194, RP6167-NPA47 and RP6167-NPA55-2 were promising in 4 tests.

However, it should be noted that most of these entries are late flowering and in some locations, this could be an escape.

Foliage feeders:

Leaf folder: Field evaluation of entries against leaf folder was carried out at 12 locations. RP6167-NPA55-2 was identified as promising in 7 of the 12 valid tests at a promising level of ≤10% DL. IBTWGL 2, Suraksha and PTB33 were promising in 4 tests.

Case worm: Field evaluation of entries at Brahmavar and Pattambi identified only BPT 3194 with ≤5% DL at Pattambi.

Whorl maggot: Damage was recorded at Pattambi. Mean damage in the trial was 11.2 %DL and none were promising.

Panicle mite: Entries were evaluated for panicle mite at Raipur. MTU 2716-28-2-1-2 was the only entry which recorded 6.2 % MIT (≤10% Mite infested tillers).

Carry over of field infestation: Field infestation of Angoumois grain moth, *Sitotroga cerealella* was studied in all the entries at Raipur and IIRR. At Raipur, the damage was observed in all the entries and it varied from 0.05%-0.79% DG. At IIRR, mean damage was 0.6%DG and 18 entries had nil damage.

Overall reaction: *Evaluation of 30 entries in 57 valid tests (7 greenhouse and 50 field tests) against 8 insect pests helped in identification of 7 test entries viz,* RP6167-NPA55-2, RP5977-MS-112, MTU 2721-7-1-2-1, MTU 2720-28-2-1-1, BPT 3194, RP6167-NPA47 and RP6168-SN230 *as most promising in 10-14 tests against 3-6 insect pests with a PPR of 7.8 -17.1 (Table 2.1.5.1). The check lines W1263 and RP 2068-18-3-5 were promising in 13 tests each against 6 and 5 pests, respectively, with a PPR 17.1and 12.7. PTB 33 was promising in 16 tests 6 pests with a PPR of and 21.1.*

Table: 2.1.5.1 Reaction of most promising cultures to insect pests in MRST, kharif 2025

Entry No	Designation	Cross combination		No. of Promising Tests (NPT)													
				BPH	WBPH	PH	GM	SBDH	SBWE	LF	PM	WM	CW	Overall NPT	No. of pests P	MRI T X P	PPR
				7	3	1	10	9	11	12	1	1	2	57	8	456	
28	RP6167-NPA55-2	Swarna/O. rufipogon		1	0	0	0	2	4	7	0	0	0	14	4	56	10.9
1	RP5977-MS-112	BPT 5204 mutant		1	1	0	1	5	4	1	0	0	0	13	6	78	17.1
8	MTU 2721-7-1-2-1	(PLA 1100/GM 70)/MTU 1156		3	1	0	0	3	5	1	0	0	0	13	5	65	14.3
7	MTU 2720-28-2-1-1	MTU 1064/ (R 3598-1-4-2-1)// (MTU 1140/RNR 15048)		2	0	0	1	1	6	2	0	0	0	12	5	60	13.2
21	BPT 3194	BPT 5204/MTU 1075		3	0	1	0	2	4	1	0	0	1	12	6	72	14.0
27	RP6167-NPA47	Swarna/O. rufipogon		0	0	0	0	6	4	2	0	0	0	12	3	36	7.0
26	RP6168-SN230	Swarna/*O. nivara*		1	0	0	0	2	5	2	0	0	0	10	4	40	7.8
	Checks																
5	W1263			1	1	0	3	3	2	3	0	0	0	13	6	78	17.1
10	PTB33			2	1	0	2	2	5	4	0	0	0	16	6	96	21.1
25	RP 2068-18-3-5			3	0	1	0	1	6	2	0	0	0	13	5	65	12.7

*. Entry under retesting; Per cent Promising Reaction (PPR)= (MRI of test entry x100)/ Total MRI

Valid reactions considered for analysis in MRST, kharif 2025

Pest	Reaction	Units	LOCATIONS												NPT
BPH	GH	DS	IIRR	CBT	LDN	MND	PNT								5
BPH	FR	DS& NO/10h		RNR set 2	RNR set 2										2
WBPH	GH	DS	IIRR	CBT											2
WBPH	FR	No/10h	NWG												1
PH	FR	No/h	IARI												1
GM	FR	%SS	JDP	MTU	NLR	PTB	SKL	WGL	ADT	CHP	GNV	KRK			10
SBDH	FR	%DH	PNT	KUL	NLR	NVS	PTB	RPR	PSA	GNV	PNT 2				9
SBWE	FR	%WE	IIRR *	CHP	CHN	KUL	LDN	PTB	RPR	SKL	WGL	PSA	PNT 1		11
LF	FR	%DL	ADT	PTB	BRH	KUL	NLR	CHT	NVS	NWG	KRK	PSA	GNV	PNT	12
PM	FR	%MIT	RPR												1
WM	FR	%DL	PTB												1
CW		%DL	BRH	PTB											2
													TOTAL		57
Grain moth		IIRR	RPR												2

2.1.6. IIRR-National Screening Nurseries (NSN)

National Screening Nurseries comprised of two sets of trials 1. IIRR-NSN for irrigated ecology and 2. CRRI- NSN for rainfed ecology.

2.16.1. IIRR-National Screening Nurseries

IIRR-National Screening Nurseries (NSN) comprised of 4 trials -National Screening Nursery 1(NSN1), National Screening Nursery 2 (NSN2), National Screening Nursery – Hills (NSN hills) and National Hybrid Screening Nursery (NHSN). **IIRR-NSN1** was constituted with 383 entries (341 AVT entries along with 10 insect checks and 32 disease checks of which six were replicated thrice) was evaluated at 20 locations. **IIRR-NSN 2** trial comprised of 728 entries (674 entries from IVT trials, six disease checks were replicated five times along with 14 disease checks and 10 insect checks) was evaluated at 16 locations against 7 insect pests. **IIRR NSN-Hills** trial was constituted with 79 entries for hill location along with 18 disease checks and 10 insect checks and evaluated at 8 locations (Ludhiana, Pantnagar, Khudwani, Malan, Chatha (Rajouri), Coimbatore, Maruteru and IIRR) against 6 insect pests in 6 greenhouse and 6 field reactions. Data was not received from Malan. **IIRR-NHSN** trial constituted with 134 entries (99 hybrids + 10 insect checks +25 disease checks) was evaluated at 17 locations against 10 insect pests and reactions against 7 insect pests were valid. The valid reactions from the evaluations in each trial are discussed pest wise:

Brown planthopper:

IIRR-NSN1: Entries were evaluated at 5 locations (IIRR, Coimbatore, Mandya, Ludhiana and Pantnagar) in SSST. IET Nos. 31479 (H)*, 33063 (H), 33079 (H), 33046 (H), 31714 (H)* and 33995 exhibited resistant reaction (DS of ≤3.0) in SSST in 2 of the 5 valid tests. PTB 33 was promising in 3 tests.

***IIRR-NSN2*:** Greenhouse evaluations were carried out at 5 locations. IET Nos 33520 recorded a DS of ≤3.0 and at par with PTB33. IET Nos 33467, 33699, 33948, PTB 33 and W 1263 recorded a DS of ≤3.0 in 2 of the 5 valid tests.

***IIRR-NSN hills*:** Evaluation of entries in SSST in greenhouses against BPH at IIRR, Coimbatore, Pantnagar and Ludhiana identified IET Nos 32333, 32317, 33335, 33352, 33356 as moderately resistant (DS≤5.0) in 3 of the 4 locations tested and at par with the resistant check, PTB 33.

***IIRR-NHSN*:** Entries were evaluated in 5 greenhouse test at IRR, Coimbatore, Pantnagar, Ludhiana and Mandya and one field reaction at Raipur. IET Nos 34023 and 34025, exhibited resistant reaction in 3 greenhouse tests and at par with PTB 33; AZ8433DT (NCH) and IET no 34042 were resistant at seedling stage with a DS ≤ 3.0 in two of the six valid tests.

White- backed planthopper:

***IIRR-NSN1*:** Entries were evaluated in greenhouse conditions against WBPH at both IIRR and Coimbatore. At IIRR, IET Nos 32460, 31768, 32798, 32875, 32889, 32890, 31107*, 31108*(R), 31966*, 31975*, 31979*, 31980*, 31982*, 32460, MTU1010, Swarna (Positive) and Rasi (Positive). But none of the test entries were observed to be promising for WBPH at Coimbatore.

IIRR-NSN2: Entries were evaluated in greenhouse conditions against WBPH at Coimbatore. Ten entries viz., IET No. 33676, 33984, 33985, 33986, 33989, DRR Dhan 55, 33807, 33817, 33820, MO 1 recorded resistant reaction to WBPH.

***IIRR-NSN hills*:** Entries were evaluated in greenhouse conditions against WBPH at both IIRR and Coimbatore. At IIRR, IET Nos 33347, 33349, 33352, 33353, 33357, 33361, 33364 DRR Dhan 53, Abhaya, Kavya, W1263 and MO1 were found resistant with a DS≤ 3.0. In the greenhouse reaction at Coimbatore, IET Nos 32354, 32343, 32344 and 33360 were identified as resistant (DS≤ 3.0). However, none of them were promising at both the locations.

IIRR-NHSN: Entries were evaluated in greenhouse conditions against WBPH at Coimbatore. None of the entries were promising.

Mixed population of Planthoppers:

IIRR-NSN1: IET Nos. 32393, 31618*, 32924 (H), 31966*, 31980*, 29546* (R). 31972 and HR-12 were identified as resistant to mixed populations of planthoppers in the field at Gangavathi in 2 valid tests (populations/10hill and DS≤ 3.0) in zone 7. All these entries recorded DS at Gangavathi. These entries also supported less than 50 planthoppers per 10 hills at Gangavathi at 75 DAT when the average infestation was 143.6 planthoppers/10hills 193.7 planthoppers/10 hills on TN1. At Gangavati, initially WBPH incidence was observed but at later stages of crop growth it was dominated by BPH.

***IIRR-NSN2*:** All the entries were evaluated in field against a mixed population of BPH and WBPH at Gangavathi, and Kaul (zone2). In the initial phase of crop growth WBPH was present but later stages it was taken over by BPH at Gangavathi. The ratio of BPH to WBPH was 8:2 at Kaul at 58DAT. Populations were recorded at Gangavati and Kaul and damage score was recorded at Gangavati at 105 DAT. The average planthopper population was 222 hoppers/10 hills at Gangavati (75 DAT) and 152 hoppers/10 hills at Kaul. Evaluation of the entries identified IET Nos 33539, 33479, 33480, 33481, 33482, 33483, 33484, 33487, 33563, 33569, 33570,33574, 33588, 33403, 33426, 33433 and Pushyami (Southern) (ZC), as promising only at Gangavathi location with a DS ≤ 3.0 and low populations (≤50 nos/ 10 hills). PTB33 had 121nos/10 hills with DS of 1.0.

Gall midge:

***IIRR-NSN1*:** Valid data pertaining to reaction of entries to rice gall midge was recorded from two locations *viz.,* Chiplima (zone3) and Jagdalpur (zone 5), and three from zone 7 (Jagtial, Warangal and Gangavati). IET No 29577* (R) and CO-39 recorded nil damage; W1263 and Kavya recorded 10%DP at both Chiplima and Jagdalpur.

Aganni, the resistant check recorded nil plant damage at Chiplima and Jagtial and 10% DP at Jagdalpur. RP 2068-18-3-5 recorded nil damage at Jagtial and 10% DP at Chiplima. At Gangavathi, IET nos 32780, 32783, 31966*, 31986*, NDR 359 (NC) recorded nil damage; IET no 32427 and 33838 recorded10 % plant damage and 5% DP in 31635 and HR 12.

***IIRR-NSN2*:** Valid reactions for gall midge damage were recorded from Jagdalpur (zone 5), Gangavati and Warangal (zone7). In field reaction at Gangavathi, four entries *viz.,* IET Nos 33511, 33484, 33734, and 33735 recorded nil damage. IET Nos 33605, 33484, 33421, 33648, 33649, 33710, 33721, 33728, FL 478, 33760 recorded nil damage at Jagdalpur though Co39 and PB1 had nil damage at Warangal it could have been an escape as both are susceptible.

***IIRR- NHSN*:** In field evaluations, IET Nos 34027, 34056, 34058, Aganni, Kavya, MO1, RP 2068-18-03-05 and Suraksha recorded nil damage at Ambikapur but recorded susceptibility at Pattambi.

Stem borer (SB):

***IIRR NSN1*:** Valid data for stem borer dead heart damage was recorded from 3 tests in 3 zones *viz.,* Pantnagar (Zone 2),) Pusa (zone 3) and Navsari (zone 6). 179 entries recorded ≤10% DH at Navsari, 7 entries at Pantnagar and 12 entries at Pusa. IET nos 31639*, 31640*, 32503, 32530, 31994*, 28P67 (RP) and 33995 were promising in 2 tests of the 3 valid tests with ≤ 10% DH damage. IET nos 31640*, 31641*, 32987, 32518, 32526, 32680, CARI Dhan 5 (RP), Observational Sensitive check (PR 127) were promising in 5 tests with ≤5% WE damage of the 10 valid tests.

***IIRR NSN2*:** Valid data for stem borer dead heart damage was reported from Pusa (zone 3); Pantnagar and Kaul (zone2), Navsari (zone 6) and Gangavathi (zone7). IET No 33522 ,33498, 33392, 33403, 33625, 33703, 33709, 33718,33736, 33941, 33945, 33984, 33990, 33991, 33824,33805 33766 recorded ≤ 5% DH damage in 2 of the 5 valid tests for dead heart damage. None of the entries were promising at Pusa where the average damage in the trial was 15.0% DH. Evaluation of entries at 7 locations viz., IET No. 33547,33571, 33581, 33582, 33608,33418, 33951, 33882, 33885, 33575, 33576, 33563, 33570, Aganni, Swarna (Positive), and Swarna recorded nil damage in 3 tests. IET no 33571 recorded nil damage in 4 tests. But it needs to be confirmed that these are not escapes.

***IIRR NSN hills*:** Entries were evaluated under field conditions at Pantnagar and Ludhiana against stem borer which were considered valid. IET nos 32333, 33334, VL DHAN-86 (NC), CO-39 and Suraksha recorded ≤10 % DH at Pantnagar. Only Tetep, had low WE damage (≤5%WE) at both Ludhiana and Pantnagar. However, it should be further confirmed through artificial inoculation. Dead heart incidence was very low at Rajouri and Ludhiana.

***IIRR NHSN*:** IET Nos 33997, 34012, 34014 and US314 recorded ≤ 10% DH damage in 2-3 tests of the 4 valid tests. In the field evaluation against SB white ear damage, IET no 34030 and RP 2068-18-3-5 were promising in 4 tests. IET nos. 34049, 34028, 34050, 34052, 34053, DRR Dhan 62 , DRR Dhan 53, PTB 33, Swarna, and BPT 5204 were promising in 3 of the 9 valid tests with ≤5% WE damage. But these lines need to be further tested under greenhouse conditions for validation of the reactions and to check that they are not escapes as it is more common in very short and long duration varieties.

Leaf folder:

***IIRR-NSN1*:** Valid data for leaf folder damage was recorded from 3 locations in zonw1 (Chatha), zone3 (Pusa), 6 (Nawagam). 30 entries recorded < 10 % DL in one of the 3 valid tests and reaction was not consistent across locations.

***IIRR- NSN2*:** Leaf folder damage was reported from Kaul (zone 2); Pusa (zone 3); and Gangavathi (zone 7). Valid data from 3 tests identified IET Nos 33591, 33609, 33617, 33400, 33401, 33939 33965 and Pushyami as promising in 2 tests with a promising level of <5-10%DL.

IIRR NSN Hills: Field evaluation against leaf folder damage was reported from Ludhiana with an average damage of 8.1 %DL at 37 DT. Only Nidhi recorded ≤5% DL at 37 DT.

IIRR NHSN: Field evaluation of entries in 2 valid tests at Nawagam and Pattambi identified 9 entries *viz.,* IET nos 33996, 33997, 33999, 34000, 34001, 34008, 34025, 34026, 34055, as promising with ≤10% DL in one test each.

Other pests:

Grass hopper

***IIRR NSN Hills*:** Grasshoppers (*Oxya nitidula, Hieroglyphus* spp. *Attractomorpha pscittacina* & Long-horned grasshopper) caused an average of 38.6% leaf damage at Khudwani. Incidence of rice skipper (*Paranara guttata*) at Khudwani was observed. Incidence of skippers, GLH and hispa were reported from Rajouri.

Rice skipper counts from Khudwani and Green leafhopper incidence from Chatha were not considered for analysis due to low pest pressure.

Case worm

NHSN: Entries were evaluated against case worm at Pattambi (average 11.3%DL at 30 DAT) under field conditions and none of the entries were promising.

Whorl maggot:

***IIRR- NSN2*:** Field reaction to whorl maggot at Chinsurah at 40 DAT identified 158 entries with 5% DL. Mean damage in the trial was 6.3 % DL.

Panicle mite/ Sheath mite:

IIRR-NSN1: The panicle mite infestation varied from 0.0 -90.2% infested tillers with an average of 31% MIT at Raipur. Evaluation of entries against sheath mite identified 91 lines with ≤10% damage at 100 DAT.

***IIRR-NHSN*:** Entries evaluation of entries against sheath mite at 92 DAT identified 43 lines with nil damage.

Overall reaction

IIRR-NSN1: Evaluation of 383 entries at 20 locations in 32 valid tests (7 greenhouse and 25 field tests) against 7 insect pests and a mite identified 14 entries of which 7 were test entries and 7 were checks (Table 2.1.6.1). IET nos 31714 (H)* was promising in 8 tests (against BPH, field tolerance to planthoppers and stemborer). IET Nos 29860*, 31618*, 31641*, 32518, 32680 and 33995 were promising in 7 tests each of the 32 valid tests. Tolerance to stemborer in check lines like Swarna PTB33 and other long duration entries is an escape (Table 2.1.6.1.1)

IIRR-NSN2: Evaluation of 674 entries along with 54 checks in 28 valid tests (6 greenhouse and 22 field tests) against 6 insect pests identified 11 entries as promising in 6-7 tests against 2-3pests. IET nos 33570, was promising in 7 tests. IET nos 33530, 33467, 33563, 33392, 33403, 33418, 33699, 33703 and 33882 were promising in 6 tests against 2-3 pests. Aganni was promising in 6 tests (Table 2.1.6.1.2).

IIRR-NHSN: In this trial, 99 hybrids along with 35 checks were evaluated in 6 greenhouse and 20 field tests against 7 insect pests at 17 locations in 26 valid tests of the 21 locations where the trial was conducted. The results identified 9 entries as promising. IET Nos 34023, 34025, 34030, were promising in 5 tests. IET Nos 34049, 34050, 34053, 33997, AZ8433DT (NCH) and US314 were promising in 4 tests of the 26 valid tests. PTB33 was promising in 7 valid tests; and RP 2068-18-3-5 were promising in 5 tests 7. (Table 2.1.6.1.3).

Table 2.1.6.1.1 Performance of breeding lines against insect pests in NSN1, kharif 2025

E. No	IET No.	Zone	VII	VII	VII	VII	VII		VII	VII		VII	VII		III	VII	V	VII	VI		II	VI	III	
			IIRR	CBT	PNT	LDN	MND		CBT	IIRR		GNV	GNV		CHP	GNV	JDP	JGT	WGL		PNT	NVS	PSA	
			BPH	BPH	BPH	BPH	BPH	**BPH**	WBPH	WBPH	**WBPH**	PH	PH	**PH**	GMB	GMB	GMB	GMB	GMB	**GM**	SBDH	SBDH	SBDH	**SBDH**
			GH	GH	GH	GH	GH	**NPT**	GH	GH	**NPT**	75DT	105DT	**NPT**	30DT	50DT	85DT	50DT	60DT	**NPT**	51DT	50DT	30DT	**NPT**
			DS	DS	DS	DS	DS	**5**	DS	DS	**2**	No./10h	DS	**2**	% DP	% DP	% DP	% DP	% DP	**5**	% DH	% DH	% DT	**3**
116	31714 (H)*	III,V	7.3	3.0	6.3	7.6	1.0	**2**	7.0	6.8	**0**	74.0	3.0	**1**	40.0	70.0	90.0	100.0	105.3	**0**	21.4	0.0	14.8	**1**
27	29860*	III,IV,V	5.5	7.2	7.2	NG	5.0	**0**	7.0	NG	**0**	86.0	3.0	**1**	0.0	70.0	50.0	100.0	50.0	**1**	21.1	0.0	15.1	**1**
33	31618*	III,IV,V,VII	7.3	6.2	8.9	NG	7.0	**0**	6.6	4.4	**0**	50.0	3.0	**2**	90.0	75.0	90.0	100.0	60.0	**0**	17.2	0.0	17.2	**1**
40	31641*	III,V,VII	8.7	8.2	7.1	NG	5.0	**0**	7.0	4.7	**0**	78.0	3.0	**1**	80.0	85.0	70.0	100.0	55.0	**0**	16.3	6.7	19.7	**1**
60	32518	III,VI	9.0	8.5	5.0	NG	7.0	**0**	6.8	NG	**0**	124.0	5.0	**0**	90.0	75.0	100.0	100.0	83.3	**0**	13.0	35.3	16.3	**0**
193	32680	VI,VII	5.9	7.0	5.0	NG	7.0	**0**	6.5	5.0	**0**	76.0	5.0	**0**	60.0	80.0	20.0	100.0	100.0	**0**	18.6	0.0	15.9	**1**
321	33995		3.7	4.0	7.8	3.0	1.0	**2**	5.6	NT	**0**	109.0	5.0	**0**	80.0	60.0	10.0	100.0	100.0	**0**	23.6	6.3	9.9	**2**
	Checks																							
378	PTB 33		6.7	4.5	2.8	3.0	3.0	**3**	5.0	NT	**0**	137.0	5.0	**0**	10.0	85.0	40.0	25.0	27.8	**0**	11.9	12.5	13.5	**0**
338	CARI Dhan 5 (RP)		3.6	6.0	5.1	NG	9.0	**0**	7.0	NT	**0**	121.0	3.0	**1**	60.0	75.0	20.0	100.0	95.0	**0**	16.6	13.3	14.6	**0**
185	PR 127	II,III,VI,VII	6.3	8.3	6.2	NG	7.0	**0**	8.3	7.2	**0**	140.0	5.0	**0**	70.0	85.0	50.0	100.0	85.0	**0**	24.4	6.7	13.3	**1**
270	Swarna (Positive)		4.9	NG	7.8	NG	NG	**0**	NG	3.0	**1**	119.0	5.0	**0**	60.0	80.0	40.0	100.0	100.0	**0**	16.3	31.3	19.7	**0**
344	Swarna (RP)		8.5	5.0	5.0	7.9	7.0	**0**	5.9	NT	**0**	80.0	3.0	**1**	40.0	75.0	20.0	100.0	85.0	**0**	12.3	0.0	12.1	**1**
56	Swarna		7.3	7.3	7.1	NG	9.0	**0**	6.0	7.7	**0**	60.0	3.0	**1**	80.0	80.0	90.0	100.0	70.0	**0**	21.4	0.0	13.0	**1**
106	Swarna		9.0	6.3	6.7	NG	9.0	**0**	9.0	NG	**0**	86.0	3.0	**1**	70.0	70.0	80.0	100.0	95.0	**0**	13.6	0.0	14.7	**1**
Total tested			370	368	359	105	373		368	200		380	380		375	380	376	373	370		378	373	383	
Max in the trial			9.0	9.0	9.0	8.0	9.0		9.0	9.0		748.0	9.0		100.0	95.0	100.0	100.0	175.0		38.7	64.3	24.7	
Min. in the trial			2.6	2.0	2.5	3.0	1.0		2.8	3.0		12.0	1.0		0.0	0.0	0.0	0.0	12.5		5.2	0.0	3.1	
Ave. in the trial			7.7	6.8	6.9	6.7	7.1		6.9	5.9		143.6	4.3		55.0	73.3	47.7	96.6	79.2		18.8	11.3	15.3	
Damage in TN1			8.0	8.3	7.1	NG	7.4		7.4	7.2		193.7	4.7		45.7	70.7	51.4	85.7	80.2		16.2	12.2	13.3	
Promising level			3	3	3	3	3		3	3		50	3		0	0	0	0	0		10	10	10	
No. promising			2	12	4	7	14		0	16		10	173		7	5	4	6	0		7	179	12	

……… Contd

Performance of Breeding lines to insect pests in NSN1, kharif 2025 (Contd.)

E. No	IET No.	Zone	V	III	III	II	VII	VI	V	IV	V	VII	SBWE	II	VI	III	LF	II	GB	V	PM	Over all
			ABP	PSA	PNT	JGT	MNC	NWG	SKL	TTB	RPR	WGL		CHT	NWG	PSA		CHT		RPR		
			SBWE	SBWE	SBWE	SBWE	SBWE	SBWE	SBWE	SBWE	SBWE	SBWE		LF	LF	LF		GB		PM		
			67DT	75DT	101DT	110DT	Pr. H	120DT	50DT	105DT	82DT	125DT	NPT	60DT	70DT	50DT	NPT	65DT	NPT	100DT	NPT	NPT
			%WE	%WE	%WE	%WE	%WE	%WE	%WE	%WE	%WE	%WE	10	%DL	%DL	%DL	3	%DG	1	% MIT	1	32
116	31714 (H)*	III,V	15.5	11.5	0.0	7.8	2.3	1.8	0.0	8.0	0.0	8.6	3	21.4	21.9	12.6	0	95.0	0	3.3	1	8
27	29860*	III,IV,V	9.1	11.1	0.0	4.5	3.9	4.5	2.9	6.9	14.9	7.8	3	28.6	6.5	15.1	1	95.0	0	25.9	0	7
33	31618*	III,IV,V,VII	6.5	14.5	9.2	1.6	1.9	1.7	3.8	11.1	2.1	1.6	4	22.2	17.0	11.9	0	90.0	0	33.8	0	7
40	31641*	III,V,VII	9.1	16.9	2.6	2.6	1.8	1.8	0.0	6.3	0.0	3.4	5	16.7	11.2	12.6	0	85.0	0	12.1	0	7
60	32518	III,VI	5.6	11.3	1.2	0.6	1.9	3.6	2.9	3.6	0.0	1.9	5	20.8	10.0	10.9	1	90.0	0	0.0	1	7
193	32680	VI,VII	11.1	19.7	2.0	1.6	2.6	5.7	0.0	9.5	3.6	1.6	5	17.3	14.3	15.7	0	80.0	0	0.0	1	7
321	33995		10.2	12.7	26.8	22.6	6.1	8.9	1.1	0.0	6.3	28.6	2	17.2	25.5	10.6	0	90.0	0	0.0	1	7
	Checks																					
378	PTB 33		23.6	15.3	29.7	0.0	1.9	4.0	18.9	7.7	0.0	0.0	3	17.2	32.4	12.2	0	80.0	0	0.0	1	7
338	CARI Dhan 5 (RP)		NT	17.8	0.0	3.2	1.8	2.0	1.8	8.0	0.0	3.6	5	16.7	20.0	10.2	0	80.0	0	0.0	1	7
185	PR 127	II,III,VI,VII	20.0	17.1	0.0	1.5	2.0	5.8	0.0	3.7	1.5	0.8	5	19.2	20.0	12.1	0	80.0	0	0.0	1	7
270	Swarna (Positive)		15.6	16.9	0.0	2.0	2.2	2.0	0.0	15.4	2.7	1.9	5	17.9	19.3	12.6	0	90.0	0	0.0	1	7
344	Swarna (RP)		13.8	15.2	1.4	0.5	1.9	6.7	16.7	3.6	0.0	0.6	4	14.3	20.2	14.2	0	95.0	0	0.0	1	7
56	Swarna		9.1	14.7	1.5	3.3	4.9	2.5	8.1	0.0	0.0	5.3	4	18.8	9.1	13.1	1	90.0	0	20.0	0	7
106	Swarna		11.3	10.7	0.0	4.5	20.9	6.0	4.5	6.5	0.0	5.1	4	21.4	34.7	10.5	0	90.0	0	0.0	1	7
Total tested			369	383	378	374	383	376	372	383	376	370		366	376	383		366		376		
Max in the trial			55.4	22.2	62.4	60.0	28.9	19.1	54.7	35.7	394.4	64.7		28.6	52.0	18.9		100.0		90.2		
Min. in the trial			3.3	3.9	0.0	0.0	1.6	0.9	0.0	0.0	0.0	0.0		12.8	6.1	4.0		70.0		0.0		
Ave. in the trial			13.7	14.3	13.1	18.2	8.5	7.5	11.9	7.0	12.2	18.9		18.3	23.4	12.7		88.7		31.0		
Damage in TN1			15.0	11.2	14.8	25.6	12.4	11.5	22.0	5.6	11.6	23.7		16.4	26.6	11.0		76.4		58.1		
Promising level			5	5	5	5	0	0	5	0	5	5		10	10	10		7		10		
No. promising			11	2	96	43	0	0	82	22	97	36		0	15	15		0		91		

Valid reactions in NSN1

Pest	Reaction	Units	Locations										NPT
BPH	GH	DS	IIRR	CBT	MTU	PNT	LDN	MND					5
WBPH	GH	DS	CBT	IIRR									2
PH	FR	No./10h	GNV										1
	FR	DS	GNV										2
GMB	FR	%DP	CHP	GNV	JDP	JGT	WGL						5
SBDH	FR	%DH	PNT	NVS	PSA								3
SBWE	FR	%WE	ABP	PSA	PNT	JGT	MNC	NWG	SKL	TTB	RPR	WGL	10
LF	FR	%DL	CHT	NWG	PSA								3
GB	FR	%DG	CHT										1
Sh. Mt	FR	% MIT	RPR										1
Total													32

NSN1 data :MTU- Trial vitiated due to Montha cyclone ; FR to BPH & WBPH from PNT, NVS, WGL, GM- ABK, RNR, IIRR, TTB; SBDH damage from ABP, GNV, JGT, JDP. MNC, NVS, RPR, RNR, SKL, TTB, WGL; SBWE damage from CHP,RNR,RPR,GNV; LF from MNC, GNV,JDP, NVS,NWG; WM from JDP; RT from RNR not considered for analysis due to low pest pressure.

Table 2.1.6.1.2 Performance of most promising cultures to insect pests in NSN2, kharif 2025

E.No	IET No.	Z VII	Z VII	Z VII	Z II	Z II		Z VII	WBPH	Z II	Z VII	Z VII		Z V	Z VII	Z VII	GMB	Z II	Z II	Z VI	Z III	Z VII	SBDH
		IIRR	CBT	MND	LDN	PNT	BPH	CBT		#KUL	GNV	GNV	PH	JDP	GNV	WGL		KUL	PNT	NVS	PSA	GNV	
		BPH	BPH	BPH	BPH	BPH	NPT	WBPH	NPT	PH	PH	PH	NPT	GMB	GMB	GMB	NPT	SBDH	SBDH	SBDH	SBDH	SBDH	NPT
		GR	GR	GR	GR	GR	5	GR	1	58DT	75DT	105DT	3	90DT	50DT	72DT	3	46DT	53DT	50DT	30DT	30DT	5
		DS	DS	DS	DS	DS		DS		No./10h	No./10h	DS		%DP	%DP	%DP		%DT	%DH	%DH	%DT	%DH	
141	33570	6.4	8.8	7.0	7.8	4.9	0	6.4	0	155	21	1.0	2	50.0	80.0	80.0	0	15.7	21.5	0.0	15.5	12.9	1
31	33530	2.7	4.0	5.0	7.5	5.4	1	5.3	0	142	80	3.0	1	40.0	90.0	75.0	0	22.6	8.6	0.0	16.0	11.4	1
92	33467	2.9	4.3	3.0	5.0	6.5	2	8.8	0	238	96	3.0	1	50.0	85.0	86.7	0	7.7	20.3	0.0	15.1	5.5	1
134	33563	8.3	7.2	9.0	NG	5.4	0	9.0	0	134	24	1.0	2	70.0	80.0	95.0	0	6.7	24.5	17.6	15.6	11.4	0
196	33379	7.7	7.6	9.0	NG	7.0	0	9.0	0	149	248	3.0	1	50.0	85.0	82.4	0	14.0	13.7	0.0	15.4	6.3	1
215	33392	6.4	5.0	9.0	NG	7.2	0	5.8	0	149	240	5.0	0	10.0	85.0	75.0	0	10.9	15.0	0.0	16.9	4.4	2
227	33403	5.5	4.2	7.0	NG	6.8	0	5.3	0	160	34	1.0	2	30.0	85.0	100.0	0	7.9	10.4	0.0	12.8	4.4	2
242	33418	4.2	6.5	7.0	NG	9.0	0	3.2	0	150	136	3.0	1	40.0	80.0	90.0	0	9.1	19.7	0.0	15.9	9.1	1
351	33699	2.5	8.6	9.0	3.0	7.5	2	8.0	0	136	108	3.0	1	20.0	90.0	100.0	0	21.7	18.2	0.0	18.3	17.6	1
356	33703	6.7	5.6	9.0	6.3	5.4	0	9.0	0	147	160	3.0	1	10.0	85.0	92.9	0	16.7	17.6	0.0	14.4	4.5	2
492	33828	6.8	5.3	9.0	7.4	7.0	0	5.7	0	157	248	3.0	1	50.0	90.0	94.1	0	21.8	24.1	0.0	14.9	13.2	1
636	33882	1.6	6.9	7.0	NG	7.3	1	7.2	0	149	184	3.0	1	20.0	80.0	83.3	0	23.8	14.7	0.0	11.5	6.3	1
713	AGANNI	8.6	5.9	3.0	7.3	3.3	1	7.2	0	152	147	3.0	1	20.0	85.0	9.1	0	27.4	28.1	0.0	16.1	8.9	1

NSN2 data :MTU- Trial vitiated due to Montha cyclone ; FR to BPH & WBPH from PNT, NVS, WGL,JDP, SBDH damage from ADT,CHN, JDP, MNC,KJT, NVS, WGL; SBWE damage from ADT,GNV,KJTNVS,; LF from JDP,MNC, WGL,JDP, NVS; GLH from JDP; not considered for analysis due to low pest pressure.

Contd...

Table 2.1.6.2 (contd) Performance of most promising cultures to insect pests in NSN2, kharif 2025

E.No	IET No.	Z II	Z II	Z III	Z III	Z VI	Z VII	Z VII	SBWE	Z VII	Z II	Z III	LF	Z III	WM	Over all
		PNT	KUL	PSA	CHN	NVS	MNC	WGL		GNV	KUL	PSA		CHN		
		SBWE	SBWE	SBWE	SBWE	SBWE	SBWE	SBWE	NPT	LF	LF	LF	NPT	WM	NPT	NPT
		127DT	79DT	80DT	100DT	Pr.h	Pr.h	95DT	7	50DT	46DT	50DT	3	40DT	1	28
		% WE	% WE	% WE	% WE	% WE	% WE	% WE		%DL	%DL	%DL		% DL		
141	33570	95.2	NF	13.7	0.0	0.0	3.3	0.0	3	4.7	17.4	11.0	1	6.9	0	7
31	33530	10.8	15.7	17.5	13.3	0.0	7.2	25.4	1	6.8	23.6	6.6	1	4.0	1	6
92	33467	35.1	NF	15.6	9.1	0.0	16.4	11.3	1	4.7	26.5	12.1	1	5.9	0	6
134	33563	91.5	NF	15.5	0.0	0.0	3.4	0.0	3	7.1	13.8	14.6	0	3.5	1	6
196	33379	30.2	5.3	16.2	0.0	0.0	3.5	9.9	2	0.0	14.3	14.8	1	3.8	1	6
215	33392	2.8	NF	14.5	0.0	0.0	9.1	9.4	2	7.8	9.2	12.4	1	3.6	1	6
227	33403	4.1	7.8	13.7	8.6	0.0	9.2	44.4	1	4.3	10.1	11.4	1	5.7	0	6
242	33418	0.0	13.4	13.2	11.2	0.0	0.0	5.7	3	4.3	11.3	12.3	1	6.1	0	6
351	33699	8.0	NF	15.1	5.9	0.0	1.6	18.2	1	8.5	19.5	11.0	0	4.3	1	6
356	33703	45.3	NF	11.8	0.0	0.0	2.2	2.4	2	10.5	17.7	12.4	0	4.3	1	6
492	33828	0.0	NF	14.9	6.2	0.0	1.5	10.0	2	4.4	22.0	12.4	1	3.1	1	6
636	33882	0.0	6.4	11.7	0.0	0.0	1.6	7.5	3	9.0	11.2	13.1	0	6.8	0	6
713	AGANNI	0.0	15.2	16.9	0.0	0.0	28.6	6.1	3	5.8	23.3	14.2	0	7.0	0	6

Shaded area – At Pantnagar entries continued in prolonged vegetative phase.

Valid reactions considered for analysis in NSN2, kharif 2025

Insect pests	Reaction	Units	Locations							NPT
BPH	GR	DS	IIRR	CBT	MND	LDN	PNT			5
WBPH	GR	DS	CBT							1
PH	FR	NO/10h	#KUL	GNV						2
	FR	DS	GNV							1
GMB	FR	% DP	JDP	GNV	WGL					3
SBDH	FR	% DH	KUL	PNT	NVS	PSA	GNV			5
SBWE	FR	% WE	PNT	KUL	PSA	CHN	NVS	MNC	WGL	7
LF	FR	%DL	GNV	KUL	PSA					3
WM	FR	%DL	CHN							1
								Total		28
# ratio of BPH : WBPH at Kaul: 8:2 Plants at pantnagar were still in vegetative phase										

Table 2.1.6.3 Performance of most promising hybrids against insect pests in NHSN, kharif 2025

E. No	IET No.	IIRR	CBT	PNT	LDN	MND	RPR	BPH	CBT	WBPH	ABP	PTB	GMB	ABP	PSA	PNT	PTB	SBDH	PTB	ABP	CHN	PSA	PNT	RPR	LDN	MNC	NWG	SBWE	SB	NWG	PTB		PTB		RPR	Sheath mite	Overall NPT
		BPH	BPH	BPH	BPH	BPH	BPH		WBPH		GMB	GMB		SBDH	SBDH	SBDH	SBDH		SBWE	SBWE	SBWE	SBWE	SBWE	SBWE	SBWE	SBWE	SBWE			LF	LF	LF	CW	CW	Sh.Mite		
		GH	GH	GH	GH	GH	FR	NPT	GH	NPT	53DT	50DT	NPT	74DT	30DT	53DT	30DT	NPT	75DT	105DT	100DT	73DT	115DT	83DT	94DT	90DT	87DT	NPT	NPT	87DT	75DT	NPT	30DT	NPT	92DT	NPT	
		DS	DS	DS	DS	DS	No./5h	6	DS	1	%DP	%DP	2	%DH	%DH	%DH	%DH	4	%WE	%WE	%WE	%WE	%WE	%WE	%WE	%WE	%WE	9	13	%DL	%DL	2	%DL	1	%MIT	1	26
41	34023	1.5	5.0	8.0	1.7	1.0	50	3	5.6	0.0	60	38.1	0	9.4	12.5	16.9	23.9	1	26.9	9.3	17.6	14.3	10.8	14.0	2.7	3.8	5.9	1	2	10.20	19.40	0.0	10.0	0	11.1	0	5
43	34025	1.3	3.3	8.2	3.0	3.0	41	3	7.0	0.0	40	42.9	0	28.6	15.1	17.1	25.7	0	22.4	29.2	2.5	16.7	10.3	14.8	2.4	8.2	4.5	1	1	9.80	17.58	1.0	18.2	0	17.3	0	5
55	34030	8.7	9.0	9.0	6.5	5.0	44	0	5.3	0.0	60	42.9	0	24.6	10.1	15.6	5.6	1	4.1	16.0	0.0	15.6	1.5	0.0	5.1	1.8	4.0	3	4	26.06	18.50	0.0	17.2	0	0.0	1	5
87	34049	NG	NG	9.0	NG	9.0	63	0	NG	0.0	70	33.3	0	24.6	14.3	11.8	7.8	1	2.6	18.0	6.8	13.9	3.1	4.3	2.6	7.7	6.6	3	4	23.53	19.04	0.0	10.0	0	52.5	0	4
88	34050	7.3	5.6	7.8	7.6	7.0	40	0	5.0	0.0	50	47.6	0	25.8	14.7	20.3	9.2	1	16.4	3.0	22.3	15.9	1.9	0.0	2.4	1.8	10.5	3	4	12.00	21.49	0.0	4.8	0	15.0	0	4
90	-	2.9	5.0	9.0	7.8	3.0	55	2	5.8	0.0	90	47.6	0	22.4	12.3	18.8	9.1	1	25.0	7.3	9.5	13.2	19.2	4.8	NG	3.9	6.0	1	2	21.43	16.50	0.0	9.4	0	18.9	0	4
92	34053	7.4	4.4	7.6	7.6	7.0	37	0	6.8	0.0	10	23.8	0	18.3	9.5	14.8	26.6	1	21.3	3.0	17.7	15.2	11.9	3.6	2.4	3.8	12.3	3	4	10.10	11.67	0.0	14.8	0	24.1	0	4
16	-	8.5	7.2	6.4	4.6	9.0	34	0	9.0	0.0	90	28.6	0	9.3	15.9	5.9	12.5	2	23.3	16.4	4.0	15.2	0.0	8.9	13.2	11.5	6.3	0	2	10.00	19.14	1.0	20.8	0	0.0	1	4
2	33997	6.8	5.0	8.5	6.4	9.0	71	0	6.2	0.0	50	47.6	0	4.1	15.1	6.5	7.1	3	23.9	37.5	9.4	7.1	5.2	8.5	5.7	7.2	6.3	0	3	9.90	19.92	1.0	1.4	0	10.7	0	4
	Checks																																				
129	PTB 33	2.4	5.0	5.5	3.0	3.0	NT	3	6.2	0.0	10	28.6	0	14.5	NT	13.8	23.7	0	2.5	10.3	0.0	NT	25.9	NT	5.0	1.9	4.2	3	3	17.79	8.08	1.0	23.5	0	18.3	0	7
131	RP 2068-18-03-05	5.3	7.2	4.3	7.8	9.0	61	0	8.5	0.0	0	9.5	1	9.8	NT	15.7	25.8	1	1.1	4.5	10.6	NT	21.8	0.0	9.8	1.9	4.8	3	4	20.00	12.03	0.0	14.8	0	15.4	0	5
105	Swarna	8.7	8.0	5.4	7.6	9.0	106	0	6.6	0.0	50	38.1	0	14.0	9.6	14.8	9.3	2	24.0	7.3	0.0	12.7	0.0	0.0	5.0	2.0	3.8	3	5	14.71	13.62	0.0	16.9	0	0.0	1	6
119	DRR Dhan 62	7.4	5.9	8.6	6.0	5.0	43	0	9.0	0.0	60	33.3	0	16.9	15.9	15.9	6.3	1	18.2	5.6	0.0	10.3	5.5	0.0	9.3	1.8	3.4	2	3	13.21	8.75	1.0	18.1	0	77.4	0	4
120	DRR Dhan 53	8.6	6.2	9.0	7.8	9.0	36	0	9.0	0.0	60	33.3	0	16.2	12.5	14.3	1.2	1	22.8	12.2	0.0	7.8	6.5	0.0	12.2	3.3	4.1	2	3	14.71	8.92	1.0	10.6	0	67.9	0	4
79	Swarna	6.6	7.0	5.7	7.6	7.0	44	0	8.5	0.0	70	47.6	0	19.7	17.1	13.3	6.7	1	18.8	4.1	4.6	11.8	2.8	0.0	7.5	1.9	4.4	2	3	10.33	23.85	0.0	19.7	0	0.0	1	4
Total tested		134	130	134	109	133	131		131		134	134		134	123	134	134		134	134	134	123	134	132	128	134	134			134	134		134		133		
Max in the trial		9.0	9.0	9.0	8.0	9.0	106		9		100.0	47.6		36.5	19.3	27.4	60.7		59.7	54.0	30.0	18.8	63.2	38.0	24.3	19.6	18.4			46.1	26.2		28.8		81.8		
Min. in the trial		1.3	3.0	4.1	1.7	1.0	13		5		0.0	4.8		1.7	9.5	5.9	1.2		1.1	3.0	0.0	7.1	0.0	0.0	2.2	1.5	1.8			7.4	2.4		0.4		0.0		
Ave. in the trial		7.1	6.6	7.4	7.0	7.4	53		7		59.9	38.6		18.2	14.2	16.7	16.5		21.2	16.2	10.5	14.8	11.4	10.6	8.8	7.3	7.2			18.0	16.1		12.7		24.2		
Damage in TN1		8.0	6.9	6.9	7.5	8.8	43		7.6		63.8	36.3		23.1	13.4	17.6	17.2		24.5	11.9	15.0	14.8	13.7	10.9	8.1	12.7	7.5			26.3	17.4		11.3		66.9		
Promising level		3	3	3	3	3	25		3		0	0		10	10	10	10		5	5	0	5	5	5	5	0	0			10	10		0		0.0		
No. promising		7	1	0	3	9	1		0		8	0		20	4	5	43		8	9	5	0	33	34	25	0	0			11	14		0		43		

Valid data considered for analysis in NHSN, Kharif 2025

Insect pests	Reaction	Units	Locations									Total NPT
BPH	GH	DS	IIRR	CBT	PNT	LDN	MND					**5**
BPH	FR	No./5 hills	RPR									**1**
WBPH	GH	DS	CBT									**1**
GMB	FR	%DP	ABP	PTB								**2**
SBDH	FR	%DH	ABP	PSA	PNT	PTB						**4**
SBWE	FR	%WE	PTB	ABP	CHN	PSA	PNT	RPR	LDN	MNC	NWG	**9**
LF	FR	%DL	NWG	PTB								**2**
CW	FR	%DL	PTB									**1**
Panicle mite	FR	%MIT	RPR									**1**
												26

NHSN DATA :MTU- Trial vitiated due to Montha cyclone ; GM- RNC; SBDH damage from ABP, CHN, KJT, LDN, MNC, NWG, PTB, RPR, RCI,REW, RNR; SBWE damage from RCI< KJT< RNR , LF from MNC,PSA,REW, RNR ; WM from RNR, RH from RNR; RT from RNR not considered for analysis due to low pest pressure

It is pertinent to note that since the breeding lines in these nurseries were not specifically bred for insect resistance, the number of promising tests is very low in all the identified promising entries in the nurseries. So, these entries need to be further tested, verified and validated for one or two seasons under suitable pest pressure situations for utilization in pest resistance breeding programs. The nil damage recorded for white ear damage should be noted with caution as we need to confirm that there is sufficient pest pressure at booting phase of the crop and it is not an escape as there is variation in the duration of the varieties.

B. CRRI-National Screening Nurseries

At CRRI Cuttack, National Screening Nurseries (NSN) consisting of two trials viz., CRRI-National Screening Nurseries-1(NSN 1) and CRRI-National Screening Nurseries-2 (NSN 2) with entries from Early Direct Seeded, rainfed Shallow Lowland, Semi Deep water and Deep water for rainfed ecology. The NSN 1 trial which consisted of 72 entries (52 AVT entries along with 20 insect checks) was evaluated at 20 locations. The NSN 2 trial which consisted of 286 entries (248 IVT entries along with 38 insect checks) was evaluated at 16 locations. The valid data of the reaction of entries in the above-mentioned trials to various insect pests are presented insect pest-wise and given in Table 2.6.2.1 and Table 2.6.2.2.

Brown Planthopper:
CRRI-NSN 1: The IET lines 32150, 32087 and 33216 were found promising (SES<DS3) in CBT, GNV and CTC, respectively. PTB 33, CR Dhan 317, CR Dhan 805 exhibited resistant reaction (SES DS≤ 3) in 3 tests and Salkathi in 2 tests in SSST under greenhouse conditions of the 5 valid tests.

CRRI-NSN 2: The IET line 34144 found promising (DS≤ 3) in CBT and GNV whereas IET line 34179 found promising only in CBT under greenhouse conditions.

White-backed Planthopper:
CRRI-NSN 1: No entries were found promising against white-backed planthopper at CBT, whereas CR Dhan 805 and Swarnanjali showed DS of 5.0 under greenhouse conditions.

CRRI-NSN 2: The IET lines 34066, 34111, 34144 and 34179 found promising (SES DS ≤3) against white-backed planthopper at CBT under greenhouse conditions.

Gall Midge:
CRRI-NSN 1: The IET lines 31246 and 33150 recorded nil damage (% silver shoot formation) at ABP and JDP, respectively. The resistant check W-1263 exhibited nil damage at JDP.

CRRI-NSN 2: The IET lines 34261, 34178, 34183 and 34270 recorded nil damage (% silver shoot formation) at JDP whereas 34090 and 34119 recorded nil damage at WGL. The resistant check PTB 33 and Salkathi also exhibited nil damage at JDP and WGL, respectively.

Stem Borer:
CRRI-NSN 1: During vegetative stage, IET line 33159 at ABP, 33089, 33202, 33264 and 33262 at JDP and 32100, 33104, 33100, 33248 and 33125 at RPR showed no dead heart formation. The IET line 32175 showed no white ear head formation during reproductive stage at GNV, JGL, RPR and WGL.

CRRI-NSN 2: During vegetative stage, IET line 34118, 34120 and 34124 recorded no dead heart formation at ADT. The IET line 34183 and 34254 showed minimum dead heart formation 1.25 and 1.22 % at MNC and PNT, respectively. The IET line 34072, 34159, 34163 and 34164 showed no white ear head formation during reproductive stage at ADT. The resistant check PTB 33 showed no white ear head formation at ADT and GNV.

Leaf Folder:

CRRI-NSN 1: The IET lines 33104, 33100, 33202, 31246, 33129 and 34116 showed nil damage at NVS. The resistant checks Aganni, Suraksha and W-1263 showed nil damage at RNR.

CRRI-NSN 2: The IET lines 33160, 34076 and 34232 showed lowest leaf damage of 0.26, 0.98 and 4.77% at ADT, CHN and KUL, respectively.

Whorl Maggot:

CRRI-NSN 1: In the field evaluation at JDP and RNR, the average leaf damage due to whorl maggots was recorded as 1.15 and 1.71 %, respectively.

CRRI-NSN 2: In the field evaluation at ADT and JDP, the average leaf damage due to whorl maggots was recorded as 4.99 and 2.72 %, respectively.

Gundhi Bug:

CRRI-NSN 1: In the field evaluation at Chatha, the average per cent grain damage due to gundhi bug was recorded as 87.89 %DG.

Sheath Mite:

CRRI-NSN 1: In the field evaluation at RPR, the average infestation due to sheath mite was recorded as 30.99 %MIT.

Table 2.6.2.1: Performance of most promising culture against insect pests in CRRI-NSN 1, Kharif 2025

Sl. No	IET No.	Number of Promising tests (NPT)					
		BPH	WBPH	GM	SBDH	SBWE	LF
		5	1	7	7	13	9
1	32100	0	0	0	1	0	1
2	32175	0	0	0	0	1	0
3	33089	0	0	0	1	0	0
4	33104	0	0	0	1	0	1
5	33100	0	0	0	1	0	0
6	32087	1	0	0	0	0	1
7	33216	1	0	0	0	0	0
8	33202	0	0	0	1	0	1
9	33248	0	0	0	1	0	0
10	31246	0	0	1	0	0	0
11	33150	0	0	1	0	0	0
12	33125	0	0	0	1	0	0
13	33129	0	0	0	0	0	1
14	33159	0	0	0	1	0	0
15	32150	1	0	0	0	0	0
16	33246	0	0	0	1	0	1
17	33262	0	0	0	1	0	0
18	34116	0	0	0	0	0	1
19	CR DHAN 317	3	0	0	0	0	0
20	W-1263	1	0	1	0	0	0
21	PTB-33	3	0	2	1	1	0
22	SURAKSHA	0	0	0	0	0	0
23	Aganni	1	0	0	0	1	1
24	Salkathi	2	0	1	0	1	2
25	CR DHAN 805	3	1	0	0	1	1

RNR for GM, CHP, GNV, JTL, LDN, RNR, TTB, WGL for SBDH, RNR for SBWE, JDP, WGL for LF were not considered for analysis due to low insect pest pressure.

Valid data in CRRI- NSN1, considered for analysis

Insect Pest	Locations												
BPH	CBT	CTC	GNV	LDN	MND								
WBPH	CBT												
Gall Midge	ABP	CHP	GNV	JDP	JTL	TTB	WGL						
SBDH	ABP	JDP	MNC	NVS	PNT	PSA	RPR						
SBWE	ABP	CHP	GNV	JTL	LDN	MNC	NVS	NWG	PNT	PSA	RPR	TTB	WGL
LF	CHT	GNV	LDN	MNC	NVS	NWG	PSA	RNR	TTB				

Table 2.6.2.2: Performance of most promising culture against insect pests in CRRI-NSN 2, ***Kharif*** 2025

Sl. No	IET No.	BPH	WBPH	GM	SBDH	SBWE	LF
	NPT	4	1	3	9	8	5
1	34066	0	1	0	0	0	0
2	34072	0	0	1	0	1	0
3	34076	0	0	0	0	0	1
4	34083	0	0	1	0	0	0
5	34090	0	0	1	0	0	0
6	34111	0	1	0	0	0	0
7	34118	0	0	0	1	0	0
8	34119	0	0	1	0	0	0
9	34120	0	0	0	1	0	0
10	34124	0	0	0	1	0	0
11	34144	2	1	0	0	0	0
12	34159	0	0	0	0	1	0
13	34160	0	0	0	0	0	1
14	34163	0	0	0	0	1	0
15	34164	0	0	0	0	1	0
16	34178	0	0	1	0	0	0
17	34179	1	1	0	0	0	0
18	34183	0	0	1	1	0	0
19	34232	0	0	0	0	0	1
20	34254	0	0	0	1	0	0
21	34261	0	0	1	0	0	0
22	34270	0	0	1	0	0	0
23	CR DHAN 317	0	0	0	0	0	3
24	W-1263	0	0	0	2	0	1
25	PTB-33	0	0	0	3	2	3
26	SURAKA	0	0	0	2	0	0
27	Aganni	1	0	0	2	0	3
28	Salkathi	1	0	0	1	0	0

LT, KUL, WGT for SBDH, KJT for SBWE, JDP, MNC, NVS for LF were not considered for analysis due to low insect pest pressure.

Valid data in CRRI- NSN2, considered for analysis

Insect Pest	Locations							
BPH	CBT		GNV	LDN	MND			
WBPH	CBT							
Gall Midge	GNV	JDP	WGL					
SBDH	ADT	CHN	GNV	JDP	MNC	NVS	PNT	PSA
SBWE	ADT	CHN	GNV	MNC	NVS	PNT	PSA	WGL
LF	ADT	CHN	GNV	KUL	PSA			

2.2. INSECT BIOTYPE STUDIES

Variation in the response of host plant/gene differentials to different pest populations in endemic areas are monitored for two major insect pests *viz.,* planthoppers and gall midge through insect biotype studies comprising of four trials a) Gall midge biotype monitoring trial (GMBT) b) Gall midge population monitoring trial (GMPM) c) Planthopper Special Screening trial (PHSS) and d) Planthopper population Monitoring trial (PHPM). The results of the observed virulence pattern of gall midge populations during *kharif* 2025 in GMBT trial are discussed below:

2.2.1Gall midge biotype monitoring trial (GMBT)

Gall midge biotype trial was constituted with a set of 20 gene differentials categorized into 6 groups, along with the susceptible check TN1. Of these, four lines with *Gm1*, *gm3, Gm8 and Gm4+ Gm8* genes in the background of Improved Samba Mahsuri were included in the 6th group. The trial was conducted at 17 locations in 9 States of India. The reaction of the differentials was observed at both 30DAT, 50DAT and/or 75DAT in terms of percent plant damage and silver shoot (%). Data with ≥50 % plant damage/ ≥15% SS in TN1 at a location was considered as valid. Differentials with nil plant damage or <1% SS damage were considered as resistant. Though gall midge incidence was recorded at Titabar (Assam), Brahmavar (Karnataka) and Nellore (Andhra Pradesh) the severity was low. The results of the evaluation from the valid data from 14 research stations and one farmers' field in 15 valid tests are summarized in Table 2.2.1 and discussed as under.

Jharkhand

***Ranchi*:** Differentials from Group 1 (Kavya, W1263, ARC6605), Group II (Madhuri L9), Group III(CR-MR 1523), Group IV (Abhaya, Aganni and INRC3021) and Group VI (RP 6749-RMS7-17-27-41) recorded nil plant damage exhibiting fairly R-S-R-R-S reaction pattern of biotype 3.

Chattishgarh

Ambikapur: Gene differentials from Group1 (Kavya and W1263), Group II (Madhuri L9), Group3 (MR1523), Group 4 (Aganni) and only RP 5925-24 in Group VI recorded nil plant damage following a pattern of R-S-R-R-S reaction pattern of biotype 3.

Jagdalpur: Reaction of differentials at Jagdalpur were categorized as R-S-S-R-S with exceptions of ARC6605 in Group 1 being susceptible. In group IV, RP2068-18-3-5 and Aganni recorded nil damage whereas INRC 3021 and INRC 17470 recorded low damage of 10% DP. In Group V1, RP5925-24 recorded nil damage.

Odisha

Chiplima: Gene differentials in *Group1* (W1263); Group II (MadhuriL9), Group IV (Aganni, INRC15888, INRC3021 INRC17470) and RP 5925-24 *in* Group VI recorded nil plant damage at this location suggesting a new pattern of R-S-S-R-S with few exceptions in each group.

Maharashtra

Sakoli: This year Kavya and W1263 (*Gm1*); Aganni, INRC 3021, INRC 17470 and RP5925-24 (with *Gm8*); RP5923 (*gm3*), recorded nil damage at this location suggesting a new pattern of R-S-S-R-S with few exceptions in Group I and Group IV.

Telangana

***IIRR*:** Populations from Ankushapur (70 km from IIRR, Medchal- Malkajgiri district) were collected and reared on TN1. Evaluation of entries identified all the differentials as resistant with R-R-R-R-S-R pattern. TN1 was susceptile.

***Jagtial*:** This year only Aganni, INRC3021 and INRC17470 from Group IV; RP5923, RP5925-24 and RP6749-RMS7-17-27-41 from Group VI recorded nil damage and all the other differentials were highly susceptible suggesting S-S-S-R-S reaction of biotype 4M.Earlier Jagtial population was categorised as biotype 3.

Warangal: Aganni and INRC 3021(with *Gm8 in Group IV*) and RP5923 from group VI exhibited nil damage at Warangal research station with the typical reaction of S-S-S-R-S of biotype 4M. Evaluation in the farmer's field which is 30 km away from research farm and identified Aganni, INRC3021 and INRC 17470 exhibited nil damage and RP5923 had 5.3 % DP.

Andhra Pradesh

***Bapatla*:** Only INRC3021 (Group IV) had nil damage. All other differentials were susceptible

***Maruteru*:** Differentials of Group 1 (Kavya and ARC6605), Group IV (INRC 17470) and RP5923 (Group VI) had nil damage. Madhuri L9 and RP6749-RMS7-17-27-41 had <10%DP.

***Ragolu*:** Differentials of Group II (DUKONG 1, MadhuriL9), and in Group IV (Aganni and INRC 3021) conferred resistance to gall midge at this location which is typical reaction (S-S-S-R-S) pattern of biotype 4.

Karnataka

Gangavathi: Only ARC 6605 (Group I) recorded nil damage while, all the other differentials were susceptible.

Kerala

***Moncompu*:** All the differentials were susceptible

***Pattambi*:** All the differentials were susceptible

Overall reaction*: Evaluation of the gene differentials in 15 field tests at 14 locations identified Aganni (Gm8) and INRC 3021(Gm8) as promising in 9 of the 15 valid tests based on per cent plant damage. INRC17470 was promising in 7 tests; W1263 and RP5925-24 in 6 tests each. Kavya was promising in 5 tests. The results suggest that donors with Gm8 and Gm1 genes confer resistance to gall midge across most of the test locations.*

Table 2.2.1 Reaction of gene differentials against gall midge populations in GMBT, ***kharif*** 2025

Group	Entry No.	Differential	Gene	IIRR*	CHP	ABP	JDP	RCI	JGT	RGL	SKL	WGL	WGL$	PTB	MNC	GNV	MTU	BPT	GMBT
				GMB	GMB	GMB	GMB1	GMB	GMB3	GMB4	GMB4	GMB4M	GMB4M	GMB5	GMB	GMB	GMB	GMB	
				GH	50DT	50DT	50DT	50DT	50DT	50DT	50DT	50DT	50DT	50DT	30DT	50DT	50DT	50DAS	NPT
					%DP	%DP	%DP	%DP	%DP	%DP	%DP	%DP	%DP	%DP	%DP	%DP	%DP	%DP	15
I	1	KAVYA	***Gm 1***	PDI	20.0	0.0	0.0	0.0	100.0	80.0	0.0	63.2	35.0	14.3	20.0	80.0	0.0	35.0	5
	2	W 1263	***Gm 1***	0	0.0	0.0	0.0	0.0	100.0	30.0	0.0	30.0	15.0	23.8	20.0	80.0	NT	30.0	6
	3	ARC 6605	***(?)***	0	40.0	30.0	50.0	0.0	100.0	20.0	85.0	58.8	31.6	66.7	40.0	0.0	0.0	20.0	4
II	4	PHALGUNA	***Gm 2***	0	60.0	60.0	20.0	NT	100.0	70.0	90.0	55.6	40.0	85.7	20.0	85.0	75.0	50.0	1
	5	ARC 5984	***Gm 5***	0	40.0	50.0	70.0	40.0	100.0	30.0	80.0	60.0	55.6	61.9	40.0	75.0	80.0	60.0	1
	6	DUKONG 1	***Gm 6t***	0	40.0	50.0	70.0	40.0	100.0	0.0	85.0	84.2	68.4	90.5	50.0	80.0	55.0	60.0	2
	7	RP 2333-156-8	***Gm 7***	0	60.0	20.0	40.0	40.0	90.0	50.0	80.0	52.6	20.0	76.2	50.0	85.0	30.0	100.0	1
	8	MADHURI L 9	***Gm 9***	0	10.0	0.0	10.0	0.0	100.0	0.0	30.0	78.6	73.7	66.7	30.0	90.0	5.0	100.0	4
	9	BG 380-2	***Gm 10***	0	20.0	20.0	80.0	30.0	100.0	50.0	85.0	62.5	52.6	81.0	50.0	90.0	20.0	90.0	1
III	10	MR 1523	***Gm 11***	0	60.0	0.0	30.0	0.0	25.0	100.0	90.0	63.2	55.0	76.2	30.0	100.0	NT	80.0	3
IV	11	RP 2068-18-3-5	***gm 3***	0	50.0	10.0	0.0	40.0	45.0	50.0	0.0	25.0	15.0	90.5	50.0	100.0	35.0	50.0	3
	12	ABHAYA	***Gm 4***	0	10.0	10.0	30.0	10.0	60.0	30.0	90.0	50.0	15.8	95.2	50.0	100.0	25.0	100.0	1
	13	INRC 3021	***Gm 8***	0	0.0	10.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	28.6	70.0	100.0	10.0	0.0	9
	14	AGANNI	***Gm 8***	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.9	0.0	38.1	60.0	100.0	NT	30.0	9
	15	INRC 15888	***Gm 8***	0	0.0	10.0	20.0	20.0	85.0	100.0	15.0	30.0	50.0	61.9	40.0	100.0	45.0	50.0	2
	16	INRC17470	***Gm8***	0	0.0	10.0	20.0	0.0	0.0	100.0	0.0	17.6	0.0	28.6	30.0	100.0	0.0	20.0	7
V	17	TN1	***None***	100	50.0	40.0	80.0	60.0	100.0	90.0	100.0	70.6	70.0	42.9	70.0	100.0	80.0	60.0	0
VI	18	RP 5922-21	***Gm 1***	0	30.0	40.0	70.0	10.0	100.0	100.0	90.0	85.0	50.0	42.9	20.0	100.0	NT	60.0	1
	19	RP 5923	***gm 3***	0	10.0	10.0	100.0	40.0	0.0	100.0	15.0	0.0	5.3	61.9	40.0	100.0	0.0	40.0	4
	20	RP 5925-24	***Gm 8***	0	0.0	0.0	0.0	30.0	0.0	90.0	0.0	50.0	15.0	90.5	40.0	100.0	NT	70.0	6
	21	RP 6749-RMS7-17-27-41	***Gm4+Gm8***	0	30.0	20.0	80.0	0.0	0.0	100.0	0.0	35.0	30.0	66.7	30.0	100.0	10.0	60.0	4
	22	TN1 (S. Check)	***none***	100	50.0	50.0	90.0	60.0	100.0	100.0	100.0	80.0	66.7	95.2	80.0	100.0	40.0	90.0	0
Total Tested				21	22	22	22	21	22	22	22	22	22	22	22	22	17	22	
Max. damage in the trial				100.0	60.0	60.0	100.0	60.0	100.0	100.0	100.0	85.0	73.7	95.2	80.0	100.0	80.0	100.0	
Min. damage in the trial				0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	20.0	0.0	0.0	0.0	
Ave. damage in the trial				9.5	26.4	20.0	39.5	20.0	63.9	58.6	47.0	48.1	34.8	63.0	42.3	89.3	30.0	57.0	
Damage in TN1				100.0	50.0	45.0	85.0	60.0	100.0	95.0	100.0	75.3	68.3	69.1	75.0	100.0	60.0	75.0	
Promising level				0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	
No.Promising				19	6	6	5	9	6	4	8	2	3	0	0	1	4	1	
*- Populations from Ankushapur- 75km from Hyderabad $ farmers field																			

2.2.2 Gall midge population monitoring (GMPM)

This trial has been designed to complement the study on characterization of gall midge biotypes. Reaction of single gall midge female collected from a light source to a set of three gene differentials *viz.*, W1263 (*Gm1*), Aganni (*Gm8*), IBT*Gm2* (*Gm4* + *Gm8*) and Purple variety (no resistance gene but highly susceptible) raised in a single pot would generate information on the virulence pattern of the gall midge population at a given location. This year the trial was conducted at six locations *viz.*, Jagtial, Warangal, Moncompu, Pattambi, Gangavathi, and Ragolu. The results are presented in Table 2.2.2 and discussed location wise.

***Jagtial*:** Of the 220 single female insects tested, 168 insects were virulent at this location. Only 76% were virulent on Purple (no resistance gene), 53.0% on W1263

(*Gm1*), 8% were virulent on IBT Gm2 (*Gm4+ Gm8*) and none were virulent on Aganni (*Gm8*). The sex ratio was favorable in all the differentials. Male progeny was 42.2% on W1263, 50% on IBT WGL2 as compared to 43.3% on purple. The results support the reaction of these differentials at Jagtial in GMBT trial suggesting Aganni as a promising donor at this location. The trend was similar to that of observed in kharif 2024. These results support the reaction of these differentials at Jagtial in GMBT trial.

***Warangal*:** At this location, 250 insects were tested but only 111 females were virulent. Low virulence of tested females was recorded on Aganni (6.3%) and IBTWGL2 (16.2%) with <10% SS damage. The virulence on W1263 (*Gm1*) was 32% and at par with purple variety (36.6%). Male progeny (%) was very high in all the gene differentials tested (23.8-50.0%). The results suggest that the population had very low level of virulence to Aganni at this location as compared to other differentials as also observed in GMBT 2025.

Ragolu: At this location, 250 single females were tested of which 243 were virulent. The gene differentials tested were Aganni, IBTWGL 2(*Gm4+Gm8*) and W1263 along with purple. The results suggest that the population was highly virulent 31.6% on the purple variety and the two gene differentials, W1263 (15.2%) and IBTWGL2 (*Gm4+Gm8*) (21.4%). None were virulent on Aganni. In all the test entries, the sex ratio was favourable towards females though male progeny (%) was more (58.1%) on W1263 (*Gm1*).

***Gangavathi*:** Of the 100 female insects tested, 95% were virulent. Of these, 97% were virulent on Purple (no gene), 33.0% on W1263 (*Gm1*), 15.0% on Aganni (*Gm8*) and 34% on IBTGm2 (*Gm4 + Gm8*). However, the damage was low in Aganni (3.0%SS) and W1263 (8.0%SS). Sex ratio was favourable towards females in all the test entries with high progeny numbers. Male progeny (%) was very high in W1263 as compared to other entries. The pattern of population structure is similar to that observed in 2024.

***Moncompu*:** Single female progeny test was conducted with 250 females of which 241 (94.0%) were virulent. Of the virulent insects, only 32.0% females were virulent on purple (no gene), 32.4% on W1263 (*Gm1*) with 8.0%SS, 2.8% on Aganni (*Gm8*) and 7.2% on IBTGm2 (*Gm4+Gm8*). Sex ratio was favourable towards females in all the test entries but the total progeny numbers were low. Male progeny (%) was very high in IBTWGL2 (52.9%) and was at par in Aganni and W1263 (33.3%) and low on purple. Though the severity of pest was low in GMBT trial, it can be deduced that under favourable conditions there can be an upsurge in the gall midge infestation at this location.

***Pattambi*:** At this location, the experiment was conducted in two sets with a gap of 12 days. In set1, 189 insects were tested and177 insects were virulent. In set 2, all 195 females were virulent.

In set 1, the virulent females per cent varied from 31.65 in W1263 to 60.5% in IBTGm2. The silver shoot damage ranged from 20.1% SS in W1263 to 64.7% in

Aganni. There was no variation in the reaction of the insect to gene differentials in terms of virulence, and sex ratio and per cent male progeny. In set 2 which was recorded 12 days after the first set, the trend was similar but for the tremendous increase in the progeny on Aganni, IBTGm2 and Purple. This is in line with the results of the GMBT trial where all the gene differentials recorded susceptibility.

Table 2.2.2: Virulence composition of gall midge populations at seven locations, GMPM, Kharif 2025

Locations	Total females tested	No of virulent females	Differentials	Virulent females (%)	%SS	Sex ratio (M:F)	Total progeny	%Male progeny
Jagtial	220	168	Aganni	0.0	0.0	-	NIL	NIL
			IBT WGL2	8	1.2	1M:1F	14	50.0
			W1263	53	8.3	1M:1.4F	89	42.2
			Purple	76	12.0	1M:1.31F	127	43.3
Warangal	250	111	Aganni	6.30	1.40	1M:2F	12	33.3
			IBT WGL2	16.2	3.2	1M:0.9F	28	50.0
			W1263	32.0	73.0	1M1.2F	207	33.3
			Purple	36.6	72.1	1M:3.2F	246	23.8
Ragolu	250	243	Aganni	0.0	0.0	Nil	Nil	Nil
			IBTGM2	41.3	21.4	1M:1.28F	137	43.8
			W1263	37.7	15.2	1M: 0.72F	105	58.1
			Purple	42.2	31.6	1M:1.04F	198	49.0
Gangavathi	100	95	Aganni	15.0	3.0	1M:1.3F	14	28.6
			IBT WGL2	34.0	8.0	1M:1.3F	34	20.0
			W1263	33.0	7.0	1M:4.3F	34	31.4
			Purple	97.0	26.0	1M:2.3 F	96	25.5
Moncompu	250	241	Aganni	2.8	0.62	1M: 2F	7	33.3
			IBT WGL2	7.2	1.7	1M:0.89 F	17	52.9
			W1263	32.4	8.0	1M: 2F	81	33.3
			Purple	32.0	8.8	1M:3.21 F	80	23.8
Pattambi	189	177	Aganni	60.5	64.7	1M:3.0F	86	26
Set1			IBTWGL-2	58.1	51.6	1M:3.0F	64	26.0
			W1263	31.6	20.1	1M:4.0F	21	21.0
			Purple	52.0	42.3	1M:3.0F	53	23.0
Pattambi	195	195	Aganni	70.70	129.4	1M:4.2F	475	19.2
Set2			IBTWGL-2	77.4	136.1	1M:4.2F	539	19.1
			W1263	27.2	18.3	1M:7.6F	75	9.3
			Purple	73.9	85.2	1M:3.9F	447	20.4

***Overall reaction**: Studies on virulence composition of gall midge populations in GMPM trial conducted at six locations across four southern states in India suggest that Aganni (Gm8) holds promise at Jagtial, and Ragolu with low susceptibility at Warangal, Moncompu and Gangavavthi. Except at Warangal all the locations recorded low silver shoot damage against W1263 (Gm1). Low virulence was recorded at Jagtial and Moncompu towards IBTGm2 (with Gm4 + Gm8). However, a close monitoring of the virulence pattern in endemic areas is important.*

2.2.3 PLANTHOPPER SPECIAL SCREENING (PHSS)

A set of 20 sources of BPH resistance with some having known resistance gene(s) was evaluated at 12 locations *viz*, IIRR, Aduthurai, Coimbatore, Gangavathi, New Delhi, Ludhiana, Mandya, Maruteru, Pantnagar, Rajendranagar, Warangal and Raipur in the greenhouse adopting Standard Seedbox Screening Test (SSST). At one location, Coimbatore screening was conducted for both the brown planthopper and white backed planthopper. From the PHSS entries of year the 2024, IR71033-121-15, ASD7 (ACC6303), Babawee, Chinnasaba (ACC33016), IR36, IR-64, IR-65482-7-2-216-1-2-B, Miliang63, Mutans-1, OM4498, and Ratuheenati were excluded. In this year 2025, new sources of resistance; IC216735, IC75975, IC76013, IC76057, MO1, NPS1, NPS110, NPS18, NPS55, RP4918-228S, RP4918-230S, and RP6112-MSM-140-25-2-5-8-9-6 were included for testing. Six gene differentials *viz.*, PTB 33 (with *bph2*+*Bph3*+*Bph32*+unknown factors), IC76013, IC 216735, IC76057, IC75975 and RP 2068-18-3-5 (with *Bph33*(t) gene) were promising in 7, 4, 5, 5, and 5 tests, respectively out of 12 tests with a damage score of ≤ 3.0. These gene differentials were found to be promising with damage score ≤3.0 in the respective locations. Two gene differentials *viz*, ARC 10550 (with *bph5* gene) and RP4918-228S showed susceptible reaction at all locations. NPS1, NPS110 and NPS55 were found susceptible at all test locations except Raipur. RP2068-18-3-5 is the only gene differential that was found promising for WBPH at Coimbatore with damage score of 3.2 (Table 2.2.3.1)

Field screening at Raipur with mixed population (BPH and WBPH) revealed clear variation in resistance levels both at tillering and panicle stages (Table 2.2.4). Entries, IC75975 and IC76057 showed relatively low BPH counts at both the crop growth stages, indicating better tolerance, while MO1 supported very low WBPH at tillering but a sharp increase in BPH at the panicle stage, suggesting stage specific susceptibility. In contrast, NPS110, Salkathi, PTB33 and ARC10550 recorded very high BPH populations at the panicle stage. Whereas, entries such as RP4918-228S and IC76013 maintained moderate and relatively stable infestation levels across plant growth stages. The susceptible check TN1 also showed high BPH counts at the panicle stage. Overall, the results indicate that resistance observed at the tillering stage does not necessarily persist to the reproductive stage, highlighting IC75975, IC76057, and RP4918-228S as promising sources of hopper tolerance with low hopper population (Table 2.2.3.2).

The evaluation of resistance mechanisms in PHSS entries at Coimbatore, Maruteru and Pantnagar, revealed substantial variation in honeydew excretion, days to wilt and probing marks (Table 2.2.3.3). Lower honeydew excretion was observed in entries such as IC76013, IC75975 and RP-2068-18-3-5, whereas, higher values in NPS55 and NPS1 suggested susceptibility. Nymphal survival rate also varied widely, with IC76013 and IC75975 showing comparatively lower survival percentages, indicating better resistance, while ARC10550, NPS1, and NPS55 recorded higher survival. In terms of tolerance, several entries such as IC76013, IC216735, IC76057, IC75975, Salkathi, RP-2068-18-3-5 and PTB33 remained green (no wilting), demonstrating strong tolerance, whereas others wilted earlier at Coimbatore. At Pantnagar, entries displayed comparatively longer durations for wilting. Probing mark analysis at Raipur showed lower probing marks in NPS18 (9.5), TN1 (10.12) and NPS55 (10.10) indicating higher feeding activity while higher probing marks in Pokkali (21.00), T12 (21.80) and IC216735 (20.50) indicated greater resistance. Overall, IC75975, IC76013 and RP-2068-18-3-5 emerged as promising lines exhibiting multiple resistance mechanisms.

Overall reaction: *Testing of 20 sources of resistance at 12 locations identified six rice differentials viz., IC76013, IC76057, IC75975, RP 2068-18-3-5, PTB 33, and IC 216735 as promising with damage score <=3.0. While, RP 2068-18-3-5 was the sole promising entry against WBPH at Coimbatore. In field screening, IC76057, IC75975, and RP4918-22 maintained the lowest pest population through the critical panicle stage. In mechanisms study gene differentials were assessed for four parameters; honeydew excretion, nymphal survival, days to wilt and probing behaviour. RP-2068-18-3-5 is the superior entry with low honey dew excretion, nymphal survival and more days to wilt. IC76013 and IC76057 were characterised by low honey dew excretion and low nymphal survival.*

Table 2.2.3.1. Reaction of gene differentials sand resistant sources to brown planthopper and white-backed planthopper under greenhouse conditions in PHSS, ***Kharif*** 2025

PHSS Entry No.	Entry Designation	Damage Score (DS)													BPH NPT 12
		BPH												WBPH	
		IIRR	ADT	CBT	GNV	IARI	LDN	MND	MTU	PNT	RNR	WGL	RPR	CBT	
1	RP6112MSM140-25-2-5-8-9-6	6.0	8.3	6.0	5.67	1.89	7.13	5.0	3.33	8.5	9.0	5.41	0.88	5.5	2
2	NPS1	6.1	9.0	7.2	8.33	5.20	6.80	9.0	7.53	8.2	9.0	8.20	2.55	5.3	1
3	IC76013	4.1	3.0	2.0	5.67	2.30	1.90	3.0	2.67	4.9	4.3	5.72	0.09	5.0	7
4	RP4918-230S	6.7	9.0	5.0	8.33	5.20	1.75	3.0	3.80	5.2	6.3	6.24	1.57	6.7	3
5	ARC10550	8.3	9.0	7.0	8.33	6.50	8.13	9.0	7.33	7.5	9.0	9.00	9.00	5.9	0
6	IC216735	6.4	6.3	3.0	2.33	4.50	2.89	5.0	3.20	7.4	9.0	7.78	0.88	4.5	4
7	TN-1	8.2	9.0	5.0	8.33	7.29	7.37	9.0	7.00	8.8	9.0	9.00	9.00	6.0	0
8	IC76057	4.9	5.7	3.0	6.33	5.10	2.09	3.0	3.60	4.3	3.0	3.94	2.22	4.8	5
9	NPS18	6.5	7.0	3.2	8.33	6.07	4.38	3.0	3.33	7.0	9.0	5.30	1.00	5.0	2
10	IC75975	4.0	4.3	2.0	5.67	5.52	1.79	3.0	2.60	5.1	5.0	6.61	0.46	4.5	5
11	MO1	6.9	9.0	6.5	4.33	7.58	5.88	7.0	7.77	4.9	8.3	8.48	2.30	7.0	1
12	NPS110	6.1	9.0	7.0	8.33	7.33	6.93	9.0	6.40	6.9	9.0	8.14	4.88	7.5	0
13	Pokkali	6.3	9.0	7.2	2.33	6.81	6.93	7.0	6.50	7.2	9.0	8.53	1.00	6.5	2
14	NPS55	7.6	8.3	8.0	6.33	7.60	6.93	9.0	6.73	6.9	9.0	9.00	3.77	7.8	0
15	Salkathi	6.2	5.7	3.5	5.67	5.23	3.83	3.0	3.47	6.8	9.0	7.39	0.62	5.0	2
16	RP4918-228S	8.6	8.3	7.2	8.33	7.20	6.94	9.0	6.93	6.9	9.0	9.00	9.00	6.6	0
17	RP-2068-18-3-5	5.0	3.0	2.0	6.33	3.84	1.74	1.0	3.13	6.9	8.3	5.55	0.16	3.2	5
18	Swarnalatha (ACC33964)	6.7	5.7	3.0	4.33	6.57	3.41	5.0	3.83	5.1	9.0	7.54	5.17	5.4	1
19	T12(ACC56989)	7.4	7.7	5.0	4.33	6.31	3.61	5.0	3.47	6.0	6.3	7.02	1.26	5.8	1
20	PTB33	6.2	7.7	5.2	6.33	3.44	3.95	3.0	2.60	2.7	9.0	4.78	0.30	5.0	4

Total tested	20	20	20	20	20	20	20	20	20	20	20	20	20
Max. damage in the trial	8.6	9.0	8.0	8.3	7.6	8.1	9.0	7.8	8.8	9.0	9.0	9.0	7.8
Min. damage in the trial	4.0	3.0	2.0	2.3	1.9	1.7	1.0	2.6	2.7	3.0	3.9	0.1	3.2
Average damage in the trial	6.4	7.2	4.9	6.2	5.6	4.7	5.5	4.8	6.4	7.9	7.1	2.8	5.7
Promising level	3	3	3	3	3	3	3	3	3	3	3	3	3
No. promising entries	0	2	6	2	2	6	8	3	1	1	0	14	0

Table 2.2.3.2. Reaction of PHSS entries to mixed population of brown planthopper and white backed planthopper under field conditions at Raipur.

PHSS Entry No.	Entry Designation	No./10 hills					
		Tillering stage		Panicle stage			
		BPH	WBPH	BPH	WBPH	Mean	Category*
1	RP6112MSM140-25-2-5-8-9-6	86	3	142	3	72.5	B
2	NPS1	77	9	156	6	81.0	B
3	IC76013	75	7	141	8	74.5	B
4	RP4918-230S	95	8	153	7	80.0	B
5	ARC10550	112	12	196	5	100.5	C
6	IC216735	69	3	179	11	95.0	C
7	TN-1	88	7	173	11	92.0	C
8	IC76057	71	3	110	5	57.5	A
9	NPS18	81	5	155	11	83.0	B
10	IC75975	48	0	132	4	68.0	A
11	MO1	62	0	197	6	101.5	C
12	NPS110	178	21	271	6	138.5	D
13	Pokkali	81	10	179	7	93.0	C
14	NPS55	74	12	159	7	83.0	B
15	Salkathi	64	1	228	5	116.5	D
16	RP4918-228S	80	7	134	8	71.0	A
17	RP-2068-18-3-5	63	1	173	6	89.5	B
18	Swarnalatha (ACC33964)	109	12	146	10	78.0	B
19	T12(ACC56989)	135	3	144	7	75.5	B
20	PTB33	59	3	209	13	111.0	D
					Mean	181.70	
					SD	39.56	

*Grading:

Grade	Category	Criteria
Grade D	High	>mean+1SD
Grade C	Above Average	Mean to Mean+1SD
Grade B	Below Average	Mean-1SD to Mean
Grade A	Low	<Mean-1SD

Table 2.2.3.3. Mechanisms of host plant resistance to brown planthopper in PHSS entries.

PHSS Entry No.	Entry Designation	Honey dew (sq. mm)					Nymphal survival (%)					Days to wilt			Probing marks	
		CBT	MTU	PNT	Mean	*Cate-gory	CBT	MTU	PNT	Mean	*Cate-gory	CBT	PNT	@Cate-gory	RPR	*Cate gory
1	RP6112MSM140-25-2-5-8-9-6	191	29.3	286	168.8	C	65	46.7	72	61.2	C	17	11.2	D	15.5	C
2	NPS1	265	184	183	210.7	D	85	76.7	62	74.6	D	11.5	11.8	C	14.3	B
3	IC76013	27.5	26.3	124.4	59.4	A	5	36.7	48	29.9	A	Green	15	B	11.3	B
4	RP4918-230S	84	55.3	191.4	110.2	B	55	53.3	46	51.4	B	21.5	14.8	B	14.8	B
5	ARC10550	257.5	174.3	194	208.6	D	75	73.3	78	75.4	D	13	15.8	B	19.9	D
6	IC216735	64.5	35.3	211.2	103.7	B	10	33.3	76	39.8	B	Green	13.2	C	20.5	D
7	TN-1	78.5	170.7	226.2	158.5	C	50	66.7	72	62.9	C	16	8.6	D	10.1	A
8	IC76057	61	96.7	96.4	84.7	B	10	50	38	32.7	A	Green	15.8	B	12.9	B
9	NPS18	70	50.3	198.2	106.2	B	35	46.7	78	53.2	C	22	14.4	B	9.5	A
10	IC75975	21	23.7	137.8	60.8	A	0	33.3	50	27.8	A	Green	13.4	C	18.3	C
11	MO1	186.5	198.3	182.4	189.1	C	50	76.7	40	55.6	C	19	15.8	B	10.5	A
12	NPS110	153	167.7	235.8	185.5	C	65	63.3	74	67.4	C	13.5	10.4	D	11.6	B
13	Pokkali	197	169	234.6	200.2	D	60	66.7	66	64.2	C	14	14.6	B	21	D
14	NPS55	321	175.7	269	255.2	D	80	70	60	70.0	D	11	13.4	C	10.1	A
15	Salkathi	25.5	45.3	226	98.9	B	10	30	64	34.7	A	Green	15	B	12	B
16	RP4918-228S	214	171.7	172.2	186.0	C	75	66.7	72	71.2	D	11.5	13.2	C	13.5	B
17	RP-2068-18-3-5	19	28	162.8	69.9	A	5	30	60	31.7	A	Green	17.8	A	12.8	B
18	Swarnalatha (ACC33964)	55.5	51.3	108.8	71.9	A	25	40	48	37.7	B	19	13.4	C	15	B
19	T12(ACC56989)	107	32.3	137	92.1	B	50	36.7	52	46.2	B	16.5	16.4	B	21.8	D
20	PTB33	168	28.3	95.8	97.4	B	65	33.3	26	41.4	B	16	22	A	17.2	C
Mean					139.2					51.5			14.3		15.13	
SD					58.7					16.3			2.83		3.97	

*Grading:

Grade	Category	Criteria
Grade D	High	>mean+1SD
Grade C	Above Average	Mean to Mean+1SD
Grade B	Below Average	Mean-1SD to Mean
Grade A	Low	<Mean-1SD

@Grading (for green/no wilting the number of days to wilt is taken as 30)

2.2.4 Planthopper population Monitoring trial (PHPM)

The Planthopper Population Monitoring (PHPM) study was conducted at four locations namely, Gangavathi, Pantnagar, IARI and Ludhiana to evaluate the virulence profiles of brown planthopper (BPH) populations in response to selected resistant donor lines. Five gene differential lines were tested namely, PTB 33 (harboring *bph2, Bph3*, and *Bph32*), RP 2068-18-3-5 (with *Bph33*(t)), IC76013 and IC75975 alongside the susceptible variety TN1. A single BPH female was introduced into a pot where all the test lines were grown and its progeny were subsequently assessed. Parameters recorded included the number of nymphs hatched, the emergence of adults, their sex ratio and the proportion of brachypterous and macropterous individuals in each line. The findings from these observations are given in Table 2.2.4 and detailed in the following report.

Gangavathi: Females laid eggs on all the gene differentials, with the highest nymphal hatching on TN1 and the lowest on PTB33. The incubation period lasted 8 days. Nymphal survival was highest on TN1 and lowest on PTB33. TN1 also had the lowest proportion of males, and across all differentials, the sex ratio favoured females. Macropterous (winged) adults made up 62.02% of the population, out numbering wingless forms and were most abundant on TN1.

Pantnagar: Egg laying was found on all gene differentials, with nymphal hatching remaining consistent among them. The incubation period was 10 days. The highest nymphal survival was recorded on RP2068-18-3-5, while the lowest was on IC76013. TN1 had the lowest percentage of males, and a female biased sex ratio was observed. Brachypterous (short winged) adults accounted for 69.7 % of the population, outnumbering winged adults and were most abundant on TN1.

IARI: Oviposition was observed across all gene differentials, with the highest nymphal emergence recorded on TN1 and the lowest on PTB33. Nymphal survival rates were highest on TN1, IC75975 and IC76013. A female biased sex ratio was consistently observed on all the differentials. Macropterous (fully winged) adults predominated over brachypterous (short-winged) forms in all differentials, comprising 84.97% of the adult population. The lowest proportion of macropterous individuals was found on PTB33 and RP2068-18-3-5, while the highest was recorded on TN1.

Ludhiana: All female individuals oviposited on all the tested gene differentials, with highest nymphal hatching on TN1. The highest nymphal survival was recorded on TN1, and the nymphal duration was 12 days. Male proportions were lowest on TN1, while a male dominant sex ratio was exclusive to PTB33. Macropterous adults constituted 69.23% of the population, exceeding the number of wingless forms, with the greatest proportion found on TN1.

Overall reaction: *Assessment of brown planthopper (BPH) virulence using four gene differentials viz., PTB 33 (with bph2, Bph3, and Bph32), RP 2068-18-3-5 (with Bph33(t)), IC76013 and IC75975 and TN1 (with no R gene) was carried out with populations at Gangavathi, IARI, Pantnagar and Ludhiana. Results revealed that the Gangavathi population was the most virulent, characterized by significantly higher fecundity and nymphal hatching with a lower proportion of males.*

Table 2.2.4 Virulence monitoring of brown planthopper populations in PHPM, Kharif 2025

Location	GNV					PNT					IARI					LDN				
No. of females tested	25					25					12					20				
Mean no. nymphs hatched /female	222.4					139.5					173.8					189.5				
Gene differential	TN-1	PTB 33	RP2068 -18-3-5	IC 76013	IC 75975	TN-1	PTB 33	RP2068 -18-3-5	IC76013	IC 75975	TN-1	PTB 33	RP2068 -18-3-5	IC 76013	IC 75975	TN-1	PTB 33	RP2068 -18-3-5	IC 76013	IC 75975
Virulent females (%)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
No nymphs hatched /F	82.5	13.16	28.44	41.8	56.52	48.1	16.08	23.28	25.24	26.8	61.4	23	27.8	28.8	32.7	69.9	25.5	30.5	28.75	34.85
Total no. nymphs/female	222	222.4	222.4	222.4	222.4	140	139.5	139.5	139.5	139.5	174	173.8	173.8	173.8	173.8	190	189.5	189.5	189.5	189.5
Egg period	8	8	8	8	8	10	10	10	10	10	NA	NA	NA	NA	NA	7	7	7	7	7
Nymphal survival %	30.7	9.4	16	22.6	25.3	10.7	8.1	37.4	2.2	6	21.6	15	18.9	19.7	21.4	25.3	19.3	20.3	21.3	22.7
Nymphal duration	12	12	12	12	12	13	13	13	13	13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Males (%)	34.5	42.8	42.3	41.4	42.9	42.1	43.4	42.8	81.8	45.2	42.9	50.3	42.6	42.6	49.3	46.1	55.2	47.5	50	50
Females -F	4	1.1	1.8	2.6	2.9	1.2	4.4	1	0.1	0.7	2.5	1.6	2.1	2.2	2.2	2.7	1.7	2.1	2.1	2.3
Males-M	2.1	0.8	1.4	1.9	2.2	0.9	3.4	0.7	0.4	0.6	1.9	1.6	1.5	1.6	2.1	2.3	2.1	1.9	2.1	2.3
Winged females	2	0.7	1.2	1.6	1.7	0	0.2	0	0	0	1.9	1.3	1.4	1.7	1.3	1.4	1.3	1.3	1.5	1.5
wingless females	2	0.4	0.6	1	1.2	1.2	4.2	0.9	0.1	0.7	0.5	0.3	0.6	0.7	0.8	1.3	0.5	0.8	0.7	0.8
Winged males	1.4	0.6	0.9	1.3	1.5	0.8	3	0	0	0	2	1.6	1.5	1.6	2.1	1.9	1.5	1.5	1.7	1.7
Wingless males	0.7	0.2	0.5	0.6	0.7	0.1	0.4	0.7	0.4	0.5	0	0	0	0	0	0.5	0.7	0.5	0.4	0.6
Total adults (F+M)	6.1	1.9	3.2	4.5	5.1	2.1	7.5	1.6	0.4	1.2	4.3	3	3.8	3.9	4.3	5.1	3.9	4.1	4.3	4.5
Sex Ratoio F:M	1.9	1.4	1.29	1.37	1.32	1.3	1.3	1.4	0.3	1.2	1.3	1	1.4	1.4	1.04	1.2	0.8	1.1	1	1

2.3 Chemical Control Studies

Early season insect pest management in Rice ecosystem has become a challenge in recent times due to non availability of insecticide molecules with wide spectrum of activity and availability of only pest specific molecules. Similarly, pesticide application is also posing a major challenge due to increase in the number of biotic constrainst that occur at the same time in the crop and increase in labour shortage. To address these two issues two trials were constituted

1. Seed Treatment for Management of Early season Insect Pests of Rice (STEP)

2. Evaluation of drones for spraying of agrochemicals (herbicides, insecticides and fungicides) in rice pest management (EDAPM)

The results of the experiments are discussed trail wise.

2.3.1 Seed Treatment for Management of Early season Insect Pests of Rice (STEP)

Early season pests namely, hispa, whorl maggot, caseworm, thrips, gall midge and stem borer cause considerable damage in rice. Of late, there is an uptrend in their incidence in many of the rice growing areas leading to severe yield losses. In order to identify the effective insecticides for seed treatment a trial was initiated in the year 2024.In addition to the treatments tested in 2024, another treatment Sedaxane 12.61% w/w + Azoxystrobin 3.15% w/w + Thiamethoxam 22.06% w/w was included this year, 2025. Details of the treatments are given below. A replicated field trial was conducted at nine locations *viz.*, ADT, CBT, PTB, CHP, GNV, JDP, KRK, MTU, and RNR.

Treatments:

T. No.	Insecticide	Dosage (formulation)
T_1	Carbosulfan 25% DS	60 g/kg seed
T_2	Chlorantraniliprole 50% W/W FS	6 ml/kg seed
T_3	Thiamethoxam 70% WS	7.5 g/kg seed
T_4	Imidacloprid 48% W/W FS	2.5 ml/kg seed
T_5	Sedaxane 12.61% w/w + Azoxystrobin 3.15% w/w + Thiamethoxam 22.06% w/w	3.0 ml/kg seed
T_6	Untreated Control	

Statistical analysis: Data were subjected to appropriate transformations and two-way ANOVA. Treatment effects across the locations (treatment*location interaction) were estimated to draw overall conclusions. Means were separated by LSD at five per cent level of significance.

Results:

Gall midge

The experiment was conducted at seven locations (ADT, CBT, CHP, GNV, JDP, PTB and MTU). Percent SS in the untreated control ranged from 12.5 (PTB) to 39.4 (GNV) and is above the ETL (5%). At all the locations, the treatment effects were significant in comparison to the untreated control. Pooled data across the locations revealed that treatment effects were highly significant with 39.5% to 49.7% reduction in SS over the untreated control. The effects of all the seed treatments superior over untreated control and T1, T2, T3, and T4 were at par (Table 2.3.1).

Stem borer

Data from nine locations (ADT, CBT, PTB, CHP, GNV, JDP, KRK, MTU, and RNR) was considered for analysis. Dead hearts (DH) incidence was lower than ETL (10%) at CBT, CHP, KRK, and MTU. Dead hearts ranged from 1.9% (MTU) to 31.0% (GVT) in the untreated control. Except at MTU and PTB treatment effects were significant and %DH was lower as compared to the untreated control. Pooled data across the locations revealed that T2 (chlorantraniliprole 50 FS) followed by T1 (Carbosulfan 25 DS) were significantly superior as compared to rest of the treatments with 60.3 and 52.9 per cent reduction in the DH (Table 2.3.2).

With respect to white ears (WE), data from eight locations (ADT, CBT, PTB, CHP, JDP, KRK, MTU, and RNR) was analysed. Percent white ears (WE) incidence ranged from 4.6% (KRK) to 29.3% (RNR). Except at PTB and RNR, in the remaining locations treatment effects were significant and %WE were lower as compared to the untreated control. Pooled mean revealed that all the treatments were significantly effective in reduction of WE and the treatments T1 (carbosulfan 25 DS) followed by T2 (chlorantraniliprole 50 FS) were superior with 45.3 and 31.9 per cent reduction over the untreated control (Table 2.3.3).

Whorl maggot

Whorl maggot incidence was recorded at PTB, ADT, and RNR. In the untreated control percent damaged leaves due to whorl maggot infestation ranged from 1.4 (RNR) to 9.4 (PTB). At PTB, in T1 (carbosulfan 25 DS) the percent damaged leaves (DL) were significantly higher at 3WAT and rest of the treatments were at par. However, treatment effects at the remaining two locations were not significant (Table 2.3.4).

Hispa

At ADT and RNR, the hispa incidence was recorded. Treatment effects were significant at both the locations. T2 (chlorantraniliprole 50 FS) showed superior efficacy (Table 2.3.4).

Leaffolder

Leaffolder incidence was recorded at CBT, GNV, JDP, KRK, MTU and PTB ranging from 1.3% to 20.9% DL per hill. Except at JDP and PTB the treatment effects were significant. Pooled data across the locations revealed that T2 (chlorantraniliprole 50 FS) was significantly superior with 40.5% reduction in damage as compared to the untreated control (Table 2.3.5).

Natural Enemies:

At MTU, RNR, and GNV the coccinellid population was recorded. Treatment effects did not show any adverse effect on the coccinellids population. Spider population was recorded at MTU, GNV, and RNR. AT MTU and RNR treatment effects were at par. Whereas, at GNV, both at 3 WAT and 5 WAT, the untreated control and T5 (Sedaxane + Azoxystrobin + Thiamethoxam) recorded significantly lower spider population as compared to the rest of the treatments. With respect to mirids, at MTU at 3 WAT and 5 WAT and at RNR, treatment mean differences were not significant. However, at GNV, significantly lower mirid population was recorded in the untreated control as compared to rest of the treatments (Table 2.3.6).

Effect on yield at different locations:

The seed treatment with insecticides has resulted in significantly higher grain yields at all the locations as compared to untreated control. Pooled mean revealed that T2 (chlorantraniliprole 50 FS) was most effective with 4853.7 Kg/ha as compared to the untreated control (3252.8 Kg/ha) i.e., 49.2% increase over the untreated control (Table 2.3.7).

Summary:

For gall midge, carbosulfan 25% DS, chlorantraniliprole 50 WS, thiamethoxam 70% WS and imidacloprid 48 FS were effective with 39.5% to 49.7% reduction in SS over the untreated control. For yellow stem borer, chlorantraniliprole 50 FS and carbosulfan 25 DS were significantly superior as compared to rest of the treatments with 60.3 and 52.9 per cent reduction in DH. Whereas, with respect to WE carbosulfan 25 DS followed by chlorantraniliprole 50 FS were superior with 45.3 and 31.9 per cent reduction over the untreated control. For whorl maggot treatment effects were not significant. For hispa, chlorantraniliprole 50 FS showed superior efficacy. For leaf folder, chlorantraniliprole 50 FS was significantly superior with 40.5% reduction in damage as compared to the untreated control.

Seed treatment chemicals did not show significant adverse impact on the coccinellids, spider and mirid populations.

The seed treatment with insecticides has resulted in higher grain yields at all the locations as compared to untreated control. Chlorantraniliprole 50 FS was most effective (4853.7 Kg/ha) with a 49.2% increase over the untreated control (3252.8 Kg/ha).

Table 2.3 1. Effect of seed treatment with insecticides on rice gall midge

	Treatment	Per cent silver shoots per hill								
		@Locations							Pooled Mean	%ROC
		ADT	CBT	CHP	GNV	JDP	MTU	PTB		
T1	Carbosulfan 25 %DS	12.4 c(7.4)	2.7 e(1.5)	6.6 c(3.8)	23.4 c(13.7)	22.4 b(13.2)	10.8 b(6.3)	10.5 b(6.2)	12.7 c(7.4)	46.9
T2	Chlorantraniliprole 50% W/w FS	2.1 d(1.2)	8.6 c(4.9)	6.0 c(3.5)	30.7 b(18.0)	19.9 bc(11.7)	10.5 b(6.0)	9.4 b(6.0)	12.4 c(7.3)	47.9
T3	Thiamethoxam 70 % WS	19.4b(11.5)	5.2 d(3.0)	4.1 d(2.4)	16.6 d(9.6)	18.1 c(10.5)	9.8 b(5.7)	10.8 b(6.5)	12.0 c(7.0)	49.7
T4	Imidacloprid 48 % w/w FS	9.5 c(5.5)	11.7 b(6.8)	7.4 bc(4.3)	23.5 c(13.7)	20.1 bc(11.7)	11.0 b(6.3)	8.9 b(5.2)	13.1 bc(7.6)	45.0
T5	Sedaxane 12.61% w/w + Azoxystrobin 3.15% w/w + Thiamethoxam 22.06% w/w	2.8 d(1.6)	7.4 c(4.2)	8.6 bc(4.9)	34.4 b(20.3)	19.9 bc(11.7)	12.5 b(7.2)	15.5 a(9.8)	14.4 b(8.5)	39.5
T6	Untreated Control	36.9a(23.8)	15.6 a(9.0)	14.9 a(8.6)	39.4 a(23.5)	31.7 a(18.8)	16.2 a(9.4)	12.5 ab(7.8)	23.9 a(14.4)	0.0
	LSD	3.6163	1.2438	1.0286	3.0043	2.5914	1.9704	3.1848	0.9327	

* Percent reduction over untreated control. @Mean of 3 and 5 weeks after transplanting. Figures in the parentheses are arcsine transformed values.
Means followed by same alphabet are significantly not different (P=0.05) (SAS version 9.4)

Table 2.3.2. Effect of seed treatment with insecticides on rice stem borer

	Treatment	Per cent dead hearts per hill									
		@Locations								Pooled Mean	%ROC
		ADT	CBT	CHP	GNV	JDP	KRK	MTU	PTB		
T1	Carbosulfan 25 %DS	6.9 dc(4.0)	3.0 c(1.7)	2.9 c(1.7)	18.7 cd(10.8)	4.7 b(2.8)	4.1 ab(2.3)	2.6 a(1.5)	11.4 a(6.7)	6.8 c(3.9)	52.9
T2	Chlorantraniliprole 50% W/w FS	5.6 dc(3.2)	1.0 d(0.6)	1.3 d(0.7)	16.6 d(9.6)	2.5 b(1.4)	3.4 b(2.0)	2.5 a(1.4)	12.9 a(7.6)	5.7 c(3.3)	60.3
T3	Thiamethoxam 70 % WS	14.5 b(8.5)	3.7 c(2.1)	2.8 c(1.6)	17.3 cd(10.0)	3.2 b(1.8)	4.7 ab(2.7)	3.4 a(1.9)	13.0 a(8.2)	7.8 b(4.6)	45.7
T4	Imidacloprid 48 % w/w FS	9.9 c(5.8)	5.8 b(3.4)	4.1 b(2.3)	22.0 bc(12.8)	4.9 b(2.8)	4.3 ab(2.5)	2.3 a(1.3)	15.4 a(9.0)	8.6 b(5.0)	40.3
T5	Sedaxane 12.61% w/w + Azoxystrobin 3.15% w/w + Thiamethoxam 22.06% w/w	4.6 d(2.6)	4.4 bc(2.6)	4.4 b(2.5)	25.5 b(14.9)	6.2 b(3.6)	4.3 ab(2.5)	2.9 a(1.6)	14.1 a(8.4)	8.3 b(4.8)	42.3
T6	Untreated Control	29.6a(18.1)	8.9 a(5.1)	8.1 a(4.6)	31.0 a(18.3)	16.8 a(10.3)	5.6 ab(3.2)	1.9 a(1.1)	13.3 a(8.2)	14.4 a(8.6)	0.0
	LSD	2.024	0.889	0.536	3.144	2.962	0.963	1.112	2.350	0.679	

*ROC- Percent reduction over untreated control. @Mean of 3 and 5 weeks after transplanting. Figures in the parentheses are arcsine transformed values. Means followed by same alphabet are significantly not different (P=0.05) (SAS version 9.4)

Treatment		Per cent white ears per hill									
		@Locations								Pooled Mean	%ROC
		PTB	ADT	CBT	KRK	MTU	RNR	JDP	CHP		
T1	Carbosulfan 25 %DS	18.6 ab(11.1)	5.9 cd(3.4)	4.0 d(2.3)	3.9 bc(2.3)	17.6 ab(10.2)	30.3 a(17.7)	5.4 c(3.1)	9.9 bc(5.7)	9.3 b(7.0)	45.3
T2	Chlorantraniliprole 50% W/w FS	19.8 a(13.9)	4.3 cd(2.4)	2.5 d(1.4)	0.7 bc(0.4)	14.6 bc(8.4)	27.6 a(16.0)	6.7 bc(3.9)	7.6 c(4.4)	11.6 b(6.4)	31.9
T3	Thiamethoxam 70 % WS	17.1 ab(10.0)	12.9 b(7.4)	8.9 c(5.1)	0.4 b(0.3)	16.2 abc(9.4)	31.4 a(18.3)	6.8 bc(4.0)	7.8 c(4.5)	12.7 b(7.4)	25.6
T4	Imidacloprid 48 % w/w FS	16.5 ab(10.5)	8.3 bc(4.8)	13.4 b(7.7)	2.2 bc(1.3)	19.6 a(11.4)	25.5 a(14.8)	7.7 bc(4.4)	11.0 b(6.3)	13.0 b(7.7)	23.7
T5	Sedaxane 12.61% w/w + Azoxystrobin 3.15% w/w + Thiamethoxam 22.06% w/w	13.3 b (7.8)	3.2 d (1.9)	10.4 c (6.0)	1.1 c (0.6)	17.3 abc (10.0)	26.3 a (15.3)	8.2 b (4.8)	9.7 bc (5.6)	12.3 b (6.5)	27.7
T6	Untreated Control	15.8 ab(9.2)	24.6 a(14.6)	18.1a(10.5)	4.6 a(2.7)	13.0 c(7.5)	29.3 a(17.1)	14.0 a(8.1)	17.1a(10.0)	17.1 a(10.0)	
	LSD	6.8362	2.8738	1.6705	1.3277	2.6155	6.6655	1.5991	1.6369	1.5667	

Table 2.3.3. Effect of seed treatment with insecticides on stem borer

*ROC- Percent reduction over untreated control. @Mean of 3 and 5 weeks after transplanting (WAT). Figures in the parentheses are arcsine transformed values. Means followed by same alphabet are significantly not different (P=0.05) (SAS version 9.4)

Table 2.3.4. Effect of seed treatment with insecticides rice whorl maggot and hispa

Treatment		Whorl maggot Damaged leaves (WMDL%)			Hispa Damaged leaves (HDL%)	
		3 WAT	5 WAT		3 WAT	
		PTB	ADT	RNR	ADT	RNR
T1	Carbosulfan 25 %DS	13.1 a(7.5)	4.5 b(2.6)	1.1 ab(0.7)	6.6 b(3.8)	2.4 ab(1.4)
T2	Chlorantraniliprole 50% W/w FS	9.5 b(5.6)	5.1 b(2.9)	0.8 ab(0.4)	6.3 b(3.6)	1.8 b(1.0)
T3	Thiamethoxam 70 % WS	8.3 b(4.8)	4.6 b(2.7)	1.0 ab(0.6)	8.0 b(4.6)	2.5 ab(1.5)
T4	Imidacloprid 48 % w/w FS	9.7 b(5.6)	4.5 b(2.6)	0.2 a(0.1)	8.4 b(4.9)	2.5 ab(1.4)
T5	Sedaxane 12.61% w/w + Azoxystrobin 3.15% w/w + Thiamethoxam 22.06% w/w	10.5 ab(6.1)	3.6 b(2.1)	1.5 a(0.8)	6.0 b(3.4)	3.2 ab(1.8)
T6	Untreated Control	9.4 b(5.4)	8.2 b(4.7)	1.4 a(0.8)	20.0 a(11.6)	3.3 a(1.9)
	LSD	1.579	1.4278	0.8958	2.215	0.8609

Figures in the parentheses are arcsine transformed values. Means followed by same alphabet are significantly not different (P=0.05) (SAS version 9.4)

Table 2.3.5. Effect of seed treatment with insecticides on rice leaffolder

	Treatment	Per cent damaged leaves per hill							
		@Locations						Pooled mean	%ROC
		CBT	GNV	JDP	KRK	MTU	PTB		
T1	Carbosulfan 25 %DS	1.0 ab(0.5)	15.1 b(8.7)	6.7 a(3.9)	2.8 a(1.6)	1.3 b(0.8)	2.9 a(1.6)	5.0 b(2.9)	20.4
T2	Chlorantraniliprole 50% W/w FS	0.6 ab(0.3)	9.6 c(5.5)	7.0 a(4.0)	1.7bc(1.0)	1.3 b(0.8)	2.1 a(1.2)	3.7 c(2.1)	40.5
T3	Thiamethoxam 70 % WS	0.6 ab(0.3)	11.7 c(6.7)	7.8 a(4.5)	2.8 ab(1.6)	1.2 b(0.7)	2.4 a(1.4)	4.4 b(2.5)	29.5
T4	Imidacloprid 48 % w/w FS	0.4 b(0.2)	16.1 b(9.3)	6.8 a(3.9)	1.6 c(0.9)	1.8 ab(1.0)	2.6 a(1.5)	4.9 b(2.8)	21.9
T5	Sedaxane 12.61% w/w + Azoxystrobin 3.15% w/w+ Thiamethoxam 22.06% w/w	0.6 ab(0.4)	20.1 a(11.6)	7.3 a(4.2)	1.9 abc(1.1)	1.8 ab(1.0)	2.4 a(1.4)	5.7 a(3.3)	9.1
T6	Untreated Control	1.3 a(0.7)	20.9 a(12.1)	7.8 a(4.5)	2.8 a(1.6)	2.1 a(1.2)	2.6 a(1.5)	6.2 a(3.6)	
	LSD	0.4555	1.4813	1.0012	0.6476	0.3933	0.5928	0.3361	

*ROC- Percent reduction over untreated control. @Mean of 3 and 5 weeks after transplanting. Figures in the parentheses are arcsine transformed values. Means followed by same alphabet are significantly not different (P=0.05) (SAS version 9.4)

Table 2.3.6. Effect of seed treatment with insecticides on natural enemies

	Treatments	Natural enemies (Number per hill)												
		Coccinellids			Spiders					Mirid bugs				
		5 WAT	3 WAT		3 WAT		5 WAT			3 WAT		5 WAT		
		MTU	RNR	MTU	MTU	GNV	MTU	RNR	GNV	MTU	GNV	MTU	RNR	GNV
T1	Carbosulfan 25 %DS	0.5 a (1.2)	0.1 a (1.0)	0.5 ab (1.2)	0.8 b (1.3)	3.1 a (2.0)	0.8 b (1.3)	0.3 a (1.1)	4.4 b (2.2)	0.0 a (1.0)	4.8 a (2.4)	0.0 b (1.0)	0.0 a (1.0)	10.3 a (3.3)
T2	Chlorantraniliprole 50% W/w FS	0.3 a (1.1)	0.0 a (1.0)	0.3 b (1.1)	0.8 b (1.3)	2.9 ab (1.9)	0.8 b (1.3)	0.2 a (1.1)	4.6 b (2.3)	0.4 a (1.1)	5.2 a (2.4)	0.4 b (1.1)	0.0 a (1.0)	9.1 a (3.1)
T3	Thiamethoxam 70 % WS	0.5 a (1.2)	0.1 a (1.0)	0.5 ab (1.2)	0.8 ab (1.3)	2.9 ab (1.9)	0.8 ab (1.3)	0.2 a (1.1)	6.1 a (2.6)	0.4 a (1.2)	5.3 a (2.5)	0.4 b (1.2)	0.1a (1.0)	10.5 a (3.4)
T4	Imidacloprid 48 % w/w FS	0.5 a (1.2)	0.0 a (1.0)	0.5 ab (1.2)	0.9 ab (1.3)	2.6 bc (1.8)	0.9 ab (1.3)	0.2 a (1.1)	3.9 bc (2.1)	0.3 a (1.1)	4.9 a (2.4)	0.3 b (1.1)	0.0 a (1.0)	7.7 b (2.9)
T5	Sedaxane 12.61% w/w + Azoxystrobin 3.15% w/w + Thiamethoxam 22.06% w/w	0.6 a (1.2)	0.0 a (1.0)	0.6 a (1.2)	1.1 ab (1.4)	2.0 d (1.7)	1.1 ab (1.4)	0.2 a (1.1)	3.3 cd (2.0)	0.4 a (1.2)	3.3 b (2.0)	0.4 b (1.2)	0.0 a (1.0)	2.9 c (1.9)
T6	Untreated Control	0.3 a (1.1)	0.1 a (1.0)	0.3 b (1.1)	1.2 a (1.5)	2.2 cd (1.7)	1.2 a (1.5)	0.3 a (1.1)	2.7 d (1.9)	1.7 b (1.6)	2.2 c (1.7)	1.7 a (1.6)	0.0 a (1.0)	2.6 c (1.8)
	LSD	0.1096	0.0391	0.1096	0.1592	0.1253	0.1592	0.0979	0.2248	0.2796	0.1274	0.2796	0.0247	0.2516

Figures in the parentheses are square root transformed values. Means followed by same alphabet are significantly not different (P=0.05) (SAS version 9.4)

Table 2.3.7. Effect of seed treatment with insecticides on grain yield

Treatment		Yield (kg/ha)										
		PTB	ADT	CBT	KRK	MTU	RNR	GNV	JDP	CHP	Pooled Mean	%IOC
T1	Carbosulfan 25 %DS	3651.9 ab	3375 ab	6189.3 b	3763.8 abc	3218.3 b	4432.9 a	6027 c	4799 a	3725.0 b	4353.6 bc	33.8
T2	Chlorantraniliprole 50% W/w FS	4482.3 a	3550 ab	7803.9 a	3889.6 ab	4107.1 a	4364.4 a	6885 b	4701 a	3900.0 a	4853.7 a	49.2
T3	Thiamethoxam 70 % WS	3463.6 ab	3125 ab	5489.6 c	3281.3 cd	3874.5 a	4327.2 a	7421 a	4809 a	3822.5 ab	4401.5 b	35.3
T4	Imidacloprid 48 % w/w FS	3384.2 ab	3300 ab	4117.2 de	3400.4 bcd	3782.5 a	4405.0 a	5653 d	4570 a	3531.3 c	4015.9 c	23.5
T5	Sedaxane 12.61% w/w + Azoxystrobin 3.15% w/w + Thiamethoxam 22.06% w/w	3490.6 ab	3850 a	4520.9 d	3970.4 a	3233.2 b	4615.9 a	5155 e	4758 a	3537.5 c	4125.7 bc	26.8
T6	Untreated Control	3193.6 b	2750 b	3498.3 e	2885.4 d	2800.3 b	3991.7 a	3594 f	4031 b	2531.3 d	3252.8 d	
	LSD	1138.9	923.9	629.19	521.81	524.46	660.1	304.21	377.67	171.75	347.16	

* IOC-Percent Increase over untreated control. Means followed by same alphabet are significantly not different (P=0.05) (SAS version 9.4)

2.3.2. Evaluation of drones for spraying of agrochemicals (herbicides, insecticides and fungicides) in rice pest management (EDAPM)

To evaluate the efficacy of drone-based spraying of agrochemicals for the management of major insect pests, diseases and weeds a collaborative trial with entomologists, agronomists and pathologists was conducted at seven locations namely, Ludhiana, Navsari, Nawagam, Chinsurah, Raipur, Gangavathi, and Rajendranagar. Stem borer, leaf blast, sheath blight, grain discolouration and weeds were the target biotic stresses. The treatment details are given below.

Treatment	Spraying Method	Crop Stage	Agro chemical	Insecticide (formulation per acre)	Dilution per acre
T1	Drone	Within 5DAT	Herbicide	Pretilachlor @600 - 750 l/acre	10 litres of water at maximum tillering stage, 16 liters at PI to booting stage
		Maximum tillering stage	Herbicide	Triafamone 20%+ethoxy-sulfuron l0% WG @90 g/acre	
			Fungicide +insecticide (Tank mix)	Tebuconazole 50% + trifloxystrobin 25% WG @ 80	
				+Isocycloseram 18.1% W/W SC @ 120 ml/acre	
		Booting stage	Fungicide +insecticide (Tank mix)	Picoxystrobin 7.05%+ propiconazole 11.7% SC @400 ml/acre	
				Chlorantraniliprole 18.50 % SC @60ml/acre	
T2	Battery operated Knapsack sprayer	Within 5 DAT	Herbicide	Pretilachlor @600 - 750 l/acre	500 litres of water depending on the crop canopy
		Maximum tillering stage	Herbicide	Triafamone 20% + ethoxysulfuron l0% WG @90 g/acre	
			Fungicide +insecticide (Tank mix)	Tebuconazole 50% + Trifloxystrobin 25% WG @ 80g/acre	
				+Isocycloseram 18.1% W/W SC @ 120 ml/acre	
		Booting stage	Fungicide +insecticide (Tank mix)	Picoxystrobin 7.05% + propiconazole 11.7% SC @400 ml/acre /ha	
				Chlorantraniliprole 18.50 % SC @60 ml/acre	
T3	Control- spray with Drones		water	Only water spray with drone	10 litres of water at maxi-mum tillering stage, 16 liters at PI to booting stage
T4	Control –spray with battery operated knap sack sprayer		water	Only water spray with battery operated knapsack sprayer	500 litres of water depending on the crop canopy
T5	Untreated control		Nil	No sprays	-

However, at RNR and NVS, the experiment was conducted with three treatments excluding T3 and T4 due operational issues. Data from these two locations is discussed separately. At all the locations data were recorded at one and two weeks after each spray. Besides data on stem borer damage, data on gall midge, leaf folder, spiders and mirid bugs also were recorded. An account of the results obtained is given and discussed hereunder.

Stem borer:

With respect to DH, except NWG, at the remaining locations treatment effects were significant. Drone insecticide spray was significantly superior to rest of the treatments including the knapsack insecticide spray at CHN, GNV and LDN with lower percentage of DH. At RPR, drone insecticide spray was at par with knapsack insecticide spray. Pooled mean across the five locations revealed that drone insecticide spray was significantly superior to rest of the treatments with 52.3 per cent reduction in DH over control **(Table 2.3.2.1)**. With respect to white ears, the trend is similar. Except at RPR, where treatment effects were not significant, at the remaining locations drone insecticide spray was superior or at par with knapsack insecticide spray. Pooled mean revealed that drone insecticide spray was most effective with 41.0% reduction in WE incidence **(Table 2.3.2.2)**.

Table 2.3.2.1. Evaluation of insecticide spraying with drones against stem borer dead heart damage

Treatment	Per cent dead hearts per hill						
	Locations#					Treatment*location@	
	CHN	GNV	NWG	LDN	RPR	Pooled mean	%ROC
Drone spray-insecticides	3.4e(2.0)	9.3d(8.5)	0.7a(0.4)	1.7d(1.0)	16.3c(9.4)	6.3 e(4.5)	52.3
Knapsack spray-insecticides	5.5d(3.2)	10.1c(9.1)	0.9a(0.5)	1.9c(1.1)	16.9bc(9.7)	7.1 d(4.9)	46.2
Drones spray-water	15.3c(8.8)	16.0b(14.5)	0.9a(0.5)	4.9b(2.8)	18.0b(10.4)	11.0 c(7.6)	16.7
Knapsack spray-water	17.3b(10.1)	16.0b(14.6)	0.9a(0.5)	5.1a(2.9)	20.3a(11.7)	11.9 b(8.2)	9.8
Untreated control	19.4a(11.3)	20.0a(17.8)	0.9a(0.5)	5.0a(2.9)	20.5a(11.9)	13.2 a(9.1)	
LSD (P=0.05)	0.7	0.4	0.2	0.0	1.0	0.3	

%ROC-Percent reduction over untreated control. Figures in the parentheses are #arc sine and @Atkinson transformed values. Means followed by same alphabet are significantly not different (P=0.05) (SAS version 9.4)

Table 2.3.2.2. Evaluation of insecticide spraying with drones against white ear damage

Treatment	Per cent white ears per hill						
	Locations#					Treatment*location@	
	CHN	GNV	NWG	LDN	RPR	Pooled Mean	%ROC
Drone spray-insecticides	1.0d(0.6)	11.8d(6.8)	2.8c(1.6)	5.2c(3.0)	13.6a(7.8)	6.9 b(3.9)	41.0
Knapsack spray-insecticides	1.5c(0.9)	15.2c(8.7)	4.5bc(2.6)	5.4c(3.1)	13.8a(7.9)	8.1 b(4.6)	30.8
Drones spray-water	5.0a(2.9)	23.0b(13.3)	5.8ab(3.3)	7.0b(4.0)	12.4a(7.1)	10.6 a(6.1)	9.4
Knapsack spray-water	4.2b(2.4)	22.9b(13.3)	7.1a(4.1)	7.2ab(4.1)	14.2a(8.1)	11.1 a(6.4)	5.1
Untreated control	4.7a(2.7)	26.8a(15.5)	7.4a(4.3)	7.4a(4.2)	12.5a(7.2)	11.7 a(6.8)	
LSD (P=0.05)	0.216	1.005	1.269	0.1359	1.070	0.962	

%ROC-P.ercent reduction over untreated control. Figures in the parentheses are #arc sine and @Atkinson transformed values. Means followed by same alphabet are significantly not different (P=0.05) (SAS version 9.4)

Gall midge:

At GNV, insecticide spray through drone was the best treatment with highest reduction (52.5 per cent) in silver shoots over the untreated control. Whereas battery operated Knapsack insecticide spray reduced the silver shoots by 48.0 percent **(Table 2.3.2.3)**.

Table 2.3.2.3. Evaluation of insecticide spraying with drones against rice gall midge

Treatment	Per cent silver shoots per hill	
	GNV	%ROC
Drone spray-insecticides	17.8d(10.3)	52.5
Knapsack spray-insecticides	19.5c(11.3)	48.0
Drones spray-water	34.0b(20.0)	9.3
Knapsack spray-water	33.5b(19.6)	10.7
Untreated control	37.5a(22.1)	
LSD (P=0.05)	0.5543	

%ROC-Percent reduction over untreated control. Figures in the parentheses are arc sine transformed values.

Mirid bugs:

Application of insecticides by drone as well as battery operated knapsack sprayer resulted in reduction of mirid bug population. At GNV, the population was significantly lower in the treatment with insecticides applied using knapsack sprayer, while at RPR it was with insecticide spray with drone. However, water spray with drone as well as knapsack spray also resulted in reduction of mirid population and both the treatments were at par at both the locations indicating no additional penalty due to drone spray. Pooled data revealed that insecticide spraying resulted in reduction of mirid bug population irrespective of method of application and the reduction was higher with battery operated knapsack spray (61.8%) followed by 52,9% in drone spraying as compared to the untreated control. **(Table 2.3.2.4)**.

Table 2.3.2.4. Effect of insecticide spraying with drones on mirid bugs population

Treatment	No. of mirids per hill			
	GNV	RPR	Pooled Mean	%ROC
Drone spray-insecticides	7.4c(2.7)	0.1c(0.7)	3.7c(1.7)	52.9
Knapsack spray-insecticides	5.3d(2.4)	0.8b(1.0)	3.0c(1.7)	61.8
Drones spray-water	12.9b(3.6)	0.6b(1.0)	6.8b(2.3)	14.4
Knapsack spray-water	12.8b(3.6)	1.0ab(1.1)	6.9b(2.3)	13.0
Untreated control	14.6a(3.8)	1.2a(1.2)	7.9a(2.5)	
LSD (P=0.05)	0.099	0.217	0.118	

%ROC-Percent reduction over untreated control. Figures in the parentheses are square root transformed values. Means followed by same alphabet are significantly not different (P=0.05) (SAS version 9.4)

Spiders:

Application of insecticides by drone as well as battery operated knapsack sprayer resulted in reduction of spider population at CHN, GNV, LDN, and RPR. However, at NWG, a significant increase in spider population was recorded in knapsack insecticides spray treatment. Pooled data revealed that insecticide spraying, irrespective of the method of spraying though resulted in reduction of spider population, treatment mean differences were not significant **(Table 2.3.2.5)**.

Table. 2.3.2.5. Effect of insecticide spraying with drones on spiders

Treatment	No. of spiders per hill						
	Location[#]					Treatment*location[@]	
	CHN	GNV	NWG	LDN	RPR	Pooled Mean	%ROC
Drone spray-insecticides	0.3b(0.8)	3.7c(2.0)	0.5bc(1.0)	0.9b(1.2)	2.1c(1.6)	1.5 a(1.3)	34.8
Knapsack spray-insecticides	0.3b(0.9)	3.1d(1.9)	0.7a(1.0)	1.1a(1.3)	2.5bc(1.7)	1.5 a(1.3)	34.8
Drones spray-water	0.7a(1.0)	4.6b(2.2)	0.5bc(1.0)	0.9b(1.2)	3.3a(1.9)	2.1 a(1.4)	8.7
Knapsack spray-water	0.6a(1.0)	4.6b(2.2)	0.4c(0.9)	1.1a(1.3)	3.0ab(1.8)	2.0 a(1.4)	13.0
Untreated control	0.6a(1.0)	6.0a(2.5)	0.4c(0.9)	1.1a(1.3)	3.3a(1.9)	2.3 a(1.5)	
LSD (P=0.05)	0.035	0.033	0.041	0.0	0.203	0.053	

%ROC-Percent reduction over untreated control. Figures in the parentheses are #arc sine and @Atkinson transformed values. Means followed by same alphabet are significantly not different (P=0.05) (SAS version 9.4)

Rajendra Nagar:

Treatment effects were not significant for SS, WM, and hispa. Whereas, DH and LF incidence was significantly lower in insecticide spray irrespective of method of application and the drone and knapsack sprays were at par. Both the spray methods significantly increased the yields being statistically at par (**Table. 2.3.2.6**) and significantly higher than untreated control.

Table. 2.3.2.6. Effect of insecticide spraying with drones on early season insect pests of rice at RajendraNagar.

Treatment	Percent			Per cent damaged leaves			Yield	
	DH	WE	SS	WM	Hispa	LF	Kg/ha	%IOC
Drone spray-insecticides	1.3b(0.8)	18.9b(10.9)	13.8a(8.0)	32.5a(19.7)	1.9a(1.1)	13.5b(7.8)	6875.0 a	25.5
Knapsack spray-insecticides	1.1b(0.6)	21.0b(12.1)	11.0a(6.6)	31.7a(19.2)	3.5a(2.0)	11.6b(6.7)	6450.0 a	17.7
Untreated control	10.1a(6.0)	26.1a(15.1)	13.2 a(7.8)	36.4 a(22.7)	3.1 a(1.8)	19.3 a(11.4)	5480.0 b	
LSD (P=0.05)	3.8	2.2	4.5	4.6	2.1	2.5	655.7	

%IOC-Percent increase over untreated control. Figures in the parentheses are arc sine transformed values. Means followed by same alphabet are significantly not different (P=0.05) (SAS version 9.4)

Navsari:

Both the drone and knapsack spraying were highly effective at reducing DH and WE incidence compared to the untreated control. Drone application was specifically more effective for WE management, though both methods performed similarly against DH. While treatment effects on LF were not significant. Both spray methods significantly increased the yields and were statistically at par (**Table. 2.3.2.7**).

Table. 2.3.2.7. Effect of insecticide spraying with drones on early season insect pests of rice at RajendraNagar.

Treatment	Percent			Yield	
	DH	WE	LFDL	Kg/ha	%IOC
Drone spray-insecticides	16.5b(9.5)	16.6c(9.6)	22.4a(13.0)	5108.8a	32.4
Knapsack spray-insecticides	16.9b (9.8)	23.6b(13.7	21.8a(12.6)	5017.5a	30.0
Untreated control	21.3a(12.4)	28.9a(16.9	22.3a(12.9)	3858.4b	
LSD (P=0.05)	1.2	1.4	0.6678	348.36	

%IOC-Percent increase over untreated control. Means followed by same alphabet are significantly not different (P=0.05) (SAS version 9.4)

Effect on diseases:

Leaf Blast: The trial was conducted at Gangavathi, Mandya, Moncompu and Nawagam. At Gangavathi, Percent disease index (PDI) of leaf blast was recorded as low both at maximum tillering and booting stage and the percentage varied between 9.42% to 11.97%. Similarly, at Mandya also the disease severity was low (2.10%) and hence the data from Mandya and Gangavathi was not considered for drawing overall conclusions.

At Moncompu, the PDI of leaf blast was recorded as 64.03% at maximum tillering stage and 69.60% at booting stage in the untreated control. Treatment T1 significantly reduced the PDI compared to treatment T2, in which disease severity was reduced by up to 53.68% at the maximum tillering stage and 50.00% at the booting stage, where a combination of fungicide and insecticide was sprayed using a drone.

At Nawagam, the PDI in the control treatment (T3) was recorded as 28.28% at maximum tillering stage and 41.62% at booting stage. The treatments T1 and T2 i.e., spraying combination of fungicide and insecticide using drone and battery operated sprayer performed on par in reducing the disease severity of leaf blast. At the maximum tillering stage, the PDI was 46.21% in T1 and 42.75% in T2, while at the booting stage, it was 47.52% in T1 and 45.77% in T2. Across the two locations, leaf blast severity was reduced by up to 49.94% with drone spraying and by 37.29% with the battery-operated knapsack sprayer (Table 2.3.2.8).

Neck Blast: The trial was conducted at Mandya to evaluate the treatments against neck blast and the PDI was recorded as 30.80% in the untreated treatment (T3). Among the two treatments, the PDI was recorded as 15.20% in T1 treatment with 50.65% disease reduction, and in T2 treatment, the PDI was recorded as 18.30% with 40.58% disease reduction (T3) at booting stage of the crop (Table 2.3.2.8).

Sheath blight: The trial was conducted at Gangavathi, Ludhiana, Mandya Moncompu and Navsari. Across the locations, the PDI of sheath blight was recorded in between 21.14% to 49.05% at maximum tillering stage and 34.25% to 66.57% at booting stage of the crop in the control treatment (T3). When the percentage of reduction was compared between the treatments T1 and T2, the results revealed that there was no much difference between the two treatments irrespective to the stage of the crop at Gangavathi and Navsari. At Ludhiana, the percentage of disease reduction was high in the T2 treatment compared to T1 treatment, wherein the knapsack sprayer is used for the spray. At Mandya, significant difference between T1 and T2 was observed only at the booting stage of the crop and not in the maximum tillering stage. At Moncompu, during the maximum tillering stage, the treatment T1 significantly reduced the PDI from 49.05% to 31.00% with 36.80% disease reduction and at booting stage, the disease was reduced up to 31.76% from 66.57% with 52.29% disease reduction (Table 2.3.2.9).

Further across the locations, treatment T1 reduced the mean PDI from 30.42% to 16.90% with 44.44% disease reduction at maximum tillering stage and reduced the mean PDI from 43.45% to 22.62% with 47. 94% disease reduction at booting stage. Similarly, the treatment T2 reduced the mean PDI from 30.42% to 19.64% with 35.43% disease reduction at maximum tillering stage and reduced the mean PDI from 43.45% to 27.37% with 37.00% disease reduction at booting stage (Table 2.3.2.10).

Grain discolouration: The trial was conducted at Rajendranagar and the management practices were adopted only at maturity stage. In the control, the PDI was 23.84% and the treatment T1 recorded lowest PDI (7.20%) with highest percentage of disease reduction (69.78%) and the treatment T2 recorded the PDI of 11.66% with 51.08% disease reduction (Table 2.3.2.11). Whereas, for other diseases the severity was low and data were not considered for analysis.

Table 2.3.2.8 Evaluation of Drone spray of chemicals for the management of leaf blast and neck blast

Disease	Leaf Blast												Neck Blast	
Location	MNC				NWG				Overall Mean across the Locations		Mean percentage (%) of disease reduction across the Locations		MND	
Treatment Details	PDI (%)		% of disease reduction		PDI (%)		% of disease reduction		PDI (%)				PDI (%)	
	MTS	BS	MTS	BS	MTS	BS	MTS	BS	MTS	BS	MTS	BS	Booting Stage	% of disease reduction
T1- Drone	29.66 - 32.86	34.8 - 36.04	53.68	50	15.21 - 22.72	21.84 - 27.67	46.21	47.52	22.43	28.32	49.94	48.76	15.2 - 22.82	50.65
T2- Battery operated Knapsack sprayer	49.53-44.69	49.54-44.69	22.64	28.82	16.19-23.41	22.57-28.15	42.75	45.77	32.86	36.05	32.69	37.29	18.3-25.05	40.58
T3 - Untreated Control	64.03-53.25	69.6-56.58	-	-	28.28-32.01	41.62-40.12	-	-	25.96	31.35	-	-	30.8-33.64	
C. V.	12.94	12.43				14.45	11.51						11.29	
LSD @ 5%(P= 0.05)	5.3	5.35				3.54	3.46						2.88	
Transformation	AT	AT				AT	AT						AT	

(MTS- Maximum Tillering Stage; BS- Booting Stage; PDI – Percent Disease Index; Figures in the parentheses indicates transformed means; AT- Arcsine transformation; ST – Square root Transformation)

Table 2.3.2.9: Evaluation of Drone spraying of chemicals for the management of sheath blight

Disease/	Sheath Blight											
Location	GNV				LDN				MND			
Treatment Details/	PDI (%)		% of disease reduction		PDI (%)		% of disease reduction		PDI (%)		% of disease reduction	
	MTS	BS	MTS	BS	MTS	BS	MTS	BS	MTS	BS	MTS	BS
T1- Drone	7.28-2.67	17.23-24.49	13.87	17	10.33-18.45	13-20.9	64.91	67.3	17.8-24.77	24.7-29.56	21.6	32.9
T2- Battery operated Knapsack sprayer	9.71-3.1	18.76-25.64	11.43	15.5	7.56-15.69	10.33-18.36	74.34	74	18-24.95	28.4-32.03	20.7	22.8
T3-Untreated Control	21.14-4.6	34.25-35.79	-	-	29.44-32.79	39.78-39.06	-	-	22.7-28.24	36.8-37.2		
C. V.	7.52	5.63			14.15	12.89			11.57	17.57		
LSD @ 5% ***(P= 0.05)***	0.24	1.52			2.97	3.16			2.83	5.44		
Transformation	ST	AT			AT	AT			AT	AT		

(MTS- Maximum Tillering Stage; BS- Booting Stage; PDI – Percent Disease Index; Figures in the parentheses indicates transformed means; AT- Arcsine transformation; ST – Square root Transformation)

(Conti…) 2.3.2.10: Evaluation of Drone spraying of chemicals for the management of sheath blight

Treatment Details/	Sheath Blight											
Location	MNC				NSV				Overall Mean across the Locations		Mean percentage (%) of disease reduction across the Locations	
Disease/	PDI (%)		% of disease reduction		PDI (%)		% of disease reduction		PDI (%)			
	MTS	BS	MTS	BS	MTS	BS	MTS	BS	MTS	BS	MTS	BS
T1- Drone	31	31.76	36.8	52.29	18.09	26.41	39.22	33.73	16.9	22.62	44.44	47.94
	-33.3	-34.1			-25.07	-30.89						
T2- Battery operated Knapsack sprayer	42.53	50.81	13.28	23.68	20.42	28.54	31.39	28.39	19.64	27.37	35.43	37
	-40.62	-45.44			-26.79	-32.26						
T3 - Untreate	49.05	66.57	-	-	29.76	39.86			30.42	43.45		
	-44.36	-54.84			-33.03	-39.13						
C. V.	15.37	12.79			5.53	4.91						
LSD @ 5% ***(P***	5.69	5.38			1.47	1.57						
Transformati	AT	AT			AT	AT						

(MTS- Maximum Tillering Stage; BS- Booting Stage; PDI – Percent Disease Index; Figures in the parentheses indicates transformed means; AT- Arcsine transformation; ST – Square root Transformation)

Table 2.3.2.11:Evaluation of Drone spray of chemicals for the management grain discolouration at Rajendranagar

	PDI (%)			
Disease	Neck Blast	Sheath Rot	Grain Discoloration	
Treatment Details	Maturity Stage	Maturity Stage	Maturity Stage	% of disease reduction
T1- Drone	0.28-0.23	1.37-0.96	7.2-7.21	69.78
T2- Battery operated Knapsack sprayer	0.91-0.58	4.29-1.93	11.66-11.66	51.08
T3 - Untreated Control	3.25-1.73	3.34-1.52	23.84-23.84	0
C. V.	70.12	64.80	28.71	
LSD @ 5% ***(P= 0.05)***	0.56	0.89	3.84	
Transformation	ST	ST	AT	

Phytotoxicity symptoms:

No phytotoxicity symptoms were observed when the test insecticides/ fungicides/ and herbicides at given recommended doses were tank mixed and sprayed with drone and battery operated knapsack sprayer in the locations tested.

Evaluation of drone for its suitability to various agronomy interventions

To evaluate the suitability and cost-effectiveness of drone (UAV) technology for various agronomic interventions in rice cultivation across eight locations (Ludhiana, Mandya, Rajendranagar, Navsari, Nawagam, Puducherry, Chinsurah and Moncompu) in four Zones. The results of eight locations revealed that pre-emergence and post-emergence application of herbicides by drone-based application was comparable to knapsack sprayer in controlling grasses, sedges and broad-leaved weeds, leading to similar crop growth, yield attributes and grain yield. While costs of cultivation varied, drone-based application resulted in labour savings and favourable economic returns. These findings indicate that drones are an effective and feasible tool for precision herbicide application in rice cultivation.

Grain Yield:

Impact of superior performance of drone pesticide spray against insect pests, diseases and weeds is reflected in the grain yield at GNV, NWG and RPR. At CHN, the grain yield was at par in both the insecticide treatments. Pooled mean revealed pesticide spray with drone and knapsack sprayer were at par and significantly superior to the rest of the treatments with 48.7 and 38.5 per cent increase over the untreated control, respectively **(Table 2.3.2.12)**.

Table 2.3.2.12. Effect of method of spraying of insecticides on the grain yield.

Treatment	Grain Yield (Kg/ha)					
	Location				Treatment*location	
	CHN	GNV	NWG	RPR	Pooled mean	%IOC
Drone spray-insecticides	7081.9a	7304.0a	6348.0a	1984.0a	5679.5a	48.7
Knapsack spray-insecticides	6978.2a	7280.0a	5026.0b	1877.0a	5290.3a	38.5
Drones spray-water	6923.5a	3332.0b	4186.0c	1548.0b	3997.4b	4.7
Knapsack spray-water	6686.6a	3302.0b	4104.0c	1517.3b	3902.5b	2.2
Untreated control	7286.4a	2482.0c	4135.0c	1370.7c	3818.5b	
LSD (P=0.05)	625.420	37.565	628.730	115.520	706.810	

%IOC-Percent increase over untreated control. Means followed by same alphabet are significantly not different (P=0.05) (SAS version 9.4)

Summary:

For the management of yellow stem borer, drone insecticide spraying was superior achieving a 52.3% reduction in DH and a 41.0% reduction in WE. Drone insecticide application was the most effective treatment against gall midge reducing SS incidence by 52.5% at GNV.

Insecticide spray reduced mirid populations irrespective of the method of spraying (52.9% to 61.8%). While both the methods decreased spider counts, the differences were not statistically significant. No phytotoxicity was observed with pesticides applied through drone or battery operated knapsack sprayer.

Spraying of fungicides with drone, clearly outperformed battery operated spraying in the management of leaf blast, neck blast, sheath blight and grain discolouration. With respect to leaf blast, drone spraying was superior over the knapsack spraying with 49.94% and 48.76% reduction at maximum tillering and boot leaf stages, respectively. For neck blast drone spray was most effective with 50.65% reduction in the disease incidence. With respect to sheath blight, drone spray outperformed battery operated knapsack spray with 44.44% and 47.94% reduction in the disease incidence at maximum tillering and booting stage, respectively. Same trend was found in case of grain discolouration drone spray outperforming knapsack spray with 69.78% reduction in the disease incidence.

With respect to grain yield, drone and battery operated knapsack spraying were statistically at par and significantly outperformed the untreated control with 48.7% and 38.5% increase over the untreated control.

2.4 Bio- control and Biodiversity studies

Under this component of rice pest management two trials *viz.*, Evaluation of entomopathogens against lepidopteran pests of rice (EELP) and Evaluation of entomopathogens against sucking pests of rice (EESP) were constituted. In these trials various strains of Biocontrol agents were evaluated for their efficcacy against target pests and natural enmeies in comparison to Standard insecticide check and an untreated control. The results are discussed trial wise.

2.4.1. Evaluation of Entomopathogens Against Lepidopteran Pests Of Rice (EELP)

The trial was initiated in 2024 with the objective of evaluating effective entomopathogens against lepidopteran pests of rice, identified though the AICRP on biocontrol programme, at multi-locations and hotspots. The trial tested the efficacy of different strains of the entomopathogens *viz.*, *Bacillus albus*, *Bacillus thuringiensis, Metarhizium anisopliae* and *Beauveria bassiana* in comparison to a recommended insecticide and an untreated control the details of which are given below. During kharif 2025, the trial was taken up at fifteen centres *viz.*, Brahmavar, Coimbatore, Chinsurah, Chiplima, Gangavati, Karjat, Kaul, Karaikal, Ludhiana, Mandya, Moncompu, Navasari, Raipur, Ranchi and Titabar. The treatments included:

T1. *Metarhizium anisopliae* NRRI TF 9 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water

T2. *Metarhizium anisopliae* NBAIR-Ma35 (1 x 10^8 cfu/ml) @ 10ml/L

T3. *Metarhizium anisopliae* TNAU 1 x 10^8 cfu/ml) @ 10ml/L

T4. *Beauveria bassiana* NRRI TF 6 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water

T5. *Beauveria bassiana* NBAIR-Bb5a (1 x 10^8cfu/ml) 10ml/L

T6. *Bacillus thuringiensis* NRRI TB 261 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water

T7. *Bacillus albus* NBAIR-BATP (1 x 10^8cfu/ml) @ 10ml/L

T8. Cartap hydrochloride 4G granules

T9. Control (Untreated)

Three rounds of foliar sprays of liquid formulations of entomopathogens were given at 14 days interval based on ETL and one need-based application of insecticide as positive check. The damage by stem borer was quantified as per cent damage of dead hearts (DH) or white ears (WE) and leaf folder damaged leaves (DL) and minor lepidopterans such as skippers and horned caterpillars as % damaged leaves.

1. *Brahmavar*

Observations were recorded on stem borer (SB), leaffolder (LF) and minor lepidopteran pest damage at Brahmavar. Significant differences were observed among treatments for per cent dead heart damage for stem borer, per cent leaf damage for leaffolder and minor lepidopteran pests (Table 2.4.1). The chemical control (T8) recorded the lowest stem borer damage of 10.72 and 8.53% dead hearts at 7 and 15 DAS, respectively, and leaffolder damage of 10.33% and 8.91% damaged leaves. Among the entomopathogens, *B. thuringiensis* NRRI TB 261 recorded comparatively lower stem borer damage (12.31% and 11.29%) and leaffolder damage (10.80% and 10.17%). Higher populations of natural enemies were recorded in entomopathogen treatments, particularly *M. anisopliae* TNAU strain which recorded 14.69 mirids, 10.13 spiders and 6.58 coccinellids per 10 hills. The highest yield was recorded in chemical control (7933 kg/ha), followed by *Bacillus thuringiensis* NRRI TB 261 (6667 kg/ha) and *M. anisopliae* TNAU strain (6267 kg/ha), while untreated control recorded the lowest yield (3267 kg/ha).

2. *Coimbatore*

At Coimbatore, pest incidence was relatively low (Table 2.4.2). Chemical control treatment (T8) recorded the lowest stem borer damage (0.47% and 1.08% dead hearts at 7 and 15 DAS) and leaffolder damage (1.76% and 1.73%). Among the entomopathogens, *B. albus* (T7) recorded lower stem borer damage (1.14% and 2.57% dead hearts) and leaffolder damage (2.59% and 2.91% damaged leaves). Spider population was higher in entomopathogen treatments compared to chemical control. The highest yield was recorded in chemical control (5763 kg/ha), followed by *B. albus* (5073 kg/ha) and *B. bassiana* (4610 kg/ha), while untreated control recorded the lowest yield (2837 kg/ha).

3. *Chinsurah*

A low infestation of leaffolder was observed at Chinsurah along with stem borer damage. All treatments reduced pest damage compared to untreated control (Table 2.4.3). Stem borer damage ranged from 4.87–7.09% dead hearts at 7 DAS and 5.62–7.89% dead hearts at 15 DAS among entomopathogen treatments, compared to 11.28% at 7DAS and 11.86% at 15 DAS in untreated control. Leaffolder damage ranged from 1.21–2.75% damaged leaves at 7 DAS and 0.81–1.63% at 15 DAS among biological treatments. Significantly higher yield was recorded in *B. bassiana* treatment (5174 kg/ha), followed by *B. albus* treatment (5076 kg/ha) and chemical control treatment (5057 kg/ha), while untreated control recorded lower yield (4846 kg/ha).

4. *Chiplima*

Observations were recorded on Leaffolder and stem borer damage at Chiplima along with natural enemy population. Pest incidence was low to moderate (Table 2.4.4). Chemical control recorded the lowest stem borer damage (2.13%DH and 1.98%DH) and leaffolder damage (0.37%DL and 0.43% DL). Among entomopathogens, *Beauveria bassiana* NRRI TF 6 recorded lower stem borer damage

(2.84% and 2.55%DH). The population of spiders was higher in biocontrol treatments compared to the chemical treatment. The highest spider population was recorded in the untreated control (19.84 per 10 hills), followed by *B. bassiana* NBAIR-Bb5a (15.01) and *M. anisopliae* TNAU (14.53). Cartap hydrochloride recorded relatively lower spider population (12.21 per 10 hills). Similarly, coccinellid population was higher in untreated control (4.07 per 10 hills) and biocontrol treatments, while the lowest population was recorded in Cartap hydrochloride (1.30 per 10 hills), indicating a comparatively higher safety of biocontrol agents to natural enemies. Significantly higher yield was recorded in chemical control (4603 kg/ha), followed by *B. bassiana* NRRI TF 6 (4433 kg/ha), while untreated control recorded the lowest yield (2767 kg/ha).

5. *Gangavathi:*

At Gangavathi, pest damage differed significantly for leaffolder but not for stem borer (Table 2.4.5). Chemical control recorded the lowest leaffolder damage (3.99%DL at 7DAS and 4.61%DL at 15DAS). Among entomopathogens, *M. anisopliae* TNAU strain and *B. thuringiensis* recorded lower leaffolder damage (5.23–6.62%DL) and at par with chemical control. Natural enemy populations were higher in entomopathogen treatments compared to chemical control. The highest yield was recorded in chemical control (7933 kg/ha), followed by *Metarhizium anisopliae* NBAIR-Ma35 (7400 kg/ha) and *Bacillus thuringiensis* (6933 kg/ha), while untreated control recorded the lowest yield (3767 kg/ha).

6. *Karjat*

At Karjat, significant differences were observed among treatments for stem borer and leaffolder damage (Table 2.4.6). Chemical control recorded the lowest stem borer damage (0.28% and 0.33%DH) and leaffolder damage (0.96% and 1.12% DL). Among entomopathogens, *B. bassiana* NRRI TF 6 recorded lower pest damage (1.83% and 2.09% DH; 3.62% and 3.87% DL) though the damage by SB and LF in all the biocontrol treatments was statistically at par. The highest yield was recorded in chemical control (4700 kg/ha), followed by *B. bassiana* NRRI TF 6 (4433 kg/ha), while untreated control recorded the lowest yield (3700 kg/ha).

7. *Karaikal*

At Karaikal, pest incidence was very low and treatment differences were non-significant (Table 2.4.7). Stem borer damage ranged from 0.44–1.42% DH and leaffolder damage ranged from 0.33–1.59%DL across treatments. The highest yield was recorded in *M. anisopliae* TNAU strain (7033 kg/ha), followed by *M. anisopliae* NRRI TF 9 (6938 kg/ha), while other treatments recorded comparable yields.

8. *Kaul*

Chemical control recorded the lowest pest damage (0.36% and 2.01% DH; 0.15% and 0.14% DL) (Table 2.4.8). Among entomopathogens, *B. albus* and *M. anisopliae* NRRI TF 9 recorded comparatively lower pest damage. The highest yield was recorded in chemical control (5900 kg/ha), followed by *B. albus* and *M.*

anisopliae NRRI TF 9 (5800 kg/ha), while untreated control recorded the lowest yield (5200 kg/ha).

9. *Ludhiana*

At Ludhiana, chemical control (T8) recorded the lowest pest damage and highest yield (6185 kg/ha) (Table 2.4.9). Among entomopathogens, *B. albus* NBAIR-BATP (T7) recorded lower stem borer damage (3.43% and 4.96% DH; 5.33% WE) and leaffolder damage (5.33% DL). Yields among entomopathogen treatments ranged from 5366–5691 kg/ha and were significantly higher than untreated control.

10. *Mandya*

Damage by stem borer and leaffolder was observed and recorded along with natural enemies like mirids, spiders and coccinellids. The chemical treatment, (T7), was the most effective in reducing pest damage, recorded the lowest pest damage (5.56% and 6.02% stem borer; 5.54% and 6.14% leaffolder) (Table 2.4.10). Among entomopathogens, *M. anisopliae* TNAU strain recorded lower pest damage (7.13% and 7.56% DH by stem borer; 7.01% and 7.92% DL by leaffolder). Entomopathogen treatments supported higher natural enemy populations compared to chemical control. Yields ranged from 2872–4411 kg/ha among entomopathogen treatments, while untreated control recorded 3600 kg/ha. Among the treatments, higher mirid bug population was recorded in *M. anisopliae* TNAU (T3), *B. albus* (T7) and *B. thuringiensis* (T6), indicating that these treatments were relatively safer to natural enemies. The lowest mirid population was recorded in chemical control (T8). Similarly, spider and coccinellid populations were higher in biocontrol treatments and lowest in T8 treatment, indicating that chemical treatment reduced natural enemy population compared to biocontrol treatments.

11. *Moncompu*

At Moncompu, all treatments reduced pest damage compared to untreated control (Table 2.4.11). Stem borer damage ranged from 8.62–12.59% DH and leaffolder damage ranged from 4.24–7.16% DL among treatments. *B bassiana* NRRI TF 6 (T4) (4.35%DH), T8 (3.04%DH), and *B. albus* T7 (6.54%DH) recorded lower stem borer incidence at 15 days after spray, compared to other treatments. The untreated control recorded the highest stem borer incidence of 28-32 % DH. Entomopathogen treatments supported higher natural enemy populations. Yields were higher in *B. bassiana* NRRI TF 6 though on par with other treatments (5303–5323 kg/ha) except untreated control (4260 kg/ha).

12. *Navsari*

Pest incidence was very low. However, chemical control recorded the lowest pest damage and highest yield (4938 kg/ha). Among entomopathogens, T6 *B. thuringiensis* recorded lower pest damage and higher yield (3921 kg/ha) compared to other biocontrol treatments.

13. *Raipur*

At Raipur, stem borer and leaffolder incidence was moderate and significant differences were observed among treatments for stem borer damage at 15 DAS and yield (Table 2.4.13). The untreated control recorded the highest stem borer damage (15.25 and 23.03% DH at 7 and15 DAS respectively) and leaffolder damage (2.81 and 0.57% DL at 7 and 15 DAS respectively). Among the entomopathogens, *B. thuringiensis* NRRI TB 261 recorded lower stem borer damage (9.86% at 7 DAS and 16.15% at 15 DAS) and leaffolder damage (1.41% at 7 DAS and 0.43% at 15 DAS), followed by *M. anisopliae* NRRI TF 9 and *M. anisopliae* TNAU strain. Natural enemy population including mirids, spiders and coccinellids did not differ significantly among treatments, but relatively higher populations were observed in entomopathogen treatments compared to chemical control. The highest grain yield was recorded in T8- chemical control (5050 kg/ha), which was on par with other treatments, while untreated control recorded lower yield. Overall, entomopathogen treatments were effective in reducing pest damage and conserving natural enemies compared to untreated control.

14. *Ranchi*

At Ranchi, pest incidence of stem borer and leaffolder was low to moderate with no significant differences observed among treatments (Table 2.4.14). Stemborer damage ranged from 4.50 to 7.35% DH at 7 DAS and 3.57 to 8.02% at 15 DAS, while leaffolder damage ranged from 1.72 to 5.71% DL at 7 DAS and 5.88 to 11.64% DL at 15 DAS across treatments. Among the entomopathogens, *B. albus* NBAIR-BATP recorded relatively lower pest damage (SB: 4.50% and 3.57%; LF: 1.72% and 5.88. Natural enemy population differed significantly for mirids ($P < 0.01$), with higher populations recorded in T7- *B. albus* (13.71/10 hills) and untreated control (14.63/10 hills), while chemical control recorded lower mirid population (8.14/10 hills). However, spider and coccinellid populations did not differ significantly among treatments. Yield differed significantly among treatments ($P < 0.01$), with the highest grain yield recorded in chemical control (7533 kg/ha), followed by T6 *B. thuringiensis* and T7 *B. albus* (5367 kg/ha each). The untreated control recorded the lowest yield (1737 kg/ha). Overall, entomopathogen treatments maintained comparable pest suppression, conserved natural enemies, and resulted in moderate yields compared to chemical control.

15. *Titabar*

At Titabar, significant differences were observed among treatments for stem borer and leaffolder damage as well as yield, while natural enemy populations did not differ significantly among treatments (Table 2.4.15). Chemical control (T8) recorded the lowest stem borer damage (0.30% and 0.00% at 7 and15 DAS respectively) and leaffolder damage (0.00% DL at both 7 and 15 DAS). Among the entomopathogens, *Bacillus albus* NBAIR-BATP recorded lower stem borer damage (4.33% at 7 DAS and 0.60% at 15 DAS), while *M. anisopliae* NRRI TF 9 and *B. bassiana* NRRI TF 6 also recorded relatively lower pest damage compared to other treatments. The untreated control recorded the highest pest damage (23.19% and 26.36% stem borer; 21.73% and 24.79% leaffolder at 7 and 15 DAS, respectively). Natural enemy populations of mirids, spiders and coccinellids were on par across treatments. Yield differed significantly among treatments, with the highest grain yield recorded in chemical control (4366.67 kg/ha), followed by *M. anisopliae* TNAU (4266.67 kg/ha) and *B. bassiana* NRRI TF 6 (4233.33 kg/ha). The untreated control recorded the lowest yield (3033.33 kg/ha).

Pooled Mean Performance of Entomopathogens Across Locations

The pooled mean data across 15 locations revealed significant differences among treatments for stem borer (%DH), leaffolder (%DL), natural enemy population and grain yield (Table 2.5.16). Chemical control recorded the lowest stem borer damage (3.42and 3.18% DH at 7 DAS and 15 DAS) and lowest leaffolder damage (2.25%DL) and recorded the highest grain yield (4603 kg/ha). Among the entomopathogens, *B. bassiana* NRRI TF 6 (T4) recorded lower stem borer damage (3.14 and 1.75% DH at 7 and 15 DAS respectively) and moderate leaffolder damage (6.78%DL), and recorded higher grain yield (4433 kg/ha) compared to other entomopathogens. *B. albus* NBAIR-BATP (T7) also recorded lower stem borer damage (4.12 and 3.61% DH at 7 and 15DAS respectively) with grain yield of 4176 kg/ha. Natural enemy populations (mirids, spiders and coccinellids) were higher in entomopathogen treatments and untreated control compared to chemical control, indicating that entomopathogens were safer to natural enemies. The untreated control recorded the highest pest damage (11.58 to 12.59% DH); 9.25% DL) and lowest grain yield (2766 kg/ha).

Overall, *B. bassiana* NRRI TF 6, *Bacillus albus* NBAIR-BATP, and *B. thuringiensis* NRRI TB 261 were found to be effective entomopathogens in reducing lepidopteran pest damage and conserving natural enemies across locations, while chemical control recorded the highest grain yield.

Evaluation of entomopathogens against lepidopteran pests of rice (EELP) was taken up in fifteen locations to test the effectiveness of different strains of the entomopathogens, Bacillus albus, Bacillus thuringiensis two strains of Beauveria bassiana and three strains of Metarhizium anisopliae, in comparison with chemical and untreated control. While chemical control consistently provided the lowest pest damage of stem borer and leaf folder and highest yield across all locations (6433–7567 kg/ha), it significantly reduced natural enemy populations of mirids, spiders and coccinellids. The entomopathogenic treatments consistently reduced lepidopteran pest damage and supported natural enemy abundance compared to untreated control. Among the entomopathogens, B. bassiana NRRI TF 6, B. albus NBAIR-BATP and M anisopliae NRRI TF 9 were found to be the most effective treatments. B bassiana NRRI TF 6 (1 x 10^8 cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water) was particularly effective in reducing stem borer damage and performed well at Brahmavar, Moncompu and Navsari. B albus NBAIR-BATP 1 x 10^8cfu/ml) @ 10ml/L was also effective in reducing leaf folder damage and performed well at Karjat and Brahmavar. M. anisopliae NRRI TF 9 @ 2 g/ l of water or 1kg/ha in 500 l of water was next best and recorded moderate reduction in stem borer and leaf folder damage at Ludhiana. Overall, the tested entomopathogens offered sustainable, eco-friendly alternatives with varying but promising efficacy across locations.

Table 2.4.1.1 Effect of entomopathogens on lepidopteran pests and natural enemies at Brahmavar, EELP, ***kharif*** 2025

TREATMENT	Per cent Damage#						Natural Enemies (No./ 10 hills) *			Yield **(kg/ha)
	SB (%DH)		LF (% LFDL)		Minor pests		Mirids	Spiders	Coccin ellids	
	7 DAS	15 DAS	7 DAS	15 DAS	7 DAS	15 DAS				
T1. *Metarhizium anisopliae* NRRI TF 9 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	14.94 [c] (22.19)	13.97 (21.45)[c]	12.24 (20.07)[b]	12.62 (20.38)[c]	6.05 (14.10)[b]	6.29 (14.37)[c]	5.50 (2.45)[b]	3.26 (1.94)[a]	1.52 (1.42)[a]	3766.67[e]
T2. *Metarhizium anisopliae* NBAIR-Ma35 (1 x 10^8 cfu/ml) @ 10ml/L	15.09 [c] (22.30)	13.74 (21.27)[c]	11.52 (19.47)[b]	12.39 (20.19)[c]	4.62 (12.32)[b]	5.45 (13.38)[b]	8.20 (2.95)[c]	5.55 (2.46)[b]	4.30 (2.19)[b]	4833.33[d]
T3. *Metarhizium anisopliae* TNAU 1 x 10^8 cfu/ml) @ 10ml/L	12.98 [b] (20.67)	10.94 (18.97)[b]	9.85 (18.00)[a]	8.27 (16.49)[a]	1.36 (6.67)[a]	1.04 (5.84)[a]	14.69 (3.90)[c]	10.13 (3.26)[b]	6.58 (2.66)[b]	6266.67[b]
T4. *Beauveria bassiana* NRRI TF 6 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	17.51 [c] (24.04)	16.18 (23.10)[d]	14.45 (21.82)[b]	14.48 (21.84)[c]	5.37 (13.28)[b]	5.95 (13.98)[b]	4.17 (2.16)[b]	3.50 (2.00)[a]	5.60 (2.47)[b]	4200.00[e]
T5. *Beauveria bassiana* NBAIR-Bb5a (1 x 10^8cfu/ml) 10ml/L	13.62 [b] (21.18)	13.61 (21.17)[c]	12.83 (20.55)[b]	14.14 (21.58)[c]	6.76 (14.90)[b]	7.32 (15.51)[c]	7.79 (2.88)[c]	6.84 (2.71)[b]	5.65 (2.48)[b]	5500.00[c]
T6. *Bacillus thuringiensis* NRRI TB 261 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	12.31 [b] (20.13)	11.29 (19.27)[b]	10.80 (18.85)[b]	10.17 (18.29)[c]	1.19 (6.24)[a]	1.43 (6.85)[a]	10.72 (3.35)[c]	10.26 (3.28)[b]	7.97 (2.91)[b]	6666.67[b]
T7. *Bacillus albus* NBAIR-BATP (1 x 10^8cfu/ml) @ 10ml/L	11.31 (19.29)[a]	11.01 (19.03)[b]	11.71 (19.63)[b]	8.91 (20.26)[c]	5.82 (13.83)[b]	6.28 (14.36)[c]	6.00 (2.55)[b]	7.45 (2.82)[b]	5.40 (2.43)[b]	5633.33[c]
T8. Cartap hydrochloride 4G granules	10.72 (18.78)[a]	8.53 (16.74)[a]	10.33 (18.43)[b]	8.91 (17.11)[b]	1.11 (6.03)[a]	1.24 (6.39)[a]	2.42 (1.71)[a]	2.81 (1.82)[a]	1.40 (1.38)[a]	7933.33[a]
T9. Control (Untreated)	20.63 (26.12)[d]	19.24 (25.21)[d]	17.79 (24.23)[c]	19.37 (25.30)[c]	8.55 (16.76)[b]	10.25 (18.36)[c]	7.40 (2.81)[c]	7.45 (2.82)[b]	6.26 (2.60)[b]	3266.67[f]
Probability/Significance	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Figures in parentheses are #Arcsine/ *square root transformed; Means followed by common letters in the same column are not significantly different at 5% level; DAS- days after spraying; SB- stem borer; LF – leaffolder; **Yield extrapolated

Table 2.4.1.2. Effect of entomopathogens on lepidopteran pests and natural enemies at Coimbatore, EELP, ***kharif*** 2025

TREATMENT	Percentage Damage#						Natural Enemies (No./10 hills)*		Yield ** (kg/ha)
	SB (%DH)		LF (% LFDL)		Minor pests		Spiders	Mirids	
	7 DAS	15 DAS	7 DAS	15 DAS	7 DAS	15 DAS			
T1. *Metarhizium anisopliae* NRRI TF 9 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	5.50 (13.44)^{d}	6.67 (14.80)^{b}	5.52 (13.46)	8.48 (16.70)^{b}	1.37 (6.71)	0.27 (2.95)^{c}	1.49 (1.41)	8.20 (2.95) ^{a}	3300.00^{f}
T2. *Metarhizium anisopliae* NBAIR-Ma35 (1 x 10^8 cfu/ml) @ 10ml/L	2.81 (9.61)^{c}	5.50 (13.44)^{b}	4.09 (11.59)	6.37 (14.47)^{b}	0.53 (4.17)	0.21 (2.60)^{c}	1.20 (1.30)	6.26 (2.60) ^{a}	4013.33^{d}
T3. *Metarhizium anisopliae* TNAU 1 x 10^8 cfu/ml) @ 10ml/L	2.43 (8.93)^{c}	4.58 (12.26)^{b}	3.65 (10.94)	4.75 (12.49)^{b}	1.06 (5.91)	0.17 (2.38)^{b}	0.91 (1.19)	5.16 (2.38) ^{b}	4206.67^{d}
T4. *Beauveria bassiana* NRRI TF 6 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	1.63 (7.31)^{c}	3.81 (11.18)^{b}	3.87 (11.27)	4.02 (11.48)^{b}	0.95 (5.58)	0.12 (1.99)^{b}	0.69 (1.09)	3.46 (1.99) ^{b}	4610.00^{c}
T5. *Beauveria bassiana* NBAIR-Bb5a (1 x 10^8cfu/ml) 10ml/L	4.32 (11.92)^{d}	5.42 (13.34)^{b}	5.17 (13.03)	6.47 (14.58)^{b}	0.66 (4.67)	0.16 (2.29)^{b}	1.14 (1.28)	4.74 (2.29) ^{b}	3823.33^{e}
T6. *Bacillus thuringiensis* NRRI TB 261 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	4.22 (11.77)^{d}	5.56 (13.51)^{b}	5.39 (13.30)	6.04 (14.08)^{b}	0.54 (4.22)	0.15 (2.20)^{b}	0.91 (1.19)	4.34 (2.20) ^{b}	3360.00^{f}
T7. *Bacillus albus* NBAIR-BATP (1 x 10^8cfu/ml) @ 10ml/L	1.14 (6.12)^{b}	2.57 (9.19)^{b}	2.59 (9.21)	2.91 (9.78)^{b}	0.54 (4.23)	0.13 (2.03)^{b}	0.94 (1.20)	3.62 (2.03) ^{b}	5073.33^{b}
T8. Cartap hydrochloride 4G granules	0.47 (3.92)^{a}	1.08 (5.94)^{a}	1.76 (7.60)	1.73 (7.53)^{a}	0.58 (4.36)	0.06 (1.43)^{a}	0.45 (0.98)	1.54 (1.43) ^{c}	5763.33^{a}
T9. Control (Untreated)	8.89 (17.10)^{d}	10.92 (18.95)^{c}	7.97 (16.18)	9.93 (18.07)^{b}	1.49 (7.00)	0.30 (3.13)^{c}	1.24 (1.32)	9.30 (3.13) ^{a}	2836.67^{g}
Probability/Significance	<0.01	<0.01	NS	0.01	0.05	<0.01	NS	<0.01	<0.01

Figures in parentheses are #Arcsine/ *square root transformed; Means followed by common letters in the same column are not significantly different at 5% level; DAS- days after spraying; SB- stem borer; LF – leaffolder; **Yield extrapolated

Table 2.4.1. 3. Effect of entomopathogens on lepidopteran pests and natural enemies at Chinsurah, EELP, ***kharif*** 2025

TREATMENT	Per cent Damage#				Yield **(kg/ha)
	SB (%DH)		LF (% LFDL)		
	7 DAS	15 DAS	7 DAS	15 DAS	
T1. *Metarhizium anisopliae* NRRI TF 9 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	5.97 (14.01)	8.17 (16.39)^a	3.46 (10.66)	1.63 (7.31)	4858.33
T2. *Metarhizium anisopliae* NBAIR-Ma35 (1 x 10^8 cfu/ml) @ 10ml/L	5.77 (13.77)	6.05 (14.10)^a	2.26 (8.62)	1.30 (6.54)	5102.78
T3. *Metarhizium anisopliae* TNAU 1 x 10^8 cfu/ml) @ 10ml/L	6.57 (14.69)	6.15 (14.21)^a	2.75 (9.50)	1.50 (7.02)	4888.89
T4. *Beauveria bassiana* NRRI TF 6 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	4.87 (12.64)	5.62 (13.59)^a	1.21 (6.29)	0.81 (5.17)	5173.61
T5. *Beauveria bassiana* NBAIR-Bb5a (1 x 10^8cfu/ml) 10ml/L	6.71 (14.85)	7.89 (16.11)^a	1.74 (7.56)	0.96 (5.61)	4915.28
T6. *Bacillus thuringiensis* NRRI TB 261 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	6.14 (14.20)	7.22 (15.40)^a	1.67 (7.41)	0.92 (5.51)	4919.44
T7. *Bacillus albus* NBAIR-BATP (1 x 10^8cfu/ml) @ 10ml/L	7.09 (15.27)	5.83 (13.84)^a	2.64 (9.31)	1.13 (6.09)	5076.39
T8. Cartap hydrochloride 4G granules	5.84 (13.85)	6.92 (15.08)^a	2.67 (9.36)	1.03 (5.81)	5056.94
T9. Control (Untreated)	11.28 (19.26)	11.86 (19.75)^b	4.83 (12.59)	2.46 (8.99)	4845.83
Probability/Significance	NS	<0.01	NS	NS	NS

Figures in parentheses are #Arcsine/ *square root transformed; Means followed by common letters in the same column are not significantly different at 5% level;
DAS- days after spraying; SB- stem borer; LF – leaffolder; **Yield extrapolated

Table 2.4.1.4. Effect of entomopathogens on lepidopteran pests and natural enemies at Chiplima, EELP, ***kharif*** 2025

TREATMENT	Per cent Damage#				Natural Enemies (No./10 hills)*		Yield **(kg/ha)
	SB (%DH)		LF (% LFDL)		Spiders	Coccinellids	
	7 DAS	15 DAS	7 DAS	15 DAS			
T1. *Metarhizium anisopliae* NRRI TF 9 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	3.01 (9.94)^c	2.81 (9.61)^b	0.81 (5.15)^b	0.82 (5.19)^c	12.05 (3.54) ^{b}	1.96 (1.57) ^{a}	4330.00^b
T2. *Metarhizium anisopliae* NBAIR-Ma35 (1 x 10^8 cfu/ml) @ 10ml/L	4.33 (11.92)^c	4.76 (12.51)^d	1.57 (7.18)^b	1.51 (7.03)^c	13.88 (3.79) ^{b}	1.61 (1.45)^b	4050.00^c
T3. *Metarhizium anisopliae* TNAU 1 x 10^8 cfu/ml) @ 10ml/L	4.53 (12.20)^c	5.31 (13.21)^d	2.11 (8.32)^b	2.21 (8.51)^c	14.53 (3.88) ^{b}	2.48 (1.73) ^{a}	3760.00^d
T4. *Beauveria bassiana* NRRI TF 6 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	2.84 (9.66)^b	2.55 (9.14)^b	0.79 (5.10)^b	0.68 (4.71)^b	11.38 (3.45) ^{b}	1.77 (1.51) ^{b}	4433.33^a
T5. *Beauveria bassiana* NBAIR-Bb5a (1 x 10^8cfu/ml) 10ml/L	4.93 (12.73)^c	4.86 (12.64)^d	2.05 (8.21)^b	2.04 (8.19)^c	15.01 (3.94) ^{b}	2.21 (1.65) ^{a}	3676.67^d
T6. *Bacillus thuringiensis* NRRI TB 261 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	4.12 (11.63)^c	3.64 (10.93)^c	1.79 (7.66)^b	1.77 (7.62)^c	14.08 (3.82) ^{b}	2.05 (1.60) ^{a}	4030.00^c
T7. *Bacillus albus* NBAIR-BATP (1 x 10^8cfu/ml) @ 10ml/L	3.57 (10.83)^c	3.35 (10.48)^c	1.53 (7.08)^b	1.46 (6.93)^c	13.03 (3.68) ^{b}	2.48 (1.73) ^{a}	4176.67^b
T8. Cartap hydrochloride 4G granules	2.13 (8.37)^a	1.98 (8.07)^a	0.37 (3.51)^a	0.43 (3.75)^a	12.21 (3.57)^b	1.30 (1.34) ^{b}	4603.33^a
T9. Control (Untreated)	7.49 (15.68)^c	9.26 (17.45)^e	4.38 (11.99)^c	4.87 (12.65)^d	19.84 (4.51)^a	4.07 (2.14) ^{a}	2766.67^e
Probability/Significance	<0.01	0.01	0.01	0.01	0.01	0.01	<0.01

Figures in parentheses are #Arcsine/ *square root transformed; Means followed by common letters in the same column are not significantly different at 5% level; DAS- days after spraying; SB- stem borer; LF – leaffolder; **Yield extrapolated

Table 2.4.1.5. Effect of entomopathogens on lepidopteran pests and natural enemies at Gangavathi, EELP, ***kharif*** 2025

TREATMENT	Per cent Damage#						Natural Enemies (No./ 10 hills) *			Yield **(kg/ha)
	SB (%DH)		LF (% LFDL)		Minor pests		Mirids	Spiders	Coccin ellids	
	7 DAS	15 DAS	7 DAS	15 DAS	7 DAS	15 DAS				
T1. *Metarhizium anisopliae* NRRI TF 9 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	7.04	7.24	6.73 (14.87) ^{b}	8.33 (16.55) ^{b}	4.36	4.64	55.15	21.97	12.75 (3.64) ^{b}	6100.00^d
T2. *Metarhizium anisopliae* NBAIR-Ma35 (1 x 10^8 cfu/ml) @ 10ml/L	10.87	10.67	12.64 (20.40) ^{c}	13.28 (20.91) ^{b}	5.66	6.03	55.45	21.87	11.96 (3.53) ^{b}	7400.00^b
T3. *Metarhizium anisopliae* TNAU 1 x 10^8 cfu/ml) @ 10ml/L	5.97	6.16	5.23 (13.11) ^{b}	6.44 (14.55) ^{a}	3.51	3.57	55.75	19.84	11.82 (3.51) ^{b}	5166.67^f
T4. *Beauveria bassiana* NRRI TF 6 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	7.29	7.43	6.96 (15.12) ^{b}	8.92 (17.12) ^{b}	4.70	4.73	58.18	22.35	12.32 (3.58) ^{b}	5633.33^e
T5. *Beauveria bassiana* NBAIR-Bb5a (1 x 10^8cfu/ml) 10ml/L	11.35	10.75	12.90 (20.61) ^{c}	13.25 (20.89) ^{b}	5.53	6.23	51.48	22.25	13.04 (3.68) ^{b}	4933.33^f
T6. *Bacillus thuringiensis* NRRI TB 261 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	6.13	6.48	5.49 (13.43) ^{b}	6.62 (14.75) ^{a}	3.85	3.87	55.15	20.84	12.32 (3.58) ^{b}	6933.33^c
T8. Cartap hydrochloride 4G granules	4.64	5.21	3.99 (11.45) ^{a}	4.61 (12.31) ^{a}	2.40	2.71	25.31	11.89	7.28 (2.79)^a	7933.33^a
T9. Control (Untreated)	12.98	12.87	18.37 (24.63) ^{c}	18.15 (24.48) ^{b}	7.23	7.00	54.26	21.12	12.97 (3.67) ^{b}	3766.67^g
Probability/Significance	NS	NS	<0.01	<0.01	NS	NS	NS	NS	<0.01	<0.01

Figures in parentheses are #Arcsine/ *square root transformed; Means followed by common letters in the same column are not significantly different at 5% level; DAS- days after spraying; SB- stem borer; LF – leaffolder; **Yield extrapolated

Table 2.4.1.6. Effect of entomopathogens on lepidopteran pests and natural enemies at Karjat, EELP, kharif 2025

TREATMENT	Per cent Damage#				Yield **(kg/ha)
	SB (%DH)		LF (% LFDL)		
	7 DAS	15 DAS	7 DAS	15 DAS	
T1. *Metarhizium anisopliae* NRRI TF 9 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	2.24 (8.57)[b]	2.44 (8.95)[b]	4.27 (11.84)[b]	4.33 (11.93)[b]	4333.33[a]
T2. *Metarhizium anisopliae* NBAIR-Ma35 (1 x 10^8 cfu/ml) @ 10ml/L	2.87 (9.71)[b]	3.10 (10.09)[b]	5.07 (12.91)[b]	5.31 (13.20)[b]	4200.00[a]
T3. *Metarhizium anisopliae* TNAU 1 x 10^8 cfu/ml) @ 10ml/L	2.54 (9.14)[b]	2.88 (9.73)[b]	4.46 (12.10)[b]	4.60 (12.30)[b]	4266.67[a]
T4. *Beauveria bassiana* NRRI TF 6 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	1.83 (7.75)[b]	2.09 (8.29)[b]	3.62 (10.90)[b]	3.87 (11.28)[b]	4433.33[a]
T5. *Beauveria bassiana* NBAIR-Bb5a (1 x 10^8cfu/ml) 10ml/L	2.99 (9.90)[b]	3.30 (10.40)[b]	5.33 (13.23)[b]	5.54 (13.49)[b]	4133.33[b]
T6. *Bacillus thuringiensis* NRRI TB 261 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	2.82 (9.61)[b]	2.98 (9.89)[b]	4.87 (12.64)[b]	4.74 (12.48)[b]	4233.33[a]
T7. *Bacillus albus* NBAIR-BATP (1 x 10^8cfu/ml) @ 10ml/L	3.27 (10.36)[b]	3.52 (10.75)[b]	5.63 (13.60)[b]	5.98 (14.02)[b]	4100.00[b]
T8. Cartap hydrochloride 4G granules	0.28 (3.06)[a]	0.33 (3.31)[a]	0.96 (5.60)[a]	1.12 (6.06)[a]	4700.00[a]
T9. Control (Untreated)	5.78 (13.77)[c]	5.95 (13.98)[c]	11.04 (19.06)[c]	11.24 (19.23)[c]	3700.00[c]
Probability/Significance	<0.01	<0.01	<0.01	<0.01	<0.01

Figures in parentheses are #Arcsine/ *square root transformed; Means followed by common letters in the same column are not significantly different at 5% level; DAS- days after spraying; SB-Stem borer; LF – leaffolder; **Yield extrapolated

Table 2.4.1.7. Effect of entomopathogens on lepidopteran pests and natural enemies at Karaikal, EELP, kharif 2025

TREATMENT	Per cent Damage#				Yield **(kg/ha)
	SB (%DH)		LF (% LFDL)		
	7 DAS	15 DAS	7 DAS	15 DAS	
T1. *Metarhizium anisopliae* NRRI TF 9 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	0.61 (4.46)	0.95 (5.58)	0.33 (3.31)	1.31 (6.57)	6937.5
T2. *Metarhizium anisopliae* NBAIR-Ma35 (1 x 10^8 cfu/ml) @ 10ml/L	0.89 (5.39)	0.63 (4.55)	0.52 (4.13)	1.25 (6.42)	6052.08
T3. *Metarhizium anisopliae* TNAU 1 x 10^8 cfu/ml) @ 10ml/L	0.44 (3.80)	0.89 (5.42)	0.93 (5.53)	0.84 (5.26)	7033.33
T4. *Beauveria bassiana* NRRI TF 6 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	1.42 (6.84)	1.41 (6.81)	0.38 (3.55)	1.59 (7.23)	5666.67
T5. *Beauveria bassiana* NBAIR-Bb5a (1 x 10^8cfu/ml) 10ml/L	0.57 (4.31)	1.32 (6.59)	0.51 (4.07)	1.29 (6.52)	5291.67
T6. *Bacillus thuringiensis* NRRI TB 261 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	0.52 (4.13)	1.84 (7.77)	0.61 (4.46)	1.23 (6.36)	6145.83
T7. *Bacillus albus* NBAIR-BATP (1 x 10^8cfu/ml) @ 10ml/L	0.69 (4.76)	1.27 (6.46)	0.91 (5.47)	1.06 (5.90)	5350.00
T8. Cartap hydrochloride 4G granules	0.56 (4.30)	2.04 (8.18)	0.78 (5.06)	0.95 (5.58)	6010.42
T9. Control (Untreated)	2.89 (9.75)	0.61 (4.47)	2.76 (9.52)	3.49 (10.71)	5360.42
Probability/Significance	NS	NS	NS	NS	NS

Table 2.4.1.8. Effect of entomopathogens on lepidopteran pests and natural enemies at Kaul, EELP, ***kharif*** 2025

TREATMENT	Per cent Damage#				Yield **(kg/ha)
	SB (%DH)		LF (% LFDL)		
	7 DAS	15 DAS	7 DAS	15 DAS	
T1. *Metarhizium anisopliae* NRRI TF 9 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	2.95 (9.84)^b	6.29 (14.38)^b	7.17 (15.35)^b	2.74 (9.49)^b	5800^a
T2. *Metarhizium anisopliae* NBAIR-Ma35 (1 x 10^8 cfu/ml) @ 10ml/L	3.47 (10.68)^b	8.31 (16.52)^b	7.79 (16.00)^b	3.25 (10.34)^b	5300^c
T3. *Metarhizium anisopliae* TNAU 1 x 10^8 cfu/ml) @ 10ml/L	6.06 (14.11)^c	11.27 (19.26)^b	8.53 (16.75)^b	4.08 (11.58)^b	5333^c
T4. *Beauveria bassiana* NRRI TF 6 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	5.68 (13.65)^c	10.62 (18.69)^b	8.49 (16.71)^b	3.07 (10.04)^b	5300^c
T5. *Beauveria bassiana* NBAIR-Bb5a (1 x 10^8cfu/ml) 10ml/L	4.01 (11.47)^c	8.69 (16.90)^b	7.67 (15.88)^b	3.81 (11.19)^b	5500^b
T6. *Bacillus thuringiensis* NRRI TB 261 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	5.16 (13.02)^c	8.90 (17.11)^b	8.39 (16.61)^b	4.29 (11.87)^b	5367^c
T7. *Bacillus albus* NBAIR-BATP (1 x 10^8cfu/ml) @ 10ml/L	3.47 (10.67)^b	5.72 (13.71)^b	7.11 (15.28)^b	2.84 (9.66)^b	5800^a
T8. Cartap hydrochloride 4G granules	0.36 (3.44)^a	2.01 (8.13)^a	0.15 (2.22)^a	0.14 (2.16)^a	5900^a
T9. Control (Untreated)	8.98 (17.18)^c	18.41 (24.65)^c	10.96 (18.99)^b	4.09 (11.60)^b	5200^c
Probability/Significance	<0.01	<0.01	<0.01	<0.01	<0.01

Figures in parentheses are #Arcsine/ *square root transformed; Means followed by common letters in the same column are not significantly different at 5% level; DAS- days after spraying; SB – stem borer; LF – leaffolder;

Table 2.4.1.9. Effect of entomopathogens on lepidopteran pests and natural enemies at Ludhiana, EELP, ***kharif*** 2025

TREATMENT	Per cent Damage#				Spiders (No./ 10 hills) *	Yield** (kg/ha)
	SB (DH %)		SB	LF (LFDL)		
	7 DAS	15 DAS	WE %	7 DAS		
T1. *Metarhizium anisopliae* NRRI TF 9 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	4.18 (11.72)^b	5.08 (12.92)^b	6.02 (14.07)^d	4.31 (11.90)^a	1.00	5460.71^b
T2. *Metarhizium anisopliae* NBAIR-Ma35 (1 x 10^8 cfu/ml) @ 10ml/L	4.45 (12.08)^b	5.37 (13.28)^b	6.35 (14.44)^d	4.57 (12.25)^a	1.00	5365.85^b
T3. *Metarhizium anisopliae* TNAU 1 x 10^8 cfu/ml) @ 10ml/L	4.46 (12.10)^b	5.38 (13.30)^b	6.18 (14.25)^d	4.34 (11.94)^a	0.93	5411.02^b
T4. *Beauveria bassiana* NRRI TF 6 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	4.43 (12.07)^b	5.23 (13.11)^b	5.92 (13.95)^c	4.28 (11.85)^a	0.98	5480.28^b
T5. *Beauveria bassiana* NBAIR-Bb5a (1 x 10^8cfu/ml) 10ml/L	4.26 (11.83)^b	5.30 (13.19)^b	6.16 (14.23)^d	4.32 (11.91)^a	1.00	5426.08^b
T6. *Bacillus thuringiensis* NRRI TB 261 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	4.10 (11.60)^b	4.63 (12.34)^b	5.42 (13.34)^b	4.22 (11.77)^a	1.02	5510.39^b
T7. *Bacillus albus* NBAIR-BATP (1 x 10^8cfu/ml) @ 10ml/L	3.43 (10.61)^a	4.96 (12.76)^b	5.33 (13.23)^b	4.20 (11.75)^a	1.04	5691.06^b
T8. Cartap hydrochloride 4G granules	3.20 (10.26)^a	3.76 (11.12)^a	4.15 (11.68)^a	3.08 (10.05)^a	1.18	6184.88^a
T9. Control (Untreated)	6.46 (14.57)^c	7.80 (16.01)^c	10.81 (18.85)^e	7.45 (15.65)^b	1.22	4953.33^c
Probability/Significance	<0.01	<0.01	<0.01	<0.01	NS	<0.01

Figures in parentheses are #Arcsine/ *square root transformed; Means followed by common letters in the same column are not significantly different at 5% level; DAS- days after spraying; SB- stem borer; LF – leaffolder; **Yield extrapolated

Table 2.4.1.10. Effect of entomopathogens on lepidopteran pests and natural enemies at Mandya, EELP, ***kharif*** 2025

TREATMENT	Per cent Damage#				Natural Enemies (No./ 10 hills) *			Yield ** (kg/ha)
	SB		LF		Mirids	Spiders	Cocci-nellids	
	7 DAS	15 DAS	7 DAS	DAS				
T1. *Metarhizium anisopliae* NRRI TF 9 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	12.87 (20.58)[c]	13.91 (21.40)[b]	10.21 (18.32)[b]	12.30 (20.12)[a]	9.53 (3.17)[b]	7.78 (2.88)[b]	8.11 (2.93)[c]	3833.33
T2. *Metarhizium anisopliae* NBAIR-Ma35 (1 x 10^8 cfu/ml) @ 10ml/L	9.44 (17.62)[c]	10.22 (18.34)[b]	11.13 (19.13)[b]	12.46 (20.25)[a]	10.88 (3.37)[c]	8.04 (2.92)[b]	7.23 (2.78)[b]	3977.78
T3. *Metarhizium anisopliae* TNAU 1 x 10^8 cfu/ml) @ 10ml/L	7.13 (15.31)[b]	7.56 (15.76)[b]	7.01 (15.17)[b]	7.92 (16.14)[a]	15.41 (3.99)[d]	12.07 (3.55)[c]	9.18 (3.11)[c]	2872.22
T4. *Beauveria bassiana* NRRI TF 6 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	10.68 (18.75)[c]	11.50 (19.45)[b]	10.91 (18.95)[b]	12.34 (20.15)[a]	11.04 (3.40)[c]	10.13 (3.26)[c]	8.15 (2.94)[c]	4411.11
T5. *Beauveria bassiana* NBAIR-Bb5a (1 x 10^8cfu/ml) 10ml/L	10.40 (18.49)[c]	10.67 (18.73)[b]	8.82 (17.03)[b]	10.46 (18.55)[a]	13.18 (3.70)[d]	11.07 (3.40)[c]	8.85 (3.06)[c]	3300.00
T6. *Bacillus thuringiensis* NRRI TB 261 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	10.30 (18.40)[c]	10.74 (18.80)[b]	9.49 (17.67)[b]	9.97 (18.11)[a]	14.25 (3.84)[d]	10.66 (3.34)[c]	10.17 (3.27)[c]	3266.67
T7. *Bacillus albus* NBAIR-BATP (1 x 10^8cfu/ml) @ 10ml/L	8.83 (17.04)[c]	8.67 (16.89)[b]	7.23 (15.41)[b]	9.25 (17.43)[a]	14.79 (3.91)[d]	10.96 (3.39)[c]	11.08 (3.40)[c]	4233.33
T8. Cartap hydrochloride 4G granules	5.56 (13.51)[a]	6.02 (14.06)[a]	5.54 (13.49)[a]	6.14 (14.20)[a]	6.92 (2.72)[a]	5.56 (2.46)[a]	2.54 (1.74)[a]	3733.33
T9. Control (Untreated)	21.71 (26.81)[d]	23.43 (27.87)[c]	18.16 (24.48)[c]	23.93 (28.16)[b]	18.85 (4.40)[d]	14.35 (3.85)[c]	11.55 (3.47)[c]	3600.00
Probability/ significance	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NS

Figures in parentheses are #Arcsine/ *square root transformed; Means followed by common letters in the same column are not significantly different at 5% level; DAS- days after spraying; SB- stem borer; LF – leaffolder; **Yield extrapolated

Table 2.4.1.11. Effect of entomopathogens on lepidopteran pests and natural pests at Moncompu, EELP, ***kharif*** 2025

TREATMENT	Per cent Damage#						Natural Enemies (No./ 10 hills) *		Yield** (kg/ha)
	SB (%DH)		LF (% LFDL)		Minor pests		Spiders	Cocci-nellids	
	7 DAS	15 DAS	7 DAS	DAS	7 DAS	15 DAS			
T1. *Metarhizium anisopliae* NRRI TF 9 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	10.37 (18.46)^a	4.24 (11.80)^a	5.11 (12.96)^a	1.95 (8.00)^b	2.27 (8.62)^a	0.78 (5.06)^c	3.65 (2.04)	5.61 (2.47)	5093.33^a
T2. *Metarhizium anisopliae* NBAIR-Ma35 (1 x 10^8 cfu/ml) @ 10ml/L	11.45 (19.41)^a	6.71 (14.85)^a	6.64 (14.77)^a	3.10 (10.09)^b	2.94 (9.83)^a	1.56 (7.15)^c	4.01 (2.12)	6.00 (2.55)	4993.33^a
T3. *Metarhizium anisopliae* TNAU 1 x 10^8 cfu/ml) @ 10ml/L	10.59 (18.66)^a	7.16 (15.34)^a	5.65 (13.63)^a	2.58 (9.20)^b	2.24 (8.57)^a	1.40 (6.79)^c	4.98 (2.34)	5.37 (2.42)	5303.33^a
T4. *Beauveria bassiana* NRRI TF 6 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	8.62 (16.83)^a	4.35 (11.95)^a	5.71 (13.70)^a	1.57 (7.18)^b	1.90 (7.90)^a	0.46 (3.89)^b	3.14 (1.91)	4.00 (2.12)	5323.33^a
T5. *Beauveria bassiana* NBAIR-Bb5a (1 x 10^8cfu/ml) 10ml/L	12.59 (20.35)^a	5.58 (13.54)^a	6.32 (14.41)^a	3.60 (10.88)^b	2.59 (9.22)^a	1.64 (7.35)^c	4.11 (2.15)	6.51 (2.65)	4856.67^a
T6. *Bacillus thuringiensis* NRRI TB 261 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	11.27 (19.26)^a	4.80 (12.55)^a	6.16 (14.22)^a	2.17 (8.43)^b	1.88 (7.86)^a	0.56 (4.28)^c	4.86 (2.32)	4.93 (2.33)	5123.33^a
T7. *Bacillus albus* NBAIR-BATP (1 x 10^8cfu/ml) @ 10ml/L	14.44 (21.81)^a	6.54 (14.66)^a	7.15 (15.33)^a	3.99 (11.45)^b	2.98 (9.89)^a	1.33 (6.60)^c	3.02 (1.88)	5.73 (2.50)	4773.33^a
T8. Cartap hydrochloride 4G granules	10.13 (18.25)^a	3.04 (9.99)^a	4.17 (11.70)^a	1.26 (6.42)^a	1.27 (6.46)^a	0.20 (2.55)^a	2.57 (1.75)	4.82 (2.31)	4630.00^a
T9. Control (Untreated)	32.17 (32.79)^b	28.94 (31.04)^b	14.03 (21.50)^b	12.50 (20.28)^c	6.78 (14.93)^b	5.93 (13.96)^d	4.79 (2.30)	5.31 (2.41)	4260.00^b
Probability/ significance	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NS	NS	<0.01

Figures in parentheses are #Arcsine/ *square root transformed; Means followed by common letters in the same column are not significantly different at 5% level; DAS- days after spraying; SB- stem borer; LF – leaffolder; **Yield extrapolated

Table 2.4.1.12. Effect of entomopathogens on lepidopteran pests and natural enemies at Navsari, EELP, ***kharif*** 2025

TREATMENT	Per cent Damage#				Yield **(kg/ha)
	SB (%DH)		LF (% LFDL)		
	7 DAS	15 DAS	7 DAS	15 DAS	
T1. *Metarhizium anisopliae* NRRI TF 9 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	5.59 (13.55)	5.84 (13.85)^b	4.38 (11.99)^b	4.10 (11.60)^c	3000.00^b
T2. *Metarhizium anisopliae* NBAIR-Ma35 (1 x 10^8 cfu/ml) @ 10ml/L	5.73 (13.72)	5.15 (13.01)^b	3.95 (11.40)^b	3.57 (10.82)^b	3033.33^b
T3. *Metarhizium anisopliae* TNAU 1 x 10^8 cfu/ml) @ 10ml/L	6.24 (14.31)	5.40 (13.32)^b	4.16 (11.68)^b	4.23 (11.78)^c	2933.33^b
T4. *Beauveria bassiana* NRRI TF 6 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	4.76 (12.50)	4.03 (11.50)^b	5.41 (13.33)^b	3.04 (9.99)^b	3266.67^b
T5. *Beauveria bassiana* NBAIR-Bb5a (1 x 10^8cfu/ml) 10ml/L	6.22 (14.30)	4.19 (11.73)^b	4.24 (11.80)^b	3.55 (10.79)^b	3033.33^b
T6. *Bacillus thuringiensis* NRRI TB 261 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	5.41 (13.33)	5.93 (13.96)^b	4.01 (11.47)^b	4.52 (12.19)^c	3200.00^b
T7. *Bacillus albus* NBAIR-BATP (1 x 10^8cfu/ml) @ 10ml/L	5.75 (13.74)	4.25 (11.81)^b	4.72 (12.45)^b	1.57 (9.69)^b	3000.00^b
T8. Cartap hydrochloride 4G granules	4.94 (12.74)	1.00 (5.73)^a	2.62 (9.27)^a	1.57 (7.17)^a	3600.00^a
T9. Control (Untreated)	7.78 (15.99)	6.97 (15.13)^b	6.02 (14.06)^b	6.62 (14.74)^c	2800.00^c
Probability/ significance	NS	<0.01	NS	<0.01	<0.01

Figures in parentheses are #Arcsine/ *square root transformed; Means followed by common letters in the same column are not significantly different at 5% level;
DAS- days after spraying; SB- stem borer; LF – leaffolder; **Yield extrapolated

Table 2.4.1.13. Effect of entomopathogens on lepidopteran pests and natural enemies at Raipur, EELP, ***kharif*** 2025

TREATMENT	Per cent Damage#						Natural Enemies (No./ 10 hills) *			Yield **(kg/ha)
	SB (%DH)		LF (% LFDL)		Minor pests		Mirids	Spiders	Coccinellids	
	7 DAS	15 DAS	7 DAS	15 DAS	7 DAS	15 DAS				
T1. *Metarhizium anisopliae* NRRI TF 9 (1 x 108cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	9.10 (17.29)	15.42 (22.54)[a]	1.72 (7.51)	0.52 (4.14)	2.11 (8.32)	1.61 (7.27)	1.40 (1.38)	2.86 (1.83)	2.91 (1.85)	5000.00[a]
T2. *Metarhizium anisopliae* NBAIR-Ma35 (1 x 10^8 cfu/ml) @ 10ml/L	10.76 (18.81)	15.87 (22.87)[a]	1.46 (6.93)	0.47 (3.81)	2.01 (8.13)	1.60 (7.25)	1.32 (1.35)	2.78 (1.81)	2.26 (1.66)	4947.50[a]
T3. *Metarhizium anisopliae* TNAU	10.19 (18.30)	15.19 (22.38)[a]	1.60 (7.24)	0.47 (3.91)	1.88 (7.87)	1.45 (6.90)	1.95 (1.57)	2.44 (1.72)	2.86 (1.83)	4909.75[a]
T5. *Beauveria bassiana* NBAIR-Bb5a (1 x 108cfu/ml) 10ml/L	10.86 (18.90)	15.11 (22.32)[a]	1.66 (7.39)	0.47 (3.93)	2.14 (8.38)	1.37 (6.75)	1.57 (1.44)	1.97 (1.57)	2.41 (1.71)	4989.75[a]
T6. *Bacillus thuringiensis* NRRI TB 261 (1 x 108cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	9.86 (18.00)	16.15 (23.08)[a]	1.41 (6.80)	0.43 (3.78)	1.68 (7.43)	1.53 (7.08)	1.54 (1.43)	2.95 (1.86)	2.45 (1.72)	4962.50[a]
T7. *Bacillus albus* NBAIR-BATP (1 x 108cfu/ml) @ 10ml/L	10.32 (18.43)	15.17 (22.36)[a]	1.17 (6.19)	0.45 (3.84)	1.86 (7.81)	1.41 (6.80)	1.36 (1.36)	3.18 (1.92)	2.13 (1.62)	4938.75[a]
T8. Cartap hydrochloride 4G granules	11.29 (19.27)	15.36 (22.50)[a]	1.70 (7.47)	0.40 (3.61)	1.53 (7.09)	1.44 (6.88)	1.66 (1.47)	3.29 (1.95)	2.87 (1.84)	5050.00[a]
T9. Control (Untreated)	15.25 (22.42)	23.03 (27.62)[b]	2.81 (9.61)	0.57 (4.32)	1.84 (7.78)	1.96 (8.02)	1.83 (1.53)	3.69 (2.05)	2.88 (1.84)	5065.00[a]
Probability	NS	<0.01	NS	NS	NS	NS	NS	NS	NS	0.01

Figures in parentheses are #Arcsine/ *square root transformed; Means followed by common letters in the same column are not significantly different at 5% level; DAS- days after spraying; SB- stem borer; LF – leaffolder; **Yield extrapolated

Table 2.4.1.14. Effect of entomopathogens on lepidopteran pests and natural enemies at Ranchi, EELP, ***kharif*** 2025

TREATMENT	Per cent Damage#				Natural Enemies (No./ 10 hills) *			Yield ** (kg/ha)
	SB (%DH)		LF (%LFDL)		Mirids	Spiders	Coccinellids	
	7 DAS	15 DAS	7 DAS	15 DAS				
T1. *Metarhizium anisopliae* NRRI TF 9 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	7.23	6.09	4.29	9.86	9.80 (3.21)	22.64	13.49	4533.33
T2. *Metarhizium anisopliae* NBAIR-Ma35 (1 x 10^8 cfu/ml) @ 10ml/L	6.26	5.29	3.85	8.92	11.20 (3.42)	20.75	12.97	4366.67
T3. *Metarhizium anisopliae* TNAU 1 x 10^8 cfu/ml) @ 10ml/L	6.38	5.32	4.06	9.78	11.75 (3.50)	21.03	12.90	4443.33
T4. *Beauveria bassiana* NRRI TF 6 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	6.29	5.17	4.13	9.29	10.79 (3.36)^b	20.29	12.10	3883.33
T5. *Beauveria bassiana* NBAIR-Bb5a (1 x 10^8cfu/ml) 10ml/L	5.66	4.54	4.25	9.76	10.46 (3.31)^c	20.02	13.12	4533.33
T6. *Bacillus thuringiensis* NRRI TB 261 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	5.61	4.72	4.01	9.42	8.92 (3.07)^c	19.48	12.10	5366.67
T7. *Bacillus albus* NBAIR-BATP (1 x 10^8cfu/ml) @ 10ml/L	4.50	3.57	1.72	5.88	13.71 (3.77)^b	21.87	14.71	5366.67
T8. Cartap hydrochloride 4G granules	7.35	7.00	5.71	11.64	8.14 (2.94)^a	17.90	11.68	7533.33
T9. Control (Untreated)	5.20	8.02	2.98	10.28	14.63 (3.89)^c	16.23	10.99	1736.67
Probability/ significance	NS	NS	NS	NS	<0.01	NS	NS	<0.01

Figures in parentheses are #Arcsine/ *square root transformed; Means followed by common letters in the same column are not significantly different at 5% level; DAS- days after spraying; SB- stem borer; LF – leaffolder; **Yield extrapolated

Table 2.4.1.15. Effect of entomopathogens on lepidopteran pests and natural enemies at Titabar, EELP, ***kharif*** 2025

TREATMENT	Per cent Damage#				Natural Enemies (No./ 10 hills) *			Yield ** (kg/ha)
	SB (%DH)		LF (% LFDL)		Mirids	Spiders	Cocci-nellids	
	7 DAS	15 DAS	7 DAS	DAS				
T1. *Metarhizium anisopliae* NRRI TF 9 (1 x 10[8]cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	4.70 (12.42)[b]	0.98 (5.67)[a]	7.23 (15.41)[b]	0.86 (5.31)[b]	0.91 (1.19)	0.82 (1.15)	0.91 (1.19)	4000.00[a]
T2. *Metarhizium anisopliae* NBAIR-Ma35 (1 x 10[8] cfu/ml) @ 10ml/L	9.04 (17.24)[b]	1.16 (6.16)[a]	5.68 (13.66)[b]	2.94 (9.82)[b]	1.30 (1.34)	1.40 (1.38)	1.15 (1.28)	4200.00[a]
T3. *Metarhizium anisopliae* TNAU 1 x 10[8] cfu/ml) @ 10ml/L	5.16 (13.02)[b]	1.42 (6.83)[a]	4.20 (11.74)[b]	0.45 (3.86)[b]	1.05 (1.24)	1.30 (1.34)	1.25 (1.32)	4266.67[a]
T4. *Beauveria bassiana* NRRI TF 6 (1 x 10[8]cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	5.19 (13.06)[b]	1.11 (6.05)[a]	3.59 (10.85)[b]	0.82 (5.17)[b]	0.91 (1.19)	1.40 (1.38)	1.34 (1.36)	4233.33[a]
T5. *Beauveria bassiana* NBAIR-Bb5a (1 x 10[8]cfu/ml) 10ml/L	6.57 (14.69)[b]	1.65 (7.35)[a]	4.52 (12.19)[b]	0.51 (4.10)[b]	1.15 (1.28)	1.05 (1.24)	0.95 (1.20)	4133.33[a]
T6. *Bacillus thuringiensis* NRRI TB 261 (1 x 10[8]cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	6.87 (15.03)[b]	0.86 (5.30)[a]	5.27 (13.16)[b]	1.69 (7.45)[b]	1.34 (1.36)	1.25 (1.32)	1.30 (1.34)	4166.67[a]
T7. *Bacillus albus* NBAIR-BATP (1 x 10[8]cfu/ml) @ 10ml/L	4.33 (11.93)[b]	0.60 (4.46)[a]	7.68 (15.88)[b]	0.00 (4.10)[b]	1.73 (1.49)	0.91 (1.19)	0.99 (1.22)	4066.67[a]
T8. Cartap hydrochloride 4G granules	0.30 (3.12)[a]	0.00 (0.00)[a]	0.00 (0.00)[a]	0.00 (0.00)[a]	1.25 (1.32)	1.30 (1.34)	1.01 (1.23)	4366.67[a]
T9. Control (Untreated)	23.19 (27.72)[c]	26.36 (29.59)[b]	21.73 (26.82)[c]	24.79 (28.68)[c]	1.23 (1.32)	1.52 (1.42)	1.52 (1.42)	3033.33[b]
Probability/ significance	<0.01	<0.01	<0.01	<0.01	NS	NS	NS	<0.01

Figures in parentheses are #Arcsine/ *square root transformed; Means followed by common letters in the same column are not significantly different at 5% level; DAS- days after spraying; SB- stem borer; LF – leaffolder; **Yield extrapolated

Table 2.5.1.16. Effect of entomopathogens on lepidopteran pests and their natural enemies across 15 locations, EELP, kharif 2025

TREATMENT	Per cent Damage#			Natural Enemies (No./ 10 hills) *			Yield
	SB (%DH)		LF (% LFDL)	Mirids	Spiders	Coccinellids	
	7 DAS	15 DAS	15 DAS				
T1. *Metarhizium anisopliae* NRRI TF 9 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	5.87 (13.88) b	5.87 (13.89) b	4.66 (12.37) b	7.71 (2.87)	6.71 (2.69)	5.39 (2.43)	4330 b
T2. *Metarhizium anisopliae* NBAIR-Ma35 (1 x 10^8 cfu/ml) @ 10ml/L	6.25 (14.33) b	6.18 (14.25) b	5.03 (12.85) b	8.20 (2.95)	6.90 (2.72)	5.45 (2.44)	4050 b
T3. *Metarhizium anisopliae* TNAU 1 x 10^8 cfu/ml) @ 10ml/L	5.63 (13.60) b	5.67 (13.65) b	4.16 (11.69) b	9.47 (3.16)	7.61 (2.85)	6.26 (2.60)	3760 b
T4. *Beauveria bassiana* NRRI TF 6 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	3.14 (10.15) a	1.75 (7.58) a	6.78 (14.92) c	8.75 (3.04)	7.31 (2.80)	6.33 (2.61)	4433 b
T5. *Beauveria bassiana* NBAIR-Bb5a (1 x 10^8cfu/ml) 10ml/L	6.36 (14.45) b	6.23 (14.30) b	5.02 (12.84) b	7.80 (2.88)	7.11 (2.76)	6.08 (2.57)	3676 b
T6. *Bacillus thuringiensis* NRRI TB 261 (1 x 10^8cfu/ml) 2 g/ l of water or 1kg/ha in 500 l of water	5.83 (13.84) b	5.69 (13.67) b	4.51 (12.17) b	7.78 (2.88)	7.33 (2.80)	5.93 (2.54)	4030 b
T7. *Bacillus albus* NBAIR-BATP (1 x 10^8cfu/ml) @ 10ml/L	4.12 (11.63) a	3.61 (10.89) b	2.96 (9.86) a	3.96 (2.11)	4.90 (2.32)	4.54 (2.24)	4176 b
T8. Cartap hydrochloride 4G granules	3.42 (10.59) a	3.18 (10.22) b	2.25 (8.59) a	4.39 (2.21)	5.22 (2.39)	3.94 (2.11)	4603 a
T9. Control (Untreated)	11.58 (19.52) d	12.59 (20.36) d	9.25 (17.44) d	9.45 (3.16)	8.01 (2.92)	6.35 (2.62)	2766 c
Probability/ significance	<0.01	<0.01	<0.01	NS	NS	NS	<0.01

Figures in parentheses are #Arcsine/ *square root transformed; Means followed by common letters in the same column are not significantly different at 5% level; DAS- days after spraying; SB- stem borer; LF – leaffolder; **Yield extrapolated

2.4.2. Evaluation of Entomopathogen, *Beauveria bassiana* Against Sucking Pests Of Rice(EESP)

The trial was conducted with the objective of evaluating an entomopathogen *Beauveria bassiana* (VKA 01 isolate) (1x 10^8 spores per ml) @ 20 g / L against sucking pests of rice, at multi-locations. During kharif 2025, the trial was taken up at five centres *viz.*, Brahmavar, Karjat, Ludhiana, Moncompu and Navasari. At Ludhiana the effectiveness was tested against planthoppers while at other locations it was tested against the gundhi bug/ear head bug, *Leptocorisa* spp. Efficacy of *B. bassiana* (VKA 01 isolate (1x 10^8 spores per ml) @ 20 g / L was tested in comparison with Azadirachtin 0.005%, Malathion 50 EC 500 g a.i per ha and an untreated control. Two sprays were recommended. First spray during the first appearance of rice bug in the field and second spray 15 days after first spray. Observations on No. of bugs/25 hills were recorded at 7 and 15 days after spray (DAS). Simultaneously the natural enemy populations were recorded. The efficacy of the treatments results are discussed location wise.

1. Brahmavar

At Brahmavar, ear head bug population was low though being a hotspot. Significant differences were observed among the treatments **(Table 2.4.2.1)**. At seven days after first spray, the ear head bug population was significantly lower in *B. bassiana* (VKA 01 isolate) ((6.00/25 hills) and Malathion (8.20/25 hills) compared to Azadirachtin (8.62/5 hills) and control (18.16/25 hills). At fifteen days after first spray and after second spray also, *B. bassiana* (VKA 01 isolate) and Malathion recorded significantly lower pest population compared to Azadirachtin and control. The natural enemy population (spiders and coccinellids) was significantly higher in *B. bassiana* and Azadirachtin treatments, whereas Malathion treated plots recorded lower natural enemy population. The highest yield was recorded in Malathion treated plots (2290 kg/ha) followed by Azadirachtin (2190 kg/ha) and *B. bassiana* (VKA 01 isolate) (2170 kg/ha), and the lowest yield was recorded in control (2108 kg/ha).

2. *Karjat*

The number of ear head bugs/hill differed significantly among treatments after spraying **(Table 2.4.2.2)**. At five days after first spray, the ear head bug population was significantly lower in Malathion treated plots (13.12/25 hills) followed by Azadirachtin (21.13/25 hills) and *B. bassiana* (VKA 01 isolate) (44.39/25 hills) as compared to control (66.09/25 hills). At ten and fifteen days after first spray also, Malathion recorded the lowest pest population (9.17 and 8.99/25 hills respectively), while *B. bassiana* and Azadirachtin recorded moderate reduction in pest population compared to control. After second spray also, Malathion recorded the lowest ear head bug population (16.89, 5.45, 2.22 and 2.49/25 hills), at all observation intervals followed by *B. bassiana* and Azadirachtin treatments, whereas the untreated control recorded the highest pest population.

The highest yield was recorded in Malathion treated plots (4881 kg/ha), which was significantly superior to all other treatments. *Beauveria bassiana* (VKA 01 isolate) (4250 kg/ha) and Azadirachtin (4225 kg/ha) recorded significantly higher yields than control (3875 kg/ha) and were on par with each other. Overall, *B. bassiana* was effective in reducing ear head bug population and recorded higher yield compared to untreated control, though it was less effective than Malathion.

3. *Ludhiana*

The hopper population showed significant differences after spraying among treatments (Table 2.4.2.3). At seven and fifteen days after spraying, Malathion recorded significantly lower hopper population followed by *Beauveria bassiana* (VKA 01 isolate) and Azadirachtin, while control recorded the highest pest population. The population of natural enemies such as spiders, coccinellids and carabids was higher in *B. bassiana* (VKA 01 isolate) and Azadirachtin treatments compared to Malathion. The highest yield was recorded in Malathion treated plots (6109 kg/ha), however *B. bassiana* (VKA 01 isolate) (5448 kg/ha) and Azadirachtin (5795 kg/ha) were statistically on par with Malathion treatment. The lowest yield was recorded in control (5107 kg/ha) **(Table 2.4.2.3)**.

4. *Moncompu*

Significant differences were observed in the ear head bug population after spraying **(Table 2.4.2.4)**. At seven days after first spray, the ear head bug population was significantly lower in Malathion treated plots (5.26/25 hills) followed by *B. bassiana* (VKA 01 isolate) (13.12/25 hills) and Azadirachtin (17.82/25 hills), while the untreated control recorded the highest population (30.19/25 hills). At fifteen days after first spray also, Malathion recorded the lowest bug population (0.37/25 hills) followed by *B. bassiana* (VKA 01 isolate) (7.51/25 hills) and Azadirachtin (10.39/25 hills), whereas control recorded the highest population (32.68/25 hills). A similar trend was observed after second spray with Malathion recording the lowest ear head bug population.

The population of natural enemies such as spiders, coccinellids and carabids was higher in *B. bassiana* (VKA 01 isolate) (18.08, 11.89 and 15.66/plot, respectively) and Azadirachtin (10.59, 10.99 and 8.44/plot, respectively) treated plots compared to Malathion. Though highest yield was recorded in Malathion treated plots (5700 kg/ha), however *B. bassiana* (VKA 01 isolate) (5237.50 kg/ha) and Azadirachtin (5206.25 kg/ha) were statistically on par with Malathion and significantly superior to control (4906.25 kg/ha).

5. *Navsari*

At Navsari, ear head bug population differed significantly among treatments at 7 DAS after the first spray and 7 DAS after the second spray (Table 2.4.2.5). At 7 DAS after the first spray, Malathion recorded the lowest ear head bug population (23.90/25 hills), followed by azadirachtin (32.33/25 hills) and *B. bassiana* (35.86/25 hills), while the untreated control recorded the highest population (68.89/25 hills).

At 15 DAS after the first spray, the treatments were statistically non-significant, with populations ranging from 57.56 to 62.86 per 25 hills. After the second spray, Malathion again recorded the lowest population at 7 DAS (20.94/25 hills), followed by Azadirachtin (27.48/25 hills) and *B. bassiana* (30.53/25 hills), whereas the highest population was recorded in the untreated control (57.56/25 hills). Spider population was on par in all treatments. The highest yield was recorded in Malathion treated plots (5328.19 kg/ha) followed by Azadirachtin (5252.06 kg/ha) and B. bassiana (5210.91 kg/ha), while the lowest yield was recorded in the untreated control (4909.47 kg/ha) **(Table 2.4.2.5)**.

Across locations, ear head bug incidence differed significantly among treatments at all observation stages after both sprays. However, all the treatments were statistically on par with each other and significantly superior to the untreated control **(Table 2.4.2.6)**. Numerically, malathion recorded the lowest ear head bug population after both sprays, followed by *B. bassiana* and azadirachtin. The untreated control recorded the highest ear head bug population throughout the crop period. Grain yield differed significantly among treatments, and all treatments were on par and superior to the control, with malathion recording the highest yield (5305 kg/ha), followed by *B. bassiana* (4923 kg/ha) and azadirachtin (4921 kg/ha), while the lowest yield was recorded in the untreated control (4590 kg/ha).

Evaluation of entomopathogens, against sucking pests of rice (EESP) was taken up in five locations to test the effectiveness of the entomopathogen, Beauveria bassiana (VKA 01 isolate) in comparison with Malathion 50 EC 500 g *a.i* per ha, Azadirachtin 0.005% and an untreated control*. Across all locations, application of Malathion* 50 EC *recorded significantly lower numbers of gundhibug and planthopper population and higher grain yield compared to Beauveria bassiana ~~bio-agent~~ treatment. Beauveria bassiana was more effective in reducing pest population and recorded higher grain yield compared to Azadirachtin in most locations. Natural enemy population, which included spiders,* coccinellids and carabids *was higher in B. bassiana and Azadirachtin treatments compared to Malathion across locations. Untreated control recorded highest pest population and lowest yield.*

Table 2.4.2.1 Effect of entomopathogen on sucking pests and their natural enemies at Brahmavar, EESP, ***kharif*** 2025

Treatment	No. of Ear head bugs / 25 hills					Natural enemies No./ plot		Yield (kg/ha) *
		I SPRAY		II SPRAY		Spider	Coccinellid	
	PC	7DAS	15DAS	7DAS	15DAS			
Beauveria bassiana (VKA 01 isolate) (1x 10^8 spores per ml) @ 20 g / L	11.61 (3.48)	6.00 (2.55)b	5.60 (2.47)a	3.70 (2.05)a	2.39 (1.70)a	1.16 (1.29)a	1.35 (1.36)b	2170
Malathion 50 EC 500 g *a.i* per ha	12.60 (3.62)	8.20 (2.95)a	6.58 (2.66)a	4.79 (2.30)a	3.58 (2.02)b	0.54 (1.02)b	0.54 (1.02)b	2290
Azadirachtin 0.005%	12.82 (3.65)	8.62 (3.02)b	11.20 (3.42)b	9.80 (3.21)b	11.61 (3.48)c	1.35 (1.36)a	0.75 (1.12)b	2190
Control	12.60 (3.62)	18.16 (4.32)c	17.99 (4.30)c	17.14 (4.20)c	16.81 (4.16)d	1.57 (1.44)a	3.11 (1.90)a	2108
Probability / Significance	NS	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	NS

Figures in parentheses are square root transformed; Means followed by common letters in the same column are not significantly different at 5% level; PC- pre-count;
DAS- days after spraying; *Yield extrapolated

Table 2.4.2.2 Effect of entomopathogen on sucking pests and their natural enemies at Karjat, EESP, ***kharif*** 2025

Treatment	No. of Ear head bugs / 25 hills								Yield Kg/ha
		I SPRAY				II SPRAY			
	PC	5 DAS	10 DAS	15 DAS	20 DAS	7 DAS	15 DAS	20 DAS	
Beauveria bassiana (VKA 01 isolate) (1x 10^8 spores per ml) @ 20 g / L	64.46 (8.06)	44.39 (6.70)[c]	30.53 (5.57)[b]	15.91 (4.05)[b]	32.10 (5.71)[b]	4.97 (24.21)[b]	3.91 (14.79)[c]	4.58 (20.48)[b]	4250[b]
Malathion 50 EC 500 g *a.i* per ha	66.58 (8.19)	13.12 (3.69)[a]	9.17 (3.11)[a]	8.99 (3.08)[a]	16.89 (4.17)[a]	2.44 (5.45)[a]	1.65 (2.22)[a]	1.73 (2.49)[a]	4881[a]
Azadirachtin 0.005%	63.18 (7.98)	21.13 (4.65)[b]	27.70 (5.31)[b]	44.39 (6.70)[c]	50.91 (7.17)[c]	3.89 (14.63)[c]	4.91 (23.61)[b]	5.09 (25.41)[b]	4225[b]
Control	64.31 (8.05)	66.09 (8.16)[c]	68.72 (8.32)[c]	75.54 (8.72)[d]	78.89 (8.91)[d]	9.46 (88.99)[d]	10.55 (110.80)[d]	11.03 (121.16)[c]	3875[c]
Probability / Significance	NS	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Figures in parentheses are square root transformed; Means followed by common letters in the same column are not significantly different at 5% level; PC- pre-count;
DAS- days after spraying; *Yield extrapolated

Table 2.4.2.3 Effect of entomopathogen on sucking pests and their natural enemies at Ludhiana, EESP, ***kharif*** 2025

Treatment	No. of hoppers / 25 hills					Spiders No./ plot	Yield Kg/ha*
	I SPRAY			II SPRAY			
	PC	7 DAS	15 DAS	7 DAS	15 DAS		
Beauveria bassiana (VKA 01 isolate) (1x 10^8 spores per ml) @ 20 g / L	161.55 (12.73)	161.55 (12.73)c	187.46 (13.71)c	121.16 (11.03)c	181.48 (13.49)c	10.19 (3.27)a	5448.30 ^{b}
Malathion 50 EC 500 g *a.i* per ha	165.39 (12.88)	165.39 (12.88)a	98.50 (9.95)a	90.71 (9.55)a	106.42 (10.34)a	8.99 (3.08)b	6109.09^a
Azadirachtin 0.005%	172.15 (13.14)	172.15 (13.14)b	159.52 (12.65)b	101.51 (10.10)b	154.01 (12.43)b	7.74 (2.87)a	5795.46^c
Control	166.68 (12.93)	166.68 (12.93)d	225.70 (15.04)d	363.17 (19.07)d	387.20 (19.69)d	14.17 (3.83)a	5107.96 ^{d}
Probability / Significance	NS	<0.01	<0.01	<0.01	<0.01	0.01	<0.01

Figures in parentheses are square root transformed; Means followed by common letters in the same column are not significantly different at 5% level; PC- pre-count;
DAS- days after spraying; *Yield extrapolated

Table 2.4.2.4 Effect of entomopathogen on sucking pests and their natural enemies at Moncompu, EESP, ***kharif*** 2025

Treatment	No. of Ear head bugs / 25 hills					Natural enemies No./ plot			Yield (kg/ha) *
	I SPRAY			II SPRAY		Spider	Coccinellid	Carabid	
	PC	7 DAS	15 DAS	7 DAS	15 DAS				
Beauveria bassiana (VKA 01 isolate) (1x 10^8 spores per ml) @ 20 g / L	28.44 (5.38)	13.12 (3.69)^b	7.51 (2.83)^b	4.43 (2.22)^b	1.78 (1.51)^b	18.08 (4.31)	11.89 (3.52)^b	15.66 (4.02)^a	5237.50 ^{a}
Malathion 50 EC 500 g *a.i* per ha	29.75 (5.50)	5.26 (2.40)^a	0.37 (0.93)^a	0.00 (0.71)^a	0.00 (0.71)^a	17.40 (4.23)	12.10 (3.55)^b	9.36 (3.14)^b	5700.00 ^{a}
Azadirachtin 0.005%	31.20 (5.63)	17.82 (4.28)^b	10.39 (3.30)^b	5.16 (2.38)^b	3.15 (1.91)^b	10.59 (3.33)	10.99 (3.39)^b	8.44 (2.99)^b	5206.25 ^{a}
Control	32.91 (5.78)	30.19 (5.54)^c	32.68 (5.76)^c	10.66 (3.34)^c	7.74 (2.87)^c	15.50 (4.00)	18.77 (4.39)^a	19.84 (4.51)^a	4906.25^b
Probability / Significance	NS	<0.01	<0.01	<0.01	<0.01	NS	0.03	0.01	0.01

Figures in parentheses are square root transformed; Means followed by common letters in the same column are not significantly different at 5% level; PC- pre-count; DAS- days after spraying; *Yield extrapolated

Table 2.4.2.5 Effect of entomopathogen on sucking pests and their natural enemies at Navsari, EESP, ***kharif*** 2025

Treatment	No. of Ear head bugs / 25 hills					Spider No./ plot	Yield (kg/ha) *
	I SPRAY			II SPRAY			
	PC	7DAS	15DAS	7DAS	15DAS		
Beauveria bassiana (VKA 01 isolate) (1x 10^8 spores per ml) @ 20 g / L	69.39 (8.36)	35.86 (6.03)^b	62.86 (7.96)	30.53 (5.57)^b	37.09 (6.13)	1.48 (1.41)	5210.91^b
Malathion 50 EC 500 g *a.i* per ha	72.43 (8.54)	23.90 (4.94)^a	58.02 (7.65)	20.94 (4.63)^a	37.45 (6.16)	0.00 (0.71)	5328.19^a
Azadirachtin 0.005%	71.75 (8.50)	32.33 (5.73)^b	57.56 (7.62)	27.48 (5.29)^b	40.08 (6.37)	1.87 (1.54)	5252.06^b
Control	72.43 (8.54)	68.89 (8.33)^c	60.65 (7.82)	57.56 (7.62)^c	41.36 (6.47)	1.86 (1.54)	4909.47^c
Probability / Significance	NS	<0.01	NS	<0.01	NS	NS	<0.01

Figures in parentheses are square root transformed; Means followed by common letters in the same column are not significantly different at 5% level; PC- pre-count; DAS- days after spraying; *Yield extrapolated

Table 2.4.2.6 Effect of entomopathogen on sucking pests and their natural enemies across locations, EESP, ***kharif*** 2025

Treatment	No. of Ear head bugs / 25 hills				Yield (kg/ha) *
	I SPRAY		II SPRAY		
	7DAS	15DAS	7DAS	15DAS	
Beauveria bassiana (VKA 01 isolate) (1x 10^8 spores per ml) @ 20 g / L	19.21 (4.44)^a	19.13 (4.43)^a	12.39 (3.59)^a	10.92 (3.38)^a	4923^a
Malathion 50 EC 500 g *a.i* per ha	11.20 (3.42)^a	13.64 (3.76)^a	5.65 (2.48)^a	7.34 (2.80)^a	5305^a
Azadirachtin 0.005%	20.30 (4.56)^a	27.48 (5.29)^b	14.33 (3.85)^a	17.81 (4.28)^a	4921^a
Control	42.54 (6.56)^b	42.53 (6.56)^b	39.06 (6.29)^b	34.31 (5.90)^b	4590^b
Probability / Significance	<0.01	<0.01	<0.01	<0.01	0.01

Figures in parentheses are square root transformed; Means followed by common letters in the same column are not significantly different at 5% level; DAS- days after spraying; *Yield extrapolated

2.5 Ecological Studies

The ecological studies were conducted through three experimental trials:

i) Influence of Establishment Methods on Pest Incidence (IEMP)**,**
ii) Pest Incidence in Natural Farming (PINF)**,** and
iii) Evaluation of Pheromone Blends for Insect Pests of Rice (EPBI)**.**

2.5.1 Influence of Establishment Methods on Pest Incidence (IEMP)

Water and labour scarcity are emerging as major constraints for irrigated agriculture in Asia and India. Conventional rice cultivation practices are highly water-demanding and exert considerable pressure on available water resources. To address this concern, farmers are gradually adopting alternative crop establishment methods such as the System of Rice Intensification (SRI), mechanical transplanting, aerobic rice cultivation, direct seeding (both wet and dry), and alternate wetting and drying (AWD). Considering these changing cultivation practices, a collaborative trial was conducted with the Agronomy scientists at the respective centres to assess the influence of different crop establishment methods on the incidence of major insect pests in rice.

During *Kharif* 2025, the trial was conducted at 8 locations, *viz.* Aduthurai, Chinsurah, Chiplima, Gangavathi, Jagdalpur, Pantnagar, Pattambi and Titabar. The incidence of insect pests at individual locations and overall pest incidence across all locations are discussed below:

1. Aduthurai

Pest incidence under two crop establishment methods, *viz.,* puddled direct seeding and unpuddled direct seeding, along with different weed management practices, was assessed at this location with the ADT 59 variety (**Table 2.5.1.1**). The incidence of dead hearts caused by stem borer at 45 DAS ranged from 10.4 to 11.5%, with no significant difference between puddled direct seeding (10.4% DH) and unpuddled direct seeding (11.5% DH). Similarly, whorl maggot incidence at 45 DAS, dead heart incidence at 60 DAS and silver shoot incidence caused by gall midge at 45 and 60 DAS did not differ significantly between the two establishment methods. However, white ear incidence at pre-harvest was significantly higher in puddled direct seeding (17.8% WE) compared to unpuddled direct seeding (12.5% WE). Leaf folder damage at 90 DAS was also significantly higher in puddled direct seeding (17.9% LFDL) than in unpuddled direct seeding (14.0% LFDL). In contrast, thrips incidence and brown planthopper population were significantly higher in unpuddled direct seeding, recording 8.8% THDL and 34.4 BPH/5 hills, compared to 12.2% THDL and 20.9 BPH/5 hills in puddled direct seeding.

Among weed management practices, mechanical weeding recorded the lowest pest incidence, 4.0% DH at 45 and 60 DAS, 2.8% WE at pre-harvest, 2.5% SS at 45 DAS, and 5.2% LFDL at 90 DAS, along with lower incidence of whorl maggot, thrips, and brown planthopper. In contrast, farmer’s practice and weedy check plots recorded comparatively higher pest incidence, particularly dead hearts, white ears, silver shoots and leaf folder damage. The brown planthopper population was highest in the weedy check (50.2 BPH/5 hills), followed by the farmer's practice (38.5 BPH/5 hills). Overall, pest incidence was relatively lower under mechanical weeding and herbicide application treatments compared to farmers' practice and weedy check plots.

Table 2.5.1.1. Influence of Crop Establishment Methods on Pest Incidence at Aduthurai, ***Kharif*** 2025

Main plots		% DH		% WE	%SS		% LFDL	% WMDL	%THDL	BPH
		45 DAS	60 DAS	Pre-har	45 DAS	60 DAS	90 DAS	45 DAS	45 DAS	105 DAS
M1 = Puddled direct seeding		10.4(3.1)a	13.6(3.6)a	17.8(3.9)a	6.9(2.5)a	7.8(2.7)a	17.9(4.0)a	10.0(3.1)a	12.2(3.5)a	20.9(4.2)b
M2 = Unpuddled direct seeding		11.5(3.1)a	12.6(3.3)a	12.5(3.2)b	7.4(2.5)a	7.2(2.5)a	14.0(3.5)b	12.1(3.4)a	8.8(2.9)b	34.4(5.4)a
LSD (0.05)		0.96	0.55	0.57	0.98	0.7	0.33	0.32	0.44	0.91
CV(%)		13.22	22.50	22.48	15.35	17.85	12.14	14.06	19.51	16.29
Sub-plots										
S1 = Herbicide application		6.8(2.3)a	6.7(2.4)cd	3.4(1.7)c	3.4(1.7)b	2.2(1.5)b	6.5(2.6)c	7.5(2.8)b	7.5(2.6)cd	6.7(2.4)c
S2 = Rotational herbicide application		8.3(2.9)b	11.2(3.4)bc	19.2(4.2)ab	6.0(2.3)ab	7.2(2.7)a	20.3(4.5)b	12.8(3.6)ab	9.2(3.1)bc	23.3(4.8)b
S3 = Farmers practice		19.8(4.4)a	18.3(4.3)ab	27.8(5.2)a	12.4(3.5)a	12.6(3.6)a	29.8(5.5)a	17.6(4.1)a	11.5(3.4)ab	38.5(6.0)ab
S4=Mechanical weeding		4.0(1.9)b	4.0(2.0)d	2.8(1.6)c	2.5(1.5)b	2.7(1.6)b	5.2(2.3)c	2.8(1.7)c	4.1(2.1)d	8.0(2.6)c
S5=Weedy check		18.8(4.3)a	24.4(4.9)a	23.0(4.8)ab	13.0(3.5)a	10.0(3.2)a	23.7(4.8)ab	13.5(3.7)a	15.5(4.0)a	50.2(7.0)a
S6=Weedy free		8.1(2.8)b	14.2(3.6)bc	14.9(3.8)b	5.5(2.3)ab	10.4(3.1)a	10.0(3.2)c	12.2(3.5)ab	15.1(3.9)a	39.2(6.1)ab
LSD (0.05)		1.24	1.01	1.34	1.27	1.04	0.87	0.80	0.68	1.69
CV(%)		20.12	22.04	18.36	18.57	20.13	17.33	18.68	16.13	16.28
M1 = Puddled direct seeding	S1	10.2(2.9)	10.3(3.2)b	3.1(1.8)c	4.6(2.0)	2.2(1.5)	6.5(2.6)cd	9.4(3.1)bcd	12.6(3.6)ab	6.0(2.4)
	S2	7.5(2.8)	8.7(3.0)c	25.7(5.0)a	4.6(2.1)	7.1(2.6)	13.6(3.7)bc	7.7(2.8)cd	12.4(3.6)ab	17.6(4.2)
	S3	16.9(4.2)	15.2(3.9)a	33.3(5.7)a	10.6(3.3)	10.9(3.4)	34.5(5.8)a	11.5(3.4)bcd	12.7(3.6)ab	28.0(5.2)
	S4	3.8(1.9)	4.0(2.0)e	3.7(1.9)bc	2.0(1.3)	2.5(1.6)	7.4(2.8)cd	2.8(1.7)ef	4.9(2.3)cd	9.0(2.6)
	S5	17.8(4.3)	22.8(4.8)ab	25.7(5.1)a	12.9(3.6)	8.9(3.0)	32.5(5.7)a	13.2(3.6)ab	14.1(3.8)ab	40.4(6.2)
	S6	6.6(2.6)	21(4.6)a	16.1(4.0)ab	6.4(2.6)	15.0(3.9)	12.6(3.6)bc	15.4(3.9)abc	16.5(4.1)a	24.4(4.8)
M2 =Un Puddled direct seeding	S1	3.3(1.7)	3.2(1.7)f	3.6(1.6)c	2.3(1.5)	2.1(1.5)	6.5(2.6)cd	5.6(2.4)def	2.4(1.7)d	7.4(2.4)
	S2	9.2(2.9)	13.7(3.7)a	13.3(3.4)abc	7.3(2.5)	7.2(2.7)	27.1(5.2)a	17.9(4.3)ab	6.0(2.5)bcd	29.0(5.3)
	S3	22.7(4.7)	21.4(4.6)a	22.3(4.7)a	14.2(3.8)	14.4(3.7)	25.2(5.1)ab	23.8(4.8)a	10.3(3.2)abc	49.0(6.9)
	S4	4.2(1.9)	4.0(2.1)e	1.9(1.4)c	3.1(1.7)	2.9(1.6)	3.0(1.8)d	2.8(1.7)f	3.3(2.0)d	7.0(2.7)
	S5	19.7(4.3)	26.1(5.1)a	20.3(4.5)a	13.1(3.3)	10.9(3.3)	14.9(3.8)bc	13.8(3.8)ab	16.9(4.1)a	60.0(7.7)
	S6	9.6(2.9)	7.3(2.5)d	13.7(3.5)abc	4.5(2.0)	5.7(2.3)	7.3(3.6)bc	8.9(3.1)bc	13.7(3.7)ab	54.0(7.4)
LSD (0.05) M in S		2.04	1.66	2.20	2.09	1.71	1.44	1.32	1.12	2.77
LSD (0.05) S in M		2.65	1.85	2.30	2.71	2.08	1.46	1.36	1.34	3.08

Values in parentheses are square-root transformed values; Means followed by the same letter in a column are not significantly different from each other

2. Chinsurah

Pest incidence under two-crop establishment methods, *viz.*, puddled wet direct-seeded rice (wet DSR) and unpuddled dry DSR, was assessed in Lalat variety at this location (**Table 2.5.1.2**). The incidence of dead hearts caused by stem borer was significantly higher in unpuddled dry DSR across all observation periods. At 30 DAS, dead heart incidence was 10.3**%** in unpuddled dry DSR compared to 5.8**%** in puddled wet DSR. A similar trend was observed at 45 DAS (15.8% DH) and 75 DAS (15.4%DH), with unpuddled dry DSR recording significantly higher dead heart damage (11.6% DH at 45DAS & 7.0 %DH at 75 DAS).

The incidence of white ear heads at pre-harvest was also significantly higher in unpuddled dry DSR (14.4%) compared to puddled wet DSR (9.7**%**). In contrast, leaf folder damage at 45 DAS was significantly higher in puddled wet DSR (6.2% LFDL) than in unpuddled dry DSR (3.0% LFDL). The incidence of whorl maggot was significantly higher in unpuddled dry DSR, recording 6.3% and 10.1% WMDL at 30 and 45 DAS, respectively, compared to 0.5% WMDL and 5.3%WMDL in puddled wet DSR.

Overall, unpuddled dry DSR recorded significantly higher stem borer and whorl maggot incidence, whereas leaf folder damage was relatively higher in puddled wet DSR.

Table 2.5.1.2. Influence of Crop Establishment Methods on Pest Incidence at Chinsurah, ***Kharif*** 2025

Treatments	%DH	%DH	%DH	%WE	%LFDL	%WMDL	%WMDL
	30 DAS	45 DAS	75 DAS	Pre har	45 DAS	30 DAS	45 DAS
M1=Puddled wet DSR	5.8(2.2)b	11.6(3.3)b	7.0(2.6)b	9.7(3.2)b	6.2(2.5)a	0.5(0.9)b	5.3(2.3)b
M2=Unpuddled dry DSR	10.3(3.2)a	15.8(3.9)a	15.4(3.9)a	14.4(3.8)a	3.0(1.8)b	6.3(2.5)a	10.1(3.1)a
LSD (0.05)	0.95	0.56	0.271	0.172	0.289	0.896	0.56
CV (%)	23.96	10.52	5.65	3.34	8.93	15.55	14.07

Values in parentheses are square-root transformed values; Means followed by the same letter in a column are not significantly different from each other

3. Chiplima

Pest incidence under three crop establishment methods, *viz.*, mechanical transplanting, direct seeding, and normal transplanting, was assessed in Hasant variety at this location (**Table 2.5.1.3**). The incidence of dead hearts and white ear heads caused by stem borer, silver shoots caused by gall midge, and leaf folder damage were statistically at par across treatments to discern any effect of the establishment methods on pest incidence.

Table 2.5.1.3. Influence of Crop Establishment Methods on Pest Incidence at Chiplima, Kharif 2025

Treatments	%DH	%DH	%DH	%WE	%SS	%SS	%LFDL	BPH	BPH
	60 DT/DS	75 DT/DS	90 DT/DS	Pre har	45 DT/DS	60 DT/DS	45 DT/DS	90 DT/DS	105 DT/DS
M1=Mechanical transplanting	1.8(1.4)a	3.1(1.9)a	2.1(1.6)a	4.5(2.3)b	9.7(3.1)a	7.8(2.7)a	1.2(1.3)b	29.4(5.4)b	30.2(5.5)b
M2=Dry Direct seeding	3.9(2.0)a	3.9(2.1)a	3.3(1.9)a	7.1(2.7)a	4.9(2.0)a	7.8(2.8)a	3.8(2.0)a	40.0(6.3)a	54.8(7.4)a
M3=Normal transplanting	2.1(1.6)a	2.9(1.8)a	3.4(1.9)a	4.7(2.3)b	6.7(2.6)a	8.7(3.0)a	1.3(1.3)b	31.4(5.6)b	36.4(6.1)b
LSD (0.05)	0.99	0.63	0.57	0.42	1.30	1.01	0.68	0.63	1.00
CV(%)	12.94	18.37	17.42	9.53	18.03	19.65	14.32	6.00	8.72

Values in parentheses are square-root transformed values; Means followed by the same letter in a column are not significantly different from each other

4. Gangavathi

At this location, pest incidence under three crop establishment methods, *viz.*, mechanical transplanting, direct seeding and normal transplanting, was assessed in the BPT 5204 variety (**Table 2.5.1.4**). The incidence of dead hearts caused by stem borer at 45 and 75 DT/DS ranged from 13.8–16.9% and 10.8–20.3%, respectively, and did not differ significantly among the establishment methods. However, at 90 DT/DS, the incidence of dead heart was significantly lower with normal transplanting

(15.1%) than with mechanical transplanting (27.4%) and direct seeding (24.6%), which were at par.

The incidence of white ear heads at pre-harvest ranged from 19.2–21.4% and did not differ significantly among the treatments. The incidence of silver shoots caused by gall midge was significantly higher in mechanical transplanting (42.8% at 45 DT/DS) and normal transplanting (47.5% at 60 DT/DS), while direct seeding recorded comparatively lower silver shoot incidence (18.3% at 45 DT/DS and 27.7% at 60 DT/DS).

The leaf folder damage at 60 DT/DS was significantly higher in mechanical transplanting (21.1%) and normal transplanting (21.6%) compared to direct seeding (9.6%). Similarly, at 75 DT/DS, normal transplanting recorded the highest leaf folder damage (20.3%), whereas mechanical transplanting (11.3%) and direct seeding (8.6%) showed comparatively lower damage. The incidence of whorl maggot and hispa at 30 DT/DS did not differ significantly among the treatments. The brown planthopper and white-backed planthopper populations were significantly lower in Wet direct seeding as compared to Mechanical and normal transplanting methods.

Overall, direct seeding recorded relatively lower incidence of gall midge, leaf folder and planthopper populations, whereas mechanical and normal transplanting methods showed comparatively higher pest incidence for several pests.

Table 2.5.1.4. Influence of Crop Establishment Methods on Pest Incidence at Gangavathi, ***Kharif*** 2025

Treatments	% DH	% DH	% DH	% WE	%SS	%SS	%LFDL	%LFDL	%WMDL	% HDL	BPH	WBPH
	45 DT/DS	75DT/DS	90DT/DS	Pre har	45 DT/DS	60 DT/DS	60 DT/DS	75 DT/DS	30 DT/DS	30 DT/DS	90 DT/DS	75 DT/DS
M1= Mechanical Transpalnting	14.5(3.8)a	18.9(4.4)a	27.4(5.2)a	19.2(4.4)a	42.8(6.5)a	40.7(6.4)ab	21.1(4.6)a	11.3(3.4)b	2.9(1.7)a	3.4(1.9)a	40.8(6.4)a	12.2(3.6)b
M2= Wet Direct seeding	13.8(3.7)a	20.3(4.5)a	24.6(5.0)a	19.3(4.4)a	18.3(4.3)b	27.7(5.3)b	9.6(3.2)b	8.6(3.0)b	4.8(2.3)a	3.3(1.8)a	18.1(4.3)b	9.2(3.1)b
M3=Normal Transplanting	16.9(4.1)a	10.8(3.3)a	15.1(3.9)b	21.4(4.7)a	36.3(6.1)a	47.5(6.9)a	21.6(4.7)a	20.3(4.5)a	6.8(2.5)a	4.9(2.3)a	39.7(6.3)a	18.1(4.3)a
LSD (0.05)	1.35	1.25	0.96	0.77	1.15	1.14	0.56	0.76	1.29	1.21	0.83	0.65
CV(%)	19.20	17.01	11.27	9.52	11.35	10.19	7.48	11.58	23.32	23.44	8.06	9.87

Values in parentheses are square-root transformed values; Means followed by the same letter in a column are not significantly different from each other

5. Jagdalpur

Pest incidence under two crop establishment methods, *viz.*, puddled direct seeding and unpuddled direct seeding**,** along with different weed management practices, was assessed with Samleshwari variety at this location (**Table 2.5.1.6**). Silver shoot incidence at 30 DAS was significantly higher in puddled direct seeding (23.7%) compared to unpuddled direct seeding (6.1%)**.** The incidence of dead hearts and white ear heads caused by stem borer, leaf folder, whorl maggot, and thrips damage, as well as WBPH and GLH populations, did not differ significantly between the two establishment methods or among the weed management practices. A similar trend was observed among the interactions also.

Table 2.5.1.5. Influence of Crop Establishment Methods on Pest Incidence at Jagdalpur, ***Kharif*** 2025

Main plots		% DH	% WE	%SS	%SS	% LFDL	% WMDL	%THDL	WBPH	GLH
		45 DS	Pre-harv	30 DS	45 DS	60 DT/DS	30 DT/DS	30 DT/DS	45 DT/DS	90 DT/DS
M1 = Puddled direct seeding		18.0(4.2)a	10.3(3.3)a	23.7(4.8)a	17.9(4.2)a	3.7(2.0)a	4.4(2.2)a	13.8(3.8)a	1.7(1.4)a	8.6(3.0)a
M2 = Unpuddled direct seeding		18.1(4.1)a	8.0(2.9)a	6.1(2.3)b	22.6(4.7)a	2.9(1.8)a	4.4(2.1)a	8.0(2.8)a	1.2(1.3)a	9.8(3.2)a
LSD (0.05)		0.58	1.03	0.93	2.20	0.58	0.80	2.38	0.52	0.58
CV(%)		6.84	16.13	12.99	14.35	14.83	18.30	15.50	19.21	16.86
Sub-plots										
S1 = Weedy check		22.7(4.7)a	8.5(3.0)a	12.3(3.1)a	18.2(4.2)a	3.9(2.1)a	4.7(2.2)a	10.5(3.3)a	1.5(1.5)a	10.0(3.2)a
S2 = Mechanical weeding		11.5(3.4)a	8.4(3.0)a	13.8(3.4)a	23.0(4.8)a	2.4(1.7)b	4.9(2.3)a	11.2(3.4)a	1.2(1.3)a	8.2(2.9)a
S3 = Chemical weed control		20.0(4.4)a	10.6(3.3)a	18.6(4.0)a	19.5(4.4)a	3.7(2.0)ab	3.6(2.0)a	10.9(3.3)a	1.7(1.6)a	9.3(3.1)a
LSD (0.05)		1.47	0.80	2.15	1.35	0.37	0.74	0.61	1.44	0.50
CV(%)		21.40	16.05	16.96	18.40	11.79	20.87	11.38	15.80	19.50
M1 = Puddled direct seeding	S1	24.0(4.9)a	8.2(2.9)a	21.8(4.6)ab	11.4(3.4)a	4.7(2.3)	3.3(1.9)a	13.2(3.7)a	1.7(1.5)a	9.7(3.2)a
	S2	12.2(3.5)a	11.2(3.4)a	17.3(4.0)ab	22.2(4.7)a	3.2(1.9)	5.5(2.4)a	12.7(3.6)a	1.3(1.3)a	6.3(2.5)a
	S3	17.7(4.2)a	11.5(3.4)a	31.9(5.7)a	20.1(4.5)a	3.3(1.9)	4.5(2.2)a	15.3(4.0)a	2.0(1.6)a	9.7(3.2)a
M2 =Un Puddled direct seeding	S1	21.4(4.5)a	8.8(3.0)a	2.9(1.7)b	25.1(5.0)a	3.0(1.9)	6.2(2.5)a	7.9(2.8)a	1.3(1.3)a	10.3(3.3)a
	S2	10.7(3.3)a	5.6(2.4)a	10.3(2.8)ab	23.8(4.9)a	1.6(1.4)	4.3(2.2)a	9.7(3.1)a	1.0(1.2)a	10.0(3.2)a
	S3	22.2(4.6)a	9.8(3.1)a	5.2(2.4)ab	18.8(4.3)a	4.2(2.1)	2.7(1.7)a	6.5(2.6)a	1.3(1.3)a	9.0(3.1)a
LSD (0.05) M in S		2.67	1.46	3.89	2.44	0.68	1.34	1.12	1.44	0.92
LSD (0.05) S in M		2.37	2.09	3.51	4.35	1.15	1.75	4.54	1.45	1.23

Values in parentheses are square-root transformed values; Means followed by the same letter in a column are not significantly different from each other

6. Pantnagar

Pest incidence under three crop establishment methods, *viz.*, wet direct-seeded rice (wet DSR), dry direct seeding and aerobic rice, was assessed with PD 24 variety at this location (**Table 2.5.1.6**). The incidence of dead hearts caused by stem borer at 15, 30 and 60 DAS ranged from 12.8–21.9%, 11.1–18.6% and 12.0–14.3%, respectively, and did not differ significantly among the treatments.

The incidence of white ear heads at pre-harvest varied from 2.1–6.5%, with no significant difference among the establishment methods. Similarly, the incidence of leaf folder damage, whorl maggot and hispa at 30 DAS ranged from 2.5–4.5% (LFDL), 3.9–8.5% (WMDL) and 4.7–6.3% (HDL), respectively, and did not differ significantly among the treatments.

Table 2.5.1.6. Influence of Crop Establishment Methods on Pest Incidence at Pantnagar, ***Kharif*** 2025

Treatments	% DH	% DH	% DH	% WE	% LFDL	% WMDL	% HDL
	15 DS	30 DS	60 DS	Pre har	30 DS	30 DS	30 DS
T1= Wet DSR	21.9(4.7)a	18.6(4.3)a	12.0(3.5)a	2.1(1.4)a	3.5(1.8)a	3.9(2.0)a	4.9(2.2)a
T2 = Dry Direct seeding	16.4(4.1)a	13.8(3.8)a	13.4(3.7)a	6.5(2.3)a	4.5(2.2)a	8.5(2.9)a	6.3(2.5)a
T3 = Aerobic Rice	12.8(3.5)a	11.1(3.4)a	14.3(3.7)a	6.5(2.3)a	2.5(1.5)a	5.8(2.5)a	4.7(2.2)a
LSD (0.05)	1.38	1.16	1.16	2.52	1.27	1.05	1.53
CV(%)	18.72	16.83	17.68	20.13	18.17	23.50	16.68

Values in parentheses are square-root transformed values; Means followed by the same letter in a column are not significantly different from each other

7. Pattambi

Four establishment methods, *viz.*, mechanical transplanting, wet direct seeding, normal transplanting and aerobic rice were evaluated at this location with Aishwarya variety (**Table 2.5.1.7**). The incidence of white ear heads was significantly low in normal transplanting (0.4% WE) compared to the other three methods and was at par with each other (11.4 – 22.5% WE). The incidence of silver shoots caused by gall midge ranged between 10.9 and 15.3% at 30 DT/DS and 9.6 to 14% at 50 DT/DS and did not differ significantly among treatments. Leaf folder incidence was significantly low in mechanical transplanting (8.6% LFDL) as compared to wet direct seeding (14.5% LFDL). The damage was at par in the other two treatments. Similarly, caseworm incidence was high in wet direct seeding (11.5% CWDL) but was at par with the other three treatments. The incidence of dead heart and whorl maggot was low in all the treatments and was at par with each other.

Table 2.5.1.7. Influence of Crop Establishment Methods on Pest Incidence at Pattambi, ***Kharif*** 2025

Treatments	% DH	% WE	% SS		%LFDL	% WMDL	% CWDL
	50 DT/DS	Pre harv	30 DT/DS	50 DT/DS	50 DT/DS	30 DT/DS	30 DT/DS
T1 = Mechanical transplanting	7.3(2.8)a	11.4(3.5)a	15.3(3.8)a	9.6(3.2)a	8.6(3.0)b	4.2(2.0)a	7.3(2.8)a
T2 = Wet Direct seeding	6.6(2.7)a	22.5(4.7)a	13.1(3.7)a	11.0(3.3)a	14.5(3.9)a	2.0(1.5)a	11.5(3.4)a
T3 = Normal transplanting	6.3(2.6)a	0.4(0.9)b	12.7(3.6)a	14.0(3.8)a	9.1(3.1)ab	3.0(1.8)a	5.7(2.5)a
T4 = Aerobic rice	7.2(2.8)a	20.8(4.6)a	10.9(3.3)a	10.8(3.2)a	9.4(3.1)ab	4.3(2.2)a	4.5(2.2)a
LSD (0.05)	0.88	1.80	2.34	2.26	0.83	1.46	1.34
CV(%)	11.50	18.57	23.00	23.68	8.96	17.49	17.38

Values in parentheses are square-root transformed values; Means followed by the same letter in a column are not significantly different from each other

8. Titabar

Numoli variety was grown in three methods of crop establishment, *viz.*, normal transplanting, puddled direct seeding and unpuddled direct seeding. Weed management practices like weedy check, mechanical weeding and chemical weeding are included as sub-plots at this location (**Table 2.5.1.8**). At Titabar, the incidence of stem borer, gall midge, leaf folder, whorl maggot and BPH was low in all the crop establishment methods and weed management subplots to draw valid conclusions.

Across the locations, the incidence of stem borer, gall midge, leaf folder, whorl maggot, caseworm, hispa, thrips, BPH, WBPH and GLH was observed in all the crop establishment methods during *Kharif* 2025. The wet direct seeding, wet DSR are compiled as puddled direct seeding. Dry direct seeding is compiled as unpuddled direct seeding. The incidence of dead hearts varied from 7.7 to 12.7%, with minimum damage in normal transplanting and maximum damage in puddled direct seeding (**Figure 2.5.1.1**). The incidence of white ear heads was low in normal transplanting (7.6% WE), followed by unpuddled direct seeding (8.8% WE), whereas incidence was maximum in aerobic rice (13.7% WE) followed by puddled direct seeding (12.1% WE). Silver shoots caused by gall midge were low in unpuddled direct seeding (8.6% SS) and high in mechanical transplanting (21% SS).

Table 2.5.1.8.Influence of Crop Establishment Methods on Pest Incidence at Titabar, ***Kharif*** 2025

Main plots		% DH	% WE	% SS	% LFDL	% WMDL	BPH
		75 DT/DS	Pre-harvest	60 DT/DS	75 DT/DS	60 DT/DS	60 DT/DS
M1 = Normal transplanting		3.7(1.9)a	4.0(2.0)a	3.9(1.8)a	2.9(1.6)a	3.7(1.9)a	0.7(1.0)a
M2 = Puddled direct seeding		6.5(2.5)a	2.7(1.7)a	1.6(1.2)a	4.1(2.0)a	3.2(1.7)a	0.4(0.9)a
M3 = Unpuddled direct seedin		7.8(2.7)a	4.3(2.1)a	4.1(1.8)a	3.4(1.8)a	4.8(2.2)a	0.4(0.9)a
LSD (0.05)		1.62	1.77	1.05	1.92	0.67	0.30
CV(%)		21.21	15.02	19.2	12.88	20.74	18.95
Sub-plots							
S1 = Weedy check		5.4(2.2)a	4.1(2.0)a	3.2(1.6)a	2.5(1.6)a	2.8(1.6)a	0.6(1.0)a
S2 = Mechanical weeding		7.4(2.7)a	3.3(1.8)a	3.2(1.6)a	3.5(1.8)a	4.6(2.2)a	0.7(1.0)a
S3 = Chemical weed control		5.3(2.1)a	3.6(1.9)a	3.2(1.5)a	4.4(2.1)a	4.4(2.0)a	0.3(0.9)a
LSD (0.05)		1.18	0.97	0.95	0.73	1.03	0.36
CV(%)		20.08	10.22	17.16	12.13	12.46	20.11
M1 = Normal transplanti	S1	3.5(1.8)a	3.4(1.8)a	4.6(2.1)a	1.6(1.2)a	3.5(1.8)a	1.0(1.2)a
	S2	4.5(2.0)a	3.3(1.8)a	4.8(2.1)a	3.4(1.8)a	4.1(2.0)a	0.7(1.0)a
	S3	3.3(1.8)a	5.3(2.4)a	2.2(1.4)a	3.6(1.7)a	3.5(1.8)a	0.3(0.9)a
M2 = Puddled direct	S1	5.6(2.5)a	2.9(1.7)a	0.0(0.7)a	3.0(1.7)a	0.0(0.7)a	0.0(0.7)a
	S2	6.2(2.6)a	2.5(1.6)a	4.9(2.1)a	3.0(1.7)a	4.8(2.3)a	0.7(1.0)a
	S3	7.8(2.5)a	2.9(1.7)a	0.0(0.7)a	6.4(1.7)a	4.9(2.1)a	0.7(1.0)a
M3 = Unpuddle d direct	S1	7.1(2.4)a	6.2(2.6)a	4.9(2.1)a	3.0(1.7)a	4.8(2.3)a	0.7(1.0)a
	S2	11.5(3.4)a	4.2(2.0)a	0.0(0.7)a	4.2(1.9)a	4.8(2.1)a	0.7(1.0)a
	S3	4.8(2.1)a	2.7(1.7)a	7.4(2.5)a	3.0(1.7)a	4.7(2.1)a	0.0(0.7)a
LSD (0.05) M in S		2.86	2.34	2.29	1.77	2.50	0.87
LSD (0.05) S in M		3.33	3.22	2.41	3.19	2.26	0.84

Values in parentheses are square-root transformed values; Means followed by the same letter in a column are not significantly different from each other

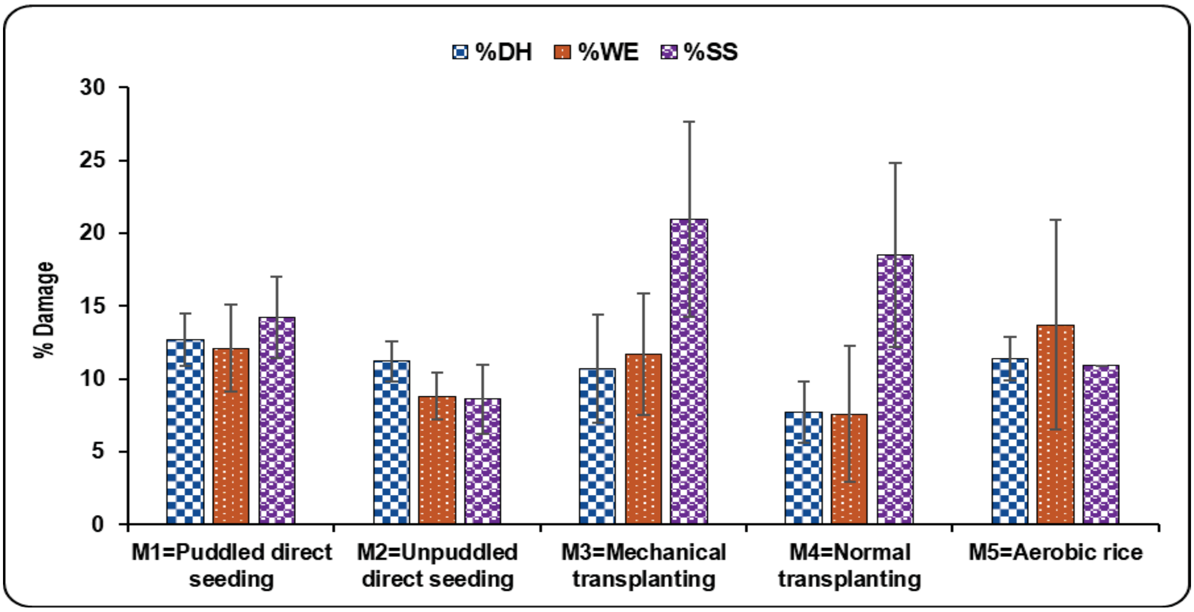


Figure 2.5.1.1. Incidence of stem borer and gall midge in different crop establishment methods across locations

Among the leaf-feeding insects, leaf folder damage was low in unpuddled direct seeding (5.3% LFDL) followed by aerobic rice (6% LFDL). The damage was high in normal transplanting (11% LFDL) followed by mechanical transplanting (10.6% LFDL). The whorl maggot damage varied from 3.6 to 7.7% with low damage of <5% in mechanical transplanting, puddled direct seeding and normal transplanting (**Figure 2.5.1.2**). Caseworm incidence was high in puddled direct seeding (11.5% CWDL) followed by mechanical transplanting (7.3% CWDL). The damage was nil in unpuddled direct seeding while it was low in aerobic rice (4.5% CWDL) and normal transplanting (5.7% CWDL). The incidence of hispa was low across all establishment methods and ranged from 3.4 to 6.3% HDL. Thrips incidence was observed only at Aduthurai in both the establishment methods, *viz.,* puddled direct seeding (13% THDL) and unpuddled direct seeding (8.4% THDL).

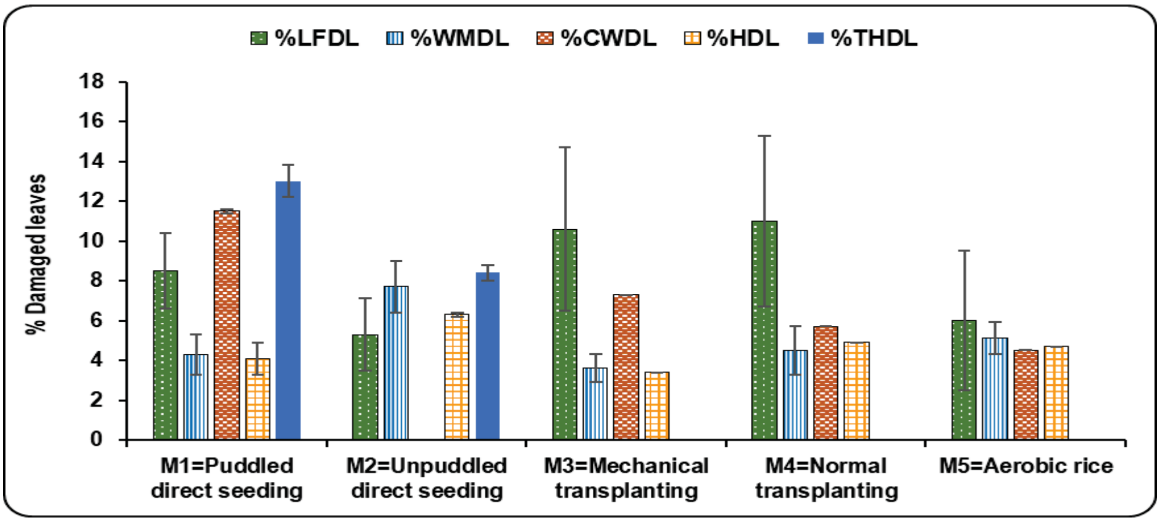


Figure 2.5.1.2. Incidence of leaf - feeding insects in different crop establishment methods across locations

Among the sucking pests, BPH and WBPH incidence were observed in all the crop establishment methods except in aerobic rice (**Figure 2.5.1.3**). BPH incidence was low in puddled direct seeding (13.1/hill) while it was high in mechanical transplanting (33.5/hill) and unpuddled direct seeding (32.4/ hill) as compared to normal transplanting (27.1/hill). WBPH incidence was low in both puddled and unpuddled direct seeding (1.2-5.5/hill) and high in normal and mechanical transplanting methods (12.2-18.1/ hill). GLH incidence was observed only at Jagdalpur in both puddled and unpuddled direct seeding methods.

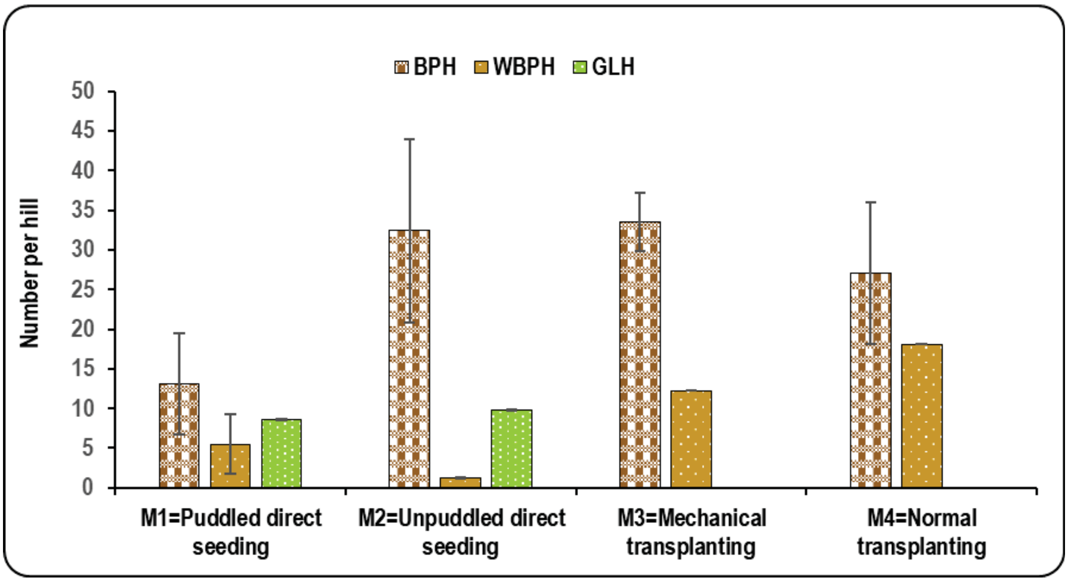


Figure 2.5.1.3 Incidence of sucking pests in different crop establishment methods across locations

A collaborative trial with the Agronomy discipline on the influence of crop establishment methods on pest incidence (IEMP) was conducted at eight locations during Kharif 2025. Across the locations, normal transplanting recorded low incidence of dead hearts (7.7%) while, puddled direct seeding recorded high incidence (12.7% DH). White ear heads were low in normal transplanting (7.6% WE) and high in aerobic rice (13.7% WE). Unpuddled direct seeding recorded low gall midge incidence (8.6% SS) whereas high incidence was found in mechanical transplanting (21% SS) followed by normal transplanting (18.5% SS). The incidence of leaf folder was low in unpuddled direct seeding (5.3% LFDL) followed by aerobic rice (6% LFDL) and high in normal transplanting (11% LFDL). High incidence of whorl maggot (7.7% WMDL) and hispa (6.3% HDL) was recorded in unpuddled direct seeding, while puddled direct seeding recorded high caseworm incidence (11.5% CWDL). The incidence of BPH was low in puddled direct seeding (13.1/ hill) and WBPH in unpuddled direct seeding (1.2/hill). Overall, the incidence of insect pests was similar in puddled direct seeding, normal transplanting and mechanical transplanting methods of crop establishment and relatively low in unpuddled direct seeding and aerobic rice.

2.5.2 Pest Incidence in Natural Farming (PINF)

Natural farming in India is an ecological approach to agriculture that relies on local resources, biodiversity, and biological processes rather than synthetic fertilizers and pesticides. Natural farming is a method where crops are grown with minimum external inputs. It aims to reduce input costs, improve soil health, and promote sustainable farming systems. Natural farming is being promoted in states like Andhra Pradesh, Himachal Pradesh, Gujarat and Karnataka. Natural farming is gaining momentum at present due to rising demand for organic, chemical-free food, government policy support and climate change concerns. Keeping this in view, a collaborative trial with the Agronomy and soil science sections was formulated to evaluate the insect pest incidence in natural farming.

The trial was formulated with five treatments replicated four times in a randomised block design with the most popular high-yielding variety of that location. The treatments included are:

T1 = Control (No addition of any inputs for operations including weeding),

T2 = Complete NF (1. *Beejamrit* + *Ghanjeevamrit* + *Jeevamrit*; 2. Crop residue mulching; 3 . Intercropping)

[Pre-monsoon dry sowing (PMDS) / Multi-variate cropping (MVC) with multiple crops during fallow + Prophylactic/preventive method of application of *Neemaster*, *Dashparni ark*, *Brahmaster*, Neem seed kernel extract, border crop, trap crop, seed treatment with *Trichoderma* or *Pseudomonas* and curative application of leaf extracts of Datura, Vitex, *Agniaster*, sour buttermilk, 2G/3G extract and use of bio-control agents and mechanical traps]

T3 = All India – Network Programme on Organic Farming (AI-NPOF) package

T4 = Integrated Crop Management (50 % nutrient application through organic manures and 50% nutrient application through inorganic sources with pre-monsoon dry sowing / Multi-variate cropping (MVC) with multiple crops during fallow. Prophylactic/preventive method of application of *Neemaster*, *Dashparni ark*, *Brahmaster*, Neem seed kernel extract, border crop, trap crop, seed treatment with *Trichoderma*, *Pseudomonas* and curative application of leaf extracts of Datura, *Vitex*, *Agniaster,* sour buttermilk, 2G/3G extract and use of bio-control agents and mechanical traps)

T5 = Integrated Crop Management (50 % nutrient application through organic manures and 50% nutrient application through inorganic sources with application of need-based pesticides for pest management).

T6-Recommended dose of fertilizer of that location (RDF).

During Kharif 2025, the trial was conducted at 12 locations, *viz.*, Chatha, Chinsurah, Chiplima, Gangavathi, Khudwani, Karaikal, Maruteru, Moncompu, Pantnagar, Pattambi, Raipur and Titabar. The results of the trial are presented below location wise.

1. Chatha

The trial was conducted with the Basmati 370 variety. Dead hearts caused by stem borer were low in all the treatments. However, white ear heads were significantly high in T1-control (29.6% WE) as compared to T2-complete natural farming (19.6% WE) at 85 DAT (**Table 2.5.2.1**). In other treatments, white ears were at par with each other, ranging from 21.1 to 25.7%. At 95 DAT, white ears were significantly low in the T3-AI-NPOF package (13.6% WE), which was at par with T2-complete natural farming (14.4% WE) as compared to T1-control (28.7% WE) and T4-ICM with NF (23.8% WE). A low population of green leafhopper, grasshopper and white leafhopper (*Cofana spectra*) was reported in all the treatments.

Table 2.5.2.1. Pest incidence in natural farming trial at Chatha, ***Kharif*** 2025

Treatments	%DH	%WE	
	75 DAT	85 DAT	95 DAT
T1 = Control (No addition of any inputs)	9.3(3.1)a	29.6(5.5)a	28.7(5.4)a
T2 = Complete Natural Farming (NF)	2.9(7.6)a	19.6(4.5)b	14.4(3.9)b
T3 = AI-NPOF package	7.3(2.8)a	22.6(4.8)ab	13.6(3.7)b
T4 = Integrated Crop Management with NF	7.2(2.7)a	21.1(4.6)ab	23.8(4.9)a
T5 = Integrated Crop Management (50 % organic and 50% inorganic sources) with need-based pesticides	8.1(2.9)a	25.7(5.1)ab	19.7(4.5)ab
LSD(0.05)	1.20	0.95	1.04
CV(%)	14.81	6.85	8.21

Values in parentheses are square-root transformed values; Means followed by the same letter in a column are not significantly different from each other

2. Chinsurah

The incidence of stem borer, leaf folder and whorl maggot was observed in all the treatments in the Manisha variety grown in this trial. Dead hearts were significantly low in T5-ICM with need-based pesticide treatment (1.7% DH at 45 DAT & 3.7% DH at 55 DAT) followed by T4-ICM with NF (3.0% DH at 45 DAT & 5.4% DH at 55 DAT). Maximum dead heart damage was observed in T3-AI-NPOF package at 45 DAT (17.9% DH) and in the T1-control at 55 DAT (28.3% DH). Similarly, leaf folder damage was significantly low in T5 – ICM with need-based pesticides at 45 DAT (0.8% LFDL) and 55 DAT (0.7% LFDL) as compared to maximum damage in T1-control (9.8 -10.1% LFDL). Similar trend was observed with respect to whorl maggot with significantly low damage in T5-ICM with need-based pesticides (1.3% WMDL at 35 DAT & 2.1% WMDL at 45 DAT). Maximum whorl maggot damage of 15.8 – 18.2% was observed in T1-control treatment (**Table 2.5.2.2**).

Table 2.5.2.2. Pest incidence in natural farming trial at Chinsurah, ***Kharif*** 2025

Treatments	%DH		%WE	%LFDL		%WMDL	
	45 DAT	55 DAT	85 DAT	45 DAT	55 DAT	35 DAT	45 DAT
T1 = Control (No addition of any inputs)	11.8 (3.5)a	28.3 (5.4)a	24.4 (5.0)a	10.1 (3.3)a	9.8 (3.2)a	18.2 (4.3)a	15.8 (4.0)a
T2 = Complete Natural Farming (NF)	9.4 (3.1)a	7.0 (2.7)c	11.5 (3.5)b	4.6 (2.3)b	2.8 (1.8)bc	5.4 (2.4)cd	4.1 (2.3)c
T3 = AI-NPOF package	17.9 (4.3)a	17.0 (4.2)b	10.2 (3.3)bc	7.4 (2.8)ab	3.8 (2.1)b	9.6 (3.2)bc	9.0 (3.1)b
T4 = Integrated Crop Management with NF	3.0 (1.9)b	5.4 (2.4)c	4.9 (2.3)bc	2.0 (1.6)c	1.9 (1.5)cd	3.8 (2.0)de	3.6 (2.0)c
T5 = Integrated Crop Management (50 % organic and 50% inorganic sources) with need-based pesticides	1.7 (1.4)b	3.7 (2.0)c	2.4 (1.6)d	0.8 (1.1)c	0.7 (1.1)d	1.3 (1.3)e	2.1 (1.6)c
T6=RDF-Inorganic source	11.3 (3.4)a	25.8 (5.1)ab	23.7 (4.9)a	8.9 (3.1)a	9.7 (3.2)a	15.2 (3.9)ab	13.7 (3.8)ab
LSD (0.05)	1.21	1.04	1.04	0.63	0.53	0.88	0.73
CV (%)	18.24	12.45	13.29	11.74	10.76	13.46	11.33

Values in parentheses are square-root transformed values; Means followed by the same letter in a column are not significantly different from each other

3. Chiplima

At this location, the incidence of stem borer, gall midge, and BPH was observed in all the treatments in Pratikshya variety (**Table 2.5.2.3**). The incidence of dead hearts was low (<5% DH) in all the treatments. The incidence of white ear heads at pre-harvest was significantly higher in the T1-control (18.5%) and T6 -RDF–inorganic source (13.3%), whereas T5 -Integrated crop management with need-based pesticides recorded the lowest incidence (3.1%), followed by T3- AI-NPOF package (5.4%) and T4 -Integrated crop management with NF (6.3%) and statistically at par. Similarly, the silver shoot incidence at 55 and 65 DAT was highest in the control (10.5 and 10.1%), while T2-complete natural farming, T3-AI-NPOF package and T5 - Integrated crop management with need-based pesticides recorded lower incidence (3.1–4.9%). The brown planthopper population was significantly higher in the T1-control (58.5 and 55.5 BPH/5 hills at 95 and 105 DAT) and T6-RDF–inorganic source (59.0 and 62.5 BPH/5 hills). In contrast, T2-complete natural farming, T3-AI-NPOF package and T4-Integrated crop management with NF recorded comparatively lower BPH populations (27.3–30.3 BPH/5 hills). The T5-Integrated crop management with need-based pesticides recorded moderate BPH population (38.0 and 32.8 BPH/5 hills).

Table 2.5.2.3. Pest incidence in natural farming trial at Chiplima, ***Kharif*** 2025

Treatments	%DH		%WE	%SS		BPH/ 5 hills	
	65 DAT	75 DAT	Pre har	55 DAT	65 DAT	95 DAT	105 DAT
T1 = Control (No addition of any inputs)	4.1 (2.1)a	3.8 (2.0)a	18.5 (4.3)a	10.5 (3.3)a	10.1 (3.2)a	58.5 (7.7)a	55.5 (7.5)a
T2 = Complete Natural Farming (NF)	2.7 (1.8)ab	3.2 (1.9)ab	7.5 (2.8)b	4.9 (2.3)b	4.6 (2.2)b	27.5 (5.3)c	27.3 (5.2)b
T3 = AI-NPOF package	2.3 (1.7)ab	2.0 (1.6)ab	5.4 (2.4)bc	4.9 (2.3)b	4.5 (2.2)b	28.5 (5.4)c	28.0 (5.3)b
T4 = Integrated Crop Management with NF	2.3 (1.7)ab	2.9 (1.8)ab	6.3 (2.6)b	5.7 (2.5)ab	7.1 (2.9)ab	29.3 (5.4)bc	30.3 (5.5)b
T5 = Integrated Crop Management (50 % organic and 50% inorganic sources) with need-based pesticides	1.1 (1.2)b	1.1 (1.2)b	3.1 (1.9)c	4.8 (2.3)b	3.1 (2.1)b	38.0 (6.2)b	32.8 (5.8)b
T6=RDF-Inorganic source	2.4 (1.7)ab	3.1 (1.9)ab	13.3 (3.7)a	9.2 (3.1)ab	8.3 (2.9)ab	59.0 (7.7)a	62.5 (7.9)a
LSD(0.05)	0.66	0.77	0.69	0.92	0.82	0.78	0.84
CV(%)	16.99	19.37	10.19	15.25	13.72	5.44	5.91

Values in parentheses are square-root transformed values; Means followed by the same letter in a column are not significantly different from each other

4. Gangavathi

Pest incidence under different natural farming and crop management practices was assessed at this location with Telangana sona variety (**Table 2.5.2.4**). The control treatment (no input additions) recorded a significantly higher incidence of all major pests. The incidence of dead hearts caused by stem borer was highest in the T1-control, recording 25.0, 26.2, and 34.6% DH at 25, 35, and 45 DAT, respectively. Dead heart damage was significantly lower than in T2-, T3- and T5- (7.7-14.6% DH). The lowest incidence of dead hearts was observed in T5 - Integrated crop management with need-based pesticides, recording 1.2, 4.4 and 6.8% at respective stages.

The incidence of white ear heads at pre-harvest was also highest in the T1-control (21.3%) and lowest in T5-Integrated crop management with need-based pesticides (4.9%). In all other treatments, the incidence was at par. Similarly, silver shoot incidence caused by gall midge at 35 and 55 DAT was significantly higher in the control (32.0 and 59.9% SS) and lowest in T5-Integrated crop management with need-based pesticides (11.4 and 13.8% SS). Silver shoot damage in other treatments was at par with each other.

The leaf folder damage at 45 and 65 DT was highest in the control (28.4 and 23.5% LFDL) and lowest in T5-Integrated crop management with need-based pesticides (3.8 and 6.0% LFDL). The whorl maggot incidence at 35 DAT was also significantly higher in the control (8.6% WMDL) and lowest in T5-Integrated crop management with need-based pesticides (1.3% WMDL).

The brown planthopper population was markedly higher in the control, recording 283.7 and 353.3 BPH/5 hills at 75 and 85 DT, respectively. In contrast, T5-Integrated crop management with need-based pesticides recorded the lowest BPH population (79.6 and 84.6 BPH/5 hills). A similar trend was observed for white-backed planthopper, where the control recorded the highest population (120.3 and 140.7 WBPH/5 hills), while T5 -Integrated crop management with need-based pesticides recorded the lowest population (38.4 and 51.4 WBPH/5 hills).

Table 2.5.2.4. Pest incidence in natural farming trial at Gangavathi, ***Kharif*** 2025

Treatments	%DH			%WE	%SS		%LFDL		%WMDL	BPH		WBPH	
	25 DAT	35 DAT	45 DAT	Pre har	35 DAT	55 DAT	45 DAT	65 DAT	35 DAT	75 DAT	85 DAT	75 DAT	85 DAT
T1 = Control (No addition of any inputs)	25.0 (5.1)a	26.2 (5.2)a	34.6 (6.0)a	21.3 (4.7)a	32.0 (5.7)a	59.9 (7.8)a	28.4 (5.4)a	23.5 (4.9)a	8.6 (3.0)a	283.7 (16.9)a	353.3 (18.8)a	120.3 (11.0)a	140.7 (11.9)a
T2 = Complete Natural Farming (NF)	11.8 (3.4)b	14.6 (3.9)b	19.9 (4.5)b	11.4 (3.4)b	24.4 (5.0)b	27.2 (5.2)b	11.4 (3.5)b	9.7 (3.2)b	9.1 (3.1)a	106.6 (10.3)b	100.0 (10.0)b	54.6 (7.4)b	65.0 (8.1)b
T3 = AI-NPOF package	10.9 (3.3)b	13.0 (3.7)b	17.3 (4.2)b	8.2 (3.0)bc	20.5 (4.6)b	23.9 (4.9)b	9.5 (3.2)b	8.5 (3.0)b	5.1 (2.4)b	87.0 (9.4)c	94.6 (9.8)bc	47.1 (6.9)bc	61.8 (7.9)bc
T4 = Integrated Crop Management with NF	7.7 (2.9)b	13.3 (3.7)b	17.0 (4.2)b	8.2 (2.9)bc	21.0 (4.6)b	23.8 (4.9(b	9.9 (3.2)b	8.9 (3.1)b	5.1 (2.4)b	87.0 (9.4)c	94.6 (9.8)bc	47.1 (6.9)bc	61.8 (7.9)bc
T5 = Integrated Crop Management (50 % organic and 50% inorganic sources) with need-based pesticides	1.2 (1.2)c	4.4 (2.2)c	6.8 (2.7)c	4.9 (2.3)c	11.4 (3.5)c	13.8 (3.8)c	3.8 (2.1)c	6.0 (2.6)c	1.3 (1.3)c	79.6 (9.0)c	84.6 (9.2)c	38.4 (6.3)c	51.4 (7.2)c
LSD(0.05)	1.40	0.35	0.71	0.84	0.59	0.67	0.59	0.25	0.54	0.45	0.63	0.72	0.75
CV(%)	19.00	4.12	7.30	11.44	5.62	5.59	7.60	3.34	9.94	1.80	2.43	4.15	3.88

Values in parentheses are square-root transformed values; Means followed by the same letter in a column are not significantly different from each other

5. Khudwani

The incidence of grasshopper and rice skipper under different natural farming and crop management practices was assessed at this location with Shalimar Rice- 4 variety (Table 2.5.2.5). The grasshopper damage at 55 DAT ranged from 18.0–25.4% and did not differ significantly among the treatments. However, at 85 DAT, the T1-control recorded significantly higher GHDL (25.7%), whereas T2-complete natural farming recorded the lowest damage (15.3%). At 95 DAT, GHDL was significantly higher in the T1-control (26.0%), while T2-complete natural farming (12.9%) and T5-Integrated crop management with need-based pesticides (14.0%) recorded lower damage. The incidence of rice skipper damage was low and did not differ significantly among treatments.

Table 2.5.2.5. Pest incidence in natural farming trial at Khudwani, ***Kharif*** 2025

Treatments	%GHDL	%GHDL	%GHDL	%RSDL	%RSDL
	55 DAT	85 DAT	95 DAT	35 DAT	75 DAT
T1 = Control (No addition of any inputs)	22.7(4.8)a	25.7(5.1)a	26.0(5.1)a	4.8(2.1)a	5.2(2.3)a
T2 = Complete Natural Farming (NF)	18.0(4.3)a	15.3(3.9)b	12.9(3.6)b	1.8(1.4)a	1.7(1.4)ab
T3 = AI-NPOF package	23.0(4.8)a	16.3(4.1)ab	18.4(4.3)ab	2.3(1.5)a	2.0(1.5)ab
T4 = Integrated Crop Management with NF	25.4(5.1)a	17.4(4.2)ab	17.1(4.2)ab	3.0(1.7)a	1.8(1.4)ab
T5 = Integrated Crop Management (50 % organic and 50% inorganic sources) with need-based pesticides	22.2(4.7)a	17.8(4.3)ab	14.0(3.8)b	1.1(1.2)a	1.2(1.2)b
LSD(0.05)	1.00	1.10	1.00	1.64	0.98
CV(%)	10.95	13.13	12.24	13.92	12.10

Values in parentheses are square-root transformed values; Means followed by the same letter in a column are not significantly different from each other

6. **Karaikal** The incidence of stem borer (<4% DH, <7% WE), gall midge (<8% SS), leaf folder (<8% LFDL), whorl maggot (<2% WMDL), hispa (<2% HDL), BPH (<6/hill) and GLH (<1/hill) was low in all the treatments in BPT 5204 variety

Table 2.5.2.6. Pest incidence in natural farming trial at Karaikal, ***Kharif*** 2025

Treatments	%DH	%WE	%SS	%LFDL	%WMDL	%HDL	BPH	GLH
	55 DAT	Pre har	55 DAT	55 DAT	75 DAT	65 DAT	95 DAT	105 DAT
T1 = Control (No addition of any inputs)	3.8 (2.1)a	2.7 (1.7)ab	6.1 (2.7)a	3.6 (1.1)a	0.5 (1.0)a	1.3 (1.4)a	2.5 (1.6)b	1.3 (1.3)a
T2 = Complete Natural Farming (NF)	1.4 (1.3)a	2.1 (1.5)ab	5.1 (2.4)a	6.3 (2..6)a	0.7 (1.0)a	1.7 (1.5)a	9.3 (3.1)ab	0.5 (0.9)a
T3 = AI-NPOF package	3.4 (2.0)a	0.0 (0.7)b	8.6 (2.9)a	6.0 (2.5)a	0.8 (1.2)a	0.9 (1.2)a	10.0 (2.5)ab	1.0 (1.2)a
T4 = Integrated Crop Management with NF	3.2 (1.9)a	3.7 (2.1)ab	7.9 (2.9)a	7.2 (2.7)a	0.2 (0.8)a	0.9 (1.1)a	11.5 (3.1)ab	1.0 (1.2)a
T5 = Integrated Crop Management (50 % organic and 50% inorganic sources) with need-based pesticides	3.1 (1.9)a	6.4 (2.6)a	7.1 (2.9)a	4.7 (2.7)a	1.1 (1.2)a	0.9 (1.2)a	28.0 (4.9)a	1.3 (1.3)a
T6=RDF-Inorganic source	2.4 (1.6)a	1.8 (1.4)ab	6.8 (2.7)a	7.9 (2.9)a	0.4 (1.0)a	1.3 (1.3)a	10.5 (2.8)ab	0.3 (0.8)a
LSD(0.05)	0.96	1.38	0.97	1.13	0.68	0.69	2.84	0.66
CV(%)	23.29	16.72	15.43	19.80	30.10	23.66	21.33	15.63

Values in parentheses are square-root transformed values; Means followed by the same letter in a column are not significantly different from each other

7. **Maruteru**

The incidence of gall midge was significantly high in T1-control treatment (10.3% SS) as compared to all other treatments (5.3-5.9%SS) in the MTU 1443 variety (**Table 2.5.2.7**). BPH population was significantly high in T4- Integrated crop management with NF (81.3/5 hills) and was at par with T5-Integrated crop management with need-based pesticides (80.8/ 5 hills) and T3-AI-NPOF package (76.8/5 hills) as compared to T1-control (49.3/ 5 hills). The incidence of dead hearts (<6% DH), white ears (<9% WE), whorl maggot (<9% WMDL), hispa (<3% HDL) and WBPH (<7/5 hills) was low in all the treatments.

Table 2.5.2.7. Pest incidence in natural farming trial at Maruteru, ***Kharif*** 2025

Treatments	%DH		%WE	%SS	%LFDL	%WMDL	%HDL	BPH	WBPH
	35DAT	45DAT	Pr har	65DAT	75DAT	35DAT	45DAT	75DAT	75DAT
T1 = Control (No addition of any inputs)	5.2 (2.4)a	4.3 (2.2)a	8.2 (2.9)a	10.3 (3.3)a	3.5 (2.0)bc	2.6 (1.7)b	2.2 (1.6)a	49.3 (7.0)b	4.0 (2.1)a
T2 = Complete Natural Farming (NF)	2.8 (1.7)ab	2.0 (1.4)a	7.4 (2.8)a	5.9 (2.5)b	2.2 (1.7)cd	1.7 (1.5)bc	2.6 (1.7)a	64.0 (7.10)ab	4.3 (2.1)a
T3 = AI-NPOF package	1.0 (1.1)b	4.6 (2.2)a	7.8 (2.8)a	5.6 (2.4)b	1.4 (1.4)d	8.2 (2.9)a	0.7 (1.1)a	76.8 (8.8)a	3.3 (1.9)a
T4 = Integrated Crop Management with NF	4.9 (2.3)ab	5.0 (2.3)a	7.4 (2.8)a	5.3 (2.4)b	4.3 (2.2)b	0.6 (1.0)c	1.0 (1.2)a	81.3 (9.0)a	6.8 (2.7)a
T5 = Integrated Crop Management (50 % organic and 50% inorganic sources) with need-based pesticides	3.8 (2.0)ab	4.4 (2.2)a	6.4 (2.7)a	5.3 (2.4)b	10.3 (3.3)a	1.7 (1.5)bc	1.6 (1.4)a	80.8 (9.0)a	5.0 (2.3)a
LSD(0.05)	1.22	1.19	1.07	0.60	0.51	0.65	0.67	1.70	0.76
CV(%)	28.77	25.73	17.00	10.22	10.74	16.80	21.17	8.99	15.21

Values in parentheses are square-root transformed values; Means followed by the same letter in a column are not significantly different from each other

8. Moncompu

The incidence of major insect pests under different natural farming and integrated crop management practices in the Uma variety is presented in **Table 2.5.2.8**. The incidence of dead hearts at 45, 65, and 75 DAT ranged from 2.5–16.7%, 2.6–19.1%, and 4.1–15.2%, respectively. Although differences were not significant at 45 DAT, comparatively lower incidence was observed in T5 –ICM with need-based pesticides) (2.5%) and T4 – ICM with NF (5.7%). At 65 DAT, the lowest dead heart incidence was recorded in T4- ICM with NF (2.6%) and T5 – ICM with need-based pesticides (4.5%), whereas the T1 - control recorded higher incidence (19.1%). The control recorded the highest WE incidence (24.0%), while T5 – ICM with need-based pesticides recorded the lowest (5.3%), followed by T4 – ICM with NF (9.1%).

The lowest damage by leaf folder was recorded under T5 – ICM with need-based pesticides (2.4% and 2.2%), whereas T2 - complete natural farming recorded relatively higher incidence (10.9% and 7.4%). The hispa damage at 35 DAT was negligible and did not differ significantly among treatments.

The thrips damage at 15 DAT ranged from 8.4–34.0% and was comparatively higher under T2 - complete natural farming (34.0%), T4 - integrated crop management with NF recorded lower incidence (8.4%). The population of brown planthopper and white-backed planthopper at 85 and 95 DAT remained negligible in most treatments, except T2 - complete natural farming, which recorded 25.0 and 7.0 insects/hill, respectively.

Table 2.5.2.8. Pest incidence in natural farming trial at Moncompu, ***Kharif*** 2025

Treatments	%DH			%WE	%LFDL		%HDL	%THDL	BPH	WBPH
	45 DAT	65 DAT	75 DAT	Pre har	25 DAT	65 DAT	35 DAT	15 DAT	85 DAT	95 DAT
T1 = Control (No addition of any inputs)	16.7 (3.9)a	19.1 (4.4)a	15.2 (3.9)a	24.0 (4.9)a	5.3 (2.0)a	4.2 (2.2)bc	0.0 (0.7)a	22.1 (4.2)a	0.0 (0.7)b	0.0 (0.7)b
T2 = Complete Natural Farming (NF)	13.8 (3.8)a	11.8 (3.5)ab	11.9 (3.5)ab	15.2 (3.9)ab	10.9 (3.2)a	7.4 (2.8)a	0.0 (0.7)a	34.0 (5.6)a	25.0 (5.0)a	7.0 (2.7)a
T3 = AI-NPOF package	10.7 (3.2)a	7.4 (2.6)ab	11.7 (3.4)ab	16.1 (4.1)ab	8.5 (2.9)a	6.3 (2.6)ab	0.9 (1.1)a	22.5 (4.7)a	0.0 (0.7)b	0.0 (0.7)b
T4 = Integrated Crop Management with NF	5.7 (2.3)a	2.6 (1.5)b	7.6 (2.8)ab	9.1 (3.1)bc	9.4 (3.1)a	3.7 (2.1)bc	0.0 (0.7)a	8.4 (2.7)a	0.0 (0.7)b	0.0 (0.7)b
T5 = Integrated Crop Management (50 % organic and 50% inorganic sources) with need-based pesticides	2.5 (1.5)a	4.5 (2.2)b	4.1 (2.1)b	5.3 (2.4)c	2.4 (1.3)a	2.2 (1.6)c	0.0 (0.7)a	16.2 (3.6)a	0.0 (0.7)b	0.0 (0.7)b
LSD (0.05)	2.43	2.06	1.38	1.18	2.67	0.58	0.45	4.41	0.29	0.55
CV (%)	16.74	12.21	19.41	14.27	17.31	11.29	15.97	17.15	8.11	12.21

Values in parentheses are square-root transformed values; Means followed by the same letter in a column are not significantly different from each other

9. Pantnagar

The incidence of dead hearts was relatively high in T3- AI-NPOF package (13.1% DH) at 35 DAT and in T2-complete natural farming (12.8% DH) at 45 DAT and was at par with all the other treatments at both the stages (**Table 2.5.2.9**). The incidence of white ears (<8% WE), leaf folder <5% LFDL), whorl maggot (<5% WMDL), hispa (<5% HDL), BPH (<7/hill) and WBPH (<1/hill) was low in all the treatments to draw valid conclusions in Pant Dhan - 24 variety grown at this location.

Table 2.5.2.9. Pest incidence in natural farming trial at Pantnagar, ***Kharif*** 2025

Treatments	%DH		%WE	%LFDL	%WMDL	%HDL	BPH	WBPH
	35 DAT	45 DAT	Pre har	45 DAT	45 DAT	45 DAT	95 DAT	95 DAT
T1 = Control (No addition of any inputs)	9.9 (3.2)a	9.5 (3.1)a	7.6 (2.9)a	3.6 (2.0)a	4.4 (2.2)a	3.6 (2.0)a	23.8 (4.9)a	1.3 (1.3)a
T2 = Complete Natural Farming (NF)	10.0 (3.2)a	12.8 (3.7)a	5.1 (2.4)a	4.0 (2.1)a	3.8 (2.1)a	3.6 (2.0)a	31.0 (5.6)a	1.3 (1.3)a
T3 = AI-NPOF package	13.1 (3.7)a	8.2 (2.9)a	6.0 (2.5)a	3.2 (1.9)a	3.0 (1.9)a	4.6 (2.2)a	32.5 (5.7)a	1.5 (1.4)a
T4 = Integrated Crop Management with NF	8.3 (2.9)a	12.4 (3.6)a	3.1 (1.9)a	3.6 (2.0)a	3.8 (2.0)a	3.7 (2.0)a	32.0 (5.7)a	3.5 (1.9)a
T5 = Integrated Crop Management (50 % organic and 50% inorganic sources) with need-based pesticides	7.4 (2.8)a	11.8 (3.5)a	2.3 (1.7)b	4.2 (2.2)a	3.0 (1.9)a	3.9 (2.1)a	30.3 (5.5)a	2.0 (1.5)a
T6=RDF-Inorganic source	9.1 (3.1)a	8.8 (3.1)a	4.2 (2.0)a	3.3 (2.0)a	4.1 (2.2)a	3.9 (2.1)a	31.5 (5.6)a	2.3 (1.5)a
LSD(0.05)	1.10	1.15	1.13	0.72	0.63	0.69	0.99	1.02
CV(%)	15.27	15.24	20.28	15.55	13.66	14.52	7.85	20.31

Values in parentheses are square-root transformed values; Means followed by the same letter in a column are not significantly different from each other

10. Pattambi

Pest incidence under different natural farming and crop management practices was assessed with Aishwarya variety at this location. The incidence of **dead hearts caused by stem borer at 30 DAT** ranged from **0.7–18.4%** and differed significantly among treatments (**Table 2.5.2.10**).

Table 2.5.2.10. Pest incidence in natural farming trial at Pattambi, ***Kharif*** 2025

Treatments	%DH	%WE	%SS	%LFDL	%WMDL	%CWDL
	30 DAT	Pre har	50 DAT	75 DAT	30 DAT	50 DAT
T1 = Control (No addition of any inputs)	0.7 (1.0)c	16.0 (4.0)a	39.6 (6.3)a	11.5 (3.2)ab	4.9 (2.3)a	4.7 (2.2)a
T2 = Complete Natural Farming (NF)	16.8 (4.1)a	21.6 (4.7)a	22.1 (4.6)a	7.3 (2.6)ab	1.9 (1.5)b	3.7 (2.0)ab
T3 = AI-NPOF package	18.4 (4.3)a	20.2 (4.6)a	32.0 (5.7)a	3.8 (1.8)b	3.4 (1.9)ab	0.0 (0.7)c
T4 = Integrated Crop Management with NF	10.8 (3.3)ab	18.1 (4.3)a	28.6 (5.4)a	18.5 (4.2)ab	2.5 (1.7)b	0.8 (1.1)bc
T5 = Integrated Crop Management (50 % organic and 50% inorganic sources) with need-based pesticides	4.0 (2.0)bc	19.7 (4.5)a	33.9 (5.8)a	25.0 (4.9)a	3.5 (2.0)ab	1.0 (1.2)abc
LSD(0.05)	1.35	1.00	1.94	3.16	0.55	1.07
CV(%)	20.26	10.01	15.47	11.99	12.78	13.01

Values in parentheses are square-root transformed values; Means followed by the same letter in a column are not significantly different from each other

The T1-control recorded the lowest dead heart incidence (0.7% DH), whereas T3-AI-NPOF package (18.4% DH) and T2-complete natural farming (16.8%) recorded higher incidence. The incidence of white ear heads at pre-harvest ranged from 16.0–21.6% and did not differ significantly among treatments. The incidence of silver shoots caused by gall midge at 50 DAT varied from 22.1–39.6%, with no significant differences among treatments, although the control recorded relatively higher incidence (39.6% SS). The leaf folder damage at 75 DAT was significantly lower in the T3-AI-NPOF package (3.8% LFDL) compared to T5- Integrated crop management with need-based pesticides (25.0%), while other treatments were at par. The incidence of whorl maggot and caseworm was low (<5%) in all the treatments.

11. Raipur

The incidence of white ear heads at pre-harvest ranged from 20.1 to 22.6% and did not differ significantly among treatments in Chhattisgarh Deobhog variety (**Table 2.5.2.11**). Similarly, leaf folder damage at 60 DAT (2.9–6.9% LFDL), whorl maggot damage at 60 DAT (16.6–29.7% WMDL), at 70 DAT (3.8 – 15% WMDL), hispa damage at 70 DAT (11.1–13.6%) were statistically at par across treatments. The population of brown planthopper (BPH) at 100 DAT varied significantly among treatments but was low in all the treatments. WBPH population varied from 4.8 – 6.5 and was at par across treatments. GLH population was low (<5/hill) across treatments. Among natural enemies, spider population per hill differed significantly across treatments, while the coccinellid population per hill was at par in all the treatments.

Table 2.5.2.11. Pest incidence in natural farming trial at Raipur, ***Kharif*** 2025

Treatments	%WE	%LFDL	%WMDL		%HDL	BPH	WBPH	GLH	Spiders	Coccinellids
	Pre har	60 DAT	60 DAT	70 DAT	70 DAT	100 DAT	100 DAT	100 DAT	100 DAT	60 DAT
T1 = Control (No addition of any inputs)	20.7 (4.6)a	5.1 (2.3)a	17.1 (4.1)a	12.7 (3.6)a	12.4 (3.6)a	3.3 (1.9)bc	4.8 (2.3)a	4.0 (2.1)a	2.8 (1.4)a	1.8 (1.4)a
T2 = Complete Natural Farming (NF)	22.3 (4.8)a	4.5 (2.2)a	29.7 (5.5)a	3.8 (13.6)a	11.1 (3.4)a	4.5 (2.2)bc	6.3 (2.6)a	3.3 (1.9)a	1.5 (1.0)b	2.8 (1.8)a
T3 = AI-NPOF package	20.2 (4.6)a	2.9 (1.8)a	16.9 (4.1)a	13.2 (3.8)a	12.0 (3.5)a	8.5 (2.9)a	6.5 (2.6)a	3.0 (1.8)a	2.3 (2.4)a	2.3 (1.7)a
T4 = Integrated Crop Management with NF	22.6 (4.8)a	6.1 (2.5)a	19.6 (4.4)a	15.0 (3.9)a	13.6 (3.8)a	5.0 (2.3)abc	6.3 (2.6)a	3.0 (1.9)a	2.0 (1.4)ab	1.0 (1.1)a
T5 = Integrated Crop Management (50 % organic and 50% inorganic sources) with need-based pesticides	20.1 (4.5)a	6.3 (2.6)a	16.6 (4.1)a	13.3 (3.7)a	11.2 (3.4)a	3.0 (1.8)c	5.5 (2.4)a	3.5 (2.0)a	2.0 (0.9)b	2.0 (1.4)a
T6=RDF - Inorganic source	21.1 (4.6)a	6.9 (2.7)a	18.5 (4.3)a	13.3 (4.0)a	12.4 (3.6)a	6.3 (2.6)ab	6.5 (2.6)a	4.0 (2.1)a	3.3 (1.3)b	0.5 (1.0)a
LSD(0.05)	0.56	0.97	1.43	0.31	0.90	0.68	0.74	0.70	0.99	1.30
CV(%)	5.23	17.88	14.13	11.76	11.06	13.05	12.91	15.65	21.22	21.04

Values in parentheses are square-root transformed values; Means followed by the same letter in a column are not significantly different from each other

12. Titabar

The incidence of dead hearts (<8% DH), white ears (<3% WE), gall midge (<6% SS), leaf folder (<6% LFDL), whorl maggot (<7% WMDL), and thrips (,5% THDL) was low in all the treatments in Keteki Joha variety grown in this trial at this location (**Table 2.5.2.12**).

Table 2.5.2.12. Pest incidence in natural farming trial at Titabar, ***Kharif*** 2025

Treatments	%DH	%WE	%SS	%LFDL	%WMDL	%THDL
	35 DAT	Pre har	85 DAT	35 DAT	45 DAT	45 DAT
T1 = Control (No addition of any inputs)	7.1 (2.6)a	2.5 (1.7)a	5.7 (2.5)a	5.8 (2.4)a	6.3 (2.4)a	4.7 (2.1)a
T2 = Complete Natural Farming (NF)	5.4 (2.3)a	2.2 (1.6)a	2.3 (1.5)ab	5.3 (2.2)a	3.7 (1.9)a	3.9 (1.8)a
T3 = AI-NPOF package	6.2 (2.4)a	2.8 (1.6)a	0.0 (0.7)b	3.3 (1.8)a	3.1 (1.8)a	0.0 (0.7)a
T4 = Integrated Crop Management with NF	3.4 (1.7)a	4.0 (2.1)a	2.2 (1.5)ab	3.4 (1.7)a	3.7 (1.9)a	3.5 (1.7)a
T5 = Integrated Crop Management (50 % organic and 50% inorganic sources) with need-based pesticides	5.0 (2.2)a	2.2 (1.5)a	1.1 (1.1)ab	2.7 (1.6)a	2.7 (1.6)a	4.0 (1.8)a
LSD(0.05)	2.65	1.42	1.48	2.51	2.27	2.65
CV(%)	12.94	16.78	15.69	17.66	12.95	12.80

Values in parentheses are square-root transformed values; Means followed by the same letter in a column are not significantly different from each other

Across the locations, the incidence of dead hearts caused by stem borer was low in T5-ICM with pesticides (4.1% DH), followed by T4- ICM with NF (6.4% DH) and T2-complete NF (**Figure 2.5.2.1**). The incidence was high in T1-control (9.5% DH), followed by T3-AI-NPOF package (7.8% DH) and T6-RDF (7.6% DH).

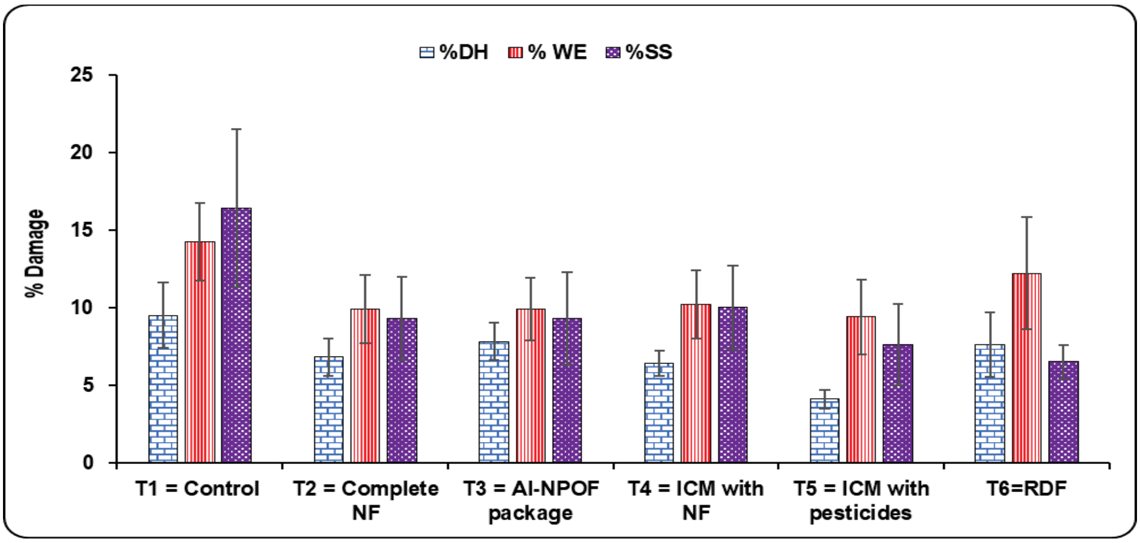


Figure 2.5.2.1. Incidence of stem borer and gall midge in different treatments across locations

Similarly, white ears incidence was low in T5-ICM with pesticides (9.4% WE), followed by T2-complete NF (9.9% WE) and T3-Ai-NPOF package (9.9% WE). Maximum incidence of white ears was observed in T1- control (14.2% WE), followed by T6-RDF (12.2% WE). The incidence of silver shoots caused by gall midge was low in T6-RDF treatment (6.5% SS), followed by T5-ICM with pesticides (7.6% SS). Gall midge incidence was high in the T1-control (16.4% SS), followed by T4-ICM with NF (10% SS).

Among foliage-feeding insects, leaf folder incidence was low in the T3-AI-NPOF package (4.6% LFDL), followed by T2-complete NF (4.8% LFDL). Leaf folder incidence was high in T1-control (8.3% LFDL), followed by T6-RDF (6.7% LFDL). The incidence of whorl maggot ranged from 3.8 to 9.8% with minimum damage in T5-ICM with pesticides and maximum in T6-RDF (**Figure 2.5.2.2**). The incidence of caseworm (0–4.7% CWDL), hispa (3.1 – 4.7% HDL), thrips (0-5.1% THDL) and rice skipper (1.2-4.7% RSDL) was low in all the treatments. Grasshopper incidence was low in T2-complete NF (15.4% GHDL), followed by T5-ICM with pesticides (18% GHDL) as compared to high incidence in T1-control (24.8% GHDL) followed by T3-AI-NPOF package (19.2% GHDL).

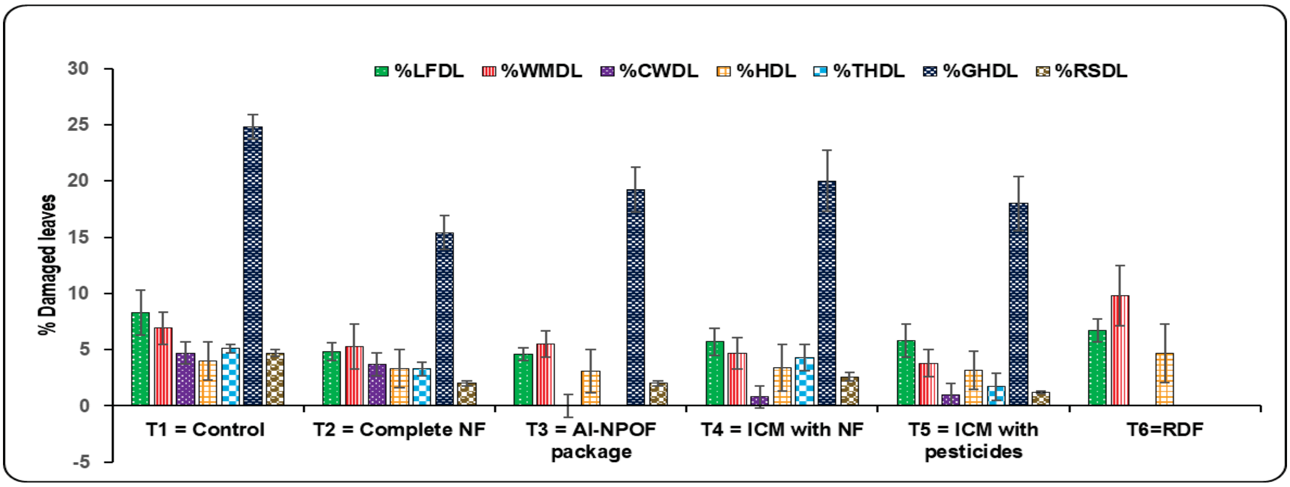


Figure 2.5.2.2. Incidence of foliage-feeding insects in different treatments across locations

Among the sucking pests of rice, BPH incidence was high in T1-control (83.7/5 hills) while it was low in T6-RDF (30/5 hills). In all the other treatments, the population varied from 36.1 to 38.8/ 5 hills (**Figure 2.5.2.3**). Low WBPH incidence was reported across treatments, varying from 2.9 to 39.2/ 5 hills. Low GLH incidence (1.9 – 2.7/ 5 hills) was reported from different treatments.

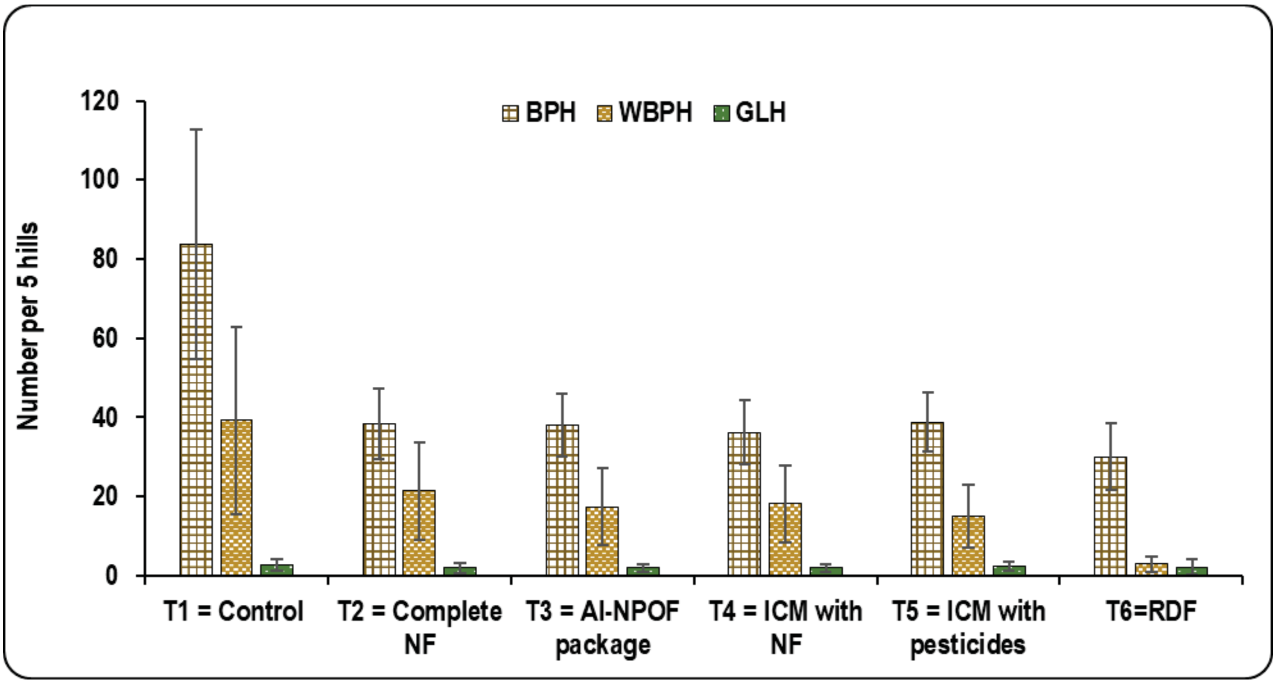


Figure 2.5.2.3. Incidence of sucking pests in different treatments across locations

Pest Incidence in Natural Farming (PINF) trial was conducted at 12 locations during Kharif 2025. This is a collaborative trial with soil science and Agronomy. Across locations, the incidence of stem borer, gall midge, leaf folder, whorl maggot, hispa, thrips, caseworm, grasshopper, rice skipper, BPH, WBPH and GLH was observed in all the treatments. The incidence of thrips was observed only at Titabar, the incidence of grasshopper and rice skipper was observed only at Khudwani. Overall, the incidence of pests was low in T5-Integrated crop management with need-based pesticides and high in T1-control. However, in majority of the locations the incidence in T2- Complete natural farming, T3 – AI-NPOF package and T4- Integrated crop management with NF was between T1-control and T5-Integrated crop management with need-based pesticides and needs to be studied in depth in relation to the inputs used and the time and frequency of application.

2.5.3 Evaluation of Pheromone Blends for Insect Pests of Rice (EPBI)

Monitoring insect pests is essential for developing effective Integrated Pest Management (IPM) strategies in rice. Sex pheromones offer strong potential for both surveillance and management of key rice pests because they are species-specific and safe to natural enemies, making them compatible with other IPM components. The present ongoing trial aims to evaluate conventional and slow-release sex pheromone formulations for the management of two major rice pests, namely the yellow stem borer and the rice leaf folder.

The trial was conducted at 14 locations, *viz.,* Aduthurai, Brahmavar, Chinsurah, Coimbatore, Jagdalpur, Jagtial, Karaikal, Ludhiana, Maruteru, Navsari, Pusa, Rajendranagar, Raipur and Titabar during *Kharif* 2025 and two locations, Gangavathi and Pattambi during *Rabi* 2024-2025. The field trial included two formulations, namely normal and slow-release, for monitoring the yellow stem borer (YSB), *Scirpophaga incertulas*, and the rice leaf folder (RLF), *Cnaphalocrocis medinalis*. All lures were placed in delta traps and installed in the field, with five traps randomly distributed over an acre area. Observations on adult moth catches in each trap were recorded at weekly intervals from trap installation until harvest. Simultaneously, field population assessments were carried out through visual counts for yellow stem borer, the disturb-and-count method (DCM) for leaf folder, and sweep net and light trap (LT) catches for both pests. The results of the study during are presented pest-wise below.

Yellow stem borer (YSB)

Two-way ANOVA revealed significant effects of location ($F=11.81$, $p<0.001$), formulations ($F=15.30$, $p=0.00015$), and their interaction ($F=2.18$, $p=0.012$), indicating that yellow stem borer catches were significantly higher under the slow-release formulations compared to the normal formulations, with the magnitude of increase varying across locations.

The mean cumulative catches of YSB across locations were significantly higher in slow-release formulations (14/trap) as compared to normal formulations (**Figure 2.5.3.1**).

Across locations and formulations, the cumulative YSB catch per trap was generally higher under slow-release formulations compared to normal formulations, with pronounced catches at PSA (49), LDN (37), CHN (23), PTB (20) and TTB (18), while only JDP showed lower incidence under slow-release formulation (7), indicating greater efficiency of slow-release formulations to stem borer (**Figure 2.5.3.2**). Out of 16 locations, 11 locations had significantly higher YSB catches in slow-release formulations as compared to normal formulations. At ADT and KRK, the catches were nil in both the formulations.

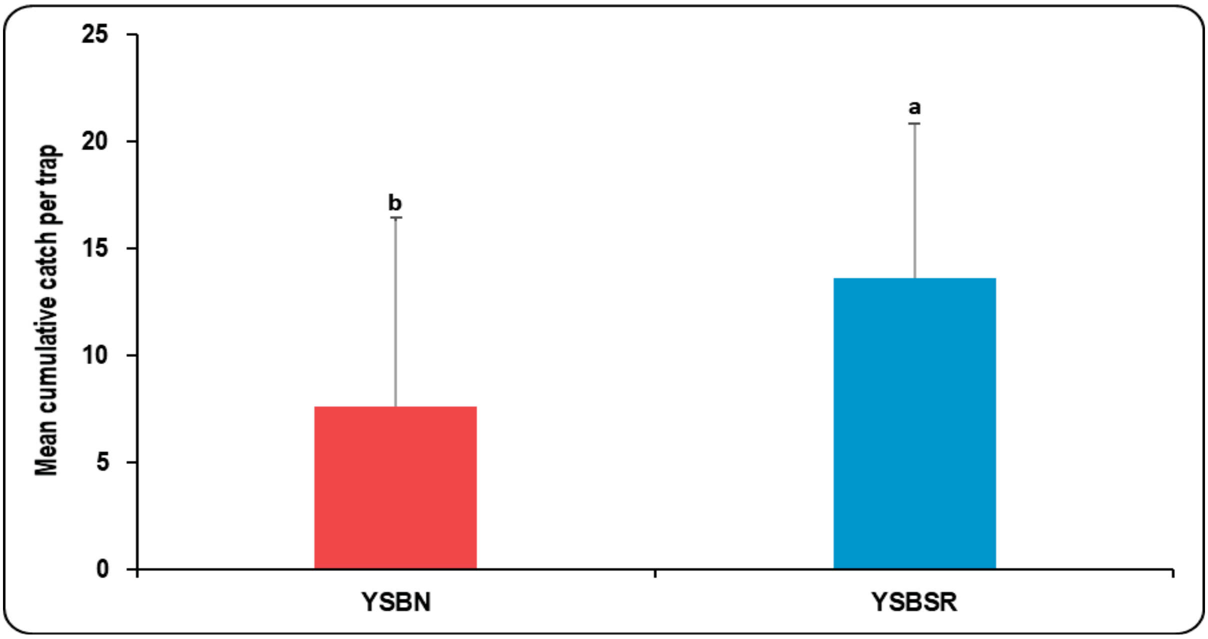


Fig. 2.5.3.1. Mean cumulative catch of YSB across locations in different pheromone formulations

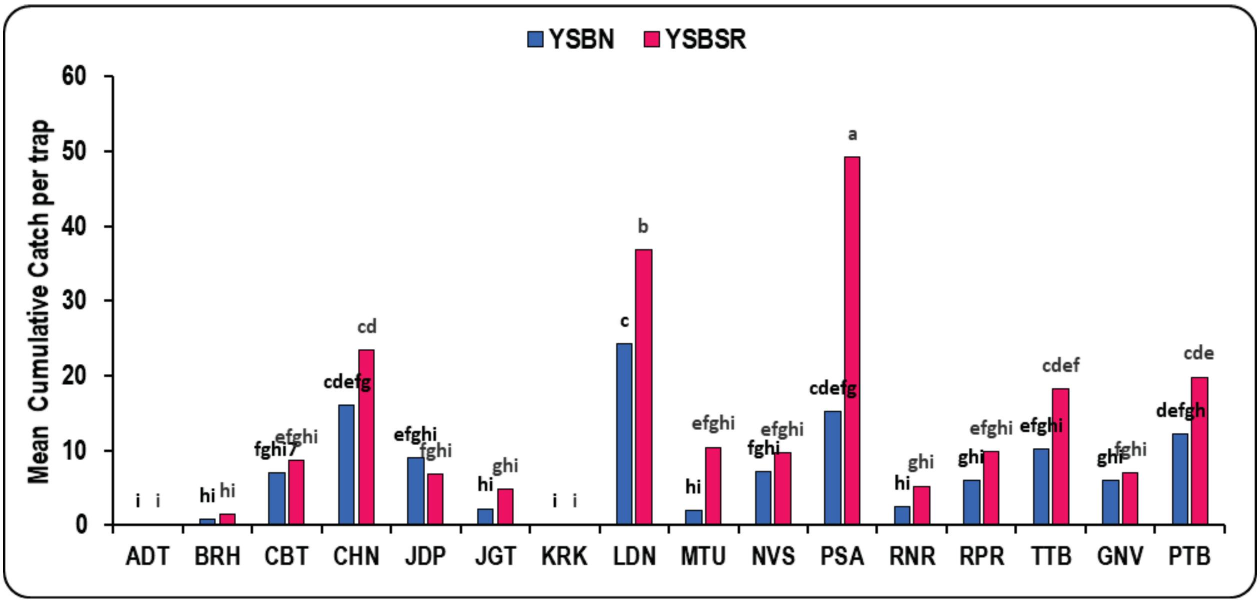


Fig. 2.5.3.2. Mean cumulative catch of YSB at each location in normal and slow-release pheromone formulations

Field population assessments indicated that the mean number of insect catches in sweep net were highest at RNR (22), followed by MTU (21), PSA (18), and NVS (11). A similar trend was observed in visual counts, which were higher at MTU (19), RNR (16), PSA (13), CBT (13), and JDP (11). Light trap catches were also comparatively high at MTU (91), followed by PTB (72), JDP (36), RPR (21), GNV (21) and CHN (20) (**Figure 2.5.3.3**). These catches comprised both male and female moths. However, pheromone trap catches at these locations were generally low, except at PSA and CHN, where relatively higher catches were recorded.

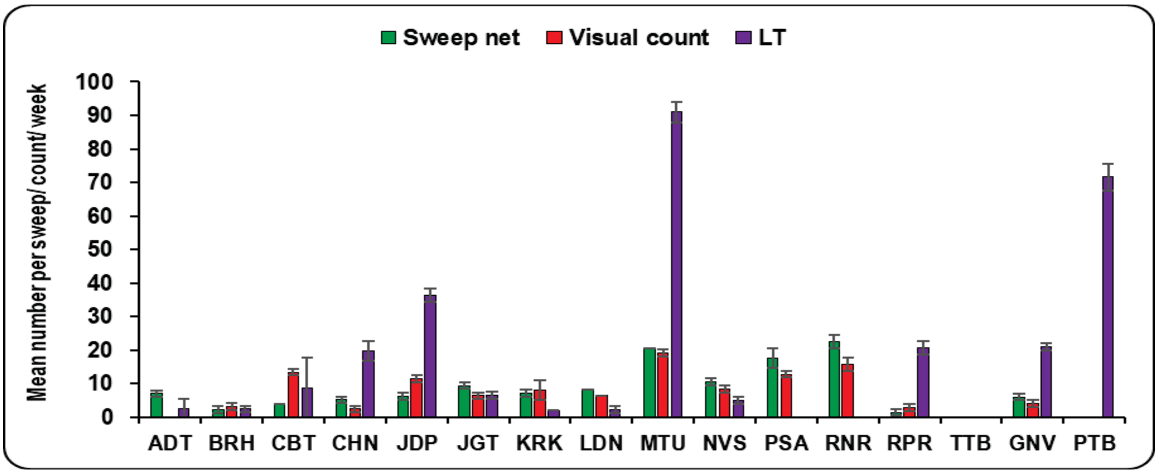


Fig. 2.5.3.3. Field population assessments of YSB at different locations

Rice Leaf folder (RLF)

Two-way ANOVA revealed that both location (F = 52.31, $p<0.0001$) and formulation type (F = 101.12, $p<0.0001$) significantly influenced RLF catches. A significant interaction between location and response type (F=8.78, $p<0.0001$) indicates that the magnitude and direction of differences between RLFN and RLFSR varied across locations. This suggests strong location-specific response patterns, highlighting the importance of environmental or site-specific factors in determining the catches in traps.

The overall mean cumulative catch/ trap in a season in RLFSR (8.92 ± 0.68) was significantly higher than RLFN (6.63 ± 0.62) across locations (**Figure 2.5.3.4**). This supports the significant main effect of response type observed in the two-factor ANOVA.

Across locations and formulations, RLF catch was significantly higher in slow-release formulations at PSA (26) and CHN (17), whereas at RNR (21), JDP (16) and TTB (11), the catch was significantly higher in normal formulations (**Figure 2.5.3.5**). At all other locations, the catch was at par in both the formulations.

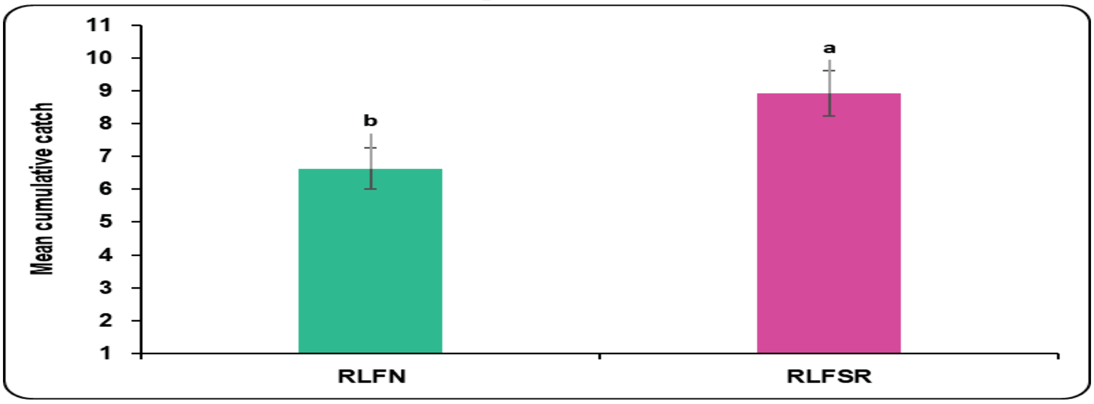


Figure 2.5.3.4. Mean cumulative catch of RLF across locations in different pheromone formulations

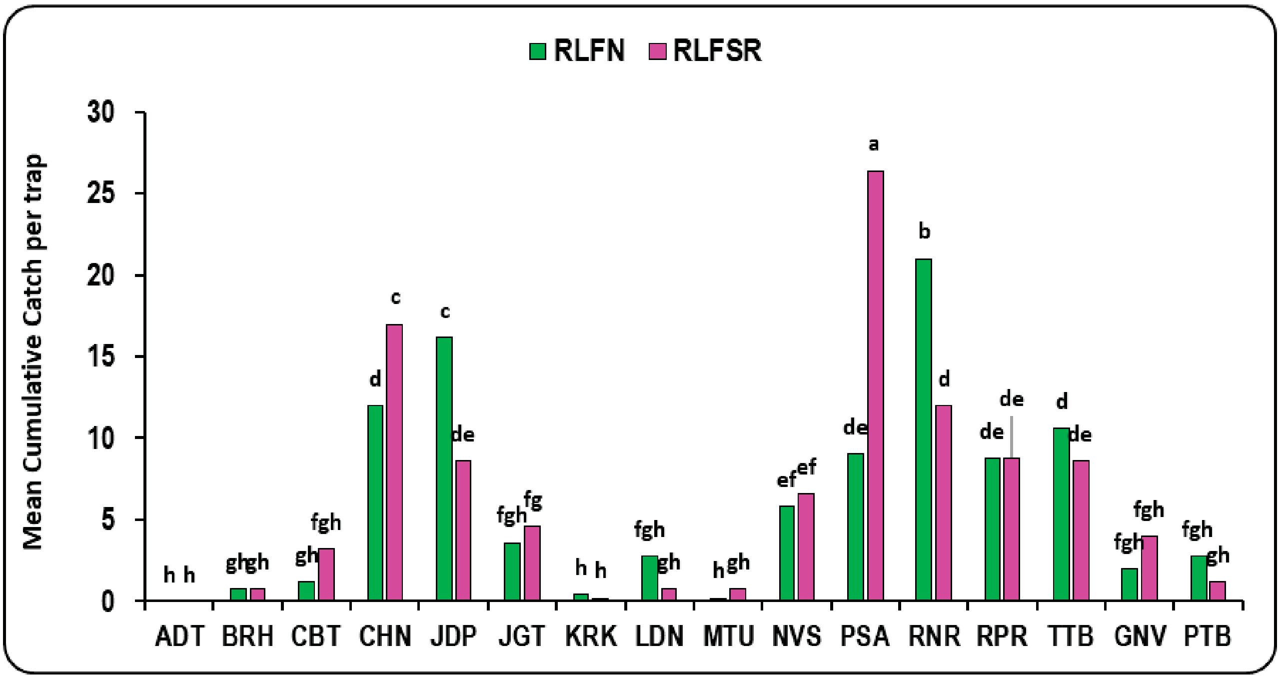


Fig. 2.5.3.5. Mean cumulative catch of RLF at each location in normal and slow-release pheromone formulations

Field population assessments indicated that sweep net catches of RLF were high at RNR (81), followed by RPR (31), ADT (20), JDP (20) and MTU (18). Similarly, disturb and count method (DCM) recorded maximum population at RNR (60), RPR (34), JDP (34) and MTU (14) (**Figure 2.5.3.6**). Light trap catches were high at JDP (67) followed by MTU (49). These catches comprised both male and female moths. However, pheromone trap catches at RNR and JDP were high in normal formulations while at other locations, catches were low in both the formulations.

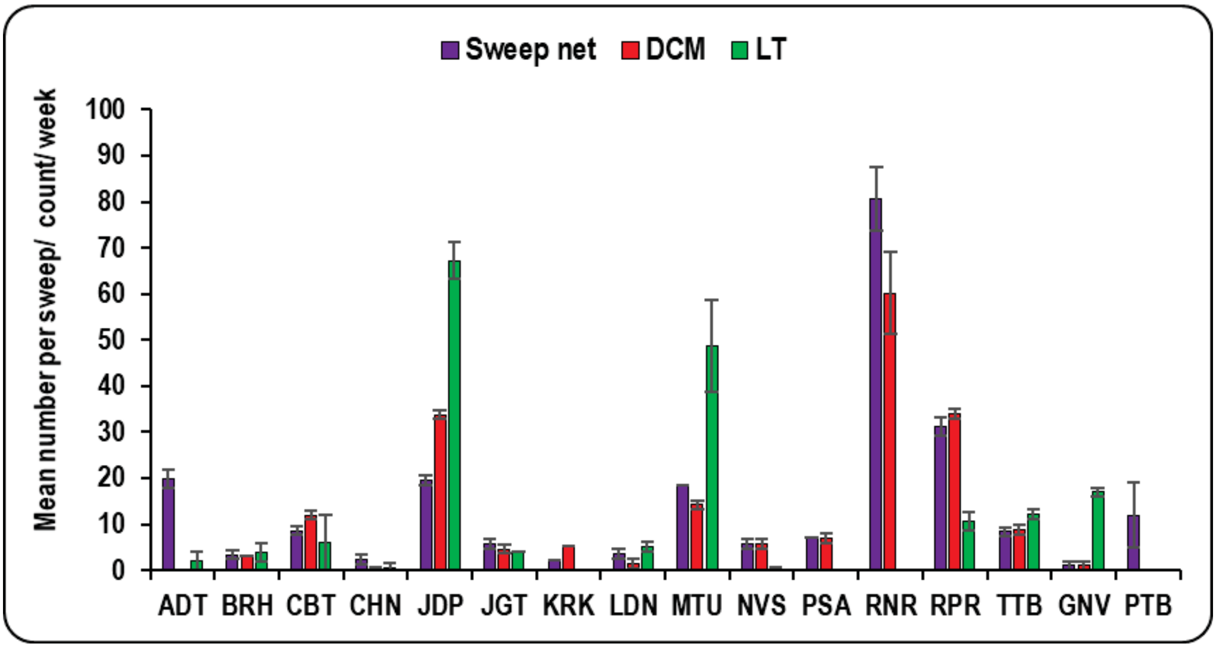


Fig. 2.5.3.6. Field population assessments of RLF at different locations

Evaluation of pheromone blends for insect pests of rice (EPBI) trial was conducted at 14 locations during Kharif 2025 and two locations during Rabi 2024-2025. The field trial included two formulations, namely normal (N) and slow-release (SR), for monitoring the yellow stem borer (YSB), and the rice leaf folder (RLF). The mean cumulative catches of YSB/season across locations were significantly higher in slow-release formulations (14 ± 1.2) as compared to normal formulations (8 ± 0.8). Across locations and formulations, YSB catch was generally higher under slow-release formulations compared to normal formulations at 11 locations, with pronounced catches per trap at PSA (49), LDN (37), CHN (23), PTB (20) and TTB (18). The overall mean cumulative catch/season in RLFSR (8.92 ± 0.68) was significantly higher than RLFN (6.63 ± 0.62) across locations. RLF catch was significantly higher in slow-release formulations at PSA (26) and CHN (17), whereas at RNR (21), JDP (16) and TTB (11), the catch was significantly higher in normal formulations. At all other locations, the RLF catch was at par in both the formulations. Field population assessments were carried out through visual counts for yellow stem borer, the disturb-and-count method (DCM) for leaf folder, and sweep net and light trap (LT) catches for both pests.

2.6 INTEGRATED PEST MANAGEMENT STUDIES

2.6 Integrated Pest Management in Direct Seeded Rice (IPM-DSR)

Rice is a staple crop in India, playing a crucial role in ensuring food security and supporting rural livelihoods. Traditionally, rice cultivation is dominated by the transplanted puddled rice (TPR) system, which involves raising seedlings in nurseries and transplanting them into puddled, continuously flooded fields. Although widely practiced, this method is highly labour-intensive, requires large quantities of water, increases production costs, and often leads to soil structural degradation over time.

In response to these constraints, Direct-Seeded Rice (DSR) has emerged as a promising alternative. In this system, rice is established by direct sowing of seeds in the main field—through dry seeding, wet seeding, or drum seeding—thereby eliminating the need for nursery raising and transplanting. DSR offers several advantages, including reduced water use, lower labour requirements, early crop maturity, and decreased cultivation costs. However, the system also presents certain challenges, such as severe weed infestation, greater exposure to insect pests and diseases, and the need for precise nutrient, water, and crop management.

With increasing labour shortages and declining water availability, several rice-growing regions in India are gradually adopting DSR. In this context, the present trial was formulated in collaboration with plant pathologists and agronomists to validate suitable Integrated Pest Management (IPM) strategies under DSR conditions. The objective was to evaluate a range of compatible options and demonstrate to farmers holistic and economically viable approaches for managing insects, diseases, and weeds in the DSR ecosystem through participatory approach.

During *Kharif* 2025, the IPM -DSR trial was conducted in 12 locations in 22 farmers' fields. The details of pest management practices followed and pest incidence zone-wise, are discussed below:

Zone II – Northern areas

The IPM DSR trial was conducted only at Kaul in this zone. The IPM DSR practices and farmers' practices followed are given below:

Practices followed in IPM DSR trial in Zone II (Northern areas)***, Kharif*** 2025

	IPM Practices	Farmer Practices (FP)
	KAUL	
Area	1 acre	1 acre
Variety	PB 1847	PB 1847
Nursery	• Seed treatment with Trichoderma	
Main Field	• Application of 25 kg DAP, 40 kg Urea, Zinc sulphate (21%) 10 kg • Application of pre-emergence weedicide, Pendimethalin @ 1300 ml/ acre • At 20-30 DAS, applied Nominee gold (Bispyribac sodium) @ 100ml/ acre • Release of *Trichogramma chilonis* 3-4 times @ 40000/ acre • Applied urea @ 40 kg as top dressing	• Application of 50 kg DAP, 80 kg Urea, Zinc sulphate (21%) 10 kg • Application of pre-emergence weedicide, Pendimethalin @ 1300 ml/ acre • Application of Nominee gold (Bispyribac sodium) @ 100ml/ acre • Application of cartap hydrochloride 50 SP @ 400 g/ acre • Applied urea @ 40 kg as top dressing

	• 2nd release of *Trichogramma chilonis* @ 40000/ acre. • Installation of bamboo bird perches @ 10/ acre • Sprayed 0.5% FeS + 2.5% N • At 60-90 DAS, sprayed Flubendiamide 20 WG @ 50 g/ acre • Sprayed copper oxychloride + Streptocycline for grain discolouration • At 90 DAS, sprayed Incipio (Isocycloceram 18.1%) @ 220 ml/ acre for stem borer management • Sprayed copper oxychloride for grain discolouration	• At 35-50 DAS, sprayed Flubendamide @ 50 g/acre + Lambda Cyhalothrin @ 30 ml/ acre • Applied urea @ 40 kg as top dressing • Sprayed Amistar top @ 200 ml/ acre + Sprayed copper oxychloride + Streptocycline • Applied Thiamethoxam 25 WG @ 40 g/ acre • Applied Pexalon (Triflumezopyrim 10% SC) @ 100 ml/ acre • Sprayed Hexaconazole @ 400 ml/ acre & Thiamethoxam 25% WG @ 40 g/ acre • Sprayed copper oxychloride for grain discolouration

Incidence of stem borer, leaf folder, BPH and WBPH was observed at Kaul in both IPM and FP plots in the wet DSR system in PB1847 variety (**Table 2.6.1.1**). However, the incidence of insect pests was low in both systems. Grain yield was high in the FP plot (4776 kg/ ha) as compared to the IPM plot (4566 kg/ ha). Nevertheless, the low cost of cultivation in the IPM plot resulted in a high BC ratio (3.1) as compared to farmers' practices (2.4).

Table 2.6.1.1 Insect pest incidence in IPMDSR trial at Kaul in Zone II (Northern areas), ***Kharif 2025***

Treat ments	% DH	% WE	%LFDL	BPH	WBPH	Yield	Gross Returns (Rs.)	Cost of Cultiva tion (Rs)	Net Returns (Rs.)	BC Ratio
	62 DAS	Pre har	83 DAS	**118 DAS**	**111 DAS**	Kg/ ha				
IPM	0.0 ± 0.0	2.3 ± 0.5	0.6 ± 0.1	2.6 ± 0.5	1.0 ± 0.4	4568 ± 79	150744	48775	101969	3.1
FP	1.4 ± 0.6	2.6 ± 0.2	0.9 ± 0.2	4.2 ± 0.6	1.0 ± 0.6	4776 ± 81	157608	66055	91553	2.4

Price of paddy = 3300 Rs/ q

The adoption of IPM practices were found to reduce the disease progression *viz.*, leaf blast (IPM – 7.00; FP-11.34), bacterial blight (IPM – 20.58; FP-39.48), sheath blight (IPM – 14.35; FP-17.85) and brown spot (IPM – 27.44; FP-35.84). In the IPM field, the disease incidence of false smut was 4.29% as compared to 8.75% in the Farmers field. In addition, the number of smut balls/Hill was 12 in number, as against 36 in the Farmers Practice adopted field (**Table 2.6.1.2**). The fungicides *viz.*, copper oxychloride + streptocycline was sprayed for the management of bacterial blight; and propiconazole sprayed once for leaf blast, false smut and brown spot. Whereas, in the farmer's field, fungicides viz., azoxystrobin + difenaconazole, copper oxychloride + streptocycline, hexaconazole were sprayed more than once.

Table 2.6.1.2: AUDPC values based on disease severity (%) at Kaul, ***Kharif '***2025

Location	Treatment	Kaul				
		AUDPC Values				DI (%)
		LB	BB	SHB	BS	FS
L1	IPM	7.00	20.58	14.35	27.44	4.29
	FP	11.34	39.48	17.85	35.84	8.75

L- Location; IPM – Integrated Pest Management Practices; FP- Farmer Practices; LB- Leaf Blast; BB- Bacterial blight; SHB- Sheath Blight; BS- Brown spot; FS- False smut; DI- Disease Incidence

Zone III – Eastern areas

In this zone, IPMDSR was conducted at Chinsurah only. The practices followed in IPM -DSR and farmers' practices are given below:

Practices followed in IPM DSR trial in Zone III (Eastern areas), ***Kharif*** 2025

	IPM Practices	Farmer Practices (FP)
CHINSURAH		
Area	1 acre	1 acre
Variety	Pratiksha	Pratiksha
Fertilizer	• Applied N:P_2O_5:K_2O @ 80:40:40 kg/ ha.. Applied 1/3 N, total P and K as basal.	Applied N:P_2O_5:K_2O @ 80:40:40 kg/ ha
Main Field	• At 15 DAS, pheromone trap with 'Scirpo' lure @ 3 traps/ acre for stem borer monitoring were installed. During installation, the trap was kept 5 inches above the crop canopy. The lure was changed after 3 weeks. • *Trichogramma japonicum* against yellow stem borer and *Trichogramma chilonis* against leaffolder were released as Tricho card. Released 5 times at 40,000/ acre, starting from 15 DAT. Tricho cards containing 1,000 parasitised eggs were stapled to the underside of leaves at 40 points uniformly distributed across 1 acre area. • Applied Chlorantraniliprole (Rynaxypyr) 18.5 SC at 60 ml /acre • Bird perchers @ 3 Nos./acre were installed	• Cartap hydrochloride 50 SP at 200 g/ acre was applied twice at 40 & 60 DAS.

The incidence of dead hearts under IPM remained low at 3.3, 5.1 and 5.2% at 45, 55 and 65 DAS, respectively, whereas significantly higher values were recorded under farmers' practice (12.8, 25.3 and 28.4% DH, respectively). Similarly, white ear incidence at pre-harvest was considerably lower under IPM (5.7%) compared to FP (21.4%). The leaf folder damage at 45 DAS and whorl maggot damage at 55 DAS were also lower under IPM (1.9% and 3.3%, respectively) than under FP (5.0% and 6.1%). Reduced pest pressure under IPM translated into higher grain yield, with IPM recording 5496 kg/ha, compared to 4960 kg/ha under farmers' practice (**Table 2.6.1.3**).

Economic analysis further demonstrated the advantage of IPM. The gross returns were higher under IPM (Rs. 131,354/ha) than FP (Rs. 118,544/ha). Although the cost of cultivation under IPM (Rs. 64,205/ha) was slightly lower than FP (Rs. 65,820/ha), IPM resulted in substantially higher net returns (Rs. 67,149/ha) compared to FP (Rs. 52,724/ha). Consequently, the benefit–cost ratio was higher under IPM (2.05) than farmers' practice (1.80), indicating the economic superiority of IPM along with effective pest suppression and improved productivity.

Table 2.6.1.3. Insect pest incidence in IPM DSR trial at Chinsurah in Zone III (Eastern areas), ***Kharif*** 2025

Treatments	% DH			% WE	% LFDL	% WMDL	Yield	Gross returns (Rs.)	Cost of cultivation (Rs.)	Net Returns (Rs.)	BC ratio
	45 DAS	55 DAS	65 DAS	Pre har	45 DAS	55 DAS	kg/ ha				
IPM	3.3 ± 0.9	5.1 ± 1.0	5.2 ± 0.7	5.7 ± 1.3	1.9 ± 0.4	3.3 ± 0.6	5496 ± 114	131354	64205	67149	2.05
FP	12.8 ± 1.4	25.3 ± 1.9	28.4 ± 2.0	21.4 ± 1.8	5.0 ± 1.0	6.1 ± 0.9	4960 ± 70	118544	65820	52724	1.80

Price of paddy = Rs 2390/ q

At Chinsurah, IPM significantly reduced weed population at both growth stages. At the active tillering stage, weed density under IPM was 3.83 m^{-2} compared to 11.47 m^{-2} under farmers' practice (**Table 2.6.1.4**). A similar trend was observed at the panicle initiation stage, where IPM recorded 1.02 m^{-2} compared to 2.81 m^{-2} under farmers practice. This indicates that IPM provided effective and sustained weed suppression throughout the crop growth period. Weed dry biomass was drastically reduced under IPM at both stages. At active tillering, biomass was 0.49 g m^{-2} under IPM compared to 3.93 g m^{-2} under farmers practice. Similarly, at panicle initiation, IPM recorded 0.14 g m^{-2}, significantly lower than 0.44 g m^{-2} under farmers practice. The substantial reduction in biomass suggests that IPM not only reduced weed numbers but also suppressed weed growth and competitiveness more effectively.

2.6.1.4 Weed population and weed biomass at Chinsurah, ***Kharif*** 2025

Treatments	Weed population no/m^2		Weed dry biomass g/m^2	
	Active Tillering Stage	Panicle Initiation Stage	Active Tillering Stage	Panicle Initiation Stage
IPM	3.83(2.08)	1.02(1.23)	0.49	0.14
Farmers Practice	11.47(3.46)	2.81(1.82)	3.93	0.44
Exp. mean	2.77	1.52	2.21	0.29
CD(0.05)	0.18	0.12	0.3	0.06

<u>Zone IV – North_Eastern areas</u>

The IPM DSR trial was conducted at two locations, Arundhutinagar and Titabar in this zone. At Arundhutinagar, the trial was conducted in Sri Gopi Debnath's field in Ishnapur village of Mohanpur Agri sub-division, Tripura. At Titabar, the trial was conducted in Sri Ranjan Hazarika's field (26.57° N and 94.18° E) at Dihingia gaon, Titabar mandal, Jorhat district in Assam. The package of practices followed are given below:

Practices followed in IPM- DSR trial in Zone IV (North-Eastern areas), ***Kharif*** 2025

	IPM Practices	Farmer Practices (FP)
TITABAR		
Area	One acre	One acre
Variety	Numoli	Numoli
Fertilizer	• Applied N:P_2O_5:K_2O @ 60:20:40 kg/ ha.. Applied 1/3 N, total P and K as basal.	Applied N:P_2O_5:K_2O @ 60:20:40 kg/ ha
Main Field	• Sprayed herbicide Triafamone +ethoxysulfron @ 67.5g a.i./ha at 2nd flush of weeds • Japanese weeder was run at 30 DAS • Installed Pheromone traps @ 12 traps/ha for stem borer • Application of Chlorantraniliprole 18.5 SC for stem borer • Placed Tricho cards for yellow stem borer and leaf folder management • Applied fresh cow dung solution @200g/litre of water at the mid tillering stage against BLB	• Manual weeding done (2times)
ARUNDHUTINAGAR		
Area	0.72 ha	0.72 ha

Variety	MTU 7029	MTU 7029
	Seed Coating with *Trichoderma viride* (received from IIRR-Hyderabad @ 10 g / kg seed was done	
Main Field	• Alleyways of 30 cm after every 2 m • Fertilizers applied @ 120:100:75 NPK • Cowpea was sown on bunds to attract natural enemies. • Cleaned bunds to eliminate the alternate hosts for off-season survival of pests • Installed Pheromone traps@ 3 traps/acre for Stem Borer • At 30 – 60 DAS, Manual weeding was done • Urea top dressing was done • Installation of bamboo perches of 2-3 ft. height in the field @ 15 to 20 per acre • Sprayed Neemazol @ 3 ml. per liter of water at 50 DAS and 60 DAS • One prophylactic spray of Chlorantraniliprole 18.5 SC @ 60 ml/ acre (against stem borer/leaf folder was done	• Fertilizers applied @ 120:100:75 NPK • Manual weeding done (2times) • Spraying of Fipronil 5% SC @1.5 ml. / liter & Propiconazole @1 ml. / liter etc.

At Titabar, the incidence of dead hearts, white ears caused by stem borer, silver shoots caused by gall midge, leaf folder and whorl maggot incidence was low in both IPM and farmers practices (**Table 2.6.1.5**). Grain yield was high in IPM DSR field leading to high gross returns and high BC ratio (2.51) compared to farmers practices (2.15).

Table 2.6.1.5. Insect pest incidence in IPM DSR trial at Titabar in Zone IV (North-Eastern areas), ***Kharif*** 2025

Treatments	%DH		%WE	%SS		%LFDL	%WMDL	Yield	Gross returns (Rs.)	Cost of cultivation (Rs.)	Net Returns (Rs.)	BC ratio
	25 DAS	35 DAS	Pre har	35 DAS	65 DAS	36 DAS	45 DAS	kg/ ha				
IPM	8.1 ± 3.4	5.3 ± 2.2	3.0 ± 0.9	5.3 ± 2.2	2.8 ± 0.7	3.0 ± 0.8	1.8 ± 0.7	4562 ± 17	108074	43000	65074	2.51
FP	7.6 ± 3.1	6.6 ± 1.5	7.9 ± 1.3	3.3 ± 1.4	4.8 ± 0.8	5.7 ± 0.6	3.7 ± 0.6	3268 ± 14	77419	36000	41419	2.15

Price of paddy = 2369 Rs/ q

At Titabar, weed population was significantly lower under IPM at both growth stages. At the active tillering stage, IPM recorded 14.60 weeds m^{-2} compared to 20.00 weeds m^{-2} under farmers practice. At the panicle initiation stage, a similar trend was observed, with IPM recording 16.00 weeds m^{-2} compared to 19.80 weeds m^{-2} under farmers practice (**Table 2.6.1.6**). These results indicate that IPM ensured effective weed suppression throughout the crop growth period. Weed dry biomass was also reduced under IPM, although the magnitude of reduction was relatively moderate. At the active tillering stage, biomass under IPM was 4.16 g m^{-2}, compared to 4.96 g m^{-2} under farmers practice. At panicle initiation, IPM recorded 4.00 g m^{-2}, significantly lower than 4.64 g m^{-2} under farmers practice. This reduction indicates that IPM not only reduced weed numbers but also restricted weed growth and vigour.

2.6.1.6 Weed population and weed biomass at Titabar, ***Kharif*** 2025

Treatments	Weed population no/m^2		Weed dry biomass g/m^2	
	Active Tillering Stage	Panicle Initiation Stage	Active Tillering Stage	Panicle Initiation Stage
IPM	14.60(3.88)	16.00(4.06)	4.16	4.00
Farmers Practice	20.00(4.52)	19.80(4.50)	4.96	4.64
Exp. mean	4.2	4.28	4.56	4.32
CD(0.05)	0.14	0.12	0.41	0.24

At Arundhutinagar, the incidence of stem borer and leaf folder was very low in both IPM and FP plots (**Table 2.6.1.7**). Grain yield was high in IPM plot resulting in high BC ratio (1.89) as compared to FP plot (1.05).

Table 2.6.1.7. Insect pest incidence in IPM DSR trial at Arundhutinagar, ***Kharif*** 2025

Treatments	%DH	%WE	%LFDL	Yield	Gross returns (Rs.)	Cost of cultivation (Rs.)	Net Returns (Rs.)	BC ratio
	30 DAS	Pre har	30 DAS	kg/ ha				
IPM	0.8	0.7	0.3	5016	118829	63000	55829	1.89
FP	1.0	1.4	0.5	3828	90685	86738	3947	1.05

Price of paddy = 2369 Rs/ q

At Arundhatinagar, the IPM practices were evaluated for their effectiveness against sheath blight, bacterial blight, and brown spot. The data was recorded as disease severity at 30 days after transplanting (**Table 2.6.1.8**). In general, the disease severity of bacterial blight and brown spot was very low, varied from 1% to 5%. The trial was conducted at four locations and in the IPM practices adopted fields, sheath blight mean disease severity across the locations was 19.25% as compared to farmer's practices (22.75%).

Table 2.6.1.8 Disease severity (%) at Arundhatinagar, ***Kharif '***2025

Location	Treatment	Disease severity (%)		
		Sheath blight	Bacterial blight	Brown spot
L1	IPM	20	3	1
	FP	25	4	2
L2	IPM	20	2	1
	FP	22	3	3
L3	IPM	20	3	1
	FP	24	5	3
L4	IPM	17	2	5
	FP	20	3	7
Mean	IPM	19.25	2.5	2
	FP	22.75	3.75	3.75

Zone VI – Western areas

In this zone, the IPM DSR trial was conducted at two locations, Karjat and Navsari. At Karjat, IPMDSR trial was conducted in Sri Sanjay Pingale's field of Gaulwadi village, Karjat mandal, Raigad district, Maharashtra. At Navsari, the trial was conducted in Sri Ashokbhai's field at Munsad village, Navsari mandal and district, Gujarat State. The package of practices followed in wet DSR in IPM and FP plots is given in the following table:

Package of practices followed in IPM DSR trial in Zone VI (Western areas), ***Kharif*** 2025		
	IPM practices	Farmers practices
KARJAT		
Area	1 acre	1 acre
Varieties	Karjat 7	Karjat 7
Seed treatment	Seed treatment with Trichoderma @ 10 g/ kg seed	
Main field	• Deep ploughing • Removal and destruction of stubbles	• Application of FYM 4 T, Urea 180 kg, Suphala 75 kg

	• Application of FYM 7.5 T, Suphala 333 Kg, Urea 110 Kg • Pre-emergence herbicide Bispyribac sodium (Nomini gold). 250ml/ha + hand weeding • Pheromone traps @ 20/ hectare • Use of bird perches in the field • Use of Vaibhav sickle for harvesting • Application of Cartap hydrochloride 18 kg/ha (one application)	• Preemergence herbicide Bispyribasodium (Nomini gold). 250ml/ha + hand weeding • Application of Cartap hydrochloride 18 kg/ha
NAVSARI		
Area	1 acre	1 acre
Varieties	GNR 3	GNR 3
Fertilizers	NPK: 40:12:0 per acre + FYM	NPK: 50:15:0 per acre
Main field	• Deep ploughing • Applied Pyrazosulfuron-ethyl 10% WP • Applied Fipronil 0.3G @ 10 kg/ acre • Applied Ethoxysulfuron @ 20 g a.i./h • Installation of bamboo perches • Sprayed Propiconazole @ 1 ml/lit • Applied Chlorantraniliprole 0.4% GR • Sprayed Spiromesifen 240 SC @ 2 ml/litre	• Applied Chlorantraniliprole 0.4% GR @ 6 kg/ acre • Hand weeding done • Applied Tebuconazole • Applied Chlorantraniliprole 0.4% GR @ 6 kg/ acre • Applied Spiromesifen 240 SC @ 3 ml/litre

At Karjat, the incidence of stem borer and leaf folder was low in both IPM and FP plots at this location (**Table 2.6.1.9**). Due to low pest incidence, grain yield was almost similar in both treatments (4080 – 4592 kg/ha), resulting in a BC ratio of 1.39 in the IPM plot and 1.36 in farmer practices.

Table 2.6.1.9. Insect pest incidence in IPM DSR trial at Karjat in Zone VI (Western areas), ***Kharif*** 2025

Treat ments	%DH		%WE	%LFDL			Yield	Gross returns (Rs.)	Cost of cultivation (Rs.)	Net Returns (Rs.)	BC ratio
	75 DAS	85 DAS	Pre har	95 DAS	105 DAS	115 DAS	kg/ ha				
IPM	1.2 ± 0.7	1.8 ± 0.8	2.0 ± 0.8	1.4 ± 0.6	1.5 ± 0.7	2.1 ± 0.8	4592 ± 115	108784	78050	30734	1.39
FP	2.7 ± 1.4	3.2 ± 1.0	3.9 ± 0.5	4.4 ± 0.8	4.0 ± 0.7	3.8 ± 0.6	4080 ± 102	96655	71200	25455	1.36

Price of paddy = 2369 Rs/ q

At Navsari, the incidence of dead hearts was relatively high in farmer practices at 25 to 45 DAS (7.1 – 9.3% DH) as compared to the IPM plot (1.2-2.9% DH). White ear head incidence was low in both IPM and FP plots (3.5-4.8% WE).Similarly, though the leaf folder damage was low in both the treatments, it was relatively high in farmer practices (4.6-5.8% LFDL) as compared to IPM plots (**Table 2.6.1.10**). Grain yield was relatively high in IPM plot (5464 kg/ha) but BC ratio was low (2.02) due to high cost of cultivation as compared to farmers practices.

Table 2.6.1.10. Insect pest incidence in IPM DSR trial at Navsari, ***Kharif*** 2025

Treat ments	%DH			%WE	%LFDL			Yield	Gross returns (Rs.)	Cost of cultivation (Rs.)	Net Returns (Rs.)	BC ratio
	25 DAS	36 DAS	45 DAS	Pre har	35 DAS	45 DAS	65 DAS	kg/ ha				
IPM	1.2 ± 1.2	2.9 ± 1.2	1.5 ± 0.9	3.5 ± 0.5	0.6 ± 0.6	0.8 ± 0.5	2.0 ± 0.8	5464 ± 20	131136	65000	66136	2.02
FP	9.3 ± 4.3	8.6 ± 1.0	7.1 ± 2.3	4.8 ± 0.6	4.7 ± 2.1	4.6 ± 0.8	5.8 ± 0.8	5192 ± 33	124608	57250	67358	2.18

Price of paddy = 2400 Rs/ q

In the IPM field, spraying of propiconazole 25 EC @ 1ml/lit and trifloxystrobin 25 + tebuconazole 50 WG @ 0.4 g/l effectively reduced the disease progress (AUDPC value) of the sheath blight (IPM - 470.05; FP - 972.93) and sheath rot (IPM -736.82; FP - 1106.49) (**Table 2.6.1.11**).

Table 2.6.1.11 AUDPC values based on disease severity (%) at Navsari, ***Kharif '***2025

Location	Treatment	Navsari	
		AUDPC Values	
		Sheath blight	Sheath Rot
L1	IPM	470.05	736.82
	FP	972.93	1106.49

At Navsari, the weed population was significantly lower under IPM at both crop stages. At the active tillering stage, IPM recorded 6.80 weeds m^{-2} compared to 10.60 weeds m^{-2} under farmers practice (**Table 2.6.1.12**). At the panicle initiation stage, a similar trend was observed, with IPM recording 6.40 weeds m^{-2} compared to 11.80 weeds m^{-2} under farmers practice. Weed dry biomass was also significantly reduced under IPM. At active tillering, biomass under IPM was 8.64 g m^{-2}, compared to 13.01 g m^{-2} under farmers practice. At panicle initiation, IPM recorded 8.59 g m^{-2}, which was significantly lower than 15.18 g m^{-2} under farmers' practice. This indicates effective and sustained weed suppression under IPM.

2.6.1.12 Weed population and weed biomass at Navsari, ***Kharif*** 2025

Treatments	Weed population no/m^2		Weed dry biomass g/m^2	
	Active Tillering Stage	Panicle Initiation Stage	Active Tillering Stage	Panicle Initiation Stage
IPM	6.80(2.68)	6.40(2.54)	8.64	8.59
Farmers Practice	10.60(3.31)	11.80(3.48)	13.01	15.18
Exp. mean	3.00	3.01	10.82	11.89
CD(0.05)	0.55	0.4	3.42	2.33

<u>Zone VII – Southern areas</u>

The IPM DSR trial was conducted in 16 farmers' fields at 6 locations in 5 States during *Kharif* 2025. The details of farmers and villages are given below:

ZONE VII (Southern areas)				
S. No	Location	State	Village, mandal/ district	Farmer Name
1	Aduthurai	Tamil Nadu	Vayalur, Thanjavur	Sri Karthikeyan
2			Vayalur, Thanjavur	Sri Subbian
3			Manaparavai, Thiruvarur	Sri Roseleen
4	Bapatla	Andhra Pradesh	Kamkata Palem, Bapatla	Sri Yarlagadda Venkateswara Rao
5			Cherukuru-II, Parchuru	Sri Paleti Sankar
6	Coimbatore	Tamil Nadu	Sankaramanallur North, Tirupur	Sri Bala Subramaniyam
7			Kumaralingam, Tirupur	Sri Gopalakrishnan
8			Kumaralingam, Tirupur	Sri Chelladurai
9	Gangavathi	Karnataka	Kartagi, Koppal	Sri Hanumanthappa Basapu
10			Sangapur, Gangavathi, Koppal	Sri Basavaraj Palkamdoddi
11			Vaddarahatti, Gangavathi, Koppal	Sri Abdulsab, S/o Peersab
12	Mandya	Karnataka	Gaanadaalu, Mandya	Sri Chikkonu, S/o Girlu Bommegouda
13			Bilaguli, Mandya	Sri Shivanna B.P. S/o Puttamadaiah
14	Rajendra nagar	Telangana	Nayakuni Thanda, Kunoor, Bommalaramaram, Bhongir mandal, Yadadri Bhongir district	Sri D Shankar
15				Sri R Ashok
16				Sri B Srinivas

The package of practices followed in both IPM and FP plots by various farmers are given in the table below:

Package of practices followed in IPM DSR trial in Zone VII (Southern areas), ***Kharif*** 2025

Practices followed in IPM DSR trial at Aduthurai, ***Kharif*** 2025		
	IPM practices	Farmers practices
Area	1 ha	1 ha
variety	IR 20	IR 20
Before sowing	Seed treatment with Trichoderma @ 10g/ kg	
Fertilizers	Applied 100 kg of N, 75 kg of P and 50 Kg K	Applied 100 kg of N, 100 kg of P and 70 Kg K
Main field	• Within 3 – 5 DAS, applied Pyrazosulfuron ethyl 20 g ai/ha • Grown blackgram as a bunds crop • At 20 DAS, installed pheromone traps with 5 mg lure @ 3 traps/acre for yellow stem borer monitoring • Released of *Trichogramma japonicum* adults against yellow stem borer and *Trichogramm chilonis* against leaf folder. • At 25 DAS, Fipronil 0.3G @ 10 kg/ acre was applied • At 30 DAS- carbendazim + mancozeb (@ 2-2.5 gm/lit) was applied • At 30 – 60 DAS, installation of bamboo perches of 2-3 ft height in the field @ 15 to 20 per acre at the vegetative stage to serve as resting/ landing sites for birds • At 61-90 DAS, one prophylactic spray of cartap hydrochloride 50 WP/SP @ 400 g/ acre	• Applied Carbofuran 3CG @ 25 kg/ ha • Chloripyriphous 20EC 1000ml/ha applied • At 25 DAS, triafamone + ethoxysulfuron @67.5 g/ ha was applied • At 30 DAS- carbendazim + mancozeb (@ 2-2.5 gm/lit) was applied • At 30-60 DAS, Sprayed chlorantraniliprole 18.5 SC @ 60ml/acre • At 61-90 DAS, Dinotefuran 12%+ Pymetrozine 45% wg @ 80g/ acre was applied for Brown Plant hopper
Practices followed in IPM DSR trial at Bapatla, Kharif 2025		
Sri Yarlagadda Venkateswara Rao, Kamkata Palem, Bapatla mandal, Andhra Pradesh		
Area	4000 sq.m	4000 sq.m
Variety	BPT 5204	BPT 5204
Fertilizers	NPK @ 90-60-60 kg/ha	NPK @ 150-86-38 kg/ha
Before sowing	• Seed Treatment with *Trichoderma* @ 10g/ kg seed	
Main field	• Formation of alleyways of 30 cm for every 2 m • Applied Triafomone + Ethoxysulfuron 30%WG (Council Active) @ 90 g/acre • At 30-60 DAS, applied carbofuran 3 CG granules @10 Kg • Applied carbendazim 12% + Mancozeb 63% WP @ 400 g • Applied Azadirachtin 0.03% 1 liter • At 60 – 90 DAS, applied chlorantraniliprole 18.5% SC @ 60 ml at 75 DAS • Applied Triflumezopyrim 10% SC (pexalon)@ 94 ml per acre at 65 DAS • Applied Tricyclazole 75% WP @ 120 g against leaf blast at 70 DAS • At 90 DAS, applied Cartap Hydrochloride 50% SP @ 400 g for Leaf Folder • Sprayed Hexaconazole 5% SC @ 400 g	• Formation of alleyways of 30 cm for every 2 m • Bispyribac Sodium 10% SC @ 100 g • Triafomone + Ethoxysulfuron 30%WG (Council Active) @ 90 g/acre applied • Application of Londax power @4 kg/acre • Applied Carbofuran granules @ 4 kg/acre 45 DAS • BASF Polyram Metiram 70% WG @ 600 g • Emamectin Benzoate 5 SG @80 g at 60 DAS • Thiamethoxam 25% WG @100 g at 60 DAS • Amistar Top Fungicide (Azoxystrobin 18.2% + Difenoconazole 11.4% SC @ 200 ml • Bayer Curbix Pro -Ethiprole 10.7% + Pymetrozine 40% WG Insecticide @ 120 g • Flubendiamide 39.35% SC@ 50 ml @ 80 DAS • Picoxystrobin 6.78% + Tricyclazole 20.33% SC- Dupont Galilio @ 400 ml • Chlorantraniliprole 18.5% SC @ 60 ml at 100 DAS • Pymetrozine 50% WG @ 120 g

		• Custodia Fungicide – Azoxystrobin 11% & Tebuconazole 18.3% SC @ 300 ml
Sri Paleti Sankar, Cherukuru –II, Parchuru Mandal, Andhra Pradesh		
Area	4000 sq.m	4000 sq.m
Variety	BPT 5204	BPT 5204
Fertilizers	NPK @ 90-60-40 kg/ ha	NPK @ 120-80-40 kg/ha
Before sowing	Seed Treatment with Trichoderma @ 10g/ kg seeds	
Main field	• Applied Oxidiargyl (Top star) @ 80-100 a.i/ha at 3 DAS • Formation of alleyways of 30 cm for every 2 m • Installed pheromone traps @ 8 traps/ ha for stem borer monitoring. • Triafomone + Ethoxysulfuron 30%WG (Council Active) @ 90 g/acre applied • Release of egg parasitoid, *T. chilonis* @ 40000/acre from 45 DAS, 3 times in 15 days interval • Applied carbofuran 3 CG granules @10 Kg	• Applied Pendimethalin 38.7 SC @1.7 lit/ha • Formation of alleyways of 30 cm for every 2 m • Manual weeding @ 30 DAS • Triafomone + Ethoxysulfuron 30%WG (Council Active) @ 90 g/acre applied • Applied Pymetrozine 50% WG @ 120 g for BPH at 70 DAS
Practices followed in IPM- DSR trial at Coimbatore, Kharif 2025		
F1 = Sri Bala subramaniyam, Sankaramanallur North village, Tirupur mandal F2 = Sri Gopalakrishnan, Kumaralingam village, Tirupur mandal F3 = Sri Chelladurai, Kumaralingam village, Tirupur mandal		
Area	1 acre	1 acre
Variety	CR 1009	CR 1009
Fertilisers	NPK @ 60, 20, 20 kg/ ha	NPK @ 70, 30, 20 kg/ ha
Before nursery	• Seed treatment with Trichoderma @ 10g/ kg seed	
Main field	• Cowpea on bunds • Applied Triafamone 20% + Ethoxysulfuron 10% WG • Installation of pheromone traps @ 3 traps/acre for yellow stemborer monitoring at 20 DAS • Release of *Trichogramma japonicum* adults against yellow stem borer and *Trichogramma chilonis* against leaf folder 2 times @ 40, 000/ acre, starting from 15 days after transplanting • At 25-30 DAS, application of post-emergence herbicide triafamone + ethoxysulfuron @ 67.5 g a.i./ha (1 field) / hand weeding (2 fields) • Nitrogen(N) top dressing as per protocol • Blanket spray of NeemAzal @ 3 ml/ liter water at 40 – 45 DAS • One prophylactic spray of Chlorantraniliprole (Coragen) 18.5 SC @ 60 ml/ acre	• Applied Triafamone 20% + Ethoxysulfuron 10% WG • Applied Thiamethoxam25 WG 100g/ha , Cartap hydro chloride 10kg/ha, Chlorantraniliprole 18.5 EC 100ml/ ha • Sprayed Copper oxy chloride, Mancozeb+ carbendazim (saaf), Propicanozole
Practices followed in IPM DSR trial at Gangavathi, Kharif 2025		
F1 = Sri Hanumanthappa Basapu; F2 = Sri Basavaraj Palkamdoddi; F3 = Sri Abdulsab s/o Peersab		
Area	1 acre	1 acre
Variety	Tungabhadra sona	Tungabhadra sona
Fertilisers	NPK @ 60:30:30 kg/ha	NPK @ 120:60:60 kg/ha
Before sowing	• Seed treatment with Chlorantaniliprole 50% FS @ 4 ml/kg seeds	
Main field	• Forming alleyways of 30 cm after every 2 m • Installation of pheromone traps @ 3 traps/ acre for monitoring at 20 DAS • Growing marigold and cowpea on bunds • Application of Fipronil 0.6G @ 4 kg/ acre at 20-25 DAS • Release of *Trichogramma japonicum* (egg cards), 4 times @ 40,000/ acre starting from 20 DAS • Sprayed Triflumezopyrim 10% SC @ 94 ml/ acre for planthopper management at 65 DAS • Spraying of Cartap hydrochloride 50 SP @ 400g/ acre at 70 DAS	• Sprayed Chlorpyrifos 20 EC @ 400 ml/ acre at 15 DAS • Application of Fipronil 0.3G @ 10 kg/ acre at 25 DAS • Spraying of Carbosulfan @ 400 ml/ acre at 35 DAS • Sprayed Triflumezopyrim 10% SC @ 94 ml/ acre for planthopper management at 50 DAS • Spraying of Pymetrozine @ 120 g/ acre at 60 DAS

		• Spraying of Cartap hydrochloride 50 SP @ 400g/ acre at 75 DAS • Spraying of Thiamethoxam 25 WG @ 100 g/ acre at 95 DAS
Practices followed in IPM DSR trial at Mandya, Kharif 2025		
Sri Chikkonu S/o Girlu Bommegowda, Ganadaalu village, Mandya district		
Area	1 acre	1 acre
Variety	Jyothi	Jyothi
Fertilisers	• Urea 45 kg/ acre, SSP 125 kg/ acre, MOP 35 kg/ acre, Top dressing 45 kg urea • Incorporated Zinc sulphate @ 8 kg/acre during puddling	• Urea 100 kg/acre, 20:20:0:13 @ 50 kg/acre, 10:26:26 @ 50 kg/acre
Before sowing	• Seed treatment with Carbandezim @ 4g / kg seed	
Main field	• Formation of alleyways of 30 cm at every 2 m • Londax power @ 4kg/ac - herbicide + one hand weeding • Installation of pheromone traps for monitoring stem borer 5 mg lure @ 8 traps / ha • Sprayed Chlorantraniliprole 0.4G @ 4 kg/acre • Sprayed Tricyclazole 75 WP @ 0.6g/ liter water at PI stage • Alternate wetting and drying followed	• Applied Pretilachlor 50EC @ 400ml/acre (Refit) + two hand weedings • Applied Fipronil 0.3G@10kg/acre • Sprayed Chlorantraniliprole @ 60 ml/acre • Applied Tebuconozole (Nativo)@0.4gr/lit • Applied Dinotefuran 20% SG @ 250g/ha at 70DAS • Continuous irrigation
Sri Shivanna B.P. s/o Puttamadaiah, Bilaguli Village, Mandya district		
Area	1 acre	1 acre
Variety	Anjali	Anjali
Fertilisers	• Urea 45 kg/ acre, SSP 125 kg/ acre, MOP 35 kg/ acre, Top dressing 45 kg urea • Incorporated Zinc sulphate @8 kg/acre during puddling	• Urea 100 kg/acre, 20:20:0:13 @ 50 kg/acre, 10:26:26 @ 50 Kg/ acre
Before sowing	• Seed treatment with Carbendazim @ 4g / kg seed	
Main field	• Formation of alleyways of 30 cm at every 2 m • Londax power @ 4kg/ac - herbicide + one hand weeding • Installation of pheromone traps for monitoring stem borer 5 mg lure @ 8 traps / ha • Applied Chlorantraniliprole 0.4GR @ 4 kg/ acre • Sprayed Tricyclazole 75 WP @ 0.6g/ liter water at PI stage • Alternate wetting and drying followed	• Applied Pretilachlor 50EC (Refit) @400ml/acre + two hand weeding's. • Applied Fipronil 0.3G @ 10kg/acre • Sprayed Cartap hydrochloride 50 SP @ 400g/ acre • Applied Azoxystrobin + Difenconazole (Amistar top)@1ml/lit • Applied Buprofezin 25 SC @1.4ml/lit at 70DAS • Continuous irrigation
Practices followed in IPM DSR trial at Rajendranagar, Kharif 2025		
Sri D Shankar, Sri R Ashok, Sri B Srinivas, Nayakuni Thanda, Kunoor, Bommalaramaram, Bhongir mandal, Yadadri Bhongir district		
Area	1 acre	1 acre
Variety	KNM 1638 (Farmer 1) & RNR 29325	KNM 1638 (Farmer 1) & RNR 29325
Fertilisers	Applied 80 kg N, 60 kg P and 15 kg K	Applied 120 kg N, 80 kg P and 20 kg K
Before sowing	Seed treatment with *Trichoderma viridae* @ 10g/kg	
Main field	• Formation of alleyways of 30 cm at every 2 m • Applied Chlorantraniliprole 0.4G @4kg/acre • Pheromone mass trapping @ 8/acre • Need based application of Chlorantraniliprole @ 60ml/acre at PI to booting and Propiconazole @ 200ml/acre for Grain discolouration and sheath rot.	• Applied weedicide: Bensulfuron Methyl + Pretilachlor (Londax Power T) @ 4kg/acre at 3-5 DAS • Sprayed Chlorpyriphos @2.5ml/l in main field at tillering • Sprayed Cartap hydrochloride 50SP @400g/acre • Sprayed Tebuconazole + trixystrobin (Nativo) @ 80g/acre

Incidence of stem borer, gall midge, leaf folder, whorl maggot, hispa, thrips, BPH and WBPH was observed at various farmers' fields in both IPM DSR and FP plots at Zone VII during *Kharif* 2025 (**Table 2.6.1.13**).

At the individual-farmer level, IPM plots recorded substantially lower DH/WE than FP, for example, at ADT locations where values under IPM ranged from 4.2–4.9% compared to 9.1–16.6% under FP. Similar reductions were observed for leaf folder damage, with IPM plots showing 1.3–4.8% compared to 4.0–16.6% in FP fields. Whorl maggot damage was also lower under IPM (3.6–5.3%) relative to FP (10.4–15.8%) at several ADT and CBT sites. Hopper populations (BPH and WBPH) were generally lower in IPM fields compared to FP plots.

Across locations such as CBT and RNR, IPM reduced both foliar damage and hopper incidence, with notable reductions in THDL (1.0 – 2.5%) and BPH counts (0-19.1/5 hills). However, in a few GNV locations (F9–F11), higher SS (17.7-23.7%) and hopper incidence (14.2-21.7/5 hills) was recorded under IPM, indicating location-specific variability and possible influence of local pest pressure and management timing.

Pooled treatment further confirmed the superiority of IPM. IPM recorded lower DH/WE (0.8%) compared to FP (1.2%), lower WMDL (0.4% vs 1.0%), reduced HDL (3.3% vs 11.1%), lower THDL (0.6% vs 1.7%), and slightly lower BPH populations (1.9 vs 1.6 insects/5 hills). However, silver shoots were higher in IPM (13.7%) than in FP (6.2%). Similarly, the WBPH population was higher under IPM (9.5 insects/5 hills) compared to FP (5.3), largely influenced by higher incidence at a few GNV sites.

Observation-wise pest dynamics showed that DH/WE increased towards later crop stages, peaking at pre-harvest (2.1%). Stem borer incidence was highest around 42–75 DAS (10.8–11.6%), while leaf folder damage peaked around 50–75 DAS (2.1%). Hopper populations increased at later stages, particularly from 50 DAS onwards.

Overall, the results demonstrate that IPM-based DSR significantly suppressed major insect pests across test locations in Zone VII, particularly stem borers, leaf folder, whorl maggot, and total leaf damage, while maintaining lower hopper populations in most locations compared to farmers' practices.

Across locations, box plots depict the incidence of stem borer, gall midge, leaf folder, whorl maggot, thrips, BPH, and WBPH in IPM and FP plots (**Figure 2.6.1.1**).

Table 2.6.1.13. Insect pest incidence in IPM DSR trial in Zone VII (Southern areas), ***Kharif*** 2025

Location	Farmer Nam	Treatments	%DH/WE	% SS	% LFDL	% WMDL	% HDL	%THDL	BPH (No/5 hills)	WBPH (No/5 hills)
ADT	F1 = Karthikeyan	IPM	4.2(1.8)b	2.2(1.3)b	1.3(1.2)b	3.6(1.7)b	1.8(1.3)b	1.9(1.3)b	1.1(1.2)b	0.0(0.7)a
		FP	9.1(2.7)a	6.0(2.2)a	4.0(1.8)a	10.4(3.1)a	7.7(2.5)a	8.4(2.5)a	3.0(1.6)a	0.0(0.7)a
LSD (0.05)			0.76 (36 df)	0.67(28 df)	0.2 (28 df)	0.5(28 df)	0.33(36 df)	0.44 (36 df)	0.29(36 df)	0.0 (28 df)
ADT	F2 = Subbian	IPM	4.8(1.8)b	3.1(1.5)b	3.3(1.7)b	4.8(2.1)b	1.3(1.1)a	1.2(1.1)a	0.8(1.1)b	0.0(0.7)a
		FP	16.6(3.2)a	7.4(2.3)a	16.6(3.4)a	14.6(3.6)a	2.1(1.4)a	2.4(1.4)a	1.8(1.4)a	0.0(0.7)a
LSD (0.05)			1.1 (36 df)	0.70 (28 df)	0.38 (28 df)	0.65 (28 df)	0.31 (36 df)	0.31(36 df)	0.27(36 df)	0.0 (28 df)
ADT	F3 = Roseleen	IPM	4.9(1.9)b	3.5(1.5)a	4.8(1.9)b	5.3(2.1)b	3.3(1.7)b	4.7(2.0)b	1.8(1.3)b	0.1(0.8)a
		FP	12.6(2.9)a	6.4(2.1)a	10.7(2.6)a	15.8(3.6)a	11.1(3.0)a	18.0(4.0)a	6.6(2.3)a	0.0(0.07)a
LSD (0.05)			0.74 (36 df)	0.99 (28 df)	0.43 (28 df)	0.51 (28 df)	0.40 (36df)	0.37 (36 df)	0.23 (36 df)	0.06 (28 df)
BPT	F4= Yarlagadda	IPM		3.1(1.5) a	6.7(2.3)a	0.5(0.9)a	0.0(0.7)a		28.3(4.3)a	21.7(4.5)a
		FP		0.6 (0.9) b	7.0(2.4)a	0.2(0.8) a	0.0(0.7)a		19.0(4.0)a	16.1(3.9)a
LSD (0.05)				0.48 (28 df)	0.49 (28 df)	0.28 (28 df)	0.0 (36df)		0.43 (36 df)	0.71 (28 df)
BPT	F5 = Paleti sankar	IPM		0.8(0.9)a	1.2(1.0)a	0.0(0.7)a	0.0(0.7)a		2.6(1.3)a	3.6(1.4)a
		FP		1.7(1.1)a	0.0(0.7)b	0.08(0.74)a	0.0(0.7)a		0.8(1.0)b	0.0 (0.7)b
LSD (0.05)				0.44 (28 df)	0.28 (28 df)	0.07 (28 df)	0.0 (36 df)		0.21 (36 df)	0.41 (28 df)
CBT	F6 = Bala subramaniyan		1.5(1.2)b	1.1(1.0)a	0.4(0.9)a	0.18(0.8)a	0.0(0.7)a	1.0(1.0)b	0.8(1.0)a	0.3 (0.8)
			8.2(2.4)a	3.9(1.5)a	0.7(1.0)a	0.6(0.9)a	0.0(0.7)a	3.5(1.6)a	0.9(1.1)a	0.7(1.0)
LSD (0.05)			0.48(36 df)	0.63 (28 df)	0.17(28 df)	0.24(28 df)	0.0(36 df)	0.49(36 df)	0.19 (36df)	0.19(28 df)
CBT	F7 = Gopal krishna	IPM	1.9(1.2)b	0.0 (0.7)a	0.6(1.0)a	0.2(0.8)a	0.0(0.7)a	1.6(1.2)b	0.4(0.9)b	0.6(1.0)a
		FP	10.2(2.7)a	0.3(0.8)a	1.3(1.2)a	1.18(1.0)a	0.4(0.8)a	3.7(1.7)a	1.1(1.2)a	0.9(1.1)a
LSD (0.05)			0.71 (36 df)	0.19(28 df)	0.29(28 df)	0.29(28 df)	0.16(36 df)	0.34(36 df)	0.21(36 df)	0.22(28 df)
CBT	F8= Chelladurai	IPM	7.0(2.2)a	1.7(1.2)a	1.6(1.3)a	1.9(1.2)a	0.04(0.7)a	2.5(1.4)a	0.8(1.0)b	0.9(1.1)a
		FP	9.9(2.7)a	0.8(0.9)a	2.4(1.5)a	1.4(1.1)a	0.0(0.7)a	4.8(1.9)a	1.4(1.3)a	0.7(1.0)a
LSD (0.05)			0.73(36df)	0.49(28 df)	0.39(28 df)	0.46(28 df)	0.04(86 df)	0.47(36 df)	0.22(36 df)	0.23(28 df)
GNV	F9 = Hanumanthappa	IPM	2.0(1.3)a	17.7(4.1)a	5.7(2.4)a		1.3(1.2)a		14.2(3.6)a	22.3(4.6)a
		FP	3.1(1.4)a	7.6(2.8)b	2.1(1.6)b		0.9(1.1)a		5.5(2.4)b	14.7(3.9)b
LSD (0.05)			0.42(36 df)	0.42 (28df)	0.17(28 df)		0.15(36 df)		0.27(36 df)	0.31(28 df)
GNV	F10 = Basavaraj	IPM	2.9(1.5)a	18.5(4.2)a	12.7(3.1)a		1.1(1.1)a		17.4(4.0)a	31.4(5.4)a
		FP	1.3(1.2)b	6.6(2.6)b	1.8(1.5)b		0.9(1.1)a		5.3(2.3)b	13.9(3.7)b
LSD (0.05)			0.18(36 df)	0.26(28 df)	0.83(28 df)		0.13(36 df)		0.30(36 df)	0.47(28 df)
GNV	F11 = Abdulsab	IPM	3.6(1.6)a	23.7(4.8)a	8.7(3.0)a		1.5(1.2)a		21.7(4.3)a	23.3(4.6)a
		FP	0.9(1.1)b	8.2(2.9)b	1.0(1.2)b		1.5(1.3)a		3.8(2.0)b	11.7(3.5)b
LSD (0.05)			0.16(36 df)	0.37(28 df)	0.14(28 df)		0.16(36 df)		0.17(36 df)	0.32(28 df)
MND	F12 = Sri Chikkonu	IPM	2.2(1.4)b		8.0(2.8)b				0.9(1.0)b	
		FP	4.2(1.7)a		12.2(3.5)a				1.9(1.2)a	
LSD (0.05)			0.18(36 df)		0.40(28 df)				0.13(36 df)	
MND	F13 = Sri Shivanna	IPM	2.0(1.3)b		6.2(2.4)b				2.0(1.2)a	
		FP	3.8(1.7)a		9.2(3.0)a				1.8(1.2)a	
LSD (0.05)			0.21(36 df)		0.32(28 df)				0.12(37 df)	
RNR	F14= D Shankar	IPM	0.7(0.9)a		0.5(0.9)a	0.02(0.7)a			0.0(0.7)b	
		FP	1.7(1.2)a		0.1(0.8)a	0.0(0.7)a			13.0(2.1)a	
LSD (0.05)			0.24(36 df)		0.14(28 df)	0.012(28 df)			0.36(35 df)	
RNR	F15= R Ashok	IPM	0.1(0.7)b		0.2(0.8)b	0.0(0.7)a			11.8(2.1)b	
		FP	2.3(1.3)a		0.8(1.0)a	0.03(0.7)a			22.8(2.7)a	
LSD (0.05)			0.22(36 df)		0.12(28 df)	0.025(28 df)			0.27(36 df)	
RNR	F16 = B Srinivas	IPM	0.7(1.0)a		2.8(1.4)a	0.0(0.7)a			19.1(2.4)b	
		FP	1.0(1.0)a		2.8(1.4)a	0.04(0.7)a			38.0(3.2)a	
LSD (0.05)			0.13(36 df)		0.21(28 df)	0.032(28 df)			0.81(36 df)	
Treatments										
T1 = IPM			0.8(2.6)b	13.7(3.4)a	1.7(2.8)a	0.4(8.1)b	3.3(1.7)b	0.6(0.5)b	1.9(0.8)a	9.5(3.9)a
T2 = FP			1.2(3.0)a	6.2(2.7)b	1.6(2.7)b	1.0(8.7)a	11.1(3.0)a	1.7(0.9)a	1.6(0.8)a	5.3(3.0)b
LSD (0.05)			0.15(504 df)	0.19(308 df)	0.16(448 df)	0.19(308 df)	0.41(36 df)	0.09(36 df)	0.03(576 df)	0.28(84 df)
DAS										
D1 = 15 DAS/22/25/29			0.1(1.5)d	6.4(2.6)b	1.0(2.2)c	0.7(8.4)b	8.0(2.9)ab	2.0(0.9)a	0.5(0.6)d	
D2 = 30 DAS/35/36			0.2(1.7)d			1.1(8.9)a	13.2(3.4)a	2.2(0.9)a	0.9(0.6)c	1.6(2.9)b
D3 = 42 DAS/43/45			1.9(4.0)b	10.8(3.2)a			5.7(2.3)b	1.3(0.9)a	1.1(0.7)c	2.6(4.0)a
D4 =50 DAS/55			0.6(2.2)c	11.0(3.2)a	2.1(3.2)a	0.9(8.6)b	9.1(2.5)b	0.3(0.6)b	2.8(0.9)b	2.8(4.1)a
D5 = 75 DAS/85				11.6(3.0)a	2.1(3.0)a	0.1(7.8)c	0.0(0.7)c	0.0(0.2)c	3.3(1.1)a	1.3(2.9)b
D5 = Pre har			2.1(4.6)a							
LSD (0.05)			0.23(504 df)	0.27(308 df)	0.23(448 df)	0.27(308 df)	0.65(36 df)	0.14(36 df)	0.05(576 df)	0.39(84 df)

Values in parentheses are square-root transformed values; Means followed by the same letter in a column are not significantly different from each other

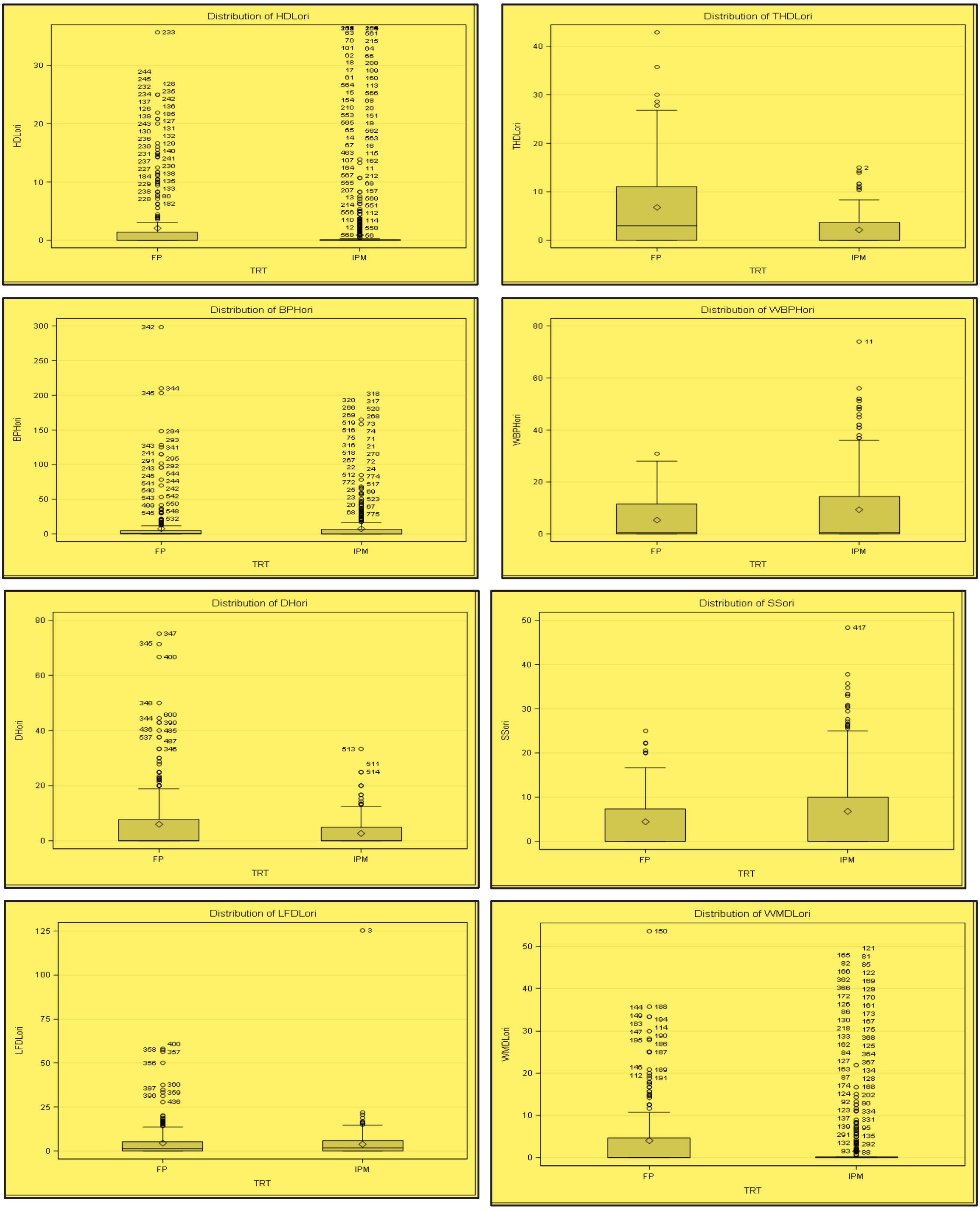


Figure 2.6.1.1. Box plots of the Incidence of dead hearts (DH), silver shoots (SS), leaf folder damaged leaves (LFDL), whorl maggot damaged leaves (WMDL), hispa damaged leaves (HDL), thrips damaged leaves (THDL), BPH and WBPH in IPM and FP plots across locations in Zone VII (Southern areas)

At Aduthurai, leaf and neck blast results of two locations revealed that the mean leaf blast progress was 69.20 in terms of AUDPC value in the IPM practices adopted field as compared to farmers practice (89.25) (**Table 2.6.1.14**). Similarly, the mean disease progress of neck blast was reduced to 49.95 (IPM Field) from 77.00 (Farmers Practice). False smut and bacterial blight were evaluated at three locations. AUDPC mean value for false smut disease progress was 34.27 in the IPM field, whereas it increased to 47.60 under farmer practices. With respect to bacterial blight, adoption of IPM practices which included application of recommended dose of fertilizers and spraying of copper oxy chloride reduced the disease progress from 153.30 (Farmers Practice) to 88.33 (IPM Field).

Table 2.6.1.14 AUDPC values of rice diseases at Aduthurai, ***Kharif*** 2025

Location	Treatment	AUDPC Values			
		LB	NB	FS	BB
L1	IPM	86.1	39.9	11.2	62.3
	FP	95.9	81.2	16.8	203.7
L2	IPM	52.3	60	58	110.3
	FP	82.6	72.8	61.6	128.8
L3	IPM	-	-	33.6	92.4
	FP	-	-	64.4	127.4
Mean	IPM	69.2	49.95	34.27	88.33
	FP	89.25	77	47.6	153.3

At Rajendranagar, the trial was carried out at three locations. Overall, the disease severity was very low except in the neck blast where the disease severity up to 10.8% was recorded (**Table 2.6.1.15**).

Table 2.6.1.15 Disease severity (%) at Rajendranagar, ***Kharif*** 2025

Location	Treatment	Disease Severity (%)				
		55 DAT	110 DAT			
		BS	NB	SHR	FS	GD
L1	IPM	3.6	-	0.18	2	5.4
	FP	1.6	-	0	3	1.74
L2	IPM	5.4	0	0.4	3.4	7.8
	FP	1	6.2	3	0	2.8
L3	IPM	-	10.8	-	-	5.5
	FP	-	7	1	-	3
Mean	IPM	4.5	5.4	0.19	1.8	4.4
	FP	1.3	6.6	1.33	1.5	2.51

L- Location; IPM – Integrated Pest Management Practices; FP- Farmer Practices; NB- Neck Blast; BS- Brown spot;FS- False smut; GD- Grain Discolouration

Application of a single spray of broad-spectrum fungicide propiconazole @ 200 ml/acre was recommended in the IPM practices. Instead of a single spray of fungicide, 2 to 3 sprays of fungicides were sprayed in the farmers' practices and hence there was nil or very low incidence of brown spot, neck blast, sheath rot, and false smut in the farmers practice adopted fields

At Gangavathi, adoption of IPM practices and application of fungicides at the specific stages reduced the disease progress of leaf blast (IPM-42, FP-58), neck blast

(IPM-60, FP-147) and bacterial blight (IPM – 884, FP- 1052). However, with respect to sheath blight and brown spot the AUDPC value and the disease incidence of false smut was high in the IPM field as compared to the farmer's field (SHB- IPM-1100, FP-936; BS - IPM-1283, FP-1054; FS IPM - 16.12%; FP-12.30 %). In the farmers practices a total of seven sprays of fungicides (hexaconazole, streptocyclin + COC, thifluzamide 24% SC, propiconazole, tricyclazole 75% WP, trifloxystrobin + tebuconozole) were applied in excess (**Table 2.6.1.16**). At Mandya, in the IPM practices adopted field the disease progress of leaf and neck blast and sheath blight was reduced significantly as compared to farmer practices (LB - IPM-224.7, FP-389.2; NB- IPM – 11.4; FP-32.4; SHB - IPM-245, FP-477.4) In addition, the disease incidence of false smut was reduced in the IPM practices as compared to the farmer's practices (IPM - 2.80; FP - 9.50). The number of smut balls per hill were recorded as 1-2 in the IPM field, whereas in the farmer's practices, the number of smut balls ranged from 11 to 22 per hill (**Table 2.6.1.16**).

Table 2.6.1.16 AUDPC values of diseases at Gangavathi and Mandya, ***Kharif*** 2025

Treatments	Gangavathi						Mandya			
	AUDPC Values					DI (%)	AUDPC Values			DI (%)
	LB	NB	SHB	BS	BB	FS	LB	NB	SHB	FS
IPM	42	60	1100	1283	884	16.12	224.7	11.4	245	2.8
FP	58	147	936	1054	1052	12.3	389.2	32.4	477.4	9.5

At Aduthurai, weed population at the active tillering stage was significantly lower under IPM (20.73 m^{-2}) compared to farmers practice (32.67 m^{-2}). Similarly, weed biomass was reduced under IPM (19.93 g m^{-2}) compared to farmers practice (22.20 g m^{-2}), though the difference was statistically non-significant (**Table 2.6.1.17**). At Coimbatore, weed dynamics clearly indicate the superiority of IPM. Weed population at active tillering was significantly reduced under IPM (26.20 m^{-2}) compared to farmers practice (32.13 m^{-2}). At panicle initiation, weed density under IPM (9.20 m^{-2}) remained significantly lower than farmers practice (11.60 m^{-2}). Weed biomass was drastically reduced under IPM at both stages (3.90 and 4.50 g m^{-2}) compared to farmers' practice (16.48 and 5.28 g m^{-2}), indicating strong suppression of weed growth.

At Gangavathi, weed population and biomass were consistently lower under IPM at both stages, though differences were not statistically significant. This indicates that IPM improved productivity through a combination of better yield attributes and reduced weed competition. At Mandya, weed population and biomass were markedly lower under IPM at both stages. Weed biomass at active tillering was 0.68 g m^{-2} under IPM compared to 1.82 g m^{-2} under farmers practice (**Table 2.6.1.17**). This strong reduction in weed pressure contributed to improved crop performance.

Table 2.6.1.17 Weed population and weed biomass in Zone VII, ***Kharif*** 2025

Location	Treatments	Weed population no/m²		Weed dry biomass g/m²	
		Active Tillering Stage	Panicle Initiation Stage	Active Tillering Stage	Panicle Initiation Stage
Aduthurai	IPM	20.73(4.26)		19.93	
	FP	32.67(5.40)		22.2	
	Exp. mean	4.83		21.07	
	CD(0.05)	1.6		9.81	
Coimbatore	IPM	26.20(5.13)	9.20(3.11)	3.90	4.50
	FP	32.13(5.70)	11.60(3.47)	16.48	5.28
	Exp. mean	**5.42**	**3.29**	**10.19**	**4.89**
	CD(0.05)	**0.34**	**0.16**	**2.65**	**0.67**
Gangavathi	IPM	9.08(3.01)	3.98(2.10)	4.19	1.78
	FP	9.75(3.19)	4.27(2.17)	4.90	2.06
	Exp. mean	3.1	2.14	4.54	1.92
	CD(0.05)	0.87	0.34	2.61	0.88
Mandya	IPM	7.00(2.60)	3.80(2.02)	0.68	0.79
	FP	10.80(3.31)	5.80(2.44)	1.82	1.24
	Exp. mean	2.96	2.23	1.25	1.02
	CD(0.05)	0.94	0.58	0.45	0.59

The yield and economic analysis of IPM–DSR trials conducted in Zone VII (Southern areas) during *Kharif* 2025 revealed clear advantages of IPM over farmers' practice (FP) across locations.

At individual locations, similar trends were observed. In ADT, IPM increased yield from 29.60–37.60 q/ha under FP to 34.00–42.40 q/ha, along with higher net returns. At CBT locations, IPM provided yield advantages of 4–8 q/ha and improved B: C ratios ranging from 1.9–2.2 compared to 1.5–1.7 under FP. In GNV locations, yield differences between treatments were smaller; however, IPM recorded lower cultivation cost, resulting in markedly higher net returns and B: C ratios (2.9–3.0) compared to FP (2.3–2.4). Even where yield differences were marginal (e.g., GNV F10), IPM practices still resulted in higher net returns owing to lower cultivation costs.

The highest yield was recorded under IPM at RNR (77.50 q/ha; Sri D. Shankar), with net returns of ₹1,23,097/ha and B: C ratio of 3.2. Similarly, higher profitability under IPM was observed at MND and RNR locations due to both increased yield and reduced production costs.

In general, the IPM treatment recorded a higher mean grain yield (55.98 q/ha) compared to FP (51.60 q/ha), representing an increase of about 4.38 q/ha. The higher yield under IPM translated into greater gross returns (₹130,793/ha) than FP (₹120,904/ha). In addition, the cost of cultivation was lower under IPM (₹54,163/ha) compared to FP (₹63,206/ha), indicating reduced expenditure on plant protection inputs and better resource optimization (**Table 2.6.1.18).**

Consequently, IPM resulted in substantially higher net returns (₹76,630/ha) compared to FP (₹57,698/ha), with an additional profit of ₹18,932/ha. The benefit–cost ratio also improved under IPM (2.41) relative to FP (1.89), demonstrating better economic efficiency of IPM-based DSR cultivation.

Overall, the results clearly demonstrate that adoption of IPM in DSR not only reduced pest incidence but also improved productivity and profitability, providing higher returns and better benefit–cost ratio compared to farmers' practice across Zone VII. This study also had provided a poof of concept where many of the ecofriendly components were deployed and validated in farmers field reaffirming the integration of various components for management of the insect pests.

Results across zones

Across zones, the incidence of stem borer damage in terms of dead hearts (DH) and white ear heads (WE) was higher in farmers' practice (FP) plots (28.4% DH and 21.4% WE) compared to IPM plots in Zone III (eastern areas). In the remaining zones, stem borer incidence remained generally low under both IPM and FP plots (**Table 2.6.1.19**). In Zone VII (southern areas), gall midge incidence was higher in IPM plots (13.7% silver shoots) compared to FP plots (6.2%), whereas rice hispa damage was greater under FP (11.1% HDL) than IPM (3.3% HDL). The incidence of leaf folder, whorl maggot, thrips, BPH, and WBPH was generally lower in IPM plots than in FP plots across zones. Overall, IPM plots recorded higher grain yield, resulting in increased gross returns and improved benefit–cost ratio compared to farmers' practice.

Table 2.6.1.18. Returns and BC ratio in IPM DSR trial at Zone VII (Southern), ***Kharif*** 2025

Location	Farmer Name	Treatments	Yield (q/ ha)	Gross returns (Rs.)	Cost of cultivation (Rs.)	Net returns (Rs.)	BC ratio
ADT	F1 = Sri Karthikeyan	IPM	34.00	61200	42350	18850	1.4
		FP	29.60	53280	48500	4780	1.1
ADT	F2 = Sri Subbian	IPM	40.80	73440	41850	31590	1.8
		FP	37.60	67680	47700	19980	1.4
ADT	F3 = Sri Roseleen	IPM	42.40	76320	35800	40520	2.1
		FP	35.20	63360	42000	21360	1.5
BPT	F4= Sri Yarlagadda Venkateswarao	IPM	67.50	155250	79538	75712	2.0
		FP	65.62	150926	87255	63671	1.7
CBT	F5 = Sri Bala subramaniyan	IPM	51.00	122400	65415	56985	1.9
		FP	42.56	102144	68750	33394	1.5
CBT	F6 = Sri Gopal krishnan	IPM	47.20	113280	51375	61905	2.2
		FP	43.04	103296	62625	40671	1.6
CBT	F7= Sri Chelladurai	IPM	49.20	118080	59000	59080	2.0
		FP	44.00	105600	62625	42975	1.7
GNV	F8 = Sri Hanumanthappa	IPM	56.82	147732	50380	97352	2.9
		FP	56.21	146146	64670	81476	2.3
GNV	F9 =Sri Basavaraj	IPM	57.44	149344	50380	98964	3.0
		FP	56.27	146302	64670	81632	2.3
GNV	F10 = Sri Abdulsab	IPM	57.57	149682	50380	99302	3.0
		FP	58.63	152438	64670	87768	2.4
MND	F11 = Sri Chikkonu	IPM	61.68	148032	57375	90657	2.6
		FP	53.41	128184	69125	59059	1.9
MND	F12 = Sri Shivanna	IPM	62.48	156200	58500	97700	2.7
		FP	54.96	137400	70500	66900	1.9
RNR	F13 = Sri D Shankar	IPM	77.50	179800	56703	123097	3.2
		FP	72.74	168757	65000	103757	2.6
RNR	F14 = Sri R Ashok	IPM	66.77	154906	56703	98203	2.7
		FP	62.22	144350	65000	79350	2.2
RNR	F15 = Sri B Srinivas	IPM	67.34	156229	56703	99526	2.8
		FP	61.94	143701	65000	78701	2.2
IPM			55.98	130793	54163	76630	2.41
FP			51.60	120904	63206	57698	1.89

Price of Paddy: F1, F2 & F3 = Rs. 1800/q; F4 = Rs. 2300/q; F5, F6, & F7 = Rs. 2400/q; F8, F9, & F10 = Rs.2600/q; F11 = Rs. 2400/q; F12 = Rs. 2500/q; F13, F14 & F15 = Rs. 2320/q

Table 2.6.1.19 Incidence of insect pests, grain yield and BC ratio in IPM DSR trial at various zones during *Kharif* 2025

Zones	Treatments	%DH/WE	%SS	%LFDL	% WMDL	%HDL	%THDL	BPH	WBPH	Grain yield	BC ratio
Zone II (Northern areas)	IPM	0.0/2.3		0.6				2.6	1.0	4568	3.10
	FP	1.4/2.6		0.9				4.2	1.0	4776	2.40
Zone III (Eastern areas)	IPM	5.2/5.7		1.9	3.3					5496	2.05
	FP	28.4/21.4		5.0	6.1					4960	1.80
Zone IV (North-eastern areas)	IPM	6.7/3.0	4.3	3	1.8					4562	2.51
	FP	7.1/7.9	4.1	5.7	3.7					3268	2.15
Zone VI (Western areas)	IPM	1.7/3.0		1.4						5028	1.70
	FP	6.2/4.4		4.6						4636	1.77
Zone VII (Southern areas)	IPM	0.8	13.7	1.7	0.4	3.3	0.6	1.9	9.5	5598	2.41
	FP	1.2	6.2	1.6	1	11.1	1.7	1.6	5.3	5160	1.89

Across the zones, in Northern zone (Kaul), the adoption of IPM practices were found effective against leaf blast, bacterial blight, sheath blight, brown spot and false smut. In North Eastern zone (Arundhutinagar) IPM practices are effective against shath blight. In the Western zone (Navsari), IPM practices are highly effective against the sheath blight and sheath rot. In the Southern zone (Aduthurai, Gangavathi, Mandya and Rajendranagar), the IPM practices reduced the disease progress of leaf and neck blast, sheath blight, bacterial blight and false smut (**Table 2.6.1.20**).

Table 2.6.1.20 AUDPC/ Disease severity (%)/Disease Incidence at various Zones, *Kharif* 2025

Zone	Treatment	LB	NB	SHB	BB	BS	FS	SHR
Zone I	IPM							
	FP							
Zone II	IPM	7		14.35	20.58	27.44	4.29$	
	FP	11.34		17.85	39.48	35.84	8.75$	
Zone III	IPM							
	FP							
Zone IV	IPM			19.25*	2.5*	2*		
	FP			22.75*	3.75*	3.75*		
Zone V	IPM							
	FP							
Zone VI	IPM			470				736
	FP			972				1106
Zone VII	IPM	112	40	245	884		2.80$	
	FP	179	85	477	1052		9.50$	

Across zones, a reduction in weed parameters was observed in all the locations across zones (**Table 2.6.1.21**). The reduction in weed population and weed dry biomass was high in Zone III at Chinsurah followed by Zone VII.

Table 2.6.1.21 Reduction in weed parameters in different zones in IPM DSR, *Kharif* 2025

Zones	Centers	Weed Population (% reduction in IPM)		Weed dry biomass (% reduction in IPM)	
		Active Tillering Stage	Panicle Initiation Stage	Active Tillering Stage	Panicle Initiation Stage
Zone-II	Ludhiana	-	27.27	-	29.16
Zone-III	Chinsurah	66.60	63.70	87.53	68.18
Zone-IV	Titabar	27.00	19.19	16.12	13.79
Zone-VI	Navasari	35.84	45.76	33.58	43.41
Zone-VII	Aduthurai	36.54	-	10.22	-
	Coimbatore	18.45	20.68	76.33	14.77
	Gangavathi	6.87	6.79	14.48	13.59
	Mandya	35.18	34.48	62.63	36.29
	Puducherry	42.27	46.78	49.92	35.75

Integrated Pest Management in Direct Seeded Rice (IPM-DSR) trials with zone-specific practices were conducted at 12 locations across 22 farmers' fields in a participatory manner during Kharif 2025. The results indicated that IPM practices effectively reduced the incidence of major insect pests compared to farmers' practice (FP) in most zones. In Zone III (eastern areas), stem borer damage in terms of dead hearts and white ear heads was higher under FP, while in other zones the incidence remained low under both treatments. In Zone VII (southern areas), gall midge incidence was relatively higher in IPM plots; however, rice hispa damage was considerably lower under IPM than FP. The incidence of leaf folder, whorl maggot, thrips, BPH, and WBPH was generally lower in IPM plots across zones, indicating better pest suppression under IPM. Grain yield was consistently higher in IPM plots across locations. Economic analysis further revealed that IPM reduced cost of cultivation and increased gross and net returns, resulting in a higher benefit–cost ratio compared to FP. This study also provided proof of concept, where many of the eco-friendly components, such as seed treatments, bund crops, bird perches, pheromone traps, and the release of egg parasitoids, etc., were deployed and validated in farmers' fields, reaffirming the integration of various components for the management of insect pests. .

The adoption of IPM practices reduced the disease progression of leaf blast, sheath blight, bacterial blight, brown spot and false smut in Zone II. In Zone IV, IPM practices reduced the disease development of sheath blight, bacterial blight and brown spot. In Zone VI, IPM practices reduced the AUDPC values of sheath blight and sheath rot. In Zone VII, the AUDPC values of leaf blast, neck blast, sheath blight and bacterial blight were low in IPM plots compared to FP plots, indicating that the IPM practices were effective in managing these diseases. However, the values of false smut were low in both IPM and farmers practices.

Weed population and weed dry biomass were significantly lower in IPM plots as compared to FP plots across the locations. In IPM-adopted fields, the mean weed population reduction across the Zones ranged from 6.87% in Zone VII at Gangavathi to 66.60% in Zone III at Chinsurah at active tillering stage while it varied from 6.79% t 63.70% at panicle initiation stage. The weed biomass was reduced from 10.22% (Zone VII, Aduthurai) to 87.53% at Chinsurah in Zone III at active tillering stage and from 13.59% to 68.18% at panicle initiation stage. This indicates that IPM improved productivity through a combination of better yield attributes and reduced weed competition.

Grain yields were significantly high in IPM-implemented plots, resulting in high gross returns. Overall, the IPM-DSR approach proved effective in minimizing pest damage, enhancing productivity, and improving profitability (B:C ratio of 1.7-3.1) across different rice-growing zones.

2.7 Assessment of Insect population dynamics in rice ecosystems

This chapter reports on the salient findings of the insect population dynamics in rice crop during *kharif* 2025 which was monitored and recorded across various zones in India along with the meteorological data through two major trials, 1. Population dynamics of insect pests and natural enemies in rice ecosystem (PDPNE) where pest damage of major insect pests and natural enemies incidence were recorded and 2. Monitoring of insect pests and natural enemies through light trap catches (MPNELT). The details of the results are reported trial wise:

2.7.1 Population dynamics of insect pests and natural enemies in rice ecosystem (PDPNE)

Understanding the population dynamics of insect pests in relation to weather variability, crop growth stages, growing seasons, and cropping systems remains essential for developing ecologically sustainable and economically viable pest management strategies. Furthermore, analysing pest population trends at specific locations continues to play a vital role in the implementation of location-specific Integrated Pest Management (IPM) approaches and precision agriculture technologies.

In India, rice cultivation spans diverse agro-climatic zones and cropping systems, leading to considerable variation in the incidence and dynamics of both major and minor insect pests. These fluctuations are influenced by a combination of abiotic factors such as temperature, rainfall, relative humidity, and sunshine hours, as well as biotic factors including natural enemies like parasitoids and predators. To effectively capture these dynamics, systematic and continuous monitoring of insect pests is carried out across multiple locations to assess both short-term and long-term trends.

For the current reporting period (*Kharif* 2025), weekly observations on insect pests and natural enemies, along with corresponding macro-weather parameters, were collected from monitoring centres. Weekly cumulative pest populations and averages of weather variables namely rainfall, maximum and minimum temperatures, morning and evening relative humidity, and sunshine hours were computed from daily records and analysed in relation to standard meteorological weeks.

Data on insect pests, natural enemies and weather parameters were collected from 30 AICRPR centres across seven zones of India and processed to obtain zone-wise averages. These included mean pest incidence, natural enemy populations and key climatic variables, providing a clear overview of regional pest dynamics and environmental conditions during the season.

List of locations under study and the pest damage

Zone	Locations	Date of Planting along with SMW	Pest damages	Natural enemies
Zone 1	Khudwani	11 June 2025 (24th SMW)	Grass hopper, Rice skipper	Spiders, coccinellids, braconids
Zone 2	New Delhi	18 July 2025 (29th SMW)	Stem borer, Leaf folder, Whorl maggot, Planthoppers	-
	Kaul	29 July 2025 (30th SMW)	Stem borer, Leaf folder, Whorl maggot, Planthoppers	Spiders, mirid bugs, braconids, Ichneumonid
	Ludhiana	10 July 2025 (28th SMW)	Stem borer, Leaf folder, Planthoppers	Spiders
	Pantnagar	08 July 2025 (27th SMW)	Stem borer, Leaf folder, Planthoppers	Spiders
Zone 3	Chiplima	01 August 2025 (31st SMW)	Gall midge, Stem borer,Leaf folder, Planthoppers	-
	Ranchi	12 July 2025 (28th SMW)	Gall midge, Stem borer, Leaf folder	Mirid bugs, Spiders, Coccinelid
	Pusa	24 July 2025 (30th SMW)	Stem borer, Leaf folder	-
	Chinsurah	12 August 2025 (32nd SMW)	Stem borer, Leaf folder, Whorl maggot	Mirid bugs, Spiders
Zone 4	Titabar	19 July 2025 (29th SMW)	Gall midge, stem borer, leaf folder, whorl maggot, Planthoppers	Spiders
Zone 5	Jagdalpur	28 July 2025 (30th SMW)	Gall midge, stem borer, leaf folder, whorl maggot, Planthoppers	-
	Rewa	-	Stem borer	-
	Raipur	12 August 2025 (32nd SMW)	Stem borer, leaf folder, whorl maggot, Planthoppers	Spiders, Coccinelid
Zone 6	Nawagam	13 August 2025 (33rd SMW)	Stem borer, leaf folder, Planthoppers	
	Karjat	21 July 2025 (29th SMW)	Stem borer, leaf folder	
	Navsari	-	Stem borer, leaf folder	
Zone 7	Aduthurai	21 July 2025 (29th SMW)	Gall midge, Stem borer, Leaf folder, Whorl maggot, Hispa, Planthoppers	Spiders, Coccinelid
	Rajendranagar	05 August 2025 (32nd SMW)	Gall midge,Stem borer,Leaf folder,Whorl maggot,Hispa, Planthoppers	Mirid bugs, Spiders, Coccinelid
	Warangal	17 July 2025 (27th SMW)	Gall midge,Stem borer,Leaf folder,Whorl maggot,Hispa, Planthoppers	-
	Bapatla	01 September 2025 (35th SMW)	Gall midge,Stem borer,Leaf folder, Planthoppers	Spiders
	Jagtial	15 July 2025 (28th SMW)	Gall midge,Stem borer,Planthoppers	-
	Ragolu	20 August 2025 (34th SMW)	Gall midge,Stem borer,Leaf folder,Whorl maggot, Planthoppers	Mirid bugs, Spiders, Coccinelid
	Nellore	-	Gall midge,Stem borer,Leaf folder,Whorl maggot, Hispa	-
	Maruteru	29 July 2025 (30th SMW)	Gall midge,Stem borer,Leaf folder,Whorl maggot,Hispa, Planthoppers	Mirid bugs, Spiders, Coccinelid
	Moncompu	-	Stem borer,Leaf folder,Whorl maggot,Hispa	Spiders, Coccinellids
	Gangavathi	08 August 2025 (32nd SMW)	Gall midge,Stem borer,Leaf folder,Whorl maggot, Hispa, Planthoppers	Mirid bugs, Spiders
	Mandya	05 September 2025 (36th SMW)	Stem borer,Leaf folder	-
	Coimbatore	19 August 2025 (33rd SMW)	Gall midge,Stem borer,Leaf folder,Whorl maggot,Planthoppers	Spiders
	Pattambi	-	Gall midge,Stem borer,Leaf folder,Whorl maggot	-
	Karaikal	-	Gall midge,Stem borer,Leaf folder,Whorl maggot,Hispa, Planthoppers	-

- Not available.

This report presents a zone wise summary of these observations and general trends in pest and natural enemy population dynamics.

Zone I: At the Khudwani centre in this zone, the major pests observed were grass hopper and rice skipper. The incidence of insect pests was recorded beginning from the 25th standard meteorological week (SMW) onwards. Grasshopper damage (% DL) was the predominant damage, starting at 5.86 per cent and increasing steadily to a peak of 33.46 per cent during the 32nd SMW. Thereafter, the incidence gradually declined towards later stages. Rice skipper incidence remained low throughout the season, ranging from 0.69 to 2.53 per cent, with the highest damage recorded during the 28th SMW (Fig. 2.7.1.1A). Among natural enemies, spider population ranged from 0.29 to 1.16 per hill, with peak population observed during the 32nd SMW, coinciding with higher pest incidence. Braconid population varied between 0.20 and 0.96 per hill, with relatively higher activity during the mid-crop stages (37th SMW), Coccinellid population ranged from 0.24 to 1.04 per hill, with peak activity recorded at 42nd SMW. (Fig. 2.7.1.1B).

FIG 2.7.1.1A POPULATION DYNAMICS OF INSECT PESTS IN RICE ECOSYSTEM (ZONE-I)

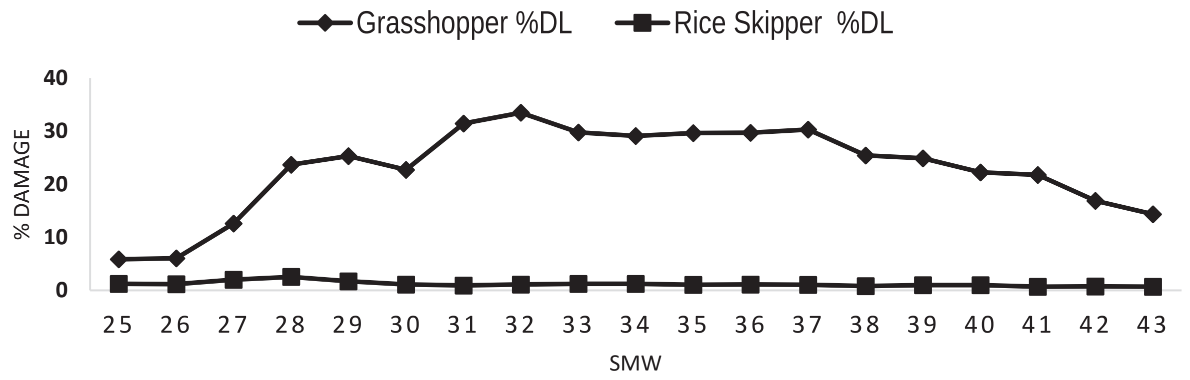
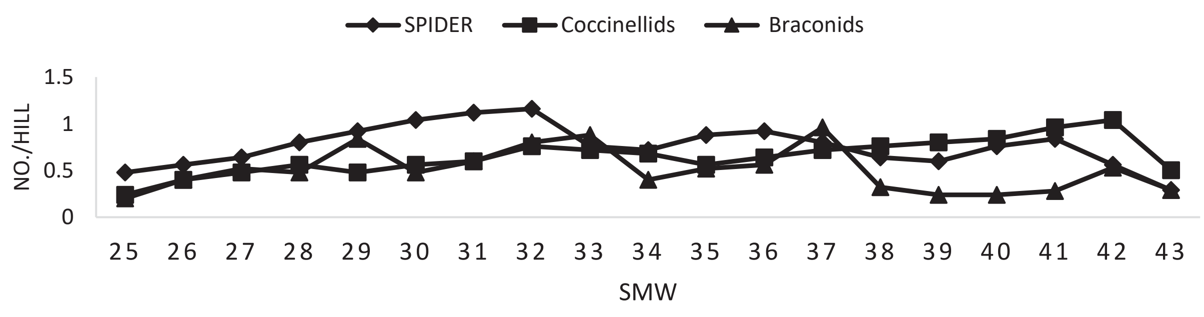
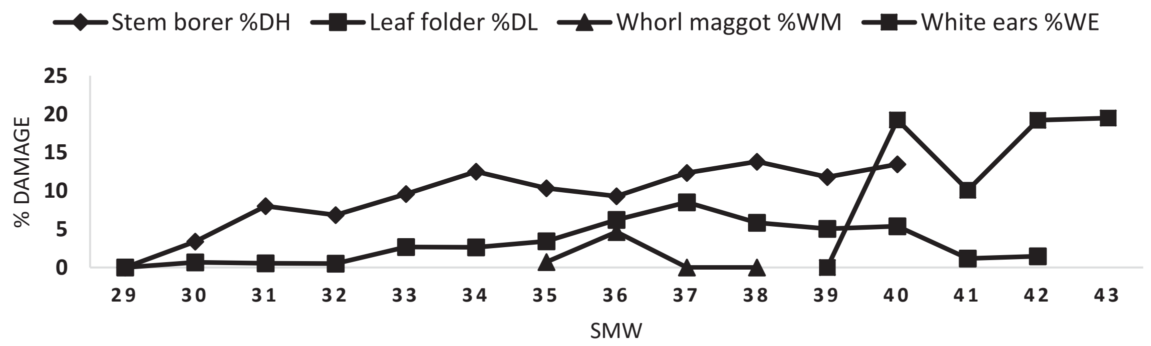


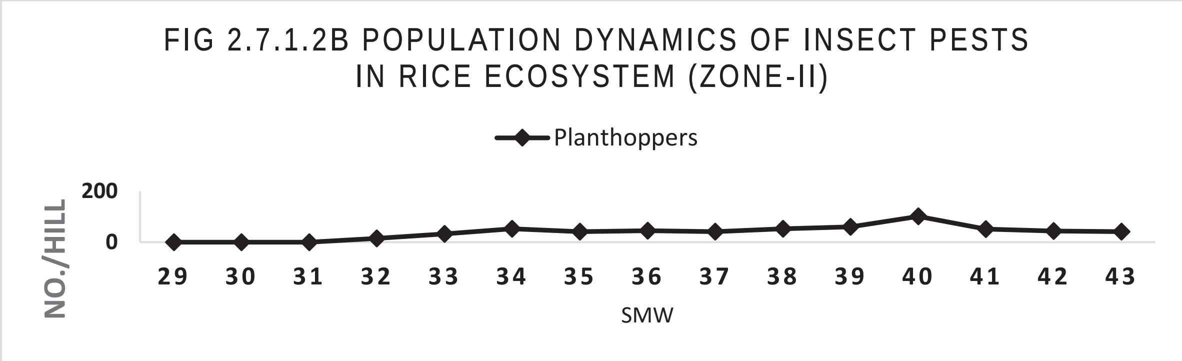
FIG 2.7.1.1B POPULATION DYNAMICS OF NATURAL ENEMIES IN RICE ECOSYSTEM (ZONE-I)

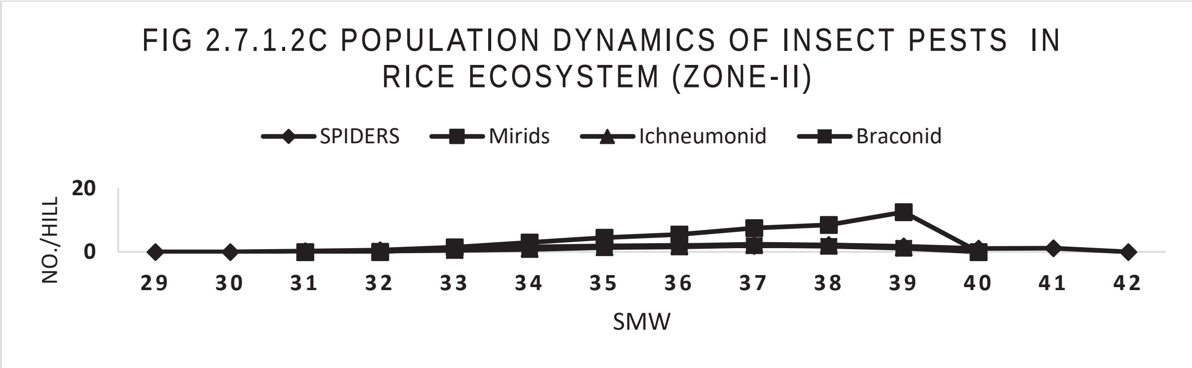


Zone II: Pest incidence was reported from New Delhi, Kaul, Pantnagar and Ludhiana. The major pests observed in this zone were stem borer, leaf folder, whorl maggot and planthoppers. The incidence of insect pests started from the 30th SMW. Stem borer infestation increased from 3.36 per cent (30th SMW) and reached a peak of 13.81 per cent during the 38th SMW, remaining high up to the 40th SMW. Leaf folder incidence was low initially (0.69%) and attained a maximum of 8.51 per cent during the 37th SMW, followed by a decline. Whorl maggot incidence was observed only for few weeks, with a peak of 4.64 per cent during the 36th SMW. BPH/WBPH population appeared from the 32nd SMW (15.00/hill) and increased sharply, reaching a maximum of 101.35/hill during the 40th SMW, followed by a decline. White ear incidence was recorded at later stages, with peak infestation of 19.48 per cent during the 43rd SMW **(Fig.2.7.1.2A and 2B)**. Natural enemy population increased gradually from 31st to 39th SMW. Spiders increased from 0.25 to a peak of 2.16 No./hill (38th SMW), while mirids showed a sharp rise, reaching a maximum of 12.50 no./hill during the 39th week. Ichneumonids and braconids also followed a similar trend, peaking at 2.40 and 2.00 per hill, respectively, around 37th week (Fig. 2.7.1.2C). Among pests, stem borer (SBDH) showed a significant positive correlation with minimum temperature (r = 0.52*), while leaffolder (LFDL) and planthoppers (PH) exhibited weak or negative association with Tmin (r = 0.11 and -0.41, respectively). Sunshine hours positively influenced pest populations, particularly leaf folder (r = 0.57) and planthoppers (r = 0.45). In contrast, evening relative humidity showed a negative correlation with most pests, especially number of planthoppers (r = -0.42). Wind speed also exerted a negative effect, notably on planthoppers (r = -0.49). Among natural enemies, spiders, mirid bugs (MB) and braconids showed positive association with maximum temperature (r = 0.17–0.42) and sunshine hours (r = 0.41–0.54). However, they exhibited negative correlation with evening relative humidity (r = -0.06 to -0.21) and wind speed (r = -0.14 to -0.26). Rainfall showed mostly weak or inconsistent relationships with both pests and natural enemies (Fig. 2.7.1.3).

FIG 2.7.1.2A POPULATION DYNAMICS OF INSECT PESTS IN RICE ECOSYSTEM (ZONE-II)







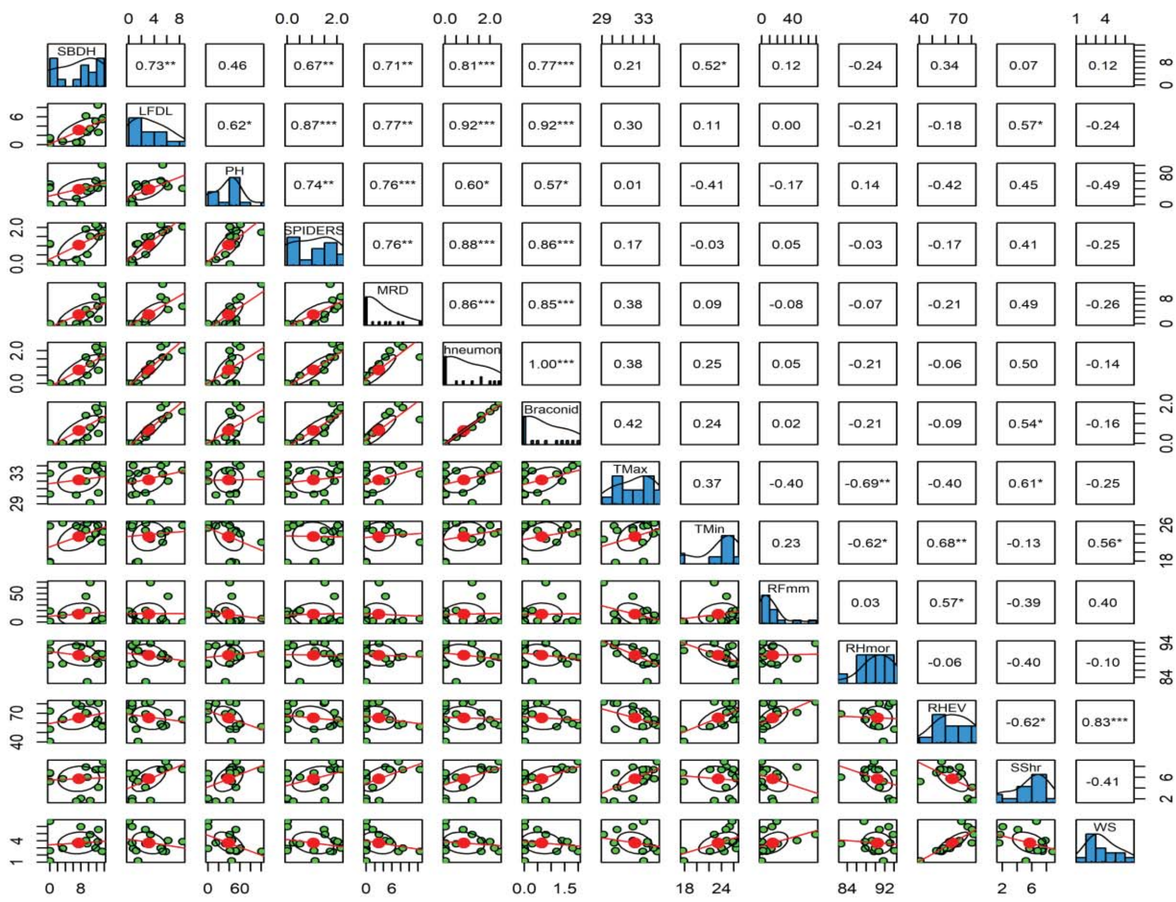
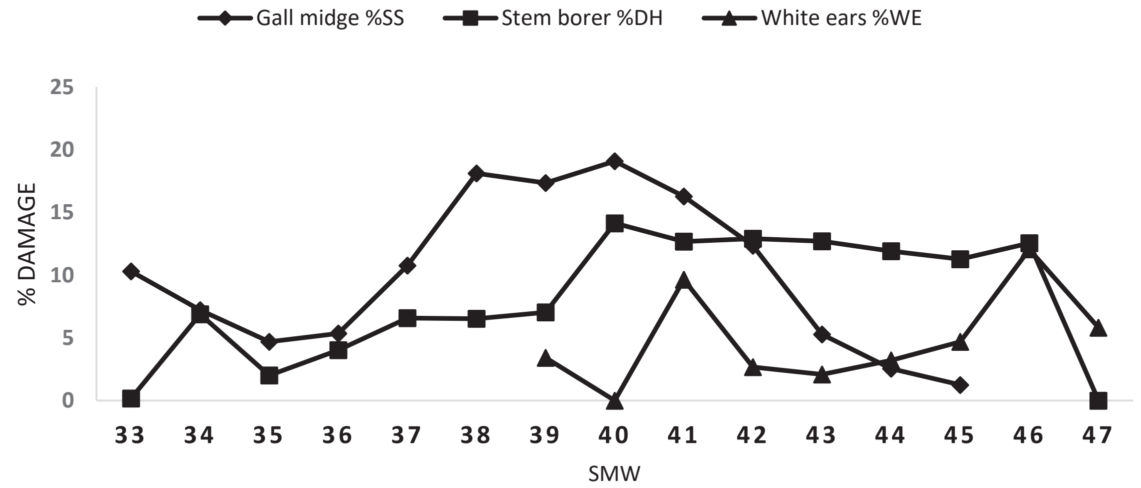


Fig: 2.7.1.3 Correlation matrix - field incidence of insect pests ***vis-à-vis*** weather parameters in Zone-II, ***Kharif,*** 2025

Zone III: Pest incidence was reported from Chiplima, Ranchi, Pusa and Chinsurah. The major pests observed in this zone were Gall midge, stem borer, leaf folder, whorl maggot and Planthoppers. The incidence of insect pests commenced from the 33rd SMW. Gall midge (%SS) was observed from the beginning with 10.30 per cent and reached a peak of 19.08 per cent during the 40th SMW, followed by a decline. Stem borer dead heart infestation increased gradually from 0.16 per cent (33rd SMW) and reached a maximum of 14.14 per cent during the 40th SMW, remaining relatively high up to later stages. Leaf folder incidence started at 2.52 per cent and attained a peak of 9.73 per cent during the 37th SMW, thereafter declining. Whorl maggot incidence was noticed only during limited periods, with the highest infestation (10.70%) recorded in the 39th SMW. BPH/WBPH population appeared from the 35th SMW (1.70/hill) and reached a peak of 11.40/hill during the 40th SMW, followed by a decline. White ear incidence appeared during later stages, reaching a maximum of 12.05 per cent during the 46th SMW (Fig. 2.7.1.4A, 4B and 4C). Among natural enemies, spiders (1.00–2.40/hill), coccinellids (0.80–1.80/hill) and mirids (1.20–4.40/hill) were observed, with relatively higher populations during peak pest incidence periods (Fig. 2.7.1.4D). Gall midge (SS) showed significant positive correlation with maximum (r = 0.71**) and minimum temperature (r = 0.56*). Leaf folder also exhibited strong positive correlation with temperature (r = 0.66** and 0.667**) and evening relative humidity (r = 0.58*). Stem borer showed negative correlation with minimum temperature (r = -0.42). White ear incidence showed significant negative correlation with minimum temperature (r = -0.70**) and evening relative humidity (r = -0.59*). Among natural enemies, spiders, coccinellids and mirids exhibited significant positive correlation with temperature (r = 0.55* to 0.74**) and evening relative humidity (r = 0.59* to 0.70**) (Fig. 2.7.1.5).

FIG 2.7.1.4A POPULATION DYNAMICS OF INSECT PESTS IN RICE ECOSYSTEM (ZONE-III)



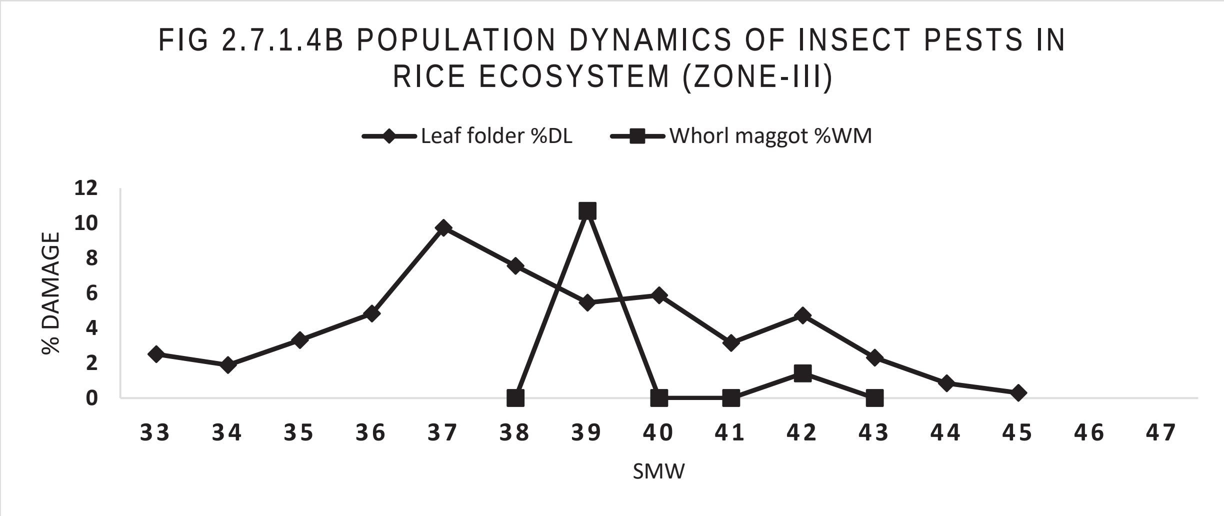


FIG 2.7.1.4B POPULATION DYNAMICS OF INSECT PESTS IN RICE ECOSYSTEM (ZONE-III)
Leaf folder %DL
Whorl maggot %WM
% DAMAGE
12
10
8
6
4
2
0
33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
SMW

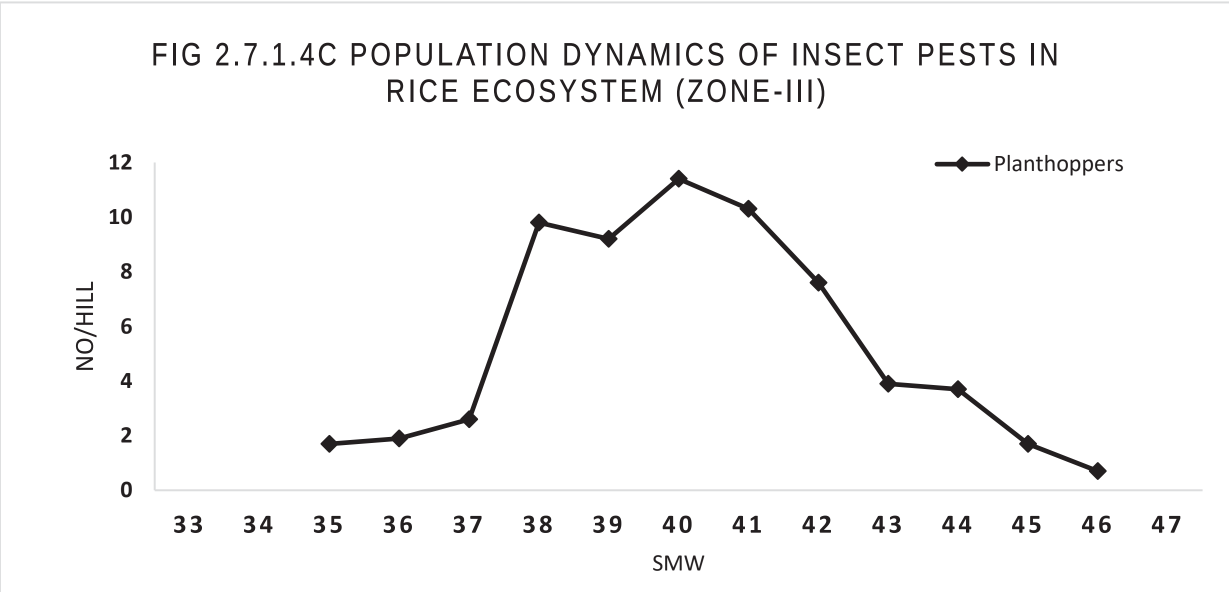


FIG 2.7.1.4C POPULATION DYNAMICS OF INSECT PESTS IN RICE ECOSYSTEM (ZONE-III)
Planthoppers
NO/HILL
12
10
8
6
4
2
0
33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
SMW

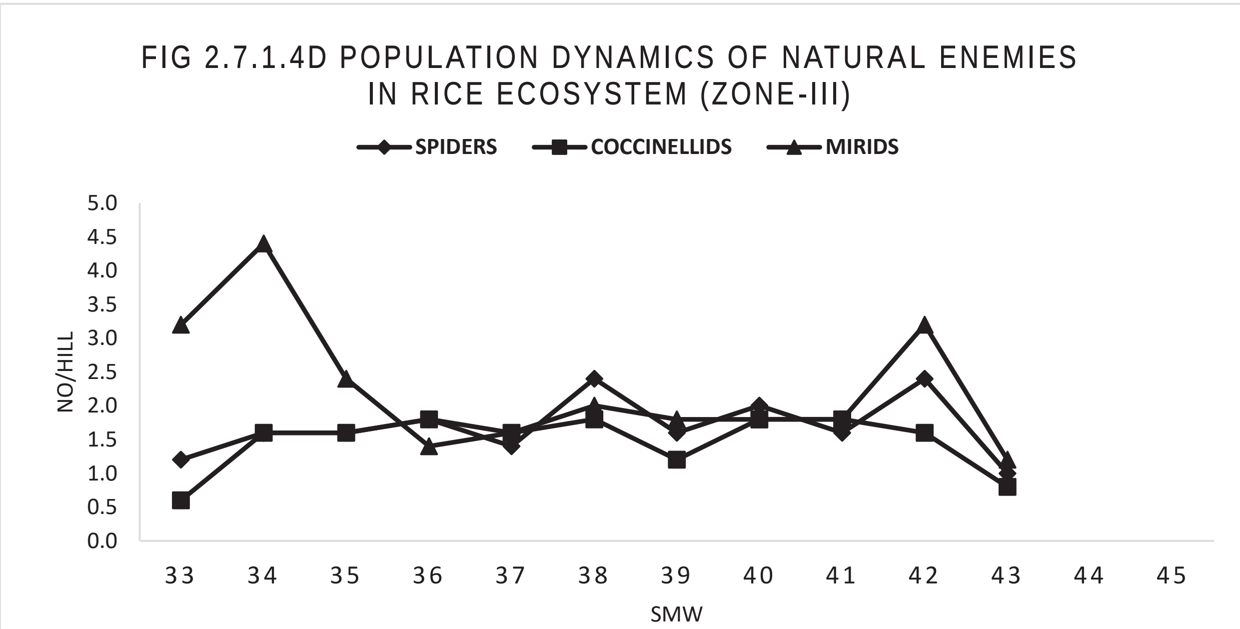


FIG 2.7.1.4D POPULATION DYNAMICS OF NATURAL ENEMIES IN RICE ECOSYSTEM (ZONE-III)
SPIDERS
COCCINELLIDS
MIRIDS
NO/HILL
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
33 34 35 36 37 38 39 40 41 42 43 44 45
SMW

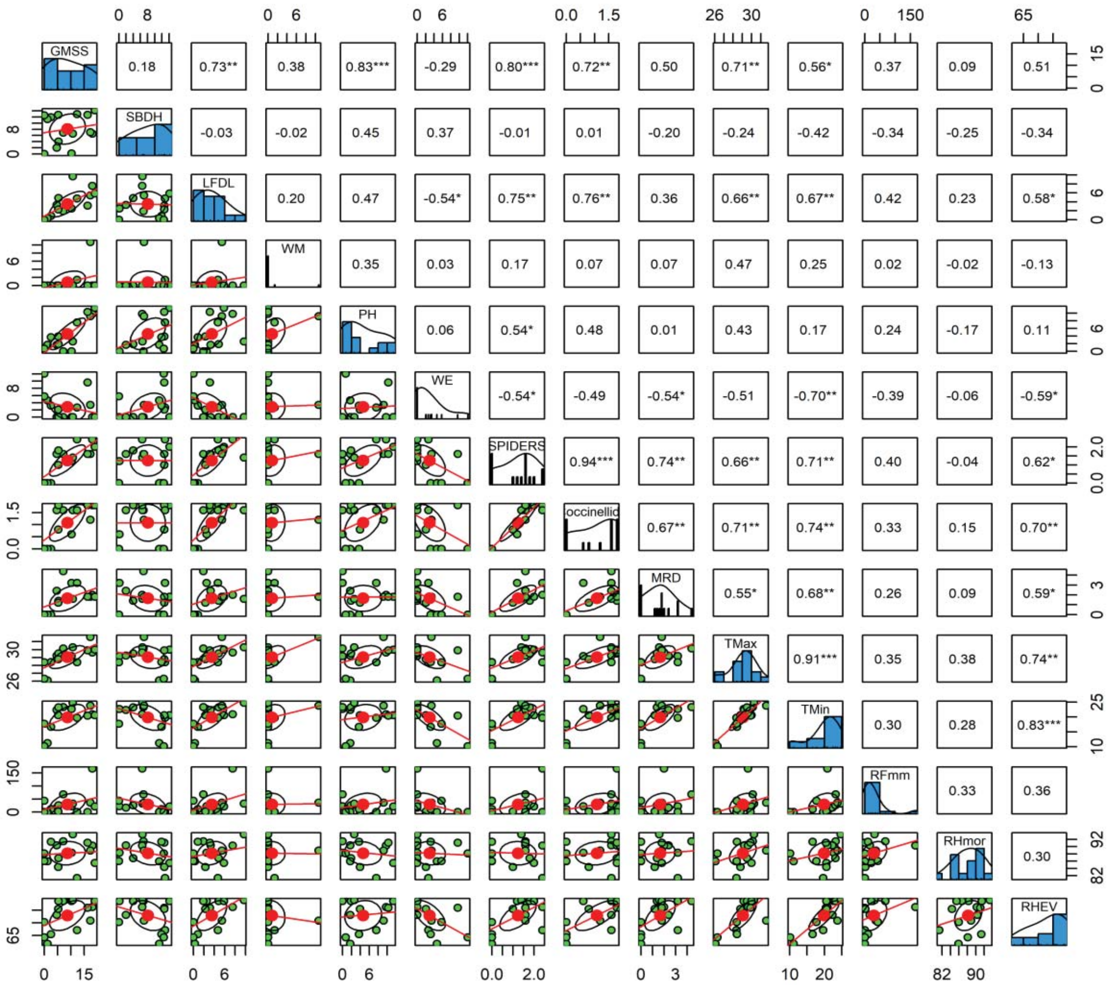


Fig 2.7.1.5 Correlation matrix-field incidence of insect pest's ***vis-à-vis*** weather parameters in Zone-III, ***Kharif,*** 2025

Zone IV: Pest incidence was reported from Titabar. The major pests observed in this zone were gall midge, stem borer, leaf folder, whorl maggot and Planthoppers. The incidence of insect pests was observed from the 32nd SMW onwards. Gall midge incidence, expressed as damaged plants (%DP) and silver shoots (%SS), appeared from the 32nd SMW (4.63% and 4.41%, respectively) and increased gradually, reaching a peak of 6.86 per cent damaged plants during the 36th SMW. Thereafter, the incidence declined and became negligible in later stages. Stem borer infestation (dead hearts) was recorded throughout the season. The incidence increased from 4.10 per cent in the 32nd SMW to a maximum of 6.30 per cent during the 35th and 37th SMW, followed by a gradual decline towards crop maturity. Leaf folder damage was observed continuously from the 32nd SMW. The infestation fluctuated during the season, with the highest incidence of 5.25 per cent recorded during the 40th SMW. Whorl maggot incidence was recorded from the 33rd SMW onwards, with the highest infestation of 4.58 per cent during the 35th SMW, followed by a declining trend. White ear incidence was observed during the later stages of the crop, appearing in the 47th SMW (6.10%) and reaching a maximum of 9.79 per cent in the 48th SMW (Fig. 2.7.1.6A and 6B). Among natural enemies, spider population ranged from 0.44 to 1.00 per hill, with peak population recorded during the 41st and 42nd SMW. Gall midge incidence (DP and SS) and leaf folder damage showed highly significant positive correlations with maximum (r = 0.84** to 0.852**) and minimum temperature (r = 0.73** to 0.77**). Stem borer (DH) showed a significant positive association with morning relative humidity (r = 0.562*). Whorl maggot DL exhibited significant positive correlations with temperature (r = 0.619** to 0.655**) and evening relative humidity (r = 0.559*). Per cent white ear incidence showed significant negative correlations with maximum (r = -0.570*) and minimum temperature (r = -0.716**) and morning relative humidity (r = -0.728**), but a positive association with sunshine hours (r = 0.495*). Among natural enemies, spider population showed significant positive correlations with maximum (r = 0.551*) and minimum temperature (r = 0.646**) and evening relative humidity (r = 0.639**) (Fig. 2.7.1.7).

FIG 2.7.1.6A POPULATION DYNAMICS OF INSECT PESTS IN RICE ECOSYSTEM (ZONE-IV)

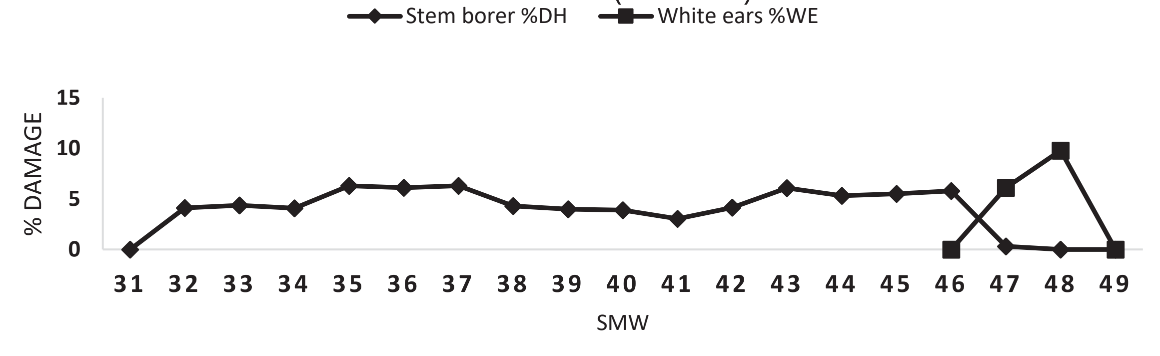
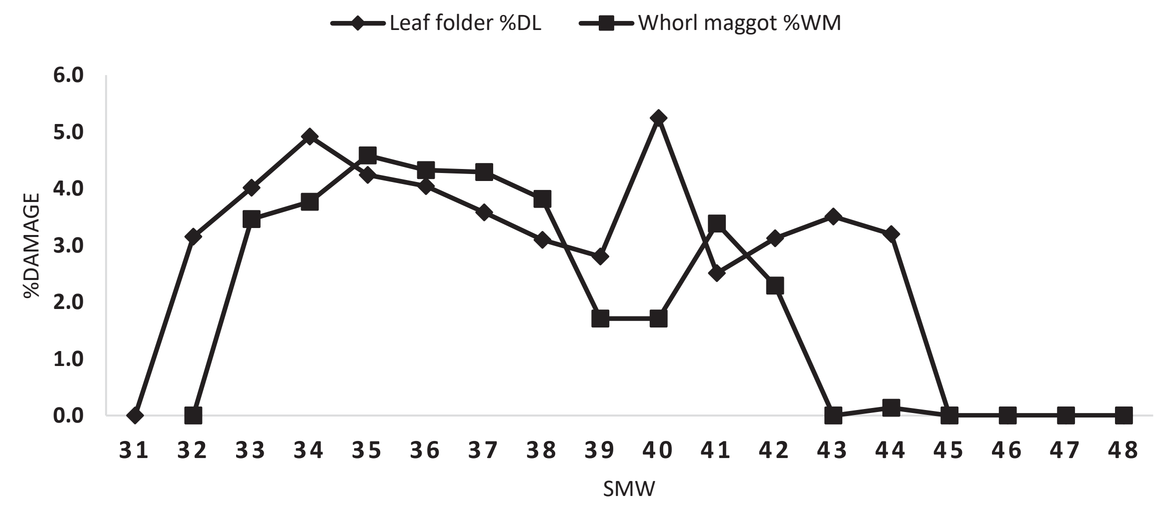


FIG 2.7.1.6B POPULATION DYNAMICS OF INSECT PESTS IN RICE ECOSYSTEM (ZONE-IV)



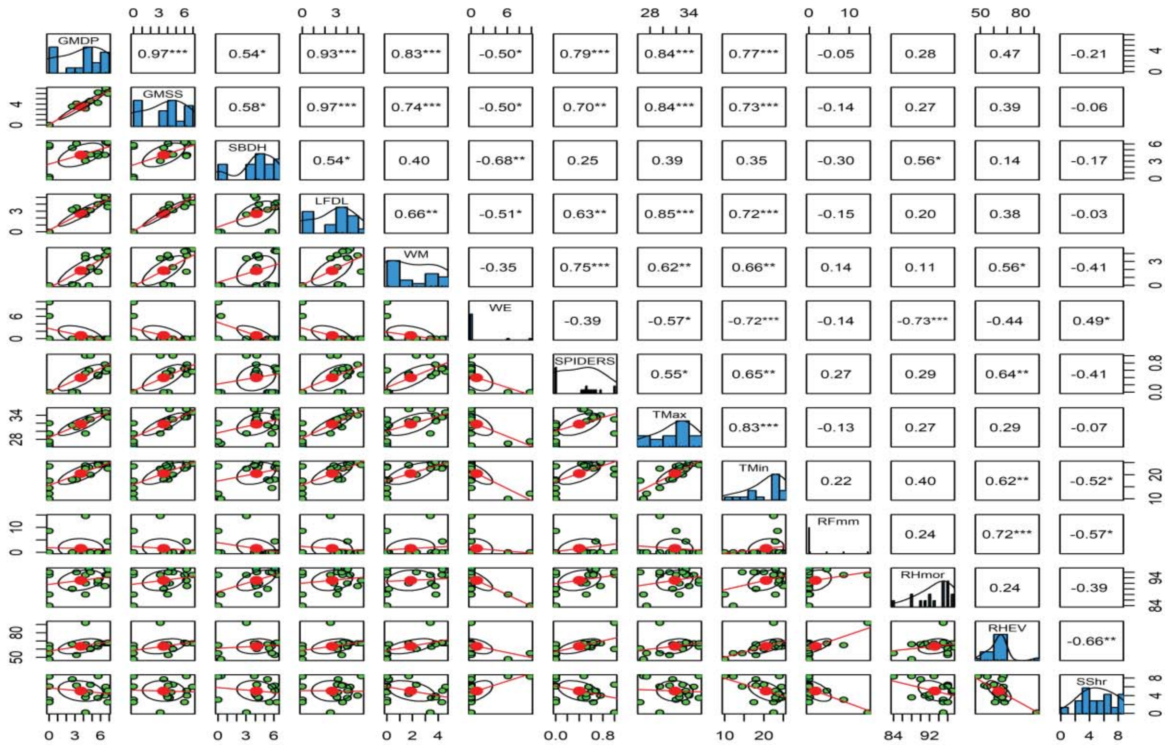


Fig: 2.7.1.7 Correlation matrix - field incidence of insect pests ***vis-à-vis*** weather parameters in Zone-IV, ***Kharif,*** 2025

Zone V: Pest incidence was reported from Jagdalpur, Rewa and Raipur. The major pests observed in this zone were gall midge, stem borer, leaf folder, whorl maggot, Planthoppers. The incidence of insect pests was observed from the 34th SMW onwards at Jagdalpur. Gall midge incidence, expressed as damaged plants (%DP) and silver shoots (%SS), appeared from the 34th SMW (24.00% DP and 5.13% SS) and increased steadily, reaching a peak of 72 per cent damaged plants during the 38th and 40th SMW. Silver shoot incidence was highest at 22.08 per cent during the 40th SMW, after which a declining trend was observed. Stem borer infestation, indicated by dead hearts, was recorded throughout the season. The incidence increased gradually from 1.80 per cent in the 34th SMW to a maximum of 16.44 per cent during the 41st SMW, followed by a decline in later weeks. Leaf folder damage was observed continuously from the 34th SMW onwards. The infestation increased gradually, reaching a peak of 6.55 per cent during the 38th SMW and thereafter showed fluctuations before declining towards the end of the season. Whorl maggot incidence was recorded from the 34th SMW, with the highest infestation of 14.12 per cent during the 34th SMW. The incidence declined progressively in subsequent weeks. The population of planthoppers (BPH/WBPH) was observed from the 34th SMW (0.64 per hill) and increased to a maximum of 4.78 hoppers per hill during the 41st SMW, followed by a gradual decline. White ear incidence was observed during the later stages of the crop, first appearing in the 43rd SMW (12.23%) and recorded12.17 per cent during the 48th SMW (Fig. 2.7.1.8A, 8B and 8C). Among natural enemies, spider population ranged from 0.20 to 0.67 per hill, with the highest population recorded during the 43rd SMW. Coccinellid population varied between 0.13 and 0.60 per hill, with the maximum recorded during the 43rd SMW (Fig. 2.7.1.8D). Gall midge (GMDP) and gall midge silver shoot (GMSS) exhibited positive correlation with minimum temperature (r = 0.85*** and 0.74**, respectively) and evening relative humidity (r = 0.65** and 0.60*), while showing negative association with sunshine hours (r = -0.61* and -0.54*). Stem borer (SBDH) showed positive correlation with minimum temperature (r = 0.48) and evening relative humidity (r = 0.42), but weak negative association with rainfall (r = -0.05). Leaf folder (LFDL) had a positive relationship with minimum temperature (r = 0.55*) and evening relative humidity (r = 0.49), while showing negative correlation with rainfall (r = -0.14) and sunshine hours (r = -0.23). Whorl maggot damaged leaves (WMDL) exhibited strong positive correlation with morning relative humidity (r = 0.82***) and evening relative humidity (r = 0.63), but a strong negative association with sunshine hours (r = -0.84***). Planthoppers (PH) showed weak and inconsistent relationships with most weather parameters. Among natural enemies, spiders showed strong positive correlation with minimum temperature (r = 0.67**) and coccinellids were positively correlated with minimum temperature (r = 0.58*) and rainfall (r = 0.41) (Fig. 2.7.1.9).

FIG 2.7.1.8A POPULATION DYNAMICS OF INSECT PESTS IN RICE ECOSYSTEM (ZONE-V)

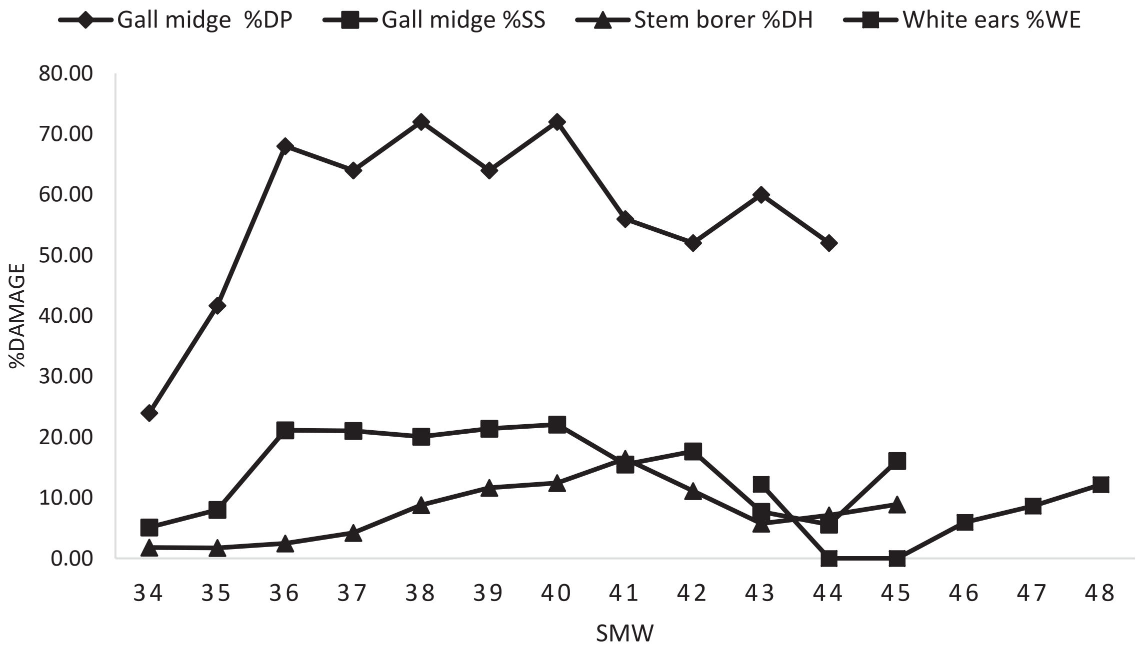


FIG 2.7.1.8B POPULATION DYNAMICS OF INSECT PESTS IN RICE ECOSYSTEM (ZONE-V)

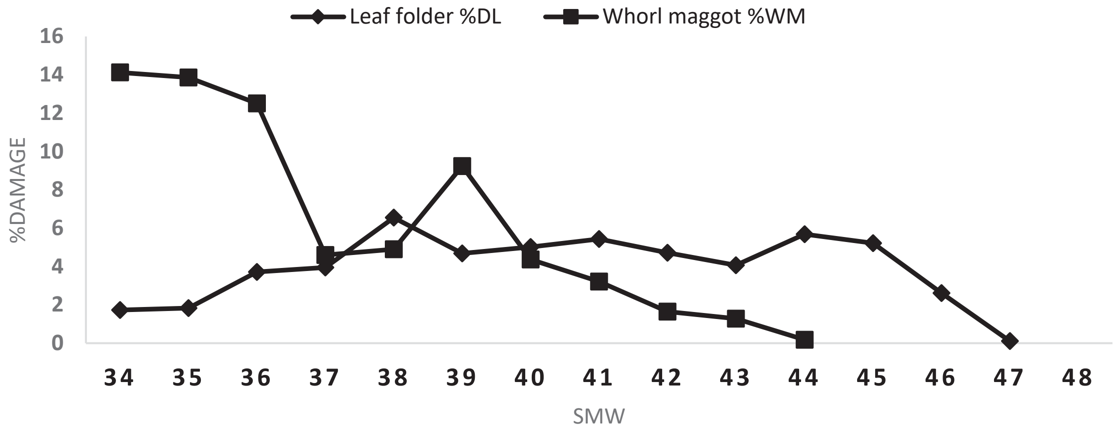


FIG 2.7.1.8C POPULATION DYNAMICS OF INSECT PESTS IN RICE ECOSYSTEM (ZONE-V)

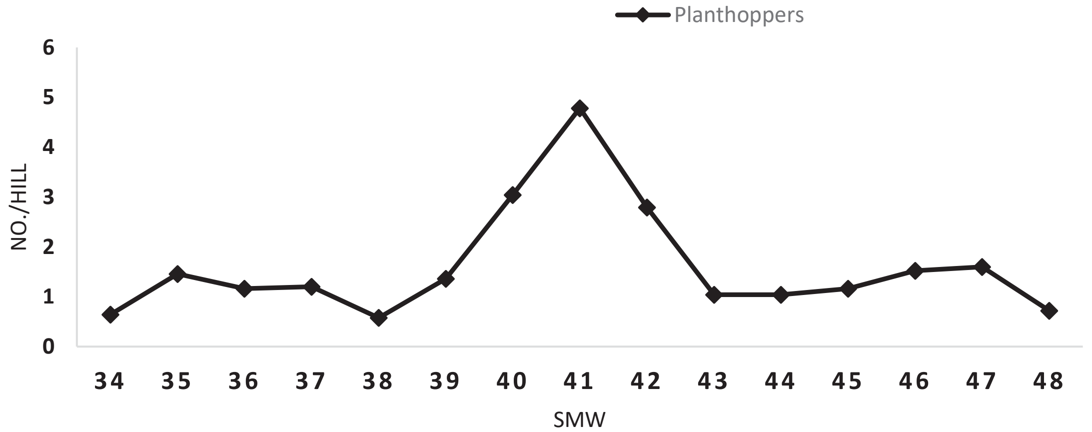
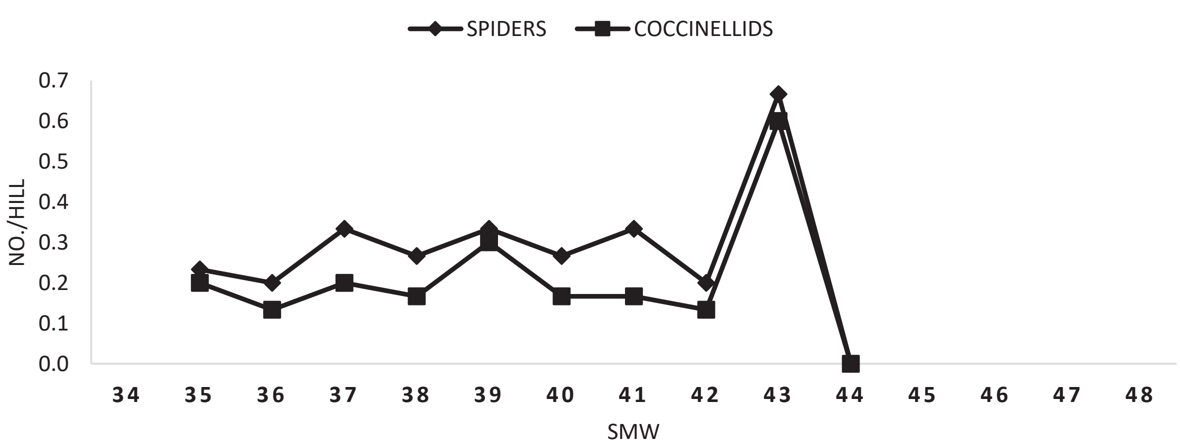


FIG 2.7.1.8D POPULATION DYNAMICS OF NATURAL ENEMIES IN RICE ECOSYSTEM (ZONE-V)



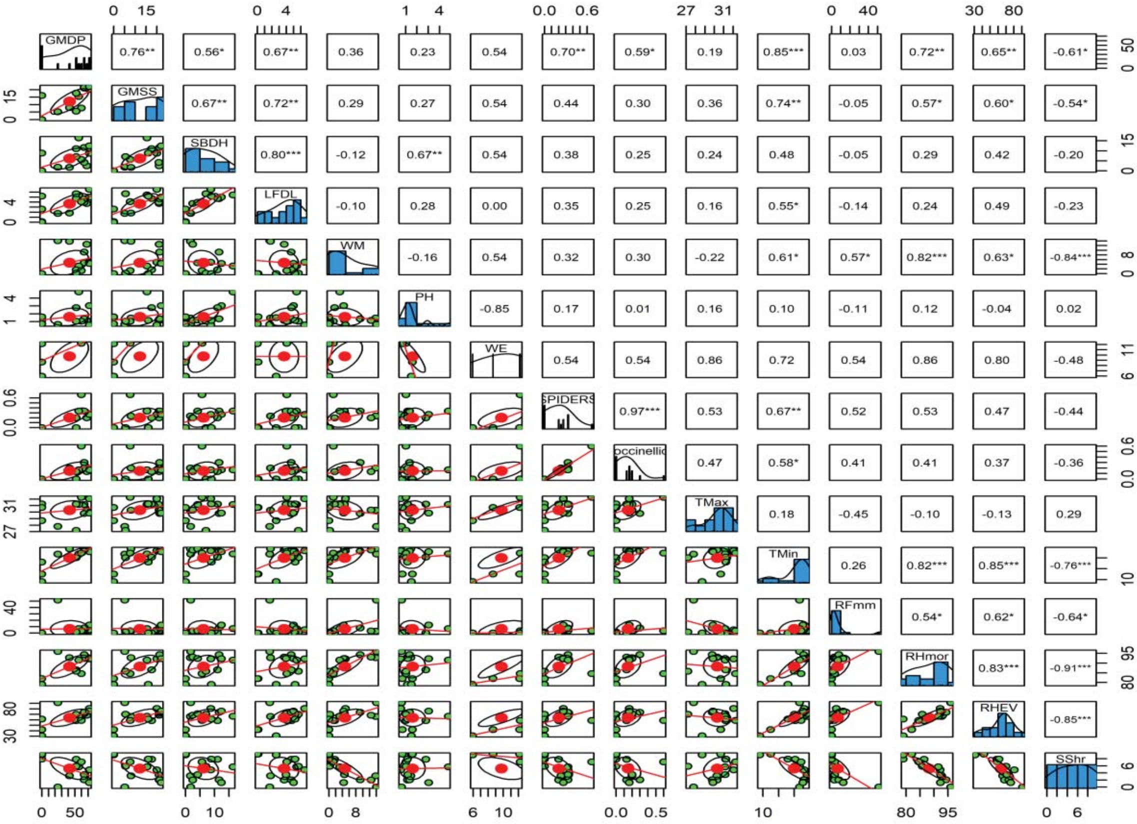


Fig: 2.7.1.9 Correlation matrix - field incidence of insect pests ***vis-à-vis*** weather parameters in Zone-V, ***Kharif,*** 2025

Zone VI: Pest incidence was reported from Nawagam, Navsari and Karjat. The major pests observed in this zone were stem borer, leaf folder and Planthoppers. The incidence of insect pests was observed from the 36th SMW onwards at Nawagam and Karjat. Stem borer infestation, expressed as dead hearts, was first noticed in the 36th SMW (0.14%) and gradually increased to a peak of 6.98 per cent during the 42nd SMW, followed by a steady decline, reaching zero by the 46th SMW. Leaf folder damage was observed from the 36th SMW and persisted throughout the cropping period. The infestation increased progressively and reached a maximum of 15.23 per cent during the 40th SMW, after which it declined gradually towards the later stages. The population of planthoppers appeared from the 36th SMW (0.16 per hill) and increased steadily, reaching a peak of 13.92 hoppers per hill during the 40th SMW, followed by a continuous decline, becoming negligible by the 46th SMW. White ear incidence was recorded during the later stages of the crop, first appearing in the 42nd SMW (0.79%) and reaching a maximum of 9.63 per cent during the 45th SMW, followed by a decline (Fig. 2.7.1.10A and 10B). Stem borer (SBDH) showed a significant positive correlation with maximum temperature (r = 0.58*) and sunshine hours (r = 0.38), while it had a negative association with rainfall (r = -0.41) and evening relative humidity (r = -0.62*). Leaf folder (LFDL) exhibited a positive relationship with maximum temperature (r = 0.38) and sunshine hours (r = 0.29), but a negative correlation with rainfall (r = -0.39) and evening relative humidity (r = -0.40). Planthoppers (PH) showed weak positive association with maximum temperature (r = 0.16) and sunshine hours (r = 0.24), while displaying negative correlation with rainfall (r = -0.32) and evening relative humidity (r = -0.18). Overall, maximum temperature and sunshine hours had a positive influence on pest incidence, whereas rainfall and evening relative humidity exerted a negative effect on pest populations (Fig. 2.7.1.11).

FIG 2.7.1.10A POPULATION DYNAMICS OF INSECT PESTS IN RICE ECOSYSTEM (ZONE-VI)

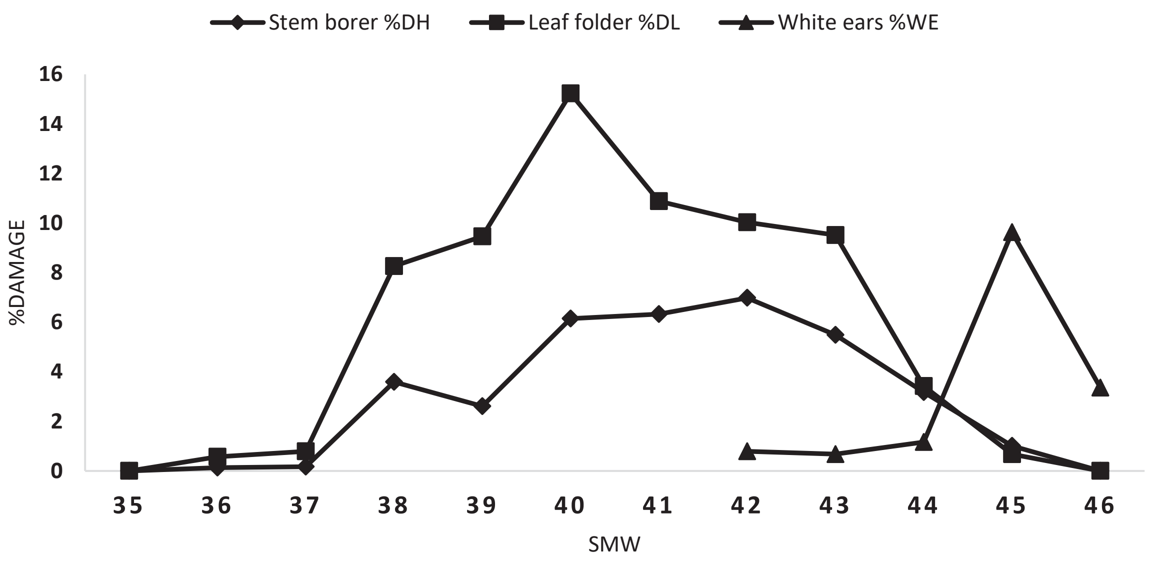


FIG 2.7.1.10B POPULATION DYNAMICS OF INSECT PESTS IN RICE ECOSYSTEM (ZONE-VI)

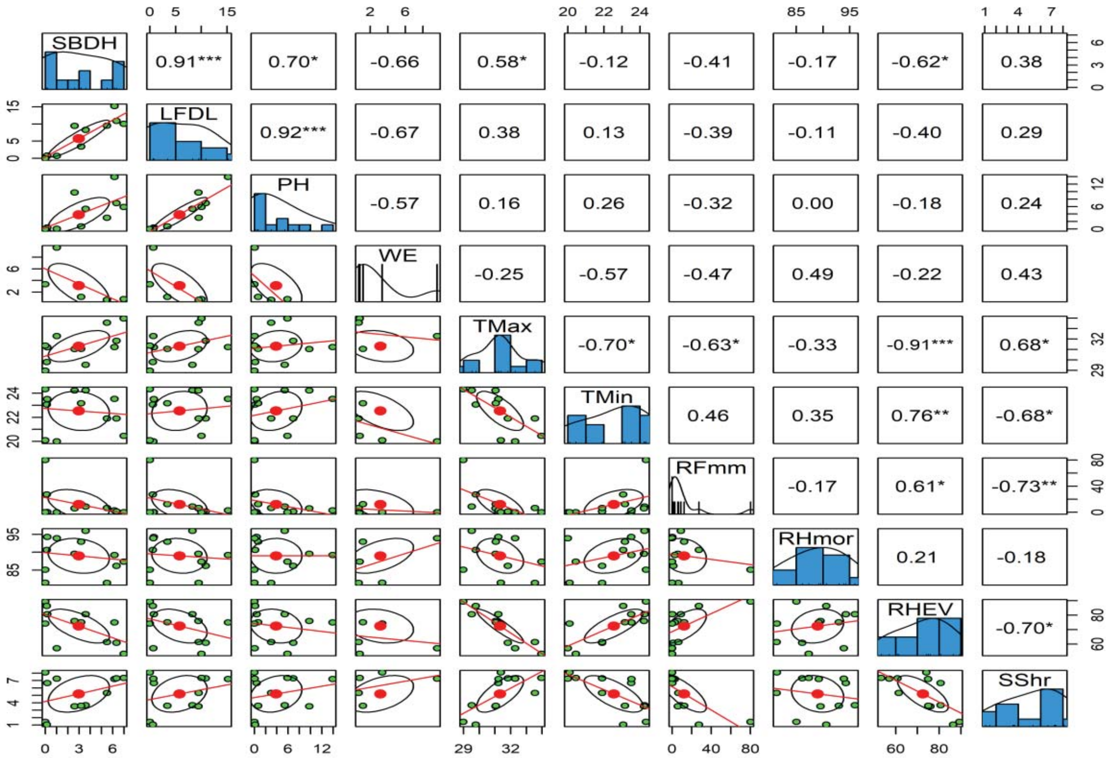


Fig: 2.7.1.11 Correlation matrix - field incidence of insect pests ***vis-à-vis*** weather parameters in Zone-VI, ***Kharif,*** 2025

Zone-VII: Pest incidence was reported from Aduthurai, Rajendranagar, Warangal, Bapatla, Jagtial, Ragolu, Nellore, Maruteru, Moncompu, Gangavathi, Mandya, Coimbatore, Pattambi and Karaikal. The major pests observed in this zone were Gall midge, stem borer, leaf folder, whorl maggot, rice hispa and Planthoppers. Gall midge incidence, expressed as damaged plants (%DP) and silver shoots (%SS), was first observed during the 32nd SMW. The damaged plants increased gradually from 7.21 per cent and reached a peak of 59.22 per cent during the 40th SMW. Thereafter, the incidence declined progressively towards the later stages of the crop. Similarly, silver shoot incidence increased from 3.10 per cent in the 32nd SMW to a maximum of 14.03 per cent during the 39thSMW, followed by a declining trend. Stem borer infestation, expressed as dead hearts, was observed throughout the cropping period. The incidence increased from 1.69 per cent in the 30th SMW and reached a maximum of 14.25 per cent in the 43rd SMW, before declining towards the end of the season. Leaf folder damage was noticed from the initial stages and persisted throughout the season. The infestation increased gradually and reached its peak at 16.68 per cent during the 46th SMW, after which it declined. Whorl maggot incidence was observed from the 30th to 48th SMW, with relatively low levels throughout the season. The maximum infestation of 2.62 per cent was recorded during the 30th SMW, followed by minor fluctuations. Rice hispa infestation remained low throughout the season, with the highest incidence of 2.74 per cent recorded during the 31st SMW. The population of planthoppers (BPH/WBPH) appeared from the 32nd SMW onwards and increased steadily, reaching a peak of 28.35 hoppers per hill during the 44th SMW, followed by a gradual decline. White ear incidence was observed during the later stages of the crop, first appearing in the 39th SMW (9.41%) and reaching a maximum of 16.67 per cent during the 46th SMW, followed by a decline (Fig. 2.7.1.12A, 12B and 12C). Among natural enemies, spider populations ranged from 0.48 to 5.88 per hill, with the highest population recorded during the 34th SMW. Coccinellid populations varied between 0.43 and 4.96 per hill, peaking during the 34th SMW. Mirid bug populations ranged from 0.22 to 5.81 per hill, with the highest population observed during the 44th SMW (Fig. 2.7.1.12D). Correlation analysis indicated that pest populations showed mixed responses to weather parameters. Gall midge (GMDP) showed positive association with maximum temperature (r = 0.33) and a negative correlation with rainfall (r = -0.36). Gall midge silver shoot (GMSS) exhibited positive correlation with maximum temperature (r = 0.37) and minimum temperature (r = 0.56*). Stem borer (SBDH) showed moderate positive association with maximum temperature (r = 0.27) and evening relative humidity (r = 0.25). Leaf folder (LFDL) showed negative correlation with temperature and evening relative humidity (r = -0.40*). Whorl maggot (WM) exhibited a negative association with sunshine hours (r = -0.48*). Hispa showed positive correlation with maximum temperature (r = 0.48*) and negative association with rainfall (r = -0.54*). Planthoppers (PH) had a strong positive correlation with sunshine hours (r = 0.52*), but negative association with rainfall (r = -0.09). Coccinellids were positively related to maximum and minimum temperature (r = 0.32 and 0.28) but negatively associated with rainfall (r = -0.15) and evening relative humidity (r = -0.46). Mirid bugs exhibited a positive correlation with rainfall (r = 0.26) (Fig. 2.7.1.13). Overall, temperature favoured natural enemies, whereas rainfall and higher humidity had a negative influence (Fig. 2.7.1.13).

FIG 2.7.1.12A POPULATION DYNAMICS OF INSECT PESTS IN RICE ECOSYSTEM (ZONE-VII)

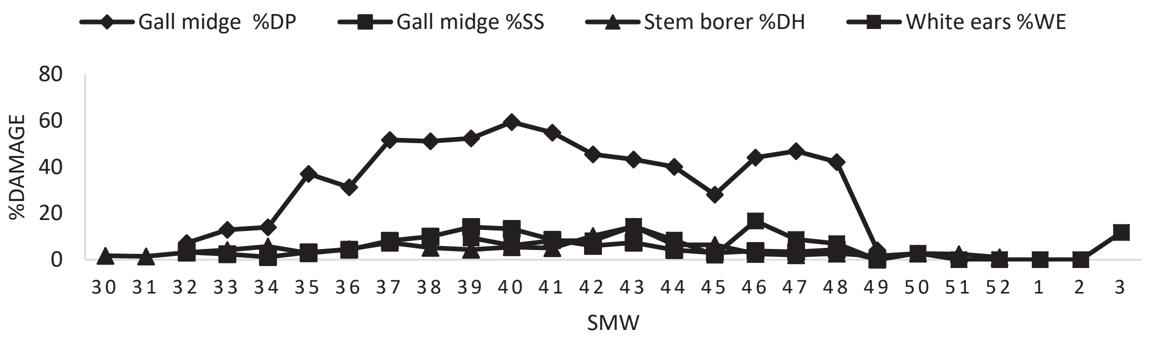


FIG 2.7.1.12B POPULATION DYNAMICS OF INSECT PESTS IN RICE ECOSYSTEM (ZONE-VII)

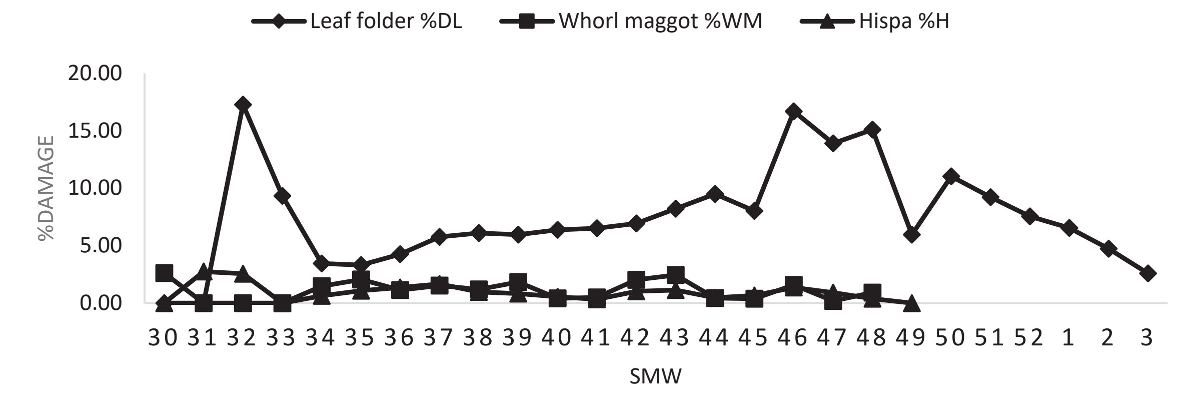


FIG 2.7.1.12C POPULATION DYNAMICS OF INSECT PESTS IN RICE ECOSYSTEM (ZONE-VII)

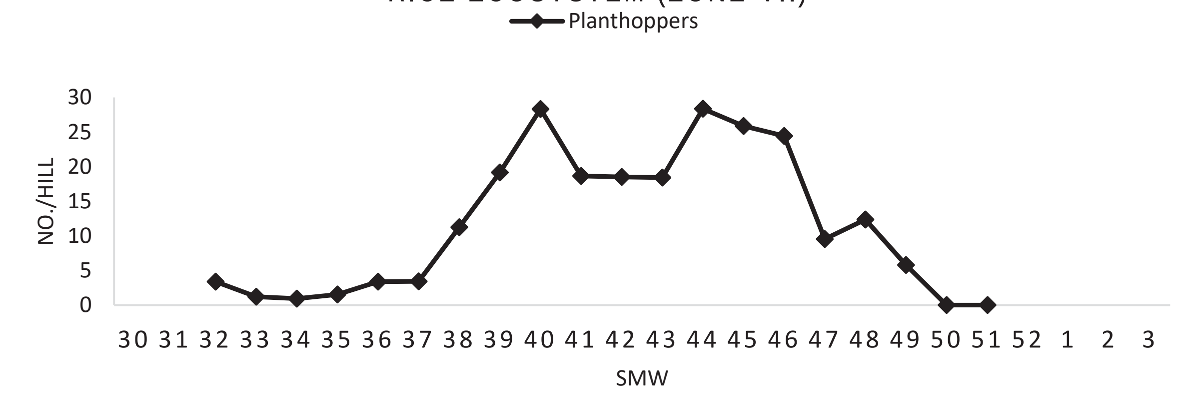
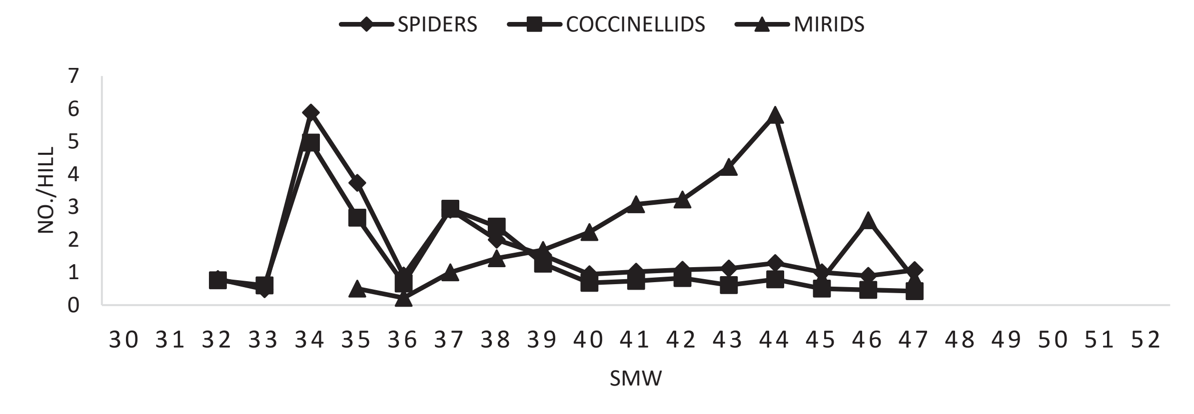


FIG 2.7.1.12D POPULATION DYNAMICS OF NATURAL ENEMIES IN RICE ECOSYSTEM (ZONE-VII)



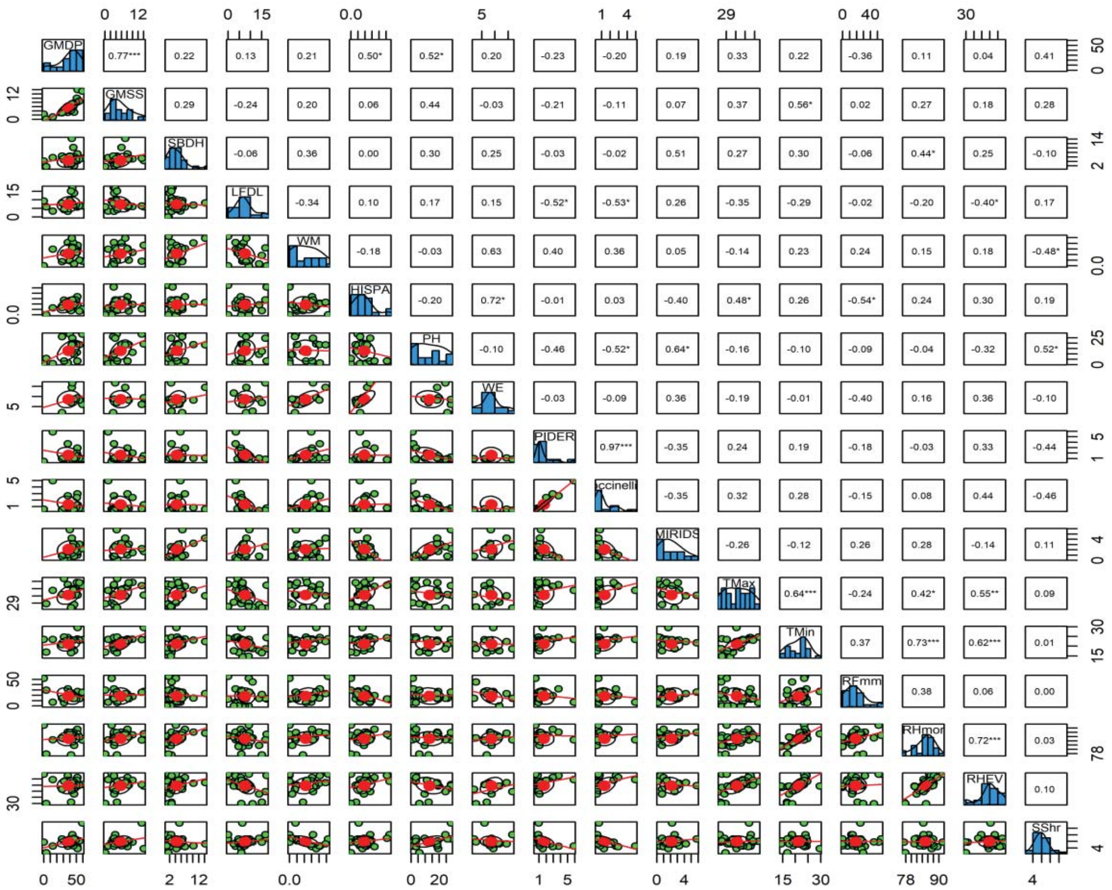


Fig: 2.7.1.13 Correlation matrix - field incidence of insect pests ***vis-à-vis*** weather parameters in Zone-VII, ***Kharif,*** 2025

Summary:

Studies on the population dynamics of insect pests and natural enemies in the rice ecosystem were conducted across 30 locations representing seven agro-climatic zones of India. The study aimed to understand the fluctuations in pest populations in relation to weather parameters, crop phenology, growing season, and cropping systems, as this information is essential for developing ecologically sound and economically viable pest management strategies.

During the *Kharif* 2025 season, yellow stem borer, planthoppers, leaf folder, and gall midge were identified as the major insect pests of rice across different regions of the country. In addition, rice hispa and whorl maggot were recorded as minor pests in the rice ecosystem at several locations.

Zone I: Pest incidence at Khudwani started from 25th SMW, dominated by grasshoppers with peak damage of 33.46% DL (32nd SMW). Rice skipper remained low (max 2.53% DL). Spider population peaked at 1.16/hill, while braconids reached 0.96/hill, showing mid-season natural enemy activity.

Zone II: Pest activity began from 30th SMW. Stem borer dead heart peaked at 13.81% (38th SMW) and leaf folder at 8.51%DL (37th SMW). Planthopper (BPH/WBPH) showed severe outbreak with maximum 101.35/hill (40th SMW) at Ludhiana. White ears damage reached peak in 43rd SMW (19.48%WE). Natural enemies (spiders, mirids, parasitoids) were higher during 38-40 SMW.

Zone III: Incidence started from 33rd SMW. Gall midge peaked at 19.08% (40th SMW), stem borer at 14.14% DH (40th SMW) and leaf folder at 9.73%DL (37th SMW), highest %DL was recorded at Pusa. Planthopper (BPH/WBPH) reached 11.40/hill, while white ears peaked at 12.05% (46th SMW) at Chiplima. Natural enemies (spiders, coccinellids, mirids) were abundant during peak pest period.

Zone IV: Pest incidence at Titabar initiated from 32nd SMW. Gall midge reached 6.86%, stem borer 6.30% and leaf folder 5.25%. Whorl maggot peaked at 4.58%. White ears appeared late with maximum 9.79% (48th SMW). Spider population ranged from 0.44–1.00/hill.

Zone V: Pest activity began from 34th SMW. Gall midge was severe with maximum 72.00% DP (38th & 40th SMW) at Jagdalpur. Stem borer peaked at 16.44% (41st SMW). Planthopper (BPH/WBPH) reached 4.78/hill. Maximum damage of white ears was recorded up to 12.23% (43rd SMW). Natural enemies (spiders, coccinellids) peaked during high pest incidence.

Zone VI: Pest incidence started from 36th SMW. Stem borer dead heart damage peaked at 6.98% (42nd SMW) and leaf folder at 15.23% (40th SMW). Planthopper (BPH/WBPH) reached 13.92/hill (40th SMW). White ears appeared late with maximum 9.63% (45th SMW).

Zone VII: Pest incidence commenced from 30th SMW, with major pests including gall midge (59.22% of DP and 14.03% SS), stem borer (14.25 DH %), leaf folder (16.68%) and Planthopper (BPH/WBPH) (28.35 No./hill) showing peak activity between 32nd -46th SMW. Whorl maggot and rice hispa remained minor pests throughout the season. White ear incidence appeared at later stages, reaching 16.67% (46th SMW). Natural enemies such as spiders (5.88/hill), coccinellids (4.96/hill) and mirids (5.81/hill) were abundant during peak pest periods, indicating their role in pest regulation.

Overall, the study revealed that major rice pests such as stem borer (%DH), leaf folder (%DL), planthoppers (No./hill) and gall midge (%DP/%SS) exhibited distinct seasonal peaks across agro-climatic zones, largely influenced by favourable weather conditions and crop growth stages. Natural enemies including spiders, mirids, coccinellids and parasitoids increased during peak pest incidence, highlighting their role in regulating pest populations.

Across zones, temperature (Tmax/Tmin) showed a consistent positive correlation with major pests such as stem borer (%DH), leaf folder (%DL) and gall midge (%DP/%SS) in Zones II, III, IV, V, VI and VII with r values ranging from 0.26 to 0.85*, and also with natural enemies (spiders, coccinellids and mirids) across Zones II–V (r = 0.17 to 0.74). Sunshine hours (SSH) positively influenced leaf folder (%DL) and planthoppers (No./hill) in Zones II, VI and VII, with r values ranging from 0.24 to 0.57. In contrast, evening relative humidity (RHEV) and rainfall (RF mm) mostly showed negative or variable associations in Zones II, VI and VII, with r values ranging from -0.18 to -0.84*, particularly reducing No. of planthopper and leaf folder (%DL). Overall, temperature remained the most consistent positive factor across zones, whereas humidity, rainfall and wind exhibited suppressive or inconsistent effects.

2.7.2. Monitoring Of Populations of Rice Insect Pests And Natural Enemies Through Light Trap Catches (MPNELT)

The population dynamics of insect pests and their natural enemies vary with the geographic location and cropping system. Insect pest populations, during the crop season are always a function of abiotic and biotic factors. Besides biotic potential, largely abiotic factors like temperature, rainfall, relative humidity, sun shine hours, etc. and biotic factors such as predators, parasitoids, entomopathogenic organisms, etc. determine the abundance of insect pests in a crop ecosystem. Therefore, to design any effective location specific pest management strategies, knowledge of population dynamics of insect pests in relation to abiotic and biotic factors becomes vital. Since rice is grown in diverse agro-climatic zones in India, concerted efforts are being made under AICRPR to study the population dynamics of insect pests of rice at different locations across the country to understand short- and long-term changes in rice pest scenario. During year 2025, insect populations in rice ecosystems were recorded daily, throughout the year using light traps (Chinsurah/Robinson type) in 27 locations. These locations are namely, ADT, BPT, BRH, CBT, CHN, CHP, CHT, GNV, JDP, JGT, KDW, KJT, KRK, LDN, MNC, MND, MTU, NVS, NWG, PNT, PTB, REW, RGL, RNR, RPR, TTB, and WGL. Corresponding weather data on minimum temperature (MinT), maximum Temperature (MaxT), rainfall (RF), relative humidity (RH1 and RH2), sunshine hours, etc. were also collected. Weekly cumulative catches of major insect pests and weekly averages of weather parameters were worked out on standard meteorological week (SMW) basis. The cumulative catches were square root transformed and presented in figures 2.7.2.1-2.7.2.8. The salient findings and trends in the insect dynamics through light trap catches during the year 2025 are presented hereunder:

Yellow stem borer: Yellow stem borer was recorded in 25 locations. Annual cumulative catches were highest at GNV (72470), PTB (32376), followed by MTU (19996). Weekly catches also were highest at GNV, PTB followed by MTU in 17th SMW, 5th SMW and 18th SMW, respectively (Fig. 2.7.2.1 and Table 2.7.2.1). In the previous year 2024, annual cumulative catches were highest at WGL (24159) and PTB (22781), followed by PNT (11201). Highest weekly catch also was at WGL followed by PTB, and PNT in 6th SMW; 6th and 39th SMW, respectively.

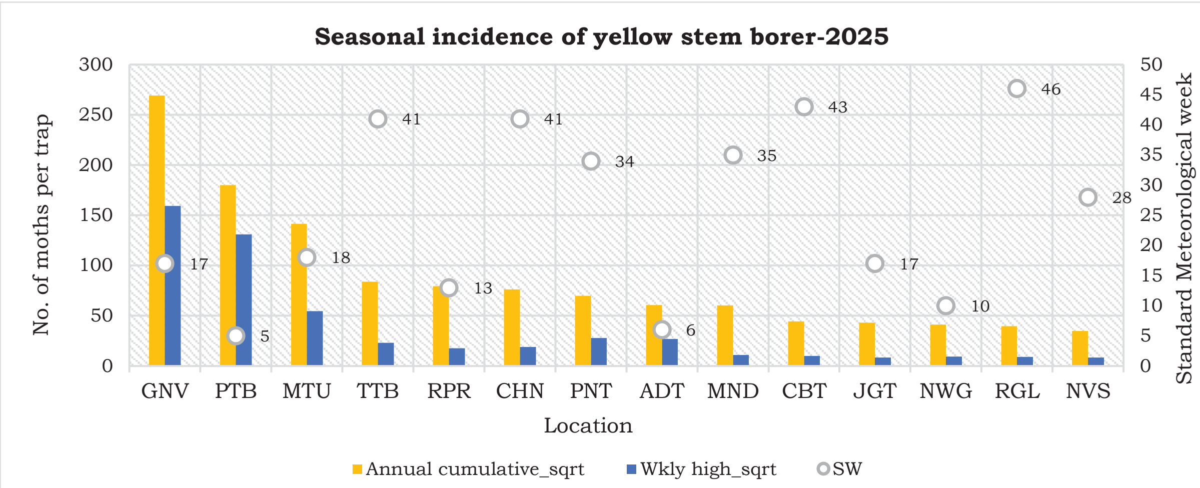


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Fig. 2.7.2.1. Seasonal incidence of yellow stem borer based on light trap catches

Table 2.7.2.1. Seasonal incidence of yellow stem borer based on light trap catches-2025

S. No	Zone	Location	Annual cumulative	Weekly high	SMW
1	Zone-II North	PNT	4895	783	34
2		LDN	269	44	40
3	Zone-III East	REW	337	78	41
4		CHN	5834	360	41
5		CHP	660	153	42
6	Zone-IV N-East	TTB	7014	528	41
7	Zone V-Central	JDP	744	40	42
8		RPR	6323	310	13
9	Zone-VI Western	NWG	1695	89	10
10		NVS	1209	72	28
11		KJT	89	9	32
12	Zone-VII: Sothern	JGT	1870	69	17
13		MND	3654	120	35
14		RGL	1570	85	46
15		CBT	1967	98	43
16		MNC	652	34	42
17		WGL	527	45	8
18		MTU	19996	2999	18
19		PTB	32376	17130	5
20		KRK	226	14	8
21		BRH	194	12	38
22		BPT	177	56	45
23		GNV	72470	25354	17
24		RNR	892	97	15
25		ADT	3678	729	6

Gall midge: Gall midge occurrence was observed at 14 locations in 4 AICRPR zones-zone III, IV, V and VIII. Annual cumulative catches were highest in GNV (15569) followed by MTU (2611) and PTB (1520) and in terms of weekly cumulative catch, it was most active in GNV (1811) in 45th SMW, followed by WGL (331) in 39st SMW and MTU (244) in 18th SMW (Fig. 2.7.2.2 and Table 2.7.2.2). Whereas, in the previous year 2024, the annual cumulative catches were highest in GNV (14628) followed by PTB (4919) and MTU (1940) and in terms of weekly cumulative catch, it was most active in GNV (2113) in 44th SMW, followed by MTU (631) in 40st SMW and PTB (573) in 38th SMW.

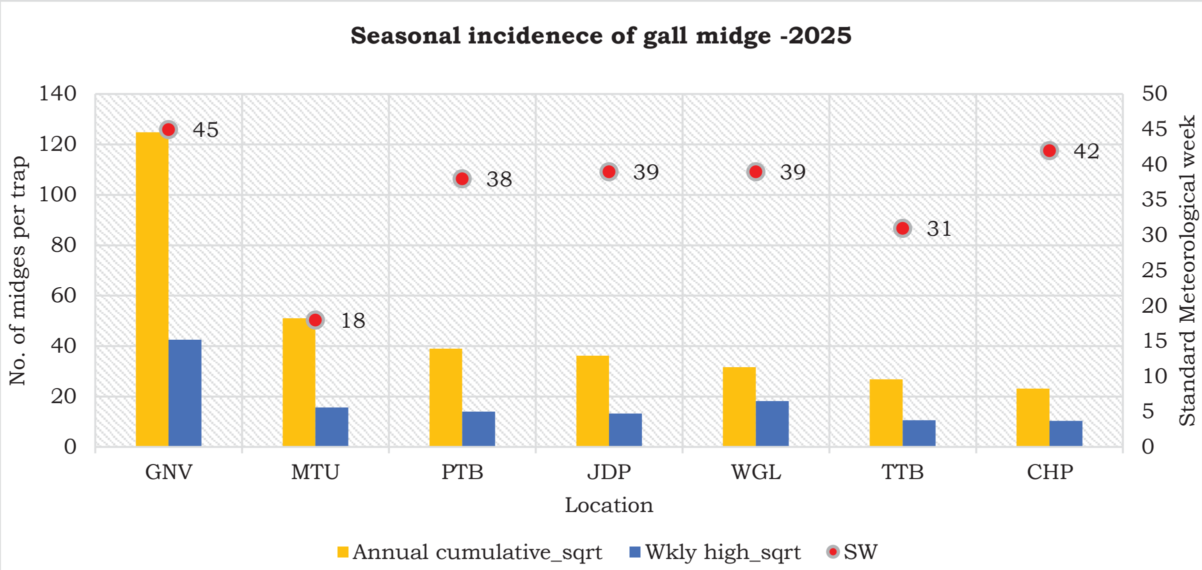

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Fig. 2.7.2.2. Seasonal incidence of gall midge based on light trap catches

Table 2.7.2.2. Seasonal incidence of gall midge based on light trap catches

S. No	Zone	Location	Annual cumulative	Weekly high	SMW
1	Zone-III East	CHP	536	108	42
2	Zone-IV N-East	TTB	719	113	31
3	Zone V-Central	JDP	1315	176	39
4	Zone-VII: Southern	BRH	299	49	33
5		BPT	186	30	45
6		JGT	172	17	42
7		MNC	75	9	14
8		KRK	21	5	8
9		RNR	2	1	40
10		GNV	15569	1811	45
11		MTU	2611	244	18
12		PTB	1520	195	38
13		WGL	1001	331	39
14		RGL	406	44	45

Leaf folder: Leaf folder was recorded at 24 locations across all the zones. Annual cumulative catches were highest at LDN (5431), MTU (3590), and CBT (2387). Whereas, weekly cumulative catches were highest in LDN (1717), PTB (436) and MTU (362) in 38th, 8th and 16th SMW, respectively (Table 2.7.3 and Fig. 2.7.3). In the previous year 2024, annual cumulative catches were highest at GGT (8293), MSD (6721), and LDN (4989). Whereas, weekly cumulative catches were highest in GGT (931), LDN (584) and MSD (462) in 35th, 39th and 41st SMW, respectively.

Table 2.7.2.3. Seasonal incidence of leaf folder based on light trap catches

S. No	Zone	Location	Annual cumulative	Weekly high	SMW
1	Zone-II North	CHT	266	21	32
2		PNT	667	133	34
3		LDN	5431	1717	38
4	Zone-III East	CHP	347	96	42
5		CHN	197	29	41
6	Zone-IV N-East	TTB	2336	228	44
7	Zone V-Central	RPR	662	115	40
8		JDP	800	67	43
9	Zone-VI Western	KJT	41	5	32
10		NVS	85	10	30
11		NWG	83	23	43
12	Zone-VII: Southern	MTU	3590	362	16
13		CBT	2387	245	48
14		GNV	1810	189	47
15		BPT	1442	272	45
16		MND	1313	65	40
17		RGL	1008	83	40
18		PTB	999	436	8
19		ADT	433	75	52
20		RNR	365	101	42
21		BRH	312	38	39
22		MNC	297	16	18
23		KRK	49	4	4
24		WGL	13	8	42

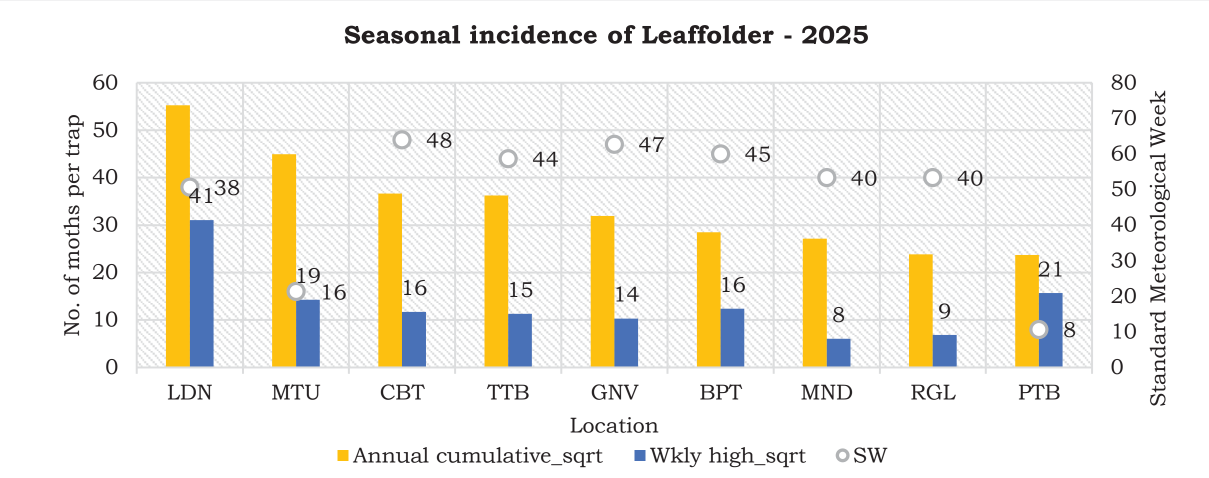

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Fig. 2.7.2.3. Seasonal incidence of leaf folder based on light trap catches

Brown planthopper: Brown planthopper was recorded in 21 locations. It was most abundant at RPR (531318), PTB (20803), and MTU (18858) on annual cumulative basis. Whereas, it was most active in 43rd SMW at RPR, 2nd SMW at PTB and in 40th SMW at MTU (Table 2.7.4 and Fig. 2.7.4). In the previous year 2024, Brown planthopper was recorded in 21 locations. It was most abundant at RPR (97029), NLR (67080), and PNT (29171) on annual cumulative basis. Whereas, it was most active in 46th SMW at RPR, NLR and in 43rd SMW at PNT.

Table 2.7.2.4. Seasonal incidence of brown planthopper based on light trap catches

S.No.	Zone	Location	Annual cumulative	Weekly high	SMW
1	Zone-II North	PNT	8861	2191	38
2	Zone-III NE	TTB	31	31	31
3	Zone-IV East	CHP	1203	377	42
4		CHN	4588	1029	41
5	Zone V-Central	JDP	2360	207	44
6		RPR	531318	140904	43
7	Zone-VI Western	NVS	178	33	43
8	Zone-VII: Sothern	PTB	20803	3782	2
9		MTU	18858	2469	40
10		RGL	5295	706	41
11		WGL	4389	521	12
12		JGT	3230	125	48
13		GNV	3200	276	16
14		MND	1954	127	40
15		ADT	1227	147	1
16		BPT	1019	129	40
17		BRH	709	53	31
18		RNR	401	100	14
19		MNC	269	26	15
20		KRK	39	10	6
21		CBT	16	1	6

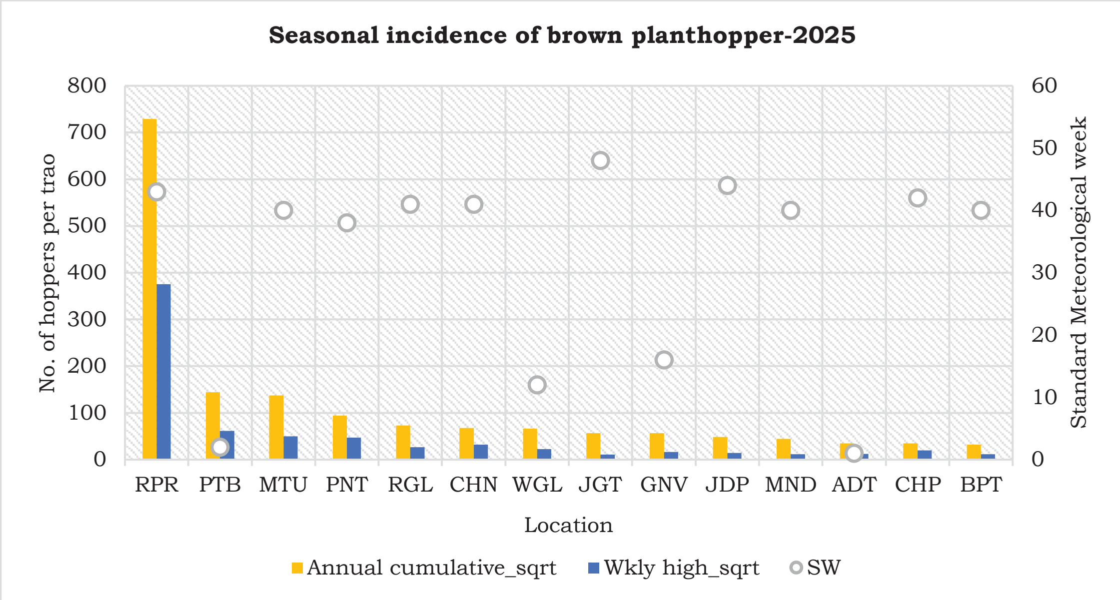

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Fig. 2.7.2.4. Seasonal incidence of brown planthopper based on light trap catches

White-backed planthopper: White backed planthopper was recorded in 15 locations spread across all the zones except the zone-I. It was most abundant at RGL (6125), MTU (5831) and WGL (3929) in terms of annual cumulative catches. It was most active in 41st, 18th and 38th SMW at RGL, MTU and WGL, respectively (Table 2.7.5 and Fig. 2.7.5). In the previous year 2024, white backed planthopper was recorded in 17 locations spread across all the zones. It was most abundant at NLR (41129), RPR (5337) and KUL (4523) in terms of annual cumulative catches. It was most active in 46th, 45th and 45th SMW at MTU, RGL and WGL, respectively.

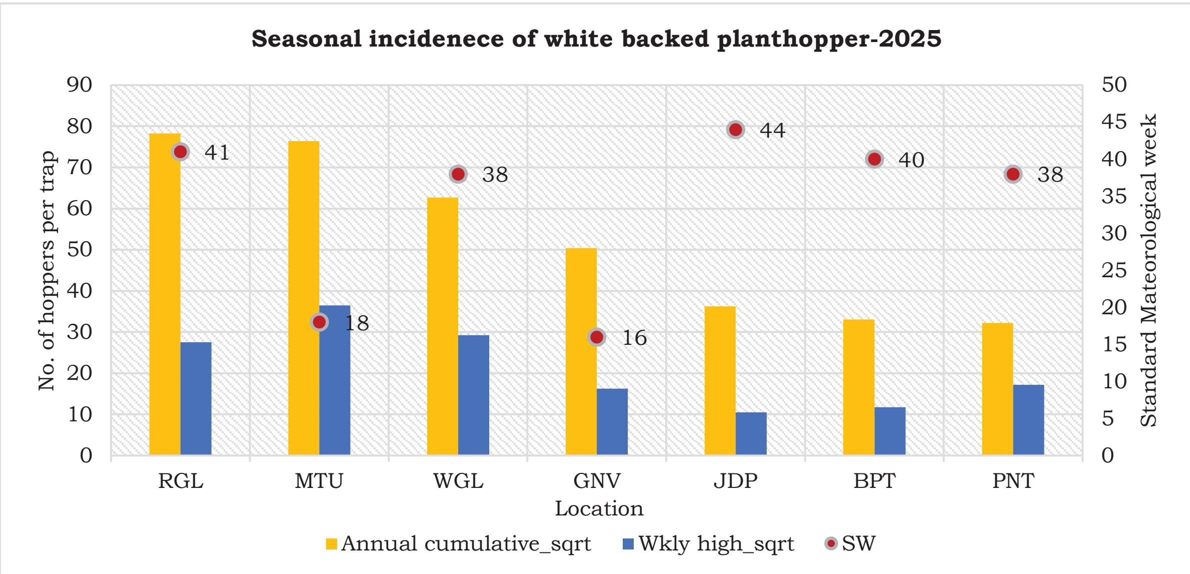

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Fig. 2.7.2.5. Seasonal incidence of white backed planthopper based on light trap catches

Table 2.7.2.5. Seasonal incidence of white- backed planthopper based on light trap catches

S. No	Zone	Location	Annual cumulative	Weekly high	SMW
1	Zone-II North	PNT	1035	296	38
2	Zone-III East	CHP	335	109	42
3		CHN	309	55	41
4	Zone-IV N-East	TTB	27	27	31
5	Zone-V Central	JDP	1311	110	44
6	Zone-VI Western	NWG	27	11	11
7	Zone-VII: Sothern	RGL	6125	756	41
8		MTU	5831	1333	18
9		WGL	3929	854	38
10		GNV	2542	263	16
11		BPT	1092	137	40
12		KRK	310	31	7
13		CBT	188	15	27
14		BRH	106	18	30
15		MNC	90	13	2

Green leafhopper: Green leafhopper was recorded from 20 locations distributed across all the zones. The annual cumulative catches were highest in JDP (85979), PTB (57104) and TTB (22128). Whereas, it was most active in 47th, 2nd and 41st SMW at JDP, PTB, and TTB, respectively (Table 2.7.2.6 and Fig. 2.7.2. 6). In the previous year 2024, it was recorded in 25 locations. The annual cumulative catches were highest in JDP (93071), PTB (48120) and GGT (32574). Whereas, it was most active in 48th, 5th and 44th SMW at JDP, PTB, and GGT.

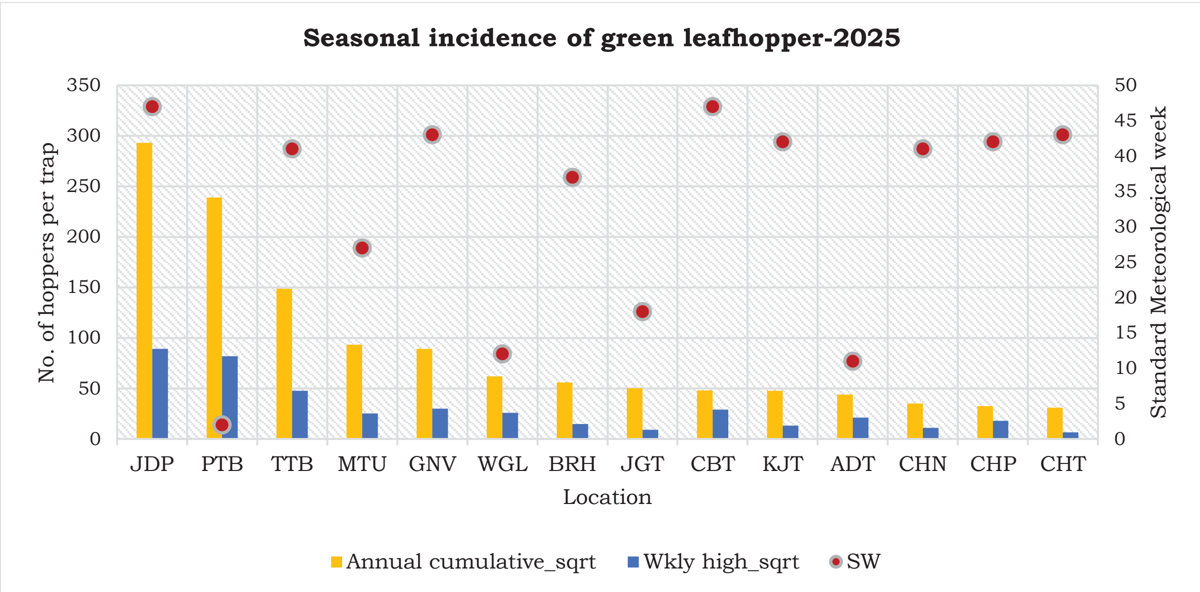

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Fig. 2.7.2.6. Seasonal incidence of green leafhopper based on light trap catches

Table 2.7.2.6. Seasonal incidence of green leafhopper based on light trap catches

S. No.	Zone	Location	Annual cumulative	Weekly high	SMW
1	Zone-II North	CHT	953	42	43
2		PNT	645	211	39
3	Zone-III East	CHN	1225	120	41
4		CHP	1055	324	42
5	Zone-IV N-East	TTB	22128	2284	41
6	Zone V-Central	JDP	85979	7932	47
7	Zone-VI Western	KJT	2287	174	42
8	Zone-VII: Sothern	PTB	57104	6703	2
9		MTU	8691	631	27
10		GNV	7954	900	43
11		WGL	3828	668	12
12		BRH	3150	222	37
13		JGT	2521	84	18
14		CBT	2312	836	47
15		ADT	1934	450	11
16		KRK	631	51	12
17		MNC	558	36	13
18		RNR	490	77	46
19		RGL	357	32	39
20		BPT	324	53	40

Case worm: Case worm was recorded in 11 locations. It was highest in terms of annual cumulative catches at TTB (1694), GNV (1630), and MND (1187) and was most active in 41st, 18th and 37th SMW at TTB, GNV and MND, respectively (Table 2.7.2.7 and Fig. 2.7.2.7). In the previous year 2024, case worm was recorded in 13 locations spread across all the zones except Northern zone. It was highest in terms of annual cumulative catches at GGT (16426), MSD (9097), and PTB (1416) and was most active in 43rd, 35th and 38th SMW at GGT, MSD and RPR).

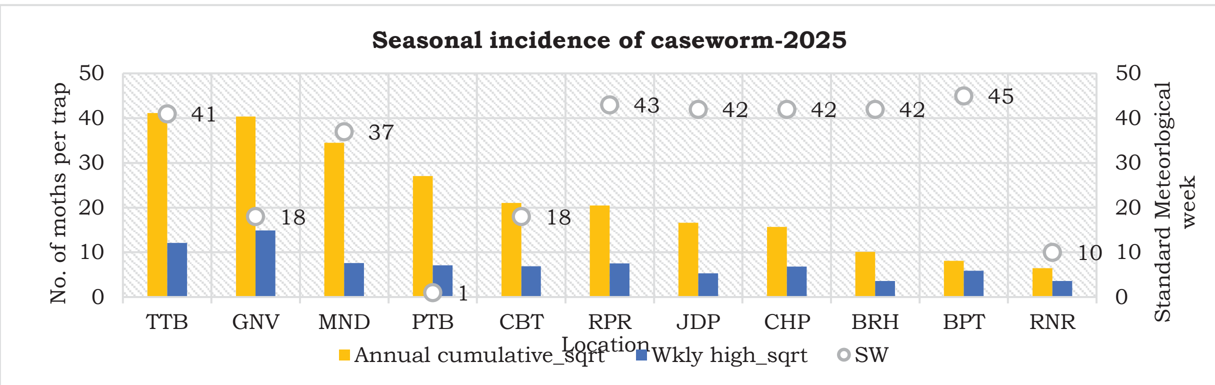

Fig. 2.7.2.7. Seasonal incidence of case worm based on light trap catches

Table 2.7.2.7. Seasonal incidence of case worm based on light trap catches

S. No	Zone	Location	Annual cumulative	Weekly high	SMW
1	Zone-IV N-East	TTB	1694	146	41
2	Zone V-Central	RPR	418	57	43
3		JDP	276	28	42
4	Zone-VII: Sothern	GNV	1630	222	18
5		MND	1187	58	37
6		PTB	730	50	1
7		CBT	442	47	18
8		CHP	246	46	42
9		BRH	102	13	42
10		BPT	65	35	45
11		RNR	42	13	10

Gundhi bug: Rice gundhi bug was recorded at 9 locations. It was most abundant at TTB (1734), JDP (807), and PNT (461) on annual cumulative basis. Whereas, on weekly cumulative basis it was most active at TTB, PNT, and REW during 43rd, 41st and 42nd SMW, respectively (Table 2.7.2.8 and Fig. 2.7.2.8). In the previous year 2024, gundhi bug was recorded at 13 locations. It was most abundant at GGT (6212), MSD (2150), and TTB (1721) on annual cumulative basis and was most active during 41st SMW at GGT and PNT, 40th SMW at MSD and 39th SMW at TTB, respectively.

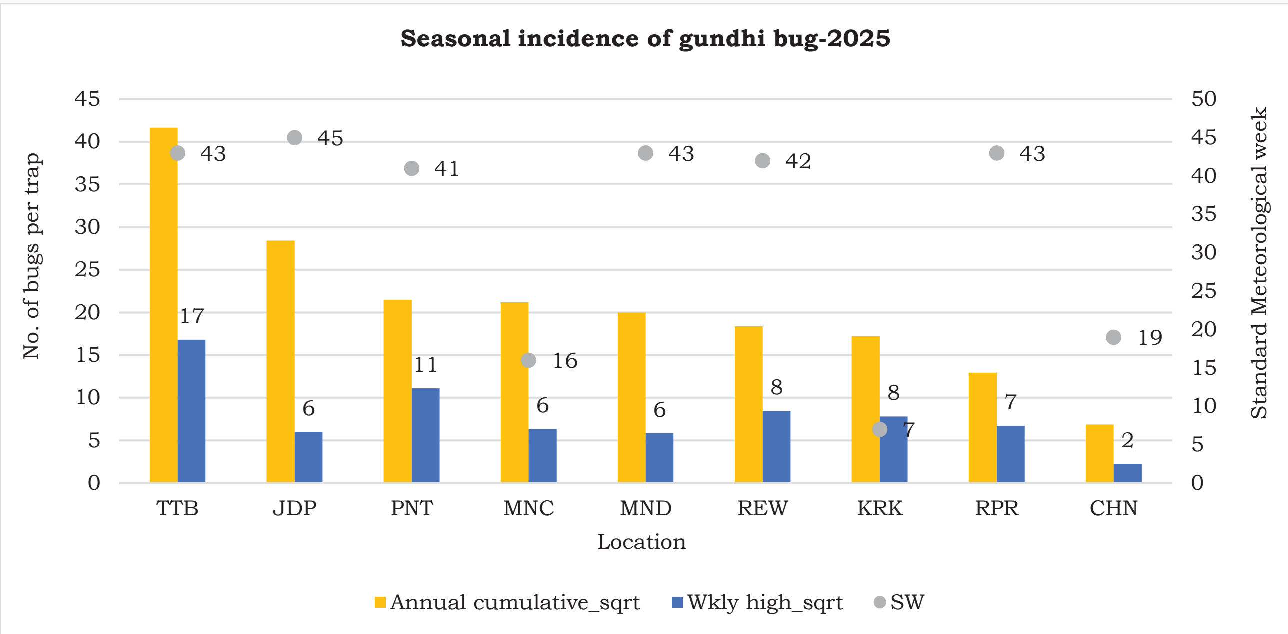

Fig. 2.7.8. Seasonal incidence of gundhi bug based on light trap catches

Table 2.7.2.8. Seasonal incidence of gundhi bug based on light trap catches

S. No.	Zone	Location	Annual cumulative	Weekly high	SMW
1	Zone-II North	PNT	461	123	41
2	Zone-III East	CHN	47	5	19
3	Zone-III N-East	TTB	1734	282	43
4	Zone V-Central	JDP	807	36	45
5		REW	337	71	42
6	Zone-VII: Sothern	MNC	449	40	16
7		MND	399	34	43
8		KRK	296	61	7
9		RPR	167	45	43

Other insect pests; White stem borer was reported from MNC and TTB; Pink stem borer was reported from RPR and RNR. Black bug was reported from five locations: ADT, RPR, MNC, MTU, and TTB. Zigzag leafhopper was found in six locations: MTU, JDP, GNV, CBT, BPT, KRK, BRH and WGL. White grub was a concern at KHD and CHT. Grasshoppers were regular pests at CHT and was also recorded at TTB and JDP. Regarding natural enemies green mirid bugs, coccinellids, rove beetles and ground beetles were recorded.

Overall, the light trap data revealed that yellow stem borer, leaf folder, and hoppers continued to be the most important pests in terms of numbers as well as spread across the locations. Gall midge continues to be an endemic pest. However, case worm, and gundhi bug showed an increase in the spread and intensity of incidence posing concern for future. Patterns in seasonal incidence and population build up based on light trap catches indicates that the key pests are reaching their peak levels in the month of October in the kharif season and in the late January or early February during rabi season. Therefore, strategies are to be timed accordingly for the effective management of insect pests in rice.

Rabi 2024-25

Summary

During Rabi 2024-25, 182 entries were evaluated under four trials at various locations under host plant resistance. The summary of the trials is given below.

Stemborer screening trial (SBST): *Evaluation of 55 entries in 4 tests for dead heart damage, 6 tests for white ear damage and 5 tests for grain yield under infested conditions identified* RP4919-NSR40 and RP5517-PTB-1-1-1-1-1 as promising for both dead heart and white ear stage in 3 valid tests and recorded higher grain yield in 2 tests . RP6166- M50, RP5588*, SM92 were promising in two tests for dead hearts and white ear damage and higher grain yield.

Multiple Resistance Screening Trial (MRST): Evaluation of 25 entries at two locations in 4 valid field tests against 3 pests identified Suraksha and RP 2068-18-3-5 as promising in 3 tests against Stem borer dead hearts and white ears and whorl maggot damage. NND2 and RP6505-75 were promising in 2 tests of the 4 valid tests.

National Screening Nursery- Boro (NSN- Boro): Evaluation of 54 IVT boro entries (43 + 11 checks) against 6 insect pests in 8 locations in 12 valid tests identified that only IET No 33293 was promising at IIRR green house reaction against BPH. For PH and SBDH, PTB33 and Suraksha were the promising entries, respectively.CR 4379-1-1-1-3 and W1263 had nil plant damage at Jagdalpur for gall midge. IET Nos. 33282, 33285, 33286, 33288, 33289, 33292, 33294, 33299, Rajalaxmi and Swarnadhan were promising at two locations for white ear damage with ≤5 % WE.

National Screening Nursery ETP (NSN E-TP): Evaluation of 40 entries in NSN ETP in 5 greenhouse and 6 field reaction against 4 pests identified 32268, 32277, 32282, 33309, 33329, HR12 and Tetep as promising in 2 tests of the 11 valid tests. PTB 33 was promising in 5tests and BM71 in 3 tests.

2.1 Stem Borer Screening Trial (SBST)

Stemborer screening trial (SBST) was constituted with 55 entries and evaluated at 8 locations against dead heart (DH) and white ear (WE) damage along with grain yield and larval survival. Out of 8 locations only 5 locations had valid data for DH damage. Damage from MTU and Gerua was not considered for analysis. Evaluation of entries for dead heart damage in 4 valid tests identified TKM6 (check) and RP4919-NSR40* as promising in two tests with ≤5-10% DH. An other 16 entries *viz.*, 0615-PTB-01-28-18, 0627-PTB-2-14-1, 0627-PTB-7-8-24, NLR 5960-14-1-1-2, NWGR-19007*, RNR 35008, RP4919-NSR24* ,RP5517-PTB-1-1-1-1-1, W1263*, RP6166- M50, RP5588*, RP6167- R139, RP6167- R198, RP5977-Bio-SB-8 (SM 93)*, (SM92)*, RP6738-42-16-3*, HKP-ISM-M8-24, HKP-ISM-M8-29 were promising in one test. NLR 5932-3-2-3-5-5-2, RP5517-PTB-1-1-1-1-1, RP5977-Bio-SB-10 (SM48)* were promising in 2 tests of the 6 valid tests for white ear damage with ≤5% WE - 15%WE based on the level of infestation at the location. Grain yield was recorded from five locations. The larval survival data was taken from three locations (CHN, PTB & IIRR) and PTB had very high infestation with stem borer larvae. Among two stem borers (Yellow stem borer and pink stem borer), infestation of PSB was 6.5 times higher than YSB at Pattambi.

***Overall reaction**: Evaluation of 55 entries in 4 tests for dead heart damage, 6 tests for white ear damage and 5 tests for grain yield under infested conditions identified* RP4919-NSR40 and RP5517-PTB-1-1-1-1-1 as promising for both dead heart and white ear stage in 3 valid tests and recorded higher grain yield in 2 tests . RP6166- M50, RP5588*, SM92 were promising in two tests for dead hearts and white ear damage and higher grain yield (Table 2.1)

Table 2.1 Reaction of entries to stem borer in SBST, ***rabi*** 2024-25

			No. of promising tests (NPT)							
			DH	**WE**	**DH+WE**	**GY**	**Overall**	**No.larvae/hill**	**No.Larave/hill**	
Entry No	Designation	Cross combination	**4**	**6**	**10**	**5**	**SBDH+WE+GY**	**3**	**YSB**	**PSB**
								Location mean	PTB	PTB
31	RP4919-NSR40*	*KMR3/O.rufipogon*	**2**	1	**3**	**2**	5	1.8	0.7	3.7
34	RP5517-PTB-1-1-1-1-1	Sampada/IRGC3938/Triguna	**1**	2	**3**	**2**	5	3.0	2.0	6.0
39	RP6166- M50		**1**	1	**2**	**2**	4	1.6	0.3	2.3
40	RP5588*	*IR64*^{3}/O.glaberrima*	**1**	1	**2**	**2**	4	2.1	0.0	5.3
50	(SM92)*	BPT mutant lines	**1**	1	**2**	**2**	4	3.4	0.7	7.0
25	TKM6 (check)	CO 18/GEB 24	**2**	0	**2**	**2**	4	3.4	0.7	6.3
11	NLR 5932-3-2-3-5-5-2	NLR 9674 / IET 26385	**0**	2	**2**	**2**	4	1.6	1.3	2.0
13	NLR 5942-36-3-3-1-2	NLR 9674/IET 24931	**0**	2	**2**	**2**	4	1.4	0.0	2.7
	* Entry under retesting									
	Ratio of pink to yellow stem borer larvae is 6.5:1 at PTB									

2.2 Multiple Resistance Screening Trial (MRST)

The trial was constituted with 25 entries and evaluated at 2 locations, Khudwani and Chinsurah against 4 insect pests. For Grasshopper (GH) RP 6505-40 was the only promising entry at Khudwani KWD with ≤15% Gr.HDL. The population pressure for skipper was very low at KWD with the average of 1.47 %DL with the maximum and minimum of 2.47 and 0.85 %DL respectively. NND-2, Suraksha, and RP 2068-18-03-05 were promising entry for DH% at CHN with ≤5% DH, while Suraksha, RP6505-75 (APKS 82-75), and RP 2068-18-03-05 were promising for WE damage in CHN with ≤10% WE. Also for WM, 13 entries such as NND-2, CGR-15-49, W1263, RP5564 PTB 1-4-1-2, RP5564 PTB 1-4-2, IBT-WGL-2, Suraksha, NND5, KNM 14382, BPT 3194, RP6505-75 (APKS 82-75), WGL 1790, and RP 2068-18-03-05 were promising at CHN with ≤10% WMDL. Suraksha, RP 2068-18-3-5 and NND2 were promising for Stem borer and whorl maggot in 3 of the 4 valid tests.

Overall reaction: Evaluation of 25 entries at 10 locations in 4 valid field tests against 3 pests identified Suraksha and RP 2068-18-3-5 as promising in 3 tests against Stem borer dead hearts and white ears and whorl maggot damage. NND2 and RP6505-75 were promising in 2 tests of the 4 valid tests.

Table 2.2 Reaction of most promising cultures to insect pests in MRST, rabi 2024-2025

					SBDH		SBWE		WM			Overall NPT
			% GR.DL	Gr. H	%DH	%DH	%WE	%WE	%DL	WMDL		
S.No.	Designation	Cross		NTP	97 DAT	NTP	148 DAT	NTP	75 DAT	NTP		4
1	NND-2*	Land race	19.7	0	4.0	1	12.4	0	4.0	1		2
15	Suraksha		21.8	0	4.9	1	9.4	1	4.9	1		3
22	RP6505-75 (APKS 82-75)	INRC18108X TN1	23.5	0	6.7	0	7.3	1	6.7	1		2
25	RP 2068-18-03-05	(APKS 82-75)	25.4	0	1.7	1	4.1	1	1.7	1		3
	Total Tested		25		24		24		24			
	Max. damage in the trial		25.4		24.3		34.7		24.3			
	Min. damage in the trial		13.8		1.7		4.1		1.7			
	Ave. damage in the trial		20.3		10.6		19.0		10.6			
	Damage in TN1		21.9		24.3		21.3		24.3			
	Promising level		15		5		10		10			
	No. promising		1		3		3		13			

2.3 National Screening Nursery- Boro (NSN- Boro)

National Screening Nursery (NSN-Boro) was constituted with 54 IVT boro entries (43 + 11 checks) and evaluated at 9 locations against 7 insect pests. The results of the evaluation suggest against 6 insect pests in 8 locations in 12 valid tests identified that only IET No 33293 was promising at IIRR green house reaction against BPH. For PH and SBDH, PTB33 and Suraksha were the promising entries, respectively.CR 4379-1-1-1-3 and W1263 had nil plant damage at Jagdalpur for gall midge.

IET Nos. 33282, 33285, 33286, 33288, 33289, 33292, 33294, 33299, Rajalaxmi and Swarnadhan were promising at two locations for white ear damage with ≤5 % WE whereas 33293 was promising at one location. For whorl maggot and dead heart damage, only Suraksha was promising and no entries were promising for gundhi bug. Pest pressure in Arundhutinagar was very low and so the data was not considered (Table 2.1.3)

2.4 National Screening Nursery (ETP)

The NSN -ETP trial was constituted with 48 entries (35 +13 checks) and evaluated at 12 locations against 6 pests and only 4 pests has valid data. The reaction of the entries from valid data in the trial is discussed pest wise.

Brown planthopper: IETNos. 32268, 32282, 33308, 33309, 33321, and RP 2068-18-3-5 and 33322 were promising at one of 5 locations whereas PTB 33 and BM71 were promising at 2 of 5 valid greenhouse reactions with DS ≤3.0.

Gall midge: A total of 7 entries such as IETNos. 32072 (RP 6764-BGIR-7-26-3), 33309, 33329, MTU 1153 (Southern)- ZC, HR 12, PTB 33, and W1263 were promising at CHP location with nil damage.

Stem borer Dead heart: None of the entries were promising at ≤10 %DH as pest pressure was very high in PTB.

Stem borer White Ear: Only three entries *viz.*, IET No 32277, Tetep, and PTB 33 were promising at 2 of 3 locations tested at ≤5 %WE.

Whorl maggot: IET No 33317, and Suraksha were promising at PTB, ≤10 %DH

Overall reaction: Evaluation of 40 entries in NSN ETP in 5 greenhouse and 6 field reaction against 4 pests identified 32268, 32277, 32282, 33309, 33329, HR12 and Tetep as promising in 2 tests of the 11 valid tests. PTB 33 was promising in 5tests and BM71 in 3 tests (Table 2.1.4).

Table 2.1.3a. Reaction of most promising cultures to cultures to insect pests in NSN Boro, rabi 2024-25

		IIRR	CBT	BPH	MTU	PH	CHP	GMB1	PTB	SBDH	TTB	CHN	GER	PTB	SBWE	PTB	CHN	WM	TTB	GB	Overall NPT
		GH	GH	NTP	92DT	NTP	50DT	NTP	50DT	NTP	115DT	72DT	74DT	85DT	NTP	50DT	30DT	NTP	130DT	NTP	12
Entry No	IET	BPH	BPH	2	PH	1	GMB1	1	SBDH	1	SBWE	SBWE	SBWE	SBWE	4	WM	WM	2	GB	1	
	No	DS	DS	DS	DS	DS	%DP	%DP	%DH		%WE	%WE	%WE	%WE	%WE	%DL	%DL	%DL	%DG	%DG	
1	33282	NG	8.5	0	9	0	10	0	33.3	0	5.9	0.9	5.9	1.3	2.0	12.0	6.2	0.0	4.8	0	2
2	33283	NG	NG	0	9	0	0	1	85.7	0	6.3	9.7	15.8	0.0	1.0	11.8	8.6	0.0	5.7	0	2
4	33285	8.07	5.8	0	9	0	20	0	79.6	0	4.8	15.1	13.2	2.9	2.0	13.4	6.7	0.0	5.6	0	2
6	33286	NG	7	0	9	0	10	0	37.1	0	10.0	1.6	21.4	0.0	2.0	11.9	9.2	0.0	4.6	0	2
8	33288	NG	7	0	9	0	30	0	13.5	1	23.1	0.8	17.4	0.0	2.0	21.0	9.2	0.0	7.4	0	3
9	33289	NG	9	0	9	0	40	0	23.6	0	22.2	1.7	29.9	0.0	2.0	15.6	9.0	0.0	3.4	0	2
13	33292	7.10	5	0	9	0	20	0	30.2	0	4.2	8.2	14.6	1.3	2.0	13.1	8.5	0.0	6.4	0	2
14	33293	1.00	4	1	9	0	20	0	40.5	0	9.5	16.7	11.5	0.0	1.0	11.4	11.1	0.0	5.7	0	2
15		7.25	8.5	0	9	0	20	0	41.6	0	5.3	1.7	22.4	0.0	2.0	10.4	6.8	0.0	7.3	0	2
16	33294	NG	9	0	9	0	30	0	51.3	0	14.3	0.9	11.7	0.0	2.0	15.8	11.1	0.0	9.3	0	2
21	33299	8.70	7	0	GF	0	60	0	32.6	0	14.3	0.8	29.5	0.0	2.0	14.0	9.5	0.0	3.4	0	2
39	Swarnadhan	5.08	4	0	9	0	80	0	40.7	0	8.7	0.8	5.7	0.0	2.0	17.3	7.0	0.0	4.8	0	2
48	PTB 33	NG	9	0	3	1	0	1	37.9	0	14.3	0.9	NG	0.0	2.0	10.5	9.5	0.0	3.4	0	4
51	Suraksha	NG	5	0	9	0	30	0	10.5	1	13.3	12.0	11.9	19.8	0.0	4.1	7.9	1.0	5.3	0	2
	Joymoti										19.0								5.6		
	Total Tested	48	48		49		48		50		55	54	50	50		50	54		54		
	Max. damage in the trial	9.00	9		9		80		85.7		38.5	33.1	33.8	57.3		21.0	15.6		10.9		
	Min. damage in the trial	2.50	2.5		3		0		10.5		4.2	0.8	3.2	0.0		4.1	5.3		3.1		
	Ave. damage in the trial	6.98	7.0		8.9		29.4		36.3		16.7	11.7	16.4	15.9		12.5	9.3		5.8		
	damage in TN1	9	9		6		35		37.8		21.4	17.3	15.9	14.0		12.7	10.1		10.1		
	Promising level	3	3		3		0		15		5	5	5	5		5	5		0		
	No. promising	1	0		1		3		0		3	15	2	19		1	0		0		

Table 2.1.3b. Reaction of most promising cultures to insect pests in in NSN-E- TP, rabi 2024-25.

		ZoneVII	ZoneVII	ZoneVII	ZoneVII			ZoneIII		ZoneVII		ZoneIII	ZoneIII	ZoneVII		ZoneVII		
		IIRR	ADT	CBT	MND	MTU	BPH	CHP	GM	PTB	SBDH	CHN	GER	PTB	SBWE	PTB	WM	Overall NPT
		GH	NH	GH	GH	GH	NPT	50DT	NPT	50DT	NPT	102	73DT	85DT	NPT	50DT	NPT	
		BPH	BPH	BPH	BPH	BPH	5	GMB1	1	SBDH	1	SBWE	SBWE	SBWE	3	WM	1	11
Sl.No.	IET No.	DS	DS	DS	DS			%DP		%DH		%WE	%WE	%WE		%DL		0
5	32268	7.4	7.0	3.0	7.0	7.0	1.0	40.0	0.0	68.6	0.0	22.9	12.3	4.2	1.0	11.2	0.0	2
6	32277	7.2	7.0	6.8	7.0	7.0	0.0	10.0	0.0	49.3	0.0	3.3	20.0	3.3	2.0	15.9	0.0	2
7	32282	NG	9.0	2.0	9.0	9.0	1.0	20.0	0.0	40.0	0.0	19.2	22.2	0.0	1.0	10.6	0.0	2
9	33309	3.4	9.0	7.5	3.0	3.0	1.0	0.0	1.0	41.6	0.0	27.5	14.0	17.1	0.0	18.4	0.0	2
31	33329	NG	NG	5.0	9.0	9.0	0.0	0.0	1.0	34.3	0.0	5.8	12.1	4.3	1.0	7.6	0.0	2
36	HR 12	NT	8.3	8.2	5.0	5.0	0.0	0.0	1.0	39.1	0.0	4.9	11.3	16.5	1.0	9.4	0.0	2
37	Tetep	8.3	7.0	8.0	7.0	7.0	0.0	70.0	0.0	43.4	0.0	0.0	0.0	8.3	2.0	6.5	0.0	2
42	PTB 33	NT	8.3	9.0	3.0	3.0	2.0	0.0	1.0	37.9	0.0	0.9	NG	0.0	2.0	10.5	0.0	5
48	BM71	NT	3.0	9.0	3.0	3.0	2.0	10.0	0.0	49.5	0.0	1.6	6.5	12.1	1.0	11.8	0.0	3
	Total Tested	21	37	48	46			44		47		48	46	47		47		
	Max. damage in the trial	9.0	9.0	9.0	9.0			80.0		68.6		41.6	28.6	93.8		21.2		
	Min. damage in the trial	0.4	3.0	2.0	3.0			0.0		10.5		0.0	0.0	0.0		2.9		
	Ave. damage in the trial	6.4	7.5	7.0	6.8			28.6		40.2		16.5	12.9	20.0		10.9		
	Damage in TN1	9.0	9.0	12.5	8.0			45.0		37.2		17.8	10.6	23.4		11.8		
	Promising level	3	3	3	3			0.0		10.0		5.0	5.0	5.0		5.0		
	No. promising	1	3	2	4			7		0		8	5	6		2		

BPH from WGL; GM damage from ADT,WGL; SBDH from ADT, CHN,CHP,GER,MNC; SBWE ADT, CHP, MNC ; LF from BRH,CHN, MNCPTB, ADT:WM from ADT,CHN; CW from BRH was not considered due to Low pest pressure

Appendix-I

ICAR-IIRR headquarters, Hyderabad: Drs. A. P. Padmakumari, Chitra Shanker, Ch. Padmavathi, Y. Sridhar and Dr. V. Chinna Babu Naik

Cooperating centres

Sl. No.	Zone	State	Location	Code	Name of the cooperator, Designation
1	VII	Andhra Pradesh	Bapatla*	BPT	Dr. N. Kamakshi, Scientist (Entomology)
2	VII		Maruteru	MTU	Dr. P. Radhika, Pr. Scientist (Entomology)
3	VII		Nellore*	NLR	Dr. I. Paramasiva Reddy, Scientist (Entomology)
4	VII		Ragolu*	RGL	Dr. Udaya Babu, Scientist, Entomology
5	IV	Assam	Titabar	TTB	Dr. Mayuri Baruah, Junior Scientist
6	IV		Gerua*	GER	Dr. Kanchan Saikia, Pr. Scientist (Ento)–(IARI-Assam)
7	III	Bihar	Pusa*	PSA	Dr. Abbas Ahmed, Scientist (Entomology)
8	V	Chattisgarh	Ambikapur *	ABP	Dr. Kanhaiyalal Painkra, Scientist (Entomology)
9	V		Jagdalpur	JDP	Dr. N. C. Mandawi, Scientist
10	V		Raipur	RPR	Dr. Sanjay Sharma, Pr. Scientist (Entomology)
13	VI	Gujarat	Nawagam	NWG	Dr. Kalpit Shah, Assoc. Res. Scientist
14	VI		Navsari	NVS	Dr. Parth B. Patel, Asst. Res. Scientist (Entomology)
15	II	Haryana	Kaul	KUL	Dr. Sumit Saini, Asst. Scientist (Entomology)
16	I	Himachal Pradesh	Malan	MLN	No Entomologist
17	II	Jammu & Kashmir	Chatha	CHT	Dr. Rajan Salalia, Prof cum Chief Scientist (Entomology)
18	I		Khudwani	KHD	Dr. Basheer Ahmed, Scientist, AICRP Rice (Ento)
12	III	Jharkhand	Ranchi	RCI	Dr. Binay Kumar, Jr. Scientist
19	VII	Karnataka	Brahmavar	BRH	Dr. Revanna Revannavar, Entomologist
20	VII		Gangavathi	GNV	Dr. Sujay Hurali, Scientist (Entomology)
21	VII		Mandya	MND	Dr. M. Shivanand Kitturmath, Entomologist
22	VII	Kerala	Moncompu	MNC	Dr. Jyoti Sara Jacob, Asst. Prof. (Entomology)
23	VII		Pattambi	PTB	Dr. K. Karthikeyan, Prof. of Entomology
24	V	Madhya Pradesh	Rewa	REW	Dr. Akhilesh Kumar, Head of Section (Entomology)
25	VI	Maharashtra	Karjat	KJT	Dr. Vaishali Sawant, Entomologist
26	V		Sakoli	SKL	Dr. Sailesh V. Dhonde, Jr. Entomologist
11	II	New Delhi	New Delhi*	IAR	Dr. S. Rajna, Scientist (Entomology)
27	III	Odisha	Cuttack*	CTC	Dr. S.D.Mohapatra, Pr. Scientist& Head (Entomology)
28	III		Chiplima	CHP	Dr. Atanu Seni, Jr Entomologist
29	II	Punjab	Ludhiana	LDN	Dr. P. S. Sarao, Principal Scientist
30	VII	Tamil Nadu	Aduthurai	ADT	Dr. P. Anandhi, Asst. Professor
31	VII		Coimbatore	CBT	Dr. Jeya Rani, Professor (Entomology.)
32	IV	Tripura	Arundhutinagar*	AND	Smt. Mithu Rani Debnath, Asst. Director.
33	VII	Telangana	Jagtial*	JGT	Dr. Y. Swathi, Scientist (Entomology)
34	VII		Rajendranagar	RNR	Dr. I. Aruna Sri. Scientist (Entomology)
35	VII		Warangal	WGL	Dr. R. Shravan Kumar, Scientist (Entomology)
36	VII	Puducherry (UnionTerritory)	Karaikal*	KRK	Dr. K. Kumar, Prof. (Agril. Entomology)
37	VII		Kurumbapet	KBP	No Entomologist-No Trials allotted
38	II	Uttaranchal	Pantnagar	PNT	Dr. Ajay K. Pandey, Prof. (Dept. of Entomology)
39	III	Uttar Pradesh	Masodha	MSD	No Entomologist
40	III		Ghaghraghat	GGT	No Entomologist
41	III	West Bengal	Chinsurah	CHN	Dr. Sitesh Chatterjee, Entomologist

* - Voluntary Centre

Appendix II

State	Location	*Rabi* 2024-25		*Kharif* 2025	
		Allotted	Received	Allotted	Received
Andhra Pradesh	Bapatla *	1	1	5	5
	Maruteru	4	3	14	14
	Nellore *			7	6
	Ragolu *			4	4
Assam	Titabar	2	2	12	12
	Gerua	2	2		
Bihar	Pusa			7	7
Chattisgarh	Ambikapur *			7	7
	Jagdalpur			11	11
	Raipur			13	13
Gujarat	Navsari			12	12
	Nawagam			9	9
Haryana	Kaul			7	6
Jammu & Kashmir	Chatha			7	7
	Khudwani	1	1	5	5
Jharkhand	Ranchi			6	6
Karnataka	Brahmavar	1	1	10	10
	Gangavathi	1	0	18	17
	Mandya	1	1	11	11
Kerala	Moncompu	1	1	14	14
	Pattambi	4	3	12	12
Madhya Pradesh	Rewa			6	6
Maharashtra	Karjat			8	8
	Sakoli			5	5
New Delhi	New Delhi *			4	4
Odisha	Cuttack *			8	3
	Chiplima	1	1	12	12
Puducherry (UT)	Karaikal *			8	8
Punjab	Ludhiana			16	16
Tamil Nadu	Aduthurai	1	1	12	12
	Coimbatore	3	3	13	13
Telangana	Jagtial *			7	7
	Rajendranagar			13	13
	Warangal	1	1	11	11
Tripura	Arundhutinagar *	1	1	3	3
Uttaranchal	Pantnagar			13	13
West Bengal	Chinsurah	4	4	13	13
Total trials in funded and voluntary centres		29	26	343	337
% Receipt of data for ***kharif 2025*** & ***rabi 2024-25***		89.66		98.26	
Overall % Receipt of data		93.95			

* - Voluntary Centre

Himachal Pradesh	Malan	While trials were not allotted for Kurumbapet, no data was received from the other centres due to absence of Entomologist
Puducherry	Kurumbapet	
Uttar Pradesh	Ghaghraghat	
	Masodha	

List of Abbreviations

a.i.	:	Active ingredient		LF	:	Leaf folder
ADL	:	Average damaged leaves		MB	:	Mirid bug
AT		After treatment		MLB	:	Mealy bug
Av.No./AN	:	Average number		N.n	:	*Nephotettix nigropictus*
AW	:	Army worm		N.v	:	*Nephotettix virescens*
BB	:	Blue beetle		N.vi	:	*Nezara viridula*
BCR	:	Benefit cost ratio		No./10h	:	Number per 10 hills
BPH	:	Brown planthopper		NP	:	Net profit
BT		Before treatment		NPT	:	Number of promising tests
Cocc.	:	Coccinellids		NT	:	Not tested
CPP	:	Cost of plant protection		PH	:	Mixed population of Planthoppers
CW	:	Case worm		PLD	:	Promising level of damage
DAT/DT	:	Days after transplanting		PM/ SM	:	Panicle Mite/ Sheath mite
DG	:	Damaged grain		PSB	:	Pink stem borer
DH	:	Dead hearts		RF	:	Rainfall
DHB	:	Dark Headed borer		RH	:	Relative humidity
DL	:	Damaged leaves		RT	:	Rice thrips
DP	:	Damaged plants		SBDH	:	Stem borer dead heart
DS	:	Damage score		SBWE	:	Stem borer white ear
DAS		Days after spraying/ Days after sowing		SW		Standard week
FR	:	Field reaction		SMW		Standard meteorological Week
GB	:	Rice Gundhi bug		SS	:	Silver shoots
GH	:	Greenhouse reaction		SSB	:	Striped Stem borer
GHC	:	Green horned caterpillar		SSH	:	Sunshine hours
GLH	:	Green leafhopper		WB	:	Water bug
GMB	:	Gall midge biotype		WBPH	:	White-backed planthopper
Gr. H	:	Grass hopper		WE	:	White ears
GSB	:	Green stink bug		WLH	:	White leafhopper
HB	:	Hopper burn		WM	:	Whorl maggot
HBP	:	Hopper burned plants		WSB	:	White Stem borer
IOC	:	Increase over control		YSB	:	Yellow stem borer
IPD	:	Infested Plants Dead		ZZLH	:	Zigzag leafhopper
MIT		Mite infested tillers		WAT		Weeks after transplanting

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PLANT PATHOLOGY

AICRPR Progress Report- Plant Pathology 2025

3.PATHOLOGY

SUMMARY

The All India Coordinated Research Project on Rice Program of the ICAR-Indian Rice Research Institute is an example of effective linkage and testing mechanism to assess the advanced breeding lines over a wide range of climatic and disease epidemic conditions and to identify broad spectrum of resistance to major rice diseases. This also helps in developing need-based management options for controlling major diseases of rice. During 2025, a total of 19 trials were conducted at 48 locations on host plant resistance, field monitoring of virulence of major pathogens and disease management methods. The details on Scientists involved in Plant Pathology Coordinated Programme and trials proposed and conducted at various test locations are given in Table 1 and 2. A set of susceptible checks (HR-12, Co-39, T(N1), IR-50, BPT 5204, and Swarna) was repeated at regular intervals among the test entries. The mean location severity index of these susceptible checks (S checks LSI) was considered in selection of promising entries from locations. Detailed data on extensive screening of diverse genotypes are furnished in a separate report entitled 'National Screening Nurseries, 2025'. The summary of observations is given below.

I. HOST PLANT RESISTANCE (NSN-1, NSN-2, NSN-H, NHSN and DSN)

❖ LEAF BLAST

The entries for leaf blast resistance was evaluated under NSN-1 (373), NSN-2 (711), NSN-Hills (97), NHSN (124) and DSN (217) at 21, 13, 10, 18 and 18 locations respectively. The entries were screened under natural and artificial methods in different centers. A set of susceptible checks (HR-12, Co-39, T(N1), IR-50, BPT 5204 and Swarna) was repeated at regular intervals among the test entries. The mean location severity index of these susceptible checks (S checks LSI) was considered in selection of promising entries from locations. The disease pressure on susceptible checks was very high (LSI >7.0) at Mandya, Almora and IIRR in different nurseries; it was moderate to high in most of the locations. Locations *viz*., Jagtial, Kariakal, Lonavala, Ponnampet, Rewa, Rajendranagar under NSN1; Karjat, Rajendranagar, Rewa under NSN2; Imphal, Mugad, Rewa under NHSN; Mugad, Rewa and Imphal under DSN were not considered in selection of promising entries; where the LSI of susceptible checks was less than 4.0. None of the entries across all the five nurseries found resistant for leaf blast, however based on overall low disease score (SI) and high promising index, some of the promising entries included were IET# 32430, 32387, 31480 (H)*, 33063 (H), 33048 (H), 33071 (H), 33079 (H), 31686 (H)*, 32547, 32420, 32436, 31775*, 32778, 32492, 28664, 31638*, 33075 (H), 32421, 32427, 32510, 33078, 31501(H) *, 33052 (H), 31452 (H)* and 31466 (H)* under NSN-1; IET# 33496, 33955, 33646, 33947, 33776, 33642, 33899, 33385, 33518, 33990 and 33457 under NSN-2; IET# 33364, 33373, 33363, 33342, 32340, 32349, 33341, 33343, 33370, 33362, 33345, 33369, 33376, 33351, 33349 and 32356 under NSN-Hills; IET# 34026, 34015, 34013, 34021, 34025, 34014, 34020, 34008, 32596, 34032, 34052, 34016, 34017, 31700, 34019 and 34047 under NHSN and BPT 3507, NLR 3774, JGL 47849, BPT 3278, HKP-MLL-93R-39, RP-BIO PATHO-3, NVSR 1310, HKP-93R, NVSR 1307, RP PATHO-2, RP PATHO-11, NL RBB-1, HKP-MLL-93R-57, DBT-395, RP 6469-139, HKP-MLL-93R-2, RTCNP-120, RP 6469-173, RP PATHO-7 and SAH-15 under DSN were considered promising.

❖ NECK BLAST

The entries were evaluated under NSN-1, NSN-2, NSN-Hills, NHSN and DSN at 8, 4, 4, 6 and 6 centers respectively. In most of the centres the screening was carried out under natural infection condition except at IIRR, Mandya and Rajendranagar, where artificial method of inoculation was followed. In majority of the locations the disease pressure was moderate (LSI 3.0-6.0), which was good enough for selection of the best entries. The overall disease pressure and on susceptible checks was low at Rajendranagar, IIRR, Karaikal, and Imphal in different nurseries. A total of 6 entries viz., IET # 30882(H)*(R), 32917 (H), 31714 (H)*, 33838, 31709 (H)* and 31877* under NSN-1 and 12 entries viz., 33570, 33885, 33704, 33510, 33588, 33598, 33862, 33591, 33711, 33563, 33577 and 33805 under NSN-2 were found resistant (SI≤3.0). In NSN- hills nursery, 19 entries viz., 32326, 32333, 33334, 33335, 33336, 33342, 33346, 33371, 33374, 33375, 33376, 33351, 33353, 33358, 33360, 33362, 33364, 33365 and 33366 were found resistant with SI ≤ 3.0. In NHSN, four entries viz., IET# 34013, 34030, 32596 and 34047 and under DSN, 6 donors viz., ISHB-16, BPT 3354, NLR 3881, NLR 3774, NVSR 6529 and HKP-MLL-93R-57 were found resistant (SI ≤ 3.0) for neck blast disease.

❖ BROWN SPOT

The entries were evaluated under NSN-1, NSN-2, NSN-Hills, NHSN and DSN at 16, 11, 6, 12 and 11 centers respectively against brown spot disease across India. In most of the centres, the screening was carried out under natural infection condition except at Coimbatore, Gangavathi, Chinsurah, IIRR, Ludhiana and Pusa; where artificial screening was followed. The disease pressure on susceptible checks was high (LSI >7.0) at Gangavathi, IIRR, Pusa in different nurseries; while it was moderate to high (LSI 4-7) in majority of the locations. None of the entries found resistant to brown spot across all nurseries; however, some of the promising entries with low disease score and high promising index included IET# 30692*, 33838, 32526, 32776, 32964*, 29577*(R), 32780, 32467, 31456 (H)(R), 27P63 (HC) and 32046 (R) under NSN-1; IET# 33670, 33930, 33921, 33933, 33429, 33582, 33658, 33401, 33814, 33404, 33977, 33462 and 33534 under NSN-2; IET# 32340, 33341, 32356, 32317, 33348, 33364, 33335, 31386, and 32354 under NSN-H; IET# 34025, 34039, 34027, 34038, 34010, 34037, 34042, 34056, 34002, 34021, 34011, 34060 and 34043 under NHSN. Promising donors for brown spot under DSN included BPT 3507, BPT 3278, NLR 3881, 8298.IRBB5, BPT 3270, BPT 3354, JGL 47953, NL RBB-3, NLR 3894, SAH-12, HKP-MLL-93R-39, JGL 47856, HKP-MLL-93R-2, RP PATHO-12 and RP-BIO PATHO-3.

❖ SHEATH BLIGHT

The entries were evaluated under NSN-1, NSN-2, NSN-Hills, NHSN, and DSN at 22, 18, 5, 28 and 20 locations, respectively. In the majority of the locations, the disease pressure was moderate to high. The promising entries to sheath blight were IET Nos. 33840 (Swarna-Shbl-NIL), 31972, 32980 (Dhan53-Shbl-NIL), 31639, 31709, 32822, 32823 30882(H)(R), 31889(R), 32752, 31714-(H), 29860, 32492, 32896, 32510, 33839 (BPT 5204-Shbl-NIL) and 31633 in NSN-1-2025; IET Nos., 33711, 33926, 33891, 33691, 33974, 33703, 33980, 33507, 33913, 33576, 33693, 33570, and 33759 in NSN-2-2025; IETs 33357, 31386, 33368, 33335, 32344, 32333, 33336, and 33338 in NSN-H-2025; IET 34049, 34055. 34046, 34013, 34051, 34015, 34030, 34054, 34042, and 34059 in NHSN-2025; and Designated entries viz., BPT 3482, NLRBB-1, NLR 3881, NLR 3895, ISHB-28, SAH-21, ISHB-10, ISHB-2, ISHB-17, ISHB-35, BPT 3745, BPT 3178, CB 22141, CB 22141, BE-812, BPT 3270, ISHB-29, BPT 3463, ISHB-11, NLR 3889, ISHB-9, BPT 3607, ISHB-8, and DBT-1129 in DSN-2025.

❖ SHEATH ROT

The entries under NSN-1, NSN-2, NSN-H, NHSN and DSN were screened against sheath rot at 10, 6, 2, 10 and 7 locations, respectively. Some of the highly promising entries in different nurseries were: 32823, 31640, 32465, 33071, 32467, 32587, 31972, 32945, 31436, 32537 and 32443 in NSN-1; IET# 33661, 33608, 33582, 33444, 33570, 33616 and 33434 in NSN-2; IET Nos. 34055, 34039, 34024, 34023, 34018, 34047, 34028 and 34048 in NHSN; ISHB-12, ISHB-8, DBT-1517, NL RBB-1, NLR 3889, 5559, ISHB-30, CB 22157, CB 22141, RTCNP-120, CB 22140, NLR 3895, DBT-1129, ISHB-9, ISHB-10, ISHB-20, SAH-21 and CB 22108 in DSN.

❖ GLUME DISCOLOURATION

Glume discolouration (GD) was observed at four locations viz., at Lonavala, Navasari Nawagam and Chatha during *Kharif* 2025. Some of the promising entries were: IET nos. 32505, 32654, 32944 (H), 31102(R), 31108 (R), 31973, 31980 in NSN 1; 33587, 33606, 33507, 33535, 33445, 33452, 33581, 33662, 33688 in NSN2 and 34030, 34021, 34038, 34043, IR-50, 34049, 34050 and 34053 in NHSN and SAH-15, BPT 3507, RP PATHO-4, RP-BIO PATHO-4, AE-1266, JGL 47856, 5559.IRBB5, RP 6469-171, DBT-1102, DBT-1164 in DSN.

❖ RICE TUNGRO DISEASE

The entries in NSN-1, NSN-2, NHSN and DSN were evaluated at 2 locations for rice tungro virus disease during *Kharif* 2025. The promising entries identified in different nurseries were: IET 32378, 32396, 32399, 32433, 33052 (H), 31686 (H)*, 32616, 32780, 31878, 31494 (H), 32729, 32855, 32846 and 33994 in NSN-1; IET Nos 33506, 33507, 33508, 33509, 33510, 33511, 33512, 33513, 33514, 33515, in NSN 2; IET nos. 34002, 34026, 34034, 31700 and 34048 in NSNH; IET nos NLR 3889, NVSR 6529, 5559, NWGR-17008, WGL 1923, RP 6469-173 and RP PATHO-5 in DSN.

❖ BACTERIAL BLIGHT

The test entries and various checks in different bacterial blight screening nurseries viz., NSN-1, NSN-2, NSN-Hills, NHSN and DSN were evaluated at 25, 19, 4, 22 and 22 locations, respectively. The number of entries including checks in different nurseries was 373 in NSN1, 711 in NSN-2, 97 in NSN-Hills, 124 in NHSN and 217 in DSN. The overall disease pressure and of susceptible checks was moderate to high in most of the locations. Some of the promising entries against bacterial blight in different nursery were IET # 33838, 32823, 33063 (H), 31480 (H)*, 32795, 32990*, 31479 (H)*, 32917 (H), 32399, 32503, 31659*, 32860, 32421, 32754, 33046 (H), 32523 and 32465 in NSN-1; IET # 33552, 33563, 33469, 33812, 33609, 33487, 33457, 33560, 33473, 33591, 33803 and 33675 in NSN-2; IET # 31431, 33342, 32371, 31389, 33339, 32317, 33377, 33357, 33362, 33343, 33364, 32325 and 33340 in NSN-Hills; IET # 34024, 34025, 34052, 33997, 34018, 32596, 34028, 34042, 33001, 34041, 34032, 34023 and

34060 in NHSN and IRTR 194, RP-BIO PATHO-9, NL RBB-1, HKP ISM, JGL 41652, 1220.IRBB13, RP-BIO PATHO-5, ISHB-10, BB-42, ISHB-30, DBT-264, ISHB-6, CB MAS 22071, ISHB-12, NL RBB-3, NLR 3881 and 1220 in DSN.

❖ MULTIPLE DISEASE RESISTANT LINES

Out of all screening nurseries, the total of 111 entries showed resistance or moderate resistance to two or more than two diseases. In NSN-1, a total of 16 entries had shown resistant/moderately resistant reaction to two or more than two diseases. The IET No 33838 (MR to NB, BS, BB & GD) showed moderate resistance to four diseases and IET# 32492 (MR to LB, SHB & GD), 32823 (MR to SHB, BB & SHR) and 32780 (MR to BS, RTD & GD) showed resistance to three diseases. In NSN-2, The entry IET# No. 33570 (R to NB, MR to ShB & ShR) showed reaction to three diseases. In NSN-H, a total of 19 entries had shown resistant (R)/moderately resistant (MR) reaction to two or more diseases. The entry IET# No. 33364 (R to NB, MR to LB, BS & BB) showed reaction to four diseases. The entries IET# No. 33335 (R to NB, MR to ShB & BS), 33342 (R to NB & MR to LB & BB) and 33362 (R to NB & MR to LB & BB) showed reaction to three diseases. In NHSN, a total of 28 entries had shown resistant (R)/moderately resistant (MR) reaction to two or more diseases. The entries IET# No. 32596 (R to NB, MR to LB, BB & RTD), 34025 (MR to LB, BS, BB & RTD) and 34047 (R to NB, MR to LB, ShR & RTD) showed reaction to four diseases. In DSN, a total of 37 entries had shown resistant (R)/moderately resistant (MR) reaction to two or more diseases. The entry NLR 3881 (R to NB, MR to ShB & BS, RTD) and NL RBB-1 (MR to LB, NB, ShB & ShR), showed reaction to four diseases.

II. FIELD MONITORING OF VIRULENCE

1. *Pyricularia oryzae*

The experiment was conducted across 21 locations in India during *Kharif* 2025 to assess the virulence pattern of *Pyricularia oryzae* (rice blast), using 39 cultivars consisting of near isogenic lines, international differentials, donors and commercial cultivars possessing different gene(s) combinations for blast resistance. Significant spatial variation in virulence was evident, with locations such as Lonavala, Hazaribagh**,** Navasari, Coimbatore, Gudalur showing higher disease pressure and greater gene breakdown, whereas IIRR, Mugad, Rajendranagar**,** exhibited comparatively lower virulence levels. Differentials such as Tetep, RP BioPath-3, Tadukan, IR-64, Raminad str-3, RP BioPath-2, PRS-58, Zenith, RP BioPath-1, RP BioPath-4 exhibited moderate to high resistance across locations, with a severity index (SI) of ≤4.0. Tetep emerged as the most stable genotype across the environments, with a low severity index (SI 2.5), showing resistance at the majority of locations (PI_3 - 86%, PI_5 - 95%). RP BioPath-3 (Pi2) also demonstrated consistent resistance reaction across the 60% of the locations with SI of 3.3 (PI5 95%). RP BioPath-3, RP BioPath-1, RP Patho lines possessing Pi2 gene maintained relatively stable resistance across locations. The susceptible checks, HR-12 and Co-39, exhibited susceptibility at most locations. Hierarchical clustering based on virulence patterns of *Magnaporthe oryzae* grouped the isolates into three major clusters. Isolates from Coimbatore, Gudalur, Navasari and Lonavala formed a distinct cluster with greater divergence with highly virulent and unique pathogen populations. In contrast, isolates from IIRR, Mugad, Imphal, Karjat, Pattambi, Gangavathi and Jagdalpur formed a closely related cluster, with relatively low virulence patterns. The study highlights geographical variability in *Pyricularia oryzae* virulence, with Lonavala, Navasari, Coimbatore, Gudalur, Almora, Hazaribagh, Khudwani emerging as hotspots for high disease pressure. While Tetep, RP BioPath-3, Tadukan, IR 64, Raminad str-3, RP BioPath-

2 demonstrated stable resistance. The breakdown of resistance in Rasi and IR 64 at certain locations suggests potential shifts in the pathogen population. This information is crucial for breeding programs and disease management strategies.

2. *Xanthomonas oryzae* pv. *oryzae*

Trial on monitoring virulence of bacterial blight (BB) pathogen, *Xanthomonas oryzae* pv. *oryzae* (*Xoo*) was conducted at 22 locations. At Ludhiana, the trial was conducted with 10 isolates. The rice differentials used in this trial consisted of eleven near isogenic lines (IRBB lines) possessing different single BB resistant genes in the genetic background of rice cultivar IR 24. Susceptible check varieties like IR 24, TN1 and resistant check variety Improved Samba Mahsuri was also included in the trial. Reactions of the *Xoo* isolates were also recorded on rice differentials possessing different combinations of five *Xa/xa* genes viz., *Xa4*, *xa5*, *Xa7*, *xa13* and *Xa21*. Most of the differentials possessing single bacterial blight resistance genes like *Xa1*, *Xa3*, *Xa7*, *xa8*, *Xa10*, *Xa11* and *Xa14* were susceptible at most of the locations. BB resistance gene *xa13* was susceptible in 8 locations while *Xa21* was susceptible in 10 locations. Based on their virulence, the isolates were grouped into high, moderate and low virulence groups. Based on the reactions of the isolates on differentials possessing single BB resistance genes, the isolates from Maruteru, IIRR-Hyderabad, Chiplima and Raipur were categorized as highly virulent. Majority of the isolates were categorized as moderately virulent. The isolate from Maruteru was totally different from rest of the isolates and formed a separate cluster. The isolates from Pattambi and Raipur and isolates from Chiplima, Gangavathi and Navsari were quite different and formed separate clusters.

III. DISEASE OBSERVATION NURSERY

Disease Observation Nursery was proposed at 12 locations *i.e.*, Bankura, Bikramgaunj, Chatha, Chinsurah, Kaul, Malan, Mandya, Maruteru, Moncompu, Nawagam, Pusa and Raipur. The data however was received from 8 centres for this trial. Disease Observation Nursery (DON) trials were carried out across multiple sites with staggered sowing schedules—early, normal, and late—adapted to the local conditions. The objective was to assess how varying planting dates influence the incidence and intensity of rice diseases in endemic regions. At Chatha, among the sowing dates, late sowing consistently recorded the highest disease severity of brown spot and BLB, while early sowing showed comparatively lower infection levels. Overall, the results suggest that delayed sowing favours higher disease development, likely due to more conducive environmental conditions for pathogen proliferation. In Maruteru, the bacterial leaf blight severity was more in late sown crop compared to early and normal sown crops. BLB disease severity was relatively high during the fag end of the crop in the late sown crop of Uma and Pournami compared to early and normal sown crops at Moncompu centre. late sown crop was more affected by the sheath rot incidence compared to normal and early sown crops in Nawagam centre. In Pusa centre, the incidence of brown leaf spot was more in late sown crop (31% PDI) compared to normal (11% PDI) and early sown crops (16.0% PDI).

IV. DISEASE MANAGEMENT TRIALS

TRIAL 11. EVALUATION OF FUNGICIDES AGAINST LOCATION SPECIFIC DISEASES

The study aimed to identify the most effective fungicidal molecule and suitable methods of application for disease management. Three combination fungicides, namely, metiram (55%) + pyraclostrobin (5%) WG, tebuconazole (50%) + trifloxystrobin (25%) WG, and hexaconazole (4%) + zineb (68%) WP, were evaluated in comparison with carbendazim 50% WP as a standard check. Fungicides were applied as seed treatment at a dosage of 2 g per kg of rice seed in four treatments, while another four treatments involved a combination of seed treatment and one foliar spray at the maximum tillering stage, along with an untreated control. The trail was proposed at 34 centres and conducted at 30 centres. The experiment was conducted against leaf blast (7 locations), neck blast (8 locations), sheath blight (14 locations), brown spot (eight locations), sheath rot (five locations), grain discoloration (two locations), false smut (one) and stem rot (one location).

Among the eight treatments evaluated, Treatment 4 [tebuconazole (50%) + trifloxystrobin (25%) WG; seed treatment @ 1.0 g/kg of seed followed by one foliar spray @ 2 g/L at maximum tillering stage] was found to be the most effective and significantly reduced both disease severity and incidence of leaf blast, neck blast, sheath blight, sheath rot, and brown spot. This treatment reduced the severity at the rate of 62.5%, 71.3%, 60%, 64.3%, 53.2% and incidence at the rate 63.1%, 43.3%, 42.2%, 52.8%, 3% against leaf blast, neck blast, sheath blight sheath rot and brown spot, respectively. In addition, Treatment 2 [metiram (55%) + pyraclostrobin (5%) WG; seed treatment @ 2 g/kg of seed followed by one foliar spray @ 2 g/L] was identified as the next best treatment for controlling leaf blast and neck blast. Similarly, Treatment 6 [hexaconazole (4%) + zineb (68%) WP; seed treatment @ 2 g/kg of seed followed by one foliar spray @ 2 g/L] was found to be the next most effective treatment for managing sheath blight, brown spot, and sheath rot.

TRIAL 12. EVALUATION OF BIO-CONTROL FORMULATIONS AGAINST FUNGAL DISEASES

Treatment T4 (Seed treatment with carbendazim @ 2g/Kg followed by foliar spray of tebuconazole 50%+ trifloxystrobin 25% WG @ 0.4 g/litre) has highest disease control compared to all the treatments tested against leaf blast, sheath rot, grain discoloration and sheath blight diseases. Among the biocontrol consortia, the treatment T3 (Seed treatment @10 g/Kg followed soil application @ 1kg/acre at 10-15 DAT (Transplanted Rice) and foliar spray (@ 10 g/l) at 45-50 DAT Transplanted Rice with consortia formulation of *Trichoderma asperellum* TAIK1 and *Bacillus cabrialesii* BIK3) which includes both the biocontrol agents showed best results in terms of reducing the disease severity of sheath blight, leaf blast, sheath rot, brown spot and grain discoloration, increasing the number of tillers, root and shoot length and grain yield of the crop. In this the biocontrol agent has an ability to promote the plant growth characteristics by inducing the host mechanisms. Being a soil borne pathogen, the seed treatment with biocontrol agent is very helpful to control the initial establishment of the pathogen. Results indicated that both the formulations demonstrate strong potential for integrated disease management against rice diseases with site-specific superiority. Integration T3 and T4 formulations in to disease management packages could enhance rice productivity.

TRIAL 13. INTEGRATED PEST MANAGEMENT in DIRECT SEEDED RICE

The trial was conducted against rice diseases under direct seeded rice conditions at four different zones *viz*., Zone II (Northern zone - Kaul); Zone IV – (North Eastern zone - Arundhutinagar), Zone VI (Western zone – Navsari) and Zone VII (Southern zone – Aduthurai, Coimbatore, Mandya, Gangavathi, Rajendranagar). Disease severity of various diseases, recorded at weekly intervals was converted in to AUDPC values and compared. In Northern zone (Kaul), the adoption of IPM practices were found effective against leaf blast, bacterial blight, sheath blight, brown spot and false smut. In North Eastern zone (Arundhutinagar) IPM practices effective against sheath blight. In the Western zone (Navsari), IPM practices are highly effective against the sheath blight and sheath rot. In Southern zone (Aduthurai, Gangavathi, Mandya and Rajendranagar), the IPM practices reduced the disease progress of leaf and neck blast, sheath blight, bacterial blight and false smut.

TRIAL 14: SPECIAL TRIAL ON YIELD LOSS ASSESSMENT DUE TO BROWN SPOT DISEASE

A special trial on yield loss was conducted to assess the impact of brown spot disease on the grain yield of rice during Kharif 2025. The trial included four treatments; which were imposed with varying levels of inoculum to create graded levels of disease infection, and fungicide application. The trial was implemented at Gangavathi, Jagdalpur, Ludhiana, Moncompu, Rewa and Pusa. Results showed that, consistent declining trend in disease severity was observed with a reduction in the number of inoculations, wherein the mean percent disease index decreased from 54.38% under T1 (thrice inoculation) to 20.20% under T4 (no inoculation); correspondingly declined in in yield, from 22.4% in T1 to negligible levels in T4 was observed. With three times pathogen inoculation, without fungicide treatment (T1), the highest percent disease index (PDI) of brown spot was recorded at Ludhiana (86.07%), followed by Moncompu (75.71%), Jagdalpur (73.70%), and Pusa (56.80%), which correspondingly resulted in yield reductions of 24.7%, 32.3%, 49.8%, and 23.1%, respectively. Among all locations, Gangavathi and Rewa showed relatively lower disease pressure with minimal or negative yield reduction. The mean values across all locations indicated a clear correlation between disease intensity and yield loss; a mean PDI of 54.38%, 43.28%, 32.12% in T1, T2 and T3 caused the yield reduction of 22.4%, 10.5%, 7.7% respectively. These results indicate the strong correlation between increasing disease severity and declining rice yield.

TRIAL 15: SPECIAL SCREENING TRIAL ON FALSE SMUT

Selected entries were screened artificially at IIRR and naturally screened at Gangavathi, Ludhiana, Masodha and Radhanagari. Among the 68 selected entries screened against false smut both by artificial inoculation (at ICAR-IIRR) and natural incidence (at hot spot locations), across the locations and across the three different sowing date of transplanting, twenty- one entries viz., RPL-32, DL-28, RPL-9, RPL-29, RPL-30, RPL-58, DL-33, IRRI-G-104, IRRI-G-117, IRRI-G-200, IRRI-G-219, IRRI-G-247, RPL-20, RPL-25, RPL-34, DL-7, DL-13, DL-26, RPL-5,RPL-11 and RPL-35 recorded 1 to 4 smut balls and showed moderate tolerance to false smut disease.

TRIAL 16: EVALUATION OF DRONES FOR SPRAYING OF AGROCHEMICALS (HERBICIDES, INSECTICIDES, AND FUNGICIDES) IN RICE PEST MANAGEMENT (EDAPM)

The trial was proposed at 10 locations viz., Coimbatore, Gangavathi, IIRR, Ludhiana, Mandya, Navasari, Nawagam, Pantnagar, Raipur and Rajendranagar and the data was received from 8 locations except Coimbatore and Raipur. At maximum tillering stage, the leaf blast severity was reduced by up to 49.94% with drone spraying and by 37.29% with the battery-operated knapsack sprayer as compared to the control treatment. With respect to neck blast, the T1 treatment recorded 50.65% disease reduction, and T2 treatment recorded 40.58% disease reduction at booting stage of the crop. In case of sheath blight, across the locations, the treatment T1 reduced the mean PDI from 30.42% to 16.90% with 44.44% disease reduction at maximum tillering stage and reduced the mean PDI from 43.45% to 22.62% with 47. 94% disease reduction at booting stage. Similarly, the treatment T2 reduced the mean PDI from 30.42% to 19.64% with 35.43% disease reduction at maximum tillering stage and reduced the mean PDI from 43.45% to 27.37% with 37.00% disease reduction at booting stage. In grain discoloration management trial, the treatment T1 recorded lowest PDI (7.20%) with highest percentage of disease reduction (69.78%) and the treatment T2 recorded the PDI of 11.66% with 51.08% disease reduction.

TRIAL No. 17: OBSERVATION ON INCIDENCE AND SEVERITY OF RICE DISEASES IN ORGANIC RICE CULTIVATION AND NATURAL FARMING (COLLABORATIVE TRIAL WITH SOIL SCIENCE)

Observations on the prevalent diseases in organic rice cultivation and natural farming was proposed at eight locations *viz*., Chinsurah, Karaikal, Khudwani, Mandya, Moncompu, Pantnagar, Pusa and Titabar. However, the data was received from only five locations *viz*., Chiplima, Karaikal, Mandya, Pantnagar and Pusa. In all the centres it was observed that the integrated disease management strategy was found to be very effective in reducing the disease incidence. At Chiplima, the adoption of integrated crop management practices (T5 treatment) along with application of need-based fungicides recorded nearly 50% disease reduction in sheath blight and brown spot diseases. The treatment (T4) in which, crop management practices were adopted along with application of botanicals and biocontrol agents reduced the disease up to 40%. At Mandya, application of state wise management practices (T3 treatment) effectively reduced the PDI of sheath blight with 47.00% disease reduction and neck blast with 44.93% disease reduction. At Karaikal, the application of integrated management practices along with application of botanicals and biocontrol agents (T4 treatment) recorded the percent disease reduction of 51.44%, 50.39%, 51.48% and 62.33% for leaf blast, brown spot, sheath rot and grain discolouration diseases respectively. In Pantnagar, the treatment T5 with integrated management practices along with need-based fungicides application (T5 treatment) significantly reduced the PDI of sheath blight with 66.76% disease reduction and brown spot with 66.76% disease reduction. At Pusa, the treatment T5 included with integrated management practices along with need-based fungicides application significantly reduced the PDI of 14.75% to 6.00% with 59.32% disease reduction.

INTRODUCTION

The All-India Co-ordinated Rice Pathology Programme of Indian Institute of Rice Research (ICAR-IIRR) provides an effective linkage for collaboration among state agricultural universities, national institutes and Department of Agriculture, Agrochemical Industry and others. The objectives of the Programme are:

- To accelerate genetic improvement of rice for resistance against major diseases occurring in different ecosystems of the country.
- To provide a testing mechanism to assess the advanced breeding lines over a wide range of climatic, cultural, soil and disease epidemic conditions.
- To identify broad spectrum of resistance to major rice diseases.
- To monitor and evaluate the genetic variation of rice pathogens.
- To monitor the prevalence of diseases in the country.
- To develop need-based disease management practice.
- To identify production constraints in different ecosystems through Production Oriented Survey.

To achieve these objectives during 2025, a total of 19 trials were conducted at 48 locations on host plant resistance, field monitoring of virulence in major pathogens and disease management. Five national screening nurseries comprising of 1,522 entries of advanced breeding lines and new rice hybrids were evaluated for their reactions to major rice diseases at 48 locations.

The composition of the nurseries is as follows:

- ❖ National Screening Nursery 1 (NSN-1) - 373 entries drawn from Advanced Variety Trials.
- ❖ National Screening Nursery 2 (NSN-2) – 711 entries from Initial Variety Trials.
- ❖ National Screening Nursery-Hills (NSN-H) - 97 entries from Advanced and Initial Varietal Trials.
- ❖ National Hybrid Screening Nursery (NHSN) - 124 entries from Initial National Hybrid Rice Trials (HRT'S).
- ❖ Donor Screening Nursery (DSN) - 217 entries from different centres.

The virulence patterns of blast and bacterial blight pathogens in the field were monitored, using differentials for respective diseases at disease endemic areas. The prevalence of the diseases was monitored in three sequentially sown disease observation nurseries laid-out in the endemic locations.

The disease management trials were conducted at hot-spot locations to evaluate the efficacy of new fungicides and commercially available combination fungicide formulations against major rice diseases. Production Oriented Survey (POS) was undertaken in 19 centres (15 states) to identify the production constraints in different rice growing ecosystems.

The weather conditions and location details are given in Annexure II and III. Out of 587 experiments proposed, data were received from 543 experiments of 19 trials indicating the good response with 92.50 % data receipt from the centres.

Table 1: Scientists involved in Plant Pathology Coordinated Programme, *Kharif* 2025. ICAR-IIRR, Headquarters, Hyderabad- Dr. M. Srinivas Prasad, PI; Associates: Drs. G. S. Laha, D. Krishnaveni, C. Kannan, D. Ladhalakshmi, V. Prakasam, K. Basavaraj and G. S. Jasudasu

S.No	Location	Co-operators	Associates
1.	Aduthurai	Dr. K. Rajappan	-
2.	Almora	Dr. Gaurav Verma	Miss. Akansha Khatri
3.	Arundhutinagar	Dr Mithu Rani Debnath	-
4.	Bankura	Dr. C. K. Bhunia	-
5.	Bikramgunj	Dr. Chandan Kumar	-
6.	Chatha	Dr. Vijay Bahadur Singh	Dr. R.S.Sudan, Dr. Rajan Salalia
7.	Chinsurah	Dr. Dilip Kumar Patra	-
8.	Chiplima	Dr. Rini Pal	-
9.	Coimbatore	Dr. C. Gopalakrishnan	-
10.	Cuttack	Drs. Arup K. Mukherjee, Srikanta Lenka	Mr.Jyoti Prakash Das
11.	Gangavati	Dr Rathnamma	-
12.	Ghaghraghat	-	-
13.	Gudalur	Dr. C. Gopalakrishnan	-
14.	Hazaribagh	Dr. Someshwar Bhagat	Dr. Amrita Banerjee
15.	IIRR	Dr. M. Srinivas Prasad, Dr. G. S. Laha, Dr D. Krishnaveni, Dr. C. Kannan, Dr D. Ladhalakshmi, Dr .V. Prakasam, Dr. K. Basavaraj and Dr. G. S. Jasudasu	-
16.	Imphal (Lamphalpet)	Dr. A.Ratankumar Singh	-
17.	Jagdalpur	Dr.R.S.Netam	-
18.	Jagtial	Mrs.N.Sumalatha	Miss.G.Ishwarya
19.	Karjat	Dr. H. D. Pawar	-
20.	Karaikal	Dr. C. Jeyalakshmi	Dr. A. Karmel Reetha & Dr. D. Shanmuga Priya
21.	Kaul	Dr. Mahaveer Singh and Dr. Vishal Gandhi	-
22.	Khudwani	Dr. F. A. Mohiddin	-
23.	Lonavla	Dr.A.M.Tirmali	Mrs.Juhili Sudit
24.	Ludhiana	Dr. Jagjeet Singh Lore	Dr. Harpreet Singh
25.	Malan	Dr. Suman Kumar	Dr. Shabnam Katoch
26.	Mandya	Dr. V. B. Sanath Kumar	Dr. G.R. Denesh, DR. M. S. Kitturmat, Dr. C. A. Deepak and Dr. H. R.Savita
27.	Maruteru	Dr. V. Bhuvaneswari	Dr. P. V. Ramesh Babu
28.	Masodha (Faizabad)	Dr. Vindeshwari Prasad	Dr. M.K. Maurya
29.	Moncompu	Dr. M. Surendran	-
30.	Mugad	Dr. Gurupada Balol	Dr. Satish RG
31.	Navsari	Dr. Vijay A. Patil	-
32.	Nawagam	Dr. Rakesh Kumar Gangwar	-
33.	Nellore	Dr. P. Madhusudhan	-
34.	New Delhi	Drs. B. Bishnu Maya & Dr. Prakash Ganeshan	Mr. Md. Shahid Afridi
35.	Pantnagar	Dr. Bijendra Kumar	-
36.	Pattambi	Dr. P. Raji	-
37.	Ponnampet	Dr. Prashantha C & Dr.N. Umashankar Kumar	Dr. Bhaganna Haralayya
38.	Pusa	Dr. R. K. Ranjan	-
39.	Raipur	Dr. Pradeep Kumar Tiwari	-
40.	Rajendranagar	Dr. T. Kiran Babu	Dr. I Arunasri, Dr. Sridhar Siddi, Dr. B. Laxmiprasanna, Dr. M. Parimala Kumar and Dr. I Swarnalatha Devi
41.	Ranchi	Dr. Manoj Kumar Barnwal	-
42.	Rewa	Dr. S. K. Tripathi	-
43.	Sabour	Dr. Amarendra Kumar	-
44.	Titabar	Dr. Popy Bora	-
45.	Umiam (Barapani)	Dr. Pankaj Baiswar	-
46.	Upper Shillong	Shri.Derek Y.Pariat	-
47.	Varanasi	Dr. R. K. Singh	-
48.	Wangbal	-	-

Table 2: Details of Trials Propoased and Conducted Across the Locations, *Kharif* - 2025

S.No	Location	Funded/ Voluntary	Experiments	
			Proposed	Conducted
1.	Aduthurai	Funded	15	14
2.	Almora	Voluntary	8	8
3.	Arundhutinagar	Funded	9	-
4.	Bankura	Funded	10	10
5.	Bikramgunj	Funded	14	14
6.	Chatha	Funded	12	15
7.	Chinsurah	Funded	14	11
8.	Chiplima	Funded	7	8
9.	Coimbatore	Funded	18	17
10.	Cuttack	Voluntary	19	8
11.	Gangavati	Funded	22	19
12.	Ghaghraghat	Funded	-	-
13.	Gudalur	Voluntary	5	4
14.	Hazaribagh	Voluntary	9	5
15.	IIRR	HQ	30	27
16.	Imphal (Lamphalpet)	Voluntary	8	7
17.	Jagdalpur	Funded	15	15
18.	Jagtial	Voluntary	1	1
19.	Karjat	Funded	17	23
20.	Karaikal	Voluntary	4	6
21.	Kaul	Funded	10	7
22.	Khudwani	Funded	9	7
23.	Lonavla	Voluntary	7	30
24.	Ludhiana	Funded	18	18
25.	Malan	Funded	10	8
26.	Mandya	Funded	18	18
27.	Maruteru	Funded	22	14
28.	Masodha (Faizabad)	Funded	11	11
29.	Moncompu	Funded	18	14
30.	Mugad	Voluntary	14	3
31.	Navsari	Funded	18	23
32.	Nawagam	Funded	20	25
33.	Nellore	Voluntary	13	8
34.	New Delhi	Voluntary	7	6
35.	Pantnagar	Funded	16	15
36.	Pattambi	Funded	16	16
37.	Ponnampet	Funded	13	12
38.	Pusa	Funded	13	13
39.	Raipur	Funded	16	15
40.	Rajendranagar	Funded	16	14
41.	Ranchi	Voluntary	10	6
42.	Rewa	Funded	12	11
43.	Sabour	Voluntary	8	8
44.	Titabar	Funded	16	13
45.	Umiam (Barapani)	Voluntary	3	2
46.	Upper Shillong	Funded	6	5
47.	Varanasi	Funded	10	9
48.	Wangbal	Funded	-	-
Total Experiments (92.50%)			587	543

I. HOST PLANT RESISTANCE

TRIAL No.1: SCREENING FOR LEAF BLAST RESISTANCE

➢ National Screening Nursery-1 (NSN-1)

The National Screening Nursery (NSN-1) comprised of 373 entries that included national regional and pathology checks. The nursery was evaluated at 21 locations across India under different-agro ecological zones. The frequency distribution of disease scores, the representative overall location severity index (overall LSI) and LSI of susceptible checks (S checks LSI) were are presented in the Table 1.1A. The screening against leaf blast was carried out under both natural and artificial inoculation conditions at different locations. The overall disease pressure was highest in Mandya (LSI 7.1) and it was lowest at Karaikal (LSI 0.8). Most of the locations recorded moderate disease pressure (Overall LSI 3-6) and it included, Hazaribagh (5.9), Nawagam (5.8), Ranchi (5.1), Jagdalpur (5.0), Almora (4.9), Khudwani (4.9), Karjat (4.9), Nellore (4.7), Uppershillong (4.7), Coimbatore (4.4), Gudalur (4.4), Pattambi (4.3), Umium (4.3), IIRR (4.2), Lonavala (3.7), Ponnampet (3.6), Rajendranagar (3.5) and Jagtial (3.3). The disease pressure was low (LSI ≤3.0) at Rewa (2.9) and Karaikal (0.8).

A set of susceptible checks (HR-12, Co-39, T(N1), IR-50, BPT 5204, and Swarna) was repeated at regular intervals among the test entries. The mean location severity index of these susceptible checks (S checks LSI) is presented in Table 1.1A. The LSI of susceptible was highest (LSI >7.0) at Mandya (8.8), IIRR (7.5) and Almora (7.1); it was moderate (3.0-6.0) at most of the locations.

The selection of superior entries was made only when the LSI of susceptible checks was above 4.0 and not less than the overall LSI, accordingly data from Jagtial, Karaikal, Lonavala, Ponnampet, Rewa and Rajendranagar were not considered. The promising entries with a low susceptibility index (SI ≤ 3.9) and high PI are presented in Table 1.1B. Only one entry (IET 32430) was found to be resistant (SI ≤ 3.0); however, several entries were identified as moderately resistant, including IET Nos. 32430, 32387, 31480 (H)*, 33063 (H), 33048 (H), 33071 (H), 33079 (H), 31686 (H)*, 32547, 32420, 32436, 31775*, 32778, 32492, 28664, 31638*, 33075 (H), 32421, 32427, 32510, 33078, 31501(H) *, 33052 (H), 31452 (H)* and 31466 (H)* (Table 1.1B).

➢ National Screening Nursery-2 (NSN-2)

The Nursery consists of 711 lines drawn from initial variety trials (IVTs). These entries were evaluated at 13 centres under various ecological zones. The entries were evaluated under both artificial and natural screening methods at different locations. The frequency distribution of disease scores, the representative overall location severity index (overall LSI) and LSI of susceptible checks (S checks LSI) were are presented in the Table 1.2A. The overall disease pressure was highest at Mandya (LSI 7.9) and the lowest at Rewa (LSI 3.2). The overall disease pressure was very high (LSI ≥7.0) at Mandya (7.9) and IIRR (7.0); however, the disease pressure was high (LSI 6.0-7.0) at Hazaribagh (6.5). Location severity index was moderate (LSI 3.0-6.0) at most of the locations and that included Nawagam (5.9). Coimbatore (5.2), Ranchi (5.2), Jagdalpur (5.0), Nellore (4.6), Karjat (4.3), Pattambi (3.9), Rajendranagar (3.5), and Rewa (3.2). The LSI of susceptible checks was very high (>7.0) at Mandya (8.9) and IIRR (7.6); high at (LSI 6-7) at Hazaribagh (6.3), Jagdalpur (6.2) and Nawagam (6.0). Although the overall LSI of locations *viz*., Karjat, Rajendranagar, and Rewa was above 3.0; however, the LSI of susceptible checks was very low (less than 4.0), hence performance of entries from these locations was not considered for the selection of best entries. (Table 1.2B).None of the entries found resistant (<3.0), but a few promising entries with low susceptibility index and which showed moderate resistant reaction was presented in Table 1.2B and that included IET #33496, 33955, 33646, 33947, 33776, 33642, 33899, 33385, 33518, 33990 and 33457 (Table 1.2B).

- **National Screening Nursery-Hills (NSN-Hills)**

The National Screening Nursery - Hills (NSN-H) comprised of 97 entries including checks, were evaluated at 10 hill locations across India for their resistance to leaf blast. These entries were screened through natural infection condition at most of the locations except at Coimbatore, and IIRR, where entries were screened under artificial method of inoculation. At Imphal and Khudwani, natural infection was supplemented by spread of diseased leaves. The frequency distribution of disease scores and location severity indices are presented in Table 1.3 A. The disease pressure was moderate (LSI 2.9-5.4) at most of the locations such as Coimbatore (5.4), Gudalur (5.4), Karjat (5.4), Khudwani (5.2), Lonavala (4.1), Imphal (4.0) and Almora (3.8). The disease pressure was low (LSI<3.0) at Upper shillong (2.9), hence data from this location was not considered for selection of best entries. None of the entries performed better over resistant check (Tetep SI 2.8); however, entries possessing moderate resistance with SI ≤3.5 with high PI were considered promising and that included IET# 33364, 33373, 33363, 33342, 32340, 32349, 33341, 33343, 33370, 33362, 33345, 33369, 33376, 33351, 33349 and 32356 (Table 1.3B).

- **National Hybrid Screening Nursery (NHSN)**

One hundred and twenty-four hybrids that included regional and pathology checks were evaluated at 18 locations against leaf blast disease under national hybrid screening nursery. The frequency distribution of disease scores, the representative overall location severity index (LSI), location severity index of susceptible checks (LSI of S checks) are presented in the Table 1.4A. At none of the centers, the overall LSI was very high (LSI>7.0) and it was high (LSI 6.0-7.0) at Mandya (6.9) and Karjat (6.0). The overall disease pressure was moderate (LSI 3.0-6.0) at most of the locations and that included Nawagam (5.8), Jagdalpur (5.4), Coimbatore (5.3), Nellore (4.8), Khudwani (4.7), Lonavala (4.6), Ranchi (4.5), IIRR (4.4), Hazaribagh (4.2), Pattambi (4.2), Mugad (3.9), Ponnampet (3.9), Rajendranagar (3.7) and Uppershillong (3.3); and it was low (LSI<3.0) was at Rewa (2.1).

The location severity index of susceptible checks was very high (LSI of S checks ≥7.0) at Mandya (8.9) and IIRR (7.4); it was high (LSI 6.0-7.0) at Jagdalpur (6.7); and moderate at most of the locations. The Performance of entries at Imphal, Mugad and Rewa was not considered for identifying promising entries; where the disease pressure on susceptible checks was very low (less than 4.0).

None of the hybrid entries found resistant (SI≤3.0) against leaf blast in NHSN; however, entries with SI≤4.1 with high PI across the locations considered promising and that included IET# 34026, 34015, 34013, 34021, 34025, 34014, 34020, 34008, 32596, 34032, 34052, 34016, 34017, 31700, 34019 and 34047 (Table 1.4B).

Table 1.1A: Location severity index (LSI) and frequency distribution of Leaf blast scores for NSN-1, *Kharif'* 2025

Score	Location/Frequency of scores (0-9)																				
	ALM	CBT	GDL	HZB	IIRR	JDP	JGL	KHD	KJT	KRK	LNV	MND	NWG	NLR	PNP	PTB	RNC	REW	RNR	UMM	USG
0	0	0	0	0	0	0	0	0	0	162	0	0	0	0	0	0	0	0	0	0	5
1	20	0	0	0	1	0	6	0	0	140	2	0	0	0	21	0	2	82	55	36	48
2	37	5	5	0	55	9	0	2	0	43	85	1	0	7	94	6	9	104	0	31	49
3	38	63	63	31	131	46	291	11	20	21	75	16	7	48	102	45	14	68	167	43	51
4	33	135	135	55	47	75	0	118	81	0	102	25	18	113	61	195	93	49	0	57	42
5	80	120	120	55	33	98	45	164	173	1	82	79	187	103	38	87	122	38	115	105	32
6	54	29	29	62	26	76	0	62	82	0	25	2	43	82	3	15	79	21	0	44	17
7	68	6	6	92	42	40	7	12	6	0	0	46	87	9	30	6	34	11	10	9	39
8	19	5	5	37	14	6	0	4	1	0	2	58	16	3	1	2	17	0	0	12	40
9	1	1	1	20	10	9	0	0	0	0	0	133	11	0	11	7	3	0	2	12	49
Total	**350**	**364**	**364**	**352**	**359**	**359**	**349**	**373**	**363**	**367**	**373**	**360**	**369**	**365**	**361**	**363**	**373**	**373**	**349**	**349**	**372**
Overall LSI	**4.9**	**4.4**	**4.4**	**5.9**	**4.2**	**5.0**	**3.3**	**4.9**	**4.9**	**0.8**	**3.7**	**7.1**	**5.8**	**4.7**	**3.6**	**4.3**	**5.1**	**2.9**	**3.5**	**4.3**	**4.7**
HR-12	7.2	7.0	7.0	5.5	8.7	6.0	3.8	5.3	4.4	2.5	4.3	8.2	6.0	6.0	5.0	8.3	5.0	2.8	3.8	6.2	8.5
CO-39	7.5	4.2	4.2	6.3	5.8	6.2	3.0	5.2	4.2	0.8	3.3	8.3	5.7	4.5	3.5	4.3	4.8	2.5	2.6	3.3	4.3
T(N1)	7.5	4.2	4.2	6.2	7.3	6.4	3.0	5.2	5.0	0.6	3.3	8.4	5.3	5.3	3.6	4.4	5.2	2.0	3.4	5.8	4.5
IR-50	7.0	4.3	4.3	5.8	7.8	5.8	3.0	4.5	4.7	1.2	3.7	8.7	5.2	4.8	3.8	4.8	3.8	1.7	4.0	5.3	4.3
BPT5204	6.2	4.3	4.3	5.8	7.8	4.5	3.0	4.0	5.0	1.0	3.3	9.0	5.3	5.7	4.5	4.0	4.8	3.8	3.0	5.0	5.0
Swarna	7.2	3.2	3.2	6.3	8.5	6.8	2.6	4.7	4.2	0.5	3.5	9.0	5.3	4.0	3.2	4.8	5.3	3.5	3.3	5.5	7.0
LSI (S Checks)	**7.1**	**4.6**	**4.6**	**6.0**	**7.5**	**5.9**	**3.2**	**4.8**	**4.7**	**1.2**	**3.5**	**8.8**	**5.3**	**5.2**	**3.8**	**5.2**	**4.9**	**3.0**	**3.4**	**5.1**	**5.8**
Tetep (R Check)	**7.0**	**3.0**	**3.0**	**7.0**	**1.0**	**5.0**	**3.0**	**6.0**	**3.0**	**1.0**	**2.0**	**3.0**	**5.0**	**5.0**	**2.0**	**4.0**	**4.0**	**5.0**	**5.0**	**4.0**	**4.0**
Screening	**N**	**A**	**N**	**A**	**A**	**N**	**A**	**N**	**A**	**N**	**N**	**A**	**A**	**A**	**N**	**N**	**N**	**A**	**A**	**N**	**N**

(LSI-Location Severity Index; N-Natural; A-Artificial; S Check- Susceptible check)

Table 1.1B: Promising entries with low susceptibility index (≤ 3.9) and high PI in NSN-1 to Leaf blast disease, *Kharif*-2025

P.No.	Br. No.	IET No.	Location/Frequency of scores (0-9)																				
			ALM	CBT	GDL	HZB	IIRR	JDP	KHD	KJT	MND	NWG	NLR	PTB	RNC	UMM	USG	SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
19	3319	32430	-	-	-	-	-	-	2	-	-	-	-		6	-	1	**3.0**	3	2	67	2	67
6	3306	32387	2	3	3	3	2	2	6	4	3	7	3	3	6	1	2	**3.3**	15	11	73	12	80
31	3705	31480 (H)*	1	4	4	3	3	3	5	4	5	5	5		4	3	1	**3.6**	14	6	43	14	100
71	3739	33063 (H)	2	4	4	5	3	3	5	5	3	5	4	3	5	2	1	**3.6**	15	7	47	15	100
112	3531	33048 (H)	1	4	4	6	2	3	5	5	5	5	4	2	4	3	1	**3.6**	15	6	40	14	93
72	3740	33071 (H)	3	3	3	5	2	3	4	6	3	5	6	3	5	3	1	**3.7**	15	9	60	13	87
75	3743	33079 (H)	4	3	3	4	2	3	6	5	5	5	3	3	6	2	1	**3.7**	15	8	53	13	87
113	3901	31686 (H)*	1	3	3	6	3	2	5	6	4	5	5	5	5	1	1	**3.7**	15	7	47	13	87
67	3735	32547	1	4	4	6	4	3	4	4	4	3	6	4	4	1	3	**3.7**	15	5	33	13	87
16	3316	32420	2	3	3	6	3	4	3	5	5	5	4	2	8	1	2	**3.7**	15	8	53	13	87
87	3512	32436	3	4	4	5	2	3	5	6	5	5	3	3	2	5	1	**3.7**	15	7	47	14	93
133	4109	31775*	3	3	3	3	4	3	5	6	5	5	4	4	4	1	3	**3.7**	15	7	47	14	93
157	4708	32778	5	4	4	5	3	4	4	3	5	5	2	4	1	5	2	**3.7**	15	5	33	15	100
45	3719	32492	4	5	5	3	4	3	4	4	3	5	4	5	6	1	1	**3.8**	15	5	33	14	93
326	5601	28664	1	3	3	4	6	4	5	5	5	5	4	4	5	1	2	**3.8**	15	5	33	14	93
37	3711	31638*	3	4	4	6	4	2	5	6	3	5	5	4	4	1	1	**3.8**	15	5	33	13	87
73	3741	33075 (H)	3	4	4	5	2	4	4	7	5	4	4	3	5	3	1	**3.9**	15	5	33	14	93
17	3317	32421	3	4	4	-	3	-	5	4	-	6	4		4	-	2	**3.9**	10	3	30	9	90
18	3318	32427	1	5	5	-	2	-	6	5	-	5	4	4	4	-	2	**3.9**	11	3	27	10	91
57	3725	32510	3	3	3	4	3	4	5	5	3	7	6	4	5	3	1	**3.9**	15	7	47	13	87
74	3742	33078 (H)	2	3	3	4	2	5	5	6	5	5	5	4	5	3	2	**3.9**	15	6	40	14	93
3	3303	31501*	1	5	5	6	2	3	5	4	5	8	5	4	4	2	0	**3.9**	15	5	33	13	87
69	3737	33052 (H)	2	3	3	6	4	4	4	5	2	5	6	4	4	5	2	**3.9**	15	5	33	13	87
78	3503	31452 (H)*	3	3	3	6	2	4	5	4	4	5	5	4	6	4	1	**3.9**	15	5	33	13	87
79	3504	31466 (H)*	2	4	4	7	2	5	4	4	4	5	3	4	5	4	2	**3.9**	15	4	27	14	93
201	**HR-12**		8	7	7	8	9	9	5	-	9	7	5	9	5	5	9	**7.3**	14	0	0	4	29
366	**Tetep**		7	3	3	7	1	5	6	3	3	5	5	4	4	4	4	**4.3**	15	5	33	12	80
Overall LSI			**4.9**	**4.4**	**4.4**	**5.9**	**4.2**	**5.0**	**4.9**	**4.9**	**7.1**	**5.8**	**4.7**	**4.3**	**5.1**	**4.3**	**4.7**						
LSI (Susceptible Check)			**7.1**	**4.6**	**4.6**	**6.0**	**3.7**	**5.9**	**4.8**	**4.7**	**8.8**	**5.3**	**5.2**	**5.2**	**4.9**	**5.1**	**5.8**						

(SI-Susceptibility Index; *No. of locations where the entry has scored ≤5 and ≤3; **Promising index (PI) based on no. of locations where the entry had scored ≤3 and ≤5)

Table 1.2A: Location severity index (LSI) and frequency distribution of Leaf blast scores of NSN-2, *Kharif* 2025

Score	Location/Frequency of scores (0-9)												
	CBT	**HZB**	**IIRR**	**JDP**	**KJT**	**MND**	**NLR**	**NWG**	**PNP**	**PTB**	**RNC**	**RNR**	**REW**
0	**0**	**0**	**0**	**16**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
1	0	0	2	0	0	0	2	0	26	0	3	120	131
2	0	0	20	41	18	0	2	0	146	58	25	0	175
3	2	19	196	114	76	10	73	7	169	163	24	293	126
4	84	58	154	118	286	3	294	21	164	341	158	0	94
5	413	81	134	113	262	79	197	340	89	76	214	240	101
6	185	149	18	120	40	0	111	66	30	36	169	1	53
7	22	218	140	113	2	140	12	203	43	15	65	33	27
8	0	130	12	31	0	115	3	53	1	7	50	0	4
9	0	39	17	30	0	347	0	13	27	4	3	0	0
Total	706	694	693	696	684	694	694	703	695	700	711	687	711
Overall LSI	**5.2**	**6.5**	**7.0**	**5.0**	**4.3**	**7.9**	**4.6**	**5.9**	**3.8**	**3.9**	**5.2**	**3.5**	**3.2**
HR-12	5.7	6.0	8.9	6.7	3.9	9.0	7.0	6.0	4.9	7.4	5.7	4.1	4.0
CO-39	5.0	5.7	6.0	6.5	4.0	8.8	4.9	6.4	3.3	3.7	4.7	3.3	3.7
T(N1)	4.6	5.7	7.7	6.3	3.7	9.0	4.9	6.4	4.3	4.3	5.1	3.6	3.3
IR-50	4.9	6.6	7.7	6.3	4.0	9.0	4.4	5.7	3.1	4.4	6.1	3.0	2.6
BPT5204	5.1	6.7	8.1	5.0	4.0	9.0	5.6	5.7	4.4	3.4	4.7	1.9	3.7
Swarna	5.1	7.3	8.0	7.1	4.0	9.0	2.9	6.4	5.4	3.7	5.0	3.0	3.9
LSI (S Check)	**5.1**	**6.3**	**7.6**	**6.2**	**3.8**	**8.9**	**5.0**	**6.0**	**4.2**	**4.4**	**5.3**	**3.3**	**3.8**
Screening	A	N	A	N	N	A	A	A	N	N	N	A	A

(LSI-Location Severity Index; N-Natural; A-Artificial); S Check- Susceptible check)

Table 1.2B: Promising entries with low susceptibility index (≤ 4.0) and high PI in NSN-2 to leaf blast, *Kharif* 2025

P.No.	Br. No.	IET No.	Location/Frequency of scores (0-9)															
			CBT	HZB	IIRR	JDP	MND	NLR	NWG	PNP	PTB	RNC	SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
128	3659	33496	5	4	3	2	7	3	5	2	3	4	**3.8**	10	5	50	9	90
422	5920	33955	5	7	3	2	3	4	5	2	4	3	**3.8**	10	5	50	9	90
291	4227	33646	5	6	4	2	5	5	3	2	2	4	**3.8**	10	4	40	9	90
414	5912	33947	5	3	4	3	5	5	5	2	4	3	**3.9**	10	4	40	10	100
574	4640	33776	5	6	3	2	5	5	5	4	3	1	**3.9**	10	4	40	9	90
286	4222	33642	6	7	2	0	5	4	6	2	3	4	**3.9**	10	4	40	7	70
656	5628	33899	5	5	3	2	7	3	5	3	3	4	**4.0**	10	5	50	9	90
208	3407	33385	5	7	3	0	5	3	5	3	3	6	**4.0**	10	5	50	8	80
18	3818	33518	5	5	3	4	3	4	5	3	3	5	**4.0**	10	4	40	10	100
462	5960	33990	5	7	3	0	5	5	6	3	2	4	**4.0**	10	4	40	8	80
81	3618	33457	4	4	3	5	5	4	5	2	4	4	**4.0**	10	2	20	10	100
201	**HR-12**		7	7	8	6	9	8	7	6	7	8	**7.3**	10	0	0	0	0
704	**Tetep**		5	6	1	0	5	4	5	3	4	7	**4.0**	10	3	30	8	80
Overall LSI			**5.2**	**6.5**	**4.7**	**5.0**	**7.9**	**4.6**	**5.9**	**3.8**	**3.9**	**5.2**						
LSI (Susceptible Check)			**5.1**	**6.3**	**7.6**	**6.2**	**8.9**	**5.0**	**6.0**	**4.2**	**4.4**	**5.3**						

(SI-Susceptibility Index; *No. of locations where the entry has scored ≤5 and ≤3;**Promising index (PI) based on no. of locations where the entry had scored ≤3 and ≤5)

Table 1.3A: Location severity index (LSI) and frequency distribution of leaf blast scores of NSN-H, *Kharif* 2025

Score	Location/Frequency of scores (0-9)									
	ALM	**CBT**	**GDL**	**IIRR**	**IMP**	**KJT**	**KHD**	**LNV**	**PNP**	**USG**
0	0	0	0	0	0	0	0	0	0	0
1	9	0	0	1	0	0	0	0	3	3
2	25	0	0	19	2	1	0	20	21	42
3	17	0	0	45	43	5	4	19	31	37
4	12	7	12	7	19	19	24	15	22	8
5	9	45	41	3	24	22	33	24	18	0
6	13	37	34	1	5	24	18	18	1	4
7	9	5	7	14	4	21	16	0	1	2
8	2	0	0	0	0	0	2	1	0	0
9	1	0	0	2	0	0	0	0	0	1
Total	**97**	**94**	**94**	**92**	**97**	**92**	**97**	**97**	**97**	**97**
LSI	**3.8**	**5.4**	**5.4**	**3.7**	**4.0**	**5.4**	**5.2**	**4.1**	**3.4**	**2.9**
Screening	**N**	**A**	**N**	**A**	**N/A**	**N**	**N/A**	**N**	**N**	**N**

(LSI-Location Severity Index; N-Natural; A-Artificial)

➢ Donor Screening Nursery (DSN)

The donor screening nursery comprised of 217 entries including pathology checks were evaluated at 18 locations. The frequency distribution of disease scores, the representative overall location severity index (LSI), location severity index of susceptible checks (LSI of S checks) are presented in the Table 1.5A. The overall location severity index was highest at Mandya (7.6) and it was lowest at (Imphal (2.1). The overall location severity index was high (LSI 6.0-7.0) at Nawagam (6.1); and in most of the centres it was moderate (LSI 3.0-6.0) that included Jagdalpur (5.3), Hazaribagh (4.9), Karjat (4.9), IIRR (4.7), Nellore (4.7), Almora (4.6). Coimbatore (4.6), Lonavala (4.6), Ranchi (4.5), Ponnampet (4.4), Pattambi (4.1), Uppershillong (4.1) and Rajendranagar (4.1). The location severity index of susceptible checks was very high (LSI ≥7.0) at Mandya (8.7) and IIRR (7.5); it was high (LSI 6.0-7.0) at Almora (6.2); moderate (LSI 3.0-6.0) at most of the locations. The overall LSI (≤3.0) and LSI of susceptible checks (≤4.0) was low at Mugad, Rewa, and Imphal; hence data from these locations were not included in selection of promising entries.

Only one donor (BPT 3507) was found resistant (SI<3.0) with severity index of 2.8, based on disease reaction from four locations. Other donors with severity index ≤4.0 were considered as promising and presented in table 1.5B and that included BPT 3507, NLR 3774, JGL 47849, BPT 3278, HKP-MLL-93R-39, RP-BIO PATHO-3, NVSR 1310, HKP-93R, NVSR 1307, RP PATHO-2, RP PATHO-11, NL RBB-1, HKP-MLL-93R-57, DBT-395, RP 6469-139, HKP-MLL-93R-2, RTCNP-120, RP 6469-173, RP PATHO-7 and SAH-15 (Table 1.5B).

Table 1.3B: Promising entries with low susceptibility index (<=4.0) and high PI in NSN-H to Leaf blast, *Kharif* 2025

P. No.	Ent No.	IET No.	Location/Frequency of scores (0-9)									SI	Total	<=3*	PI (<3)**	<=5*	PI (<5)**
			ALM	CBT	GDL	IIRR	IMP	KJT	KHD	LNV	PNP						
77	2428	33364	1	4	4	3	4	4	4	2	2	**3.1**	**9**	**4**	**44**	**9**	**100**
37	2509	33373	3	-	-	3	3	5	5	2	2	**3.3**	**7**	**5**	**71**	**7**	**100**
76	2427	33363	2	4	4	2	3	7	4	2	2	**3.3**	**9**	**5**	**56**	**8**	**89**
21	2321	33342	2	5	5	4	3	3	3	3	3	**3.4**	**9**	**6**	**67**	**9**	**100**
52	2403	32340	1	5	5	2	3	3	4	6	2	**3.4**	**9**	**5**	**56**	**8**	**89**
60	2411	32349	3	5	5	2	4	5	3	3	3	**3.7**	**9**	**5**	**56**	**9**	**100**
20	2320	33341	1	6	6	3	3	4	4	3	3	**3.7**	**9**	**5**	**56**	**7**	**78**
22	2322	33343	2	-	-	3	4	-	6	3	4	**3.7**	**6**	**3**	**50**	**5**	**83**
33	2505	33370	2	7	7	2	3	3	4	2	4	**3.8**	**9**	**5**	**56**	**7**	**78**
75	2426	33362	1	5	5	2	3	5	5	5	3	**3.8**	**9**	**4**	**44**	**9**	**100**
24	2324	33345	3	5	5	-	3	-	6	2	3	**3.9**	**7**	**4**	**57**	**6**	**86**
32	2504	33369	4	6	6	2	2	-	5	4	2	**3.9**	**8**	**3**	**38**	**6**	**75**
40	2512	33376	2	6	6	2	3	5	7	2	2	**3.9**	**9**	**5**	**56**	**6**	**67**
63	2414	33351	3	6	6	2	3	4	6	3	2	**3.9**	**9**	**5**	**56**	**6**	**67**
61	2412	33349	1	5	5	3	5	4	4	5	3	**3.9**	**9**	**3**	**33**	**9**	**100**
54	2405	32356	6	5	5	2	4	3	4	5	2	**4.0**	**9**	**3**	**33**	**8**	**89**
49	**HR12**		7	5	5	9	5	6	6	5	4	**5.8**	**9**	**0**	**0**	**5**	**56**
82	**Tetep**		1	4	4	1	2	4	5	2	2	**2.8**	**9**	**5**	**56**	**9**	**100**
LSI			**3.8**	**5.4**	**5.4**	**3.7**	**4.0**	**5.4**	**5.3**	**4.1**	**3.4**						

(SI-Susceptibility Index; *No. of locations where the entry has scored ≤5 and ≤3;**Promising index (PI) based on no. of locations where the entry had scored ≤3 and and ≤5)

Table 1.4A: Location severity index (LSI) and frequency distribution of leaf blast scores of NHSN, *Kharif* 2025.

Score	Location/Frequency of scores (0-9)																	
	CBT	HZB	IIRR	IMP	JDP	KHD	KJT	LNV	MND	MGD	NLR	NWG	PNP	PTB	RNR	RNC	REW	USG
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
1	0	0	1	12	0	0	0	0	0	24	1	0	3	0	20	0	33	9
2	0	0	16	23	1	0	0	8	0	0	1	0	21	6	0	10	53	41
3	5	51	52	49	11	13	1	19	14	45	14	0	33	16	51	21	30	43
4	16	34	13	16	23	48	7	33	0	0	35	9	28	70	0	25	6	12
5	58	22	6	20	29	40	20	27	34	25	35	55	21	21	34	44	2	0
6	36	9	2	2	25	15	54	25	0	0	34	22	2	6	0	17	0	5
7	2	2	17	2	24	5	42	11	13	26	3	31	12	3	8	5	0	7
8	1	4	8	0	5	3	0	0	14	0	1	6	0	2	0	2	0	3
9	4	2	9	0	3	0	0	1	47	0	0	1	3	0	5	0	0	4
Total	122	124	124	124	121	124	124	124	122	120	124	124	123	124	120	124	124	124
Overall LSI	**5.3**	**4.2**	**4.4**	**3.2**	**5.4**	**4.7**	**6.0**	**4.6**	**6.9**	**3.9**	**4.8**	**5.8**	**3.9**	**4.2**	**3.7**	**4.5**	**2.1**	**3.3**
HR-12	8.4	3.6	9.0	4.4	7.4	7.0	6.6	3.6	9.0	3.4	6.4	6.4	5.2	7.2	4.2	3.8	2.6	7.4
CO-39	5.4	4.0	5.8	3.4	6.6	4.0	5.2	5.0	8.4	4.2	4.6	6.0	5.4	4.2	2.2	4.0	2.0	2.8
T(N1)	5.4	3.4	7.2	3.4	6.6	3.8	4.8	5.4	9.0	3.8	5.6	6.2	5.0	4.4	5.0	4.6	1.6	3.0
IR-50	5.4	3.8	7.6	2.6	5.8	5.2	6.0	5.4	8.6	3.8	5.2	6.4	5.2	4.2	4.2	4.2	1.6	3.0
BPT5204	5.2	4.0	7.6	3.2	5.4	5.0	6.0	4.2	9.0	2.6	5.6	5.2	6.2	4.0	5.4	5.2	2.2	3.4
Swarna	5.0	3.8	8.4	2.4	8.6	4.4	5.8	5.2	9.0	3.5	3.2	6.0	3.4	4.4	5.0	4.4	1.6	6.2
LSI (S Check)	**5.7**	**4.0**	**7.4**	**3.4**	**6.7**	**4.9**	**5.6**	**4.6**	**8.9**	**3.6**	**5.1**	**5.9**	**4.9**	**4.8**	**4.3**	**4.6**	**2.0**	**4.4**
Screening	**A**	**N**	**A**	**N**	**N**	**N**	**A**	**N**	**A**	**N**	**A**	**A**	**N**	**N**	**A**	**N**	**A**	**N**

(LSI-Location severity Index; N-Natural; A-Artificial; S Check- Susceptible check)

Table 1.4B: Promising entries with low susceptibility index (≤ 4.1) and high PI in NHSN to leaf blast, *Kharif* 2025.

S.No	Br.No.	IET No.	Location/Frequency of scores (0-9)															SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
			CBT	HZB	IIRR	JDP	KHD	KJT	LNV	MND	NLR	NWG	PNP	PTB	RNR	RNC	USG						
44	IHRT-ME-2917	34026	6	3	2	3	5	6	3	3	4	5	3	4	3	3	2	**3.7**	15	9	60	12	80
31	IHRT-ME-2904	34015	4	3	3	4	3	5	4	5	3	5	3	3	3	5	2	**3.7**	15	8	53	14	93
29	IHRT-ME-2902	34013	5	3	2	4	5	6	4	3	4	5	2	5	3	3	2	**3.7**	15	7	47	13	87
38	IHRT-ME-2911	34021	6	3	3	3	3	7	7	7	3	5	4	2	1	2	1	**3.8**	15	9	60	10	67
43	IHRT-ME-2916	34025	5	3	3	5	3	6	3	5	4	5	2	4	3	3	3	**3.8**	15	8	53	13	87
30	IHRT-ME-2903	34014	5	3	3	4	6	6	4	5	3	6	2	4	1	2	3	**3.8**	15	7	47	11	73
37	IHRT-ME-2910	34020	5	3	2	3	4	6	5	3	5	4	2	3	5	5	3	**3.9**	15	7	47	13	87
90	IHRT-M-3019	-	4	4	3	4	4	5	7	5	3	8	3	3	1	2	2	**3.9**	15	7	47	12	80
15	IHRT-E-2815	34008	5	**5**	2	4	5	6	5	3	6	5	2	4	3	2	1	**3.9**	15	6	40	12	80
4	IHRT-E-2804	-	6	4	3	2	4	6	4	5	4	7	1	4	0	6	2	**3.9**	15	5	33	10	67
83	IHRT-M-3012	32596	5	4	3	3	4	6	3	7	6	4	3	4	1	6	1	**4.0**	15	6	40	10	67
57	IHRT-ME-2924	34032	6	4	4	4	4	6	5	3	4	4	3	3	3	4	3	**4.0**	15	5	33	12	80
91	IHRT-M-3020	34052	5	4	3	3	3	6	6	5	4	6	4	4	3	2	3	**4.1**	15	6	40	11	73
32	IHRT-ME-2905	34016	5	3	3	4	4	5	6	3	4	5	3	4	5	5	2	**4.1**	15	5	33	13	87
33	IHRT-ME-2906	34017	4	4	3	5	4	6	3	5	4	5	2	4	5	5	2	**4.1**	15	4	27	13	87
82	IHRT-M-3011	31700	5	4	3	4	5	7	6	5	5	5	4	4	1	2	1	**4.1**	15	4	27	12	80
35	IHRT-ME-2908	34019	4	3	3	-	5	6	5	8	3	4	-	4	3	4	1	**4.1**	13	5	38	10	77
84	IHRT-M-3013	34047	6	4	3	3	5	6	4	3	5	5	4	3	3	6	2	**4.1**	15	6	40	11	73
117	Tetep		5	6	1	3	6	6	5	3	4	7	3	4	5	6	3	**4.5**	15	5	33	9	60
111	HR-12		9	6	9	8	7	7	3	9	7	6	7	8	7	3	7	**6.9**	15	2	13	2	13
LSI			**5.3**	**4.2**	**4.4**	**5.4**	**4.7**	**6.0**	**4.6**	**6.9**	**4.8**	**5.8**	**3.9**	**4.2**	**3.7**	**4.5**	**3.3**						
LSI (Susceptible Check)			**5.7**	**4.0**	**7.4**	**6.7**	**4.9**	**5.6**	**4.6**	**8.9**	**5.1**	**5.9**	**4.9**	**4.8**	**4.3**	**4.6**	**4.4**						

(SI-Susceptibility Index; *No. of locations where the entry has scored ≤5 and ≤3;**Promising index (PI) based on no. of locations where the entry had scored ≤3 and ≤5)

Table 1.5A: Location severity index (LSI) and frequency distribution of leaf blast scores of DSN, *Kharif* 2025

Score	Location/Frequency of scores (0-9)																	
	ALM	CBT	HZB	IIRR	IMP	JDP	KJT	LNV	MND	MGD	NLR	NWG	PTB	PNP	RNR	RNC	REW	USG
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	5
1	23	0	0	2	78	0	0	1	0	77	6	0	0	1	21	2	37	11
2	22	0	3	13	62	1	0	19	0	0	6	0	14	36	0	32	90	32
3	18	27	35	62	52	16	7	28	9	80	34	1	48	48	79	22	54	69
4	20	78	57	35	7	45	60	54	0	0	46	9	95	47	0	47	15	35
5	42	79	50	36	9	51	98	60	37	46	43	82	28	32	73	54	20	1
6	55	24	41	14	1	54	46	32	0	0	66	28	11	5	0	41	1	13
7	30	2	22	34	1	37	0	19	29	7	4	70	12	24	28	14	0	32
8	0	2	7	5	0	5	0	1	29	0	2	21	3	2	0	5	0	4
9	2	1	2	9	0	0	0	3	104	0	2	2	0	18	2	0	0	15
Total	**212**	**213**	**217**	**210**	**210**	**209**	**211**	**217**	**208**	**210**	**209**	**213**	**211**	**213**	**205**	**217**	**217**	**217**
Overall LSI	**4.6**	**4.6**	**4.9**	**4.7**	**2.1**	**5.3**	**4.9**	**4.6**	**7.6**	**2.8**	**4.7**	**6.1**	**4.1**	**4.4**	**4.0**	**4.5**	**2.5**	**4.1**
HR-12	6.0	4.6	4.8	9.0	3.4	6.0	4.8	4.4	9.0	3.4	6.8	5.2	7.4	6.2	3.4	5.2	1.6	8.0
CO-39	6.0	4.3	4.8	5.5	2.8	5.8	4.5	5.5	8. 5	1.5	5.3	5.5	5.0	4.0	5.0	4.0	1.8	3.8
T(N1)	6.3	4.3	4.3	7.0	1.8	5.3	5.0	4.5	8.5	1.7	4.5	6.0	3.7	5.3	5.0	4.5	2.0	1.5
IR-50	6.3	4.3	4.8	8.3	1.3	5.5	4.5	5.0	8.3	2.5	5.0	6.0	4.0	3.8	6.0	5.5	2.8	3.0
BPT5204	6.0	4.5	4.8	7.3	1.5	5.3	5.0	4.0	9.0	2.5	5.5	5.0	4.0	4.8	4.5	4.3	3.8	4.3
Swarna	6.6	5.4	5.6	8.0	2.2	6.2	5.0	5.0	9.0	2.6	2.4	6.2	4.4	4.8	5.0	6.0	3.8	6.2
LSI (S Check)	**6.2**	**4.6**	**4.8**	**7.5**	**2.1**	**5.7**	**4.8**	**4.7**	**8.7**	**2.4**	**4.9**	**5.7**	**4.7**	**4.8**	**4.8**	**4.9**	**2.6**	**4.5**
Screening	**N**	**N**	**A**	**N**	**A**	**N**	**N**	**A**	**N**	**A**	**N**	**A**	**N**	**A**	**A**	**N**	**N**	**A**

(LSI-Location Severity Index; N-Natural; A-Artificial; S Check- Susceptible check)

Table 1.5B: Promising entries with low susceptibility index (≤ 4.0) and high PI in DSN to leaf blast, *Kharif* 2025

P. No.	Desgination	Location/Frequency of scores (0-9)																				
		ALM	CBT	HZB	IIRR	JDP	KJT	LNV	MND	NLR	NWG	PTB	PNP	RNR	RNC	USG	SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
9	BPT 3507	-	-	4	-	-	-	5	-	-	-		-	-	2	0	**2.8**	4	2	50	4	100
17	NLR 3774	2	5	3	3	4	5	4	5	3	5	2	1	1	2	3	**3.2**	15	9	60	15	100
19	JGL 47849	1	5	3	3	3	4	2	5	3	7	3	2	3	6	1	**3.4**	15	10	67	13	87
1	BPT 3278	2	5	3	3	4	4	7	3	5	4	3	3	3	3	3	**3.7**	15	9	60	14	93
37	HKP-MLL-93R-39	1	5	3	3	5	6	5	3	4	8	3	3	1	3	2	**3.7**	15	9	60	13	87
94	RP-BIO PATHO-3	1	5	3	3	4	6	2	5	3	7	3	2	3	6	2	**3.7**	15	9	60	12	80
30	NVSR 1310	1	5	2	3	3	4	5	9	6	5	4	3	1	2	3	**3.7**	15	8	53	13	87
49	HKP-93R	1	5	3	3	3	5	7	7	4	6	3	2	1	5	1	**3.7**	15	8	53	12	80
29	NVSR 1307	2	4	3	4	4	3	5	7	6	5	3	2	1	5	2	**3.7**	15	7	47	13	87
81	RP PATHO-2	1	4	4	3	4	5	2	5	6	6	2	5	3	3	3	**3.7**	15	7	47	13	87
90	RP PATHO-11	3	4	3	2	4	5	3	7	3	6	3	4	3	5	2	**3.8**	15	8	53	13	87
13	NL RBB-1	5	4	3	3	3	4	9	3	2	8	3	2	1	7	1	**3.9**	15	9	60	12	80
36	HKP-MLL-93R-57	1	5	2	3	6	5	5	5	4	7	2	2	0	8	3	**3.9**	15	7	47	12	80
123	DBT-395	5	4	4	4	3	5	4	3	3	6	5	4	3	2	3	**3.9**	15	6	40	14	93
66	RP 6469-139	3	3	3	2	5	5	4	8	5	5	3	2	5	5	1	**3.9**	15	7	47	14	93
35	HKP-MLL-93R-2	1	4	7	3	4	5	5	7	3	7	3	3	1	4	2	**3.9**	15	7	47	12	80
132	RTCNP-120	5	3	3	4	3	4	5	7	5	7	4	3	3	2	2	**4.0**	15	7	47	13	87
71	RP 6469-173	2	5	7	2	4	5	5	5	5	5	4	3	3	4	1	**4.0**	15	5	33	14	93
86	RP PATHO-7	1	4	4	2	4	6	2	5	4	5	3	3	5	5	7	**4.0**	15	5	33	13	87
181	SAH-15	-	5	6	-	-	-	5	-	-	-		-	-	4	0	**4.0**	5	1	20	4	80
204	HR-12	6	8	6	9	4	4	4	9	9	6	7	9	3	6	7	**6.5**	15	1	7	4	27
210	Tetep	1	5	5	1	3	5	4	5	4	5	4	4	3	6	3	**3.9**	15	5	33	14	93
Overall LSI		**4.6**	**4.6**	**4.9**	**4.7**	**5.3**	**4.9**	**4.6**	**7.6**	**4.7**	**6.1**	**4.1**	**4.4**	**4.0**	**4.5**	**4.1**						
LSI (Susceptible Check)		**5.8**	**4.5**	**4.9**	**7.2**	**5.6**	**4.8**	**4.6**	**8.4**	**4.8**	**5.9**	**4.7**	**4.9**	**4.7**	**5.0**	**4.9**						

(SI-Susceptibility Index; *No. of locations where the entry has scored ≤5 and ≤3;**Promising index (PI) based on no. of locations where the entry had scored ≤3 and ≤5)

❖ TRIAL No.2: SCREENING FOR NECK BLAST RESISTANCE

➢ National Screening Nursery-1 (NSN-1)

National Screening Nursery-1 (NSN-1) comprised of 373 entries were evaluated for neck blast disease at eight locations across India. The entries were screened under natural infection conditions in Jagdalpur, Karaikal, Lonavala, Nawagam and Ponnampet; while at IIRR, Mandya and Rajendranagar artificial method of screening was followed. The frequency distribution of disease scores, overall location severity indices and location severity indices of susceptible checks were presented in Table 2.1A. None of the locations showed very high (LSI >7.0) overall location severity index. The highest overall location severity was observed in Mandya (6.0) while the lowest at Karaikal (0.2). The disease pressure was moderate (LSI 3.0-6.0) at most the locations that included Mandya (6.0), Nawagam (5.1), Lonavala (5.0), Jagdalpur (4.4) and Ponnampet (4.1). With regard to location severity index of susceptible checks, Mandya showed highest LSI (7.1); it was moderate at Jagdalpur (5.4), Lonavala (5.2), Nawagam (5.2), and Ponnampet (4.8). The selection of promising entries was done based on the data of those locations where overall LSI was more than 3.0 and LSI of susceptible checks more than 4.0; accordingly, data from Rajendranagar, IIRR, and Karaikal was not considered for selection of best entries.

The promising entries with a low susceptibility index (SI ≤ 3.7) and high PI are presented in Table 2.1B. The resistant entries (SI≤3.0) included IET#30882(H)*(R), 32917 (H), 31714 (H)*, 33838, 31709 (H)* and 31877* (Table 2.1B). Other promising entries with moderate resistant reaction included IET# 31973*, 33028 (H), 31878*, 31686 (H)*, 32812, 33002 (H), 32513, 30692*, 31452 (H)*, 32870 and 32785 (Table 2.1B).

➢ National Screening Nursery-2 (NSN-2)

A total of 711 entries were evaluated under NSN-2 for neck blast resistance at four different locations during *Kharif* 2025. The screening was done under natural infection condition at Jagdalpur, Nawagam, and Ponnampet, while it was under artificial inoculations at Mandya. The location severity index (Overall LSI and LSI of susceptible checks) and frequency distribution of scores presented in the Table 2.2A. The overall disease pressure was high (LSI 6.0-7.0) at Mandya (6.1); moderate (LSI 3.0-6.0) at Nawagam (5.0), Jagdalpur (4.2) and Ponnampet (3.9). The disease pressure on susceptible checks was very high at Mandya (7.3), moderate at Jagdalpur (5.0), Nawagam (5.0) and Ponnampet (4.3). The selection of promising entries was done based data of those locations where overall LSI was more than 3.0 and LSI of susceptible checks more than 4.0; accordingly, data of all the locations was considered.

The resistant entries with a low susceptibility index (SI≤3.0) and high PI across the locations were presented in Table 2.2B and that included IET#33570, 33885, 33704, 33510, 33588, 33598, 33862, 33591, 33711, 33563, 33577 and 33805.

Table 2.1A: Location severity index (LSI) and frequency distribution of Neck blast scores of NSN-1, *Kharif* 2025.

Score	Location/Frequency of scores (0-9)							
	IIRR	JDP	KRK	LNV	MND	NWG	PNP	RNR
0	95	0	335	0	0	0	0	78
1	125	23	22	0	10	0	10	91
2	0	0	0	0	0	0	53	0
3	53	125	8	128	43	61	122	82
4	0	0	0	0	0	0	0	0
5	77	150	2	182	150	236	124	95
6	0	0	0	0	0	0	0	0
7	18	50	0	54	80	71	50	21
8	0	0	0	0	0	0	0	0
9	1	9	0	9	80	1	2	1
Total	**369**	**357**	**367**	**373**	**363**	**369**	**361**	**368**
LSI	**2.2**	**4.4**	**0.2**	**5.0**	**6.0**	**5.1**	**4.1**	**2.6**
HR-12	2.8	7.1	0.0	4.7	8.6	5.3	6.7	5.3
CO-39	1.0	6.7	0.0	5.0	7.0	5.0	6.0	3.2
T(N1)	3.4	4.6	0.0	6.0	7.4	5.3	5.4	2.0
IR-50	3.2	6.3	0.2	4.7	6.3	6.3	3.8	3.3
BPT5204	2.2	4.0	0.2	6.0	5.0	4.7	4.2	1.5
Swarna	0.7	3.3	0.0	4.7	8.3	4.3	3.0	0.0
LSI (Susc. Check)	**2.2**	**5.4**	**0.1**	**5.2**	**7.1**	**5.2**	**4.8**	**2.6**
Screening	**A**	**N**	**N**	**N**	**A**	**N**	**N**	**A**

(LSI-Location Severity Index; N-Natural; A-Artificial)

Table 2.1B: Promising entries with low susceptibility index (≤3.7) and high PI in NSN-1 to Neck blast, *Kharif* 2025.

P. No.	Br. No.	Location/Frequency of scores (0-9)											
		IET No.	JDP	LNV	MND	NWG	PNP	SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
117	3905	30882(H)*(R)	1	3	1	7	1	**2.6**	5	4	80	4	80
208	5801	32917 (H)	3	3	1	5	2	**2.8**	5	4	80	5	100
116	3904	31714 (H)*	1	5	1	5	2	**2.8**	5	3	60	5	100
340	5112	33838	-	3	-	-	-	**3.0**	1	1	100	1	100
114	3902	31709 (H)*	1	5	3	3	3	**3.0**	5	4	80	5	100
168	4902	31877*	1	5	5	3	1	**3.0**	5	3	60	5	100
272	5208	31973*	5	3	3	3	2	**3.2**	5	4	80	5	100
108	3527	33028 (H)	1	5	3	5	2	**3.2**	5	3	60	5	100

P. No.	Br. No.	IET No.	Location/Frequency of scores (0-9)										
			JDP	LNV	MND	NWG	PNP	SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
167	4901	31878*	3	3	3	5	3	**3.4**	5	4	80	5	100
113	3901	31686 (H)*	1	3	3	5	5	**3.4**	5	3	60	5	100
176	4910	32812	5	5	1	3	3	**3.4**	5	3	60	5	100
22	3322	33002 (H)	3	3	5	5	2	**3.6**	5	3	60	5	100
58	3726	32513	5	3	5	3	2	**3.6**	5	3	60	5	100
76	3501	30692*	3	3	5	5	2	**3.6**	5	3	60	5	100
78	3503	31452 (H)*	5	3	3	5	2	**3.6**	5	3	60	5	100
307	5237	32870	3	3	5	5	2	**3.6**	5	3	60	5	100
150	4707	32785	-	3	-	5	3	**3.7**	3	2	67	3	100
151	**HR-12**		9	5	9	5	7	**7.0**	5	0	0	2	40
366	**Tetep**		3	3	3	5	3	**3.4**	5	4	80	5	100
LSI			**4.4**	**5.0**	**6.0**	**5.1**	**4.1**						
Susceptible check LSI			**5.4**	**5.2**	**7.1**	**5.2**	**4.8**						

(SI-Susceptibility Index; *No. of locations where the entry has scored ≤5 and ≤3;**Promising index (PI) based on no. of locations where the entry had scored ≤3 and ≤5)

Table 2.2A: Location severity index (LSI) and frequency distribution of Neck blast scores of NSN-2, *Kharif* 2025.

Score	Location/Frequency of scores (0-9)			
	JDP	MND	NWG	PNP
0	0	0	0	0
1	26	19	0	42
2	0	0	0	116
3	307	81	113	214
4	0	0	0	0
5	296	260	468	247
6	0	0	0	0
7	63	172	122	78
8	0	0	0	0
9	3	164	0	1
Total	**695**	**696**	**703**	**698**
LSI	**4.2**	**6.1**	**5.0**	**3.9**
HR-12	4.7	8.4	4.7	5.9
CO-39	5.7	6.7	5.0	5.0
T(N1)	5.6	7.9	5.6	4.4
IR-50	4.1	6.1	5.6	4.4
BPT5204	5.3	5.6	5.0	2.6
Swarna	4.7	9.0	4.4	3.7
LSI (Susc. Check)	**5.0**	**7.3**	**5.0**	**4.3**
Screening	**N**	**A**	**N**	**N**

(LSI-Location Severity Index; N-Natural; A-Artificial)

Table 2.2B: Promising entries with low susceptibility index (≤3.0) and high PI in NSN-2 to Neck blast, *Kharif* 2025.

P.No.	Br. No.	IET No.	Location/Frequency of scores (0-9)				SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
			JDP	MND	NWG	PNP						
141	4009	33570	1	3	3	1	**2.0**	4	4	100	4	100
639	5611	33885	3	1	3	1	**2.0**	4	4	100	4	100
357	4424	33704	1	1	5	2	**2.3**	4	3	75	4	100
10	3810	33510	3	3	3	1	**2.5**	4	4	100	4	100
161	4029	33588	3	3	3	1	**2.5**	4	4	100	4	100
171	4039	33598	3	3	3	1	**2.5**	4	4	100	4	100
584	5501	33862	3	1	3	3	**2.5**	4	4	100	4	100
164	4032	33591	3	1	5	1	**2.5**	4	3	75	4	100
364	4431	33711	1	1	5	3	**2.5**	4	3	75	4	100
134	4002	33563	3	1	5	2	**2.8**	4	3	75	4	100
149	4017	33577	1	3	5	2	**2.8**	4	3	75	4	100
534	4827	33805	5	1	3	2	**2.8**	4	3	75	4	100
501	**HR-12**		7	9	5	5	**6.5**	4	0	0	2	50
704	**Tetep**		3	1	5	5	**3.5**	4	2	50	4	100
Overall LSI			**4.2**	**6.1**	**5.0**	**3.9**						
Susceptible Check LSI			**5.0**	**7.3**	**5.0**	**4.3**						

(SI-Susceptibility Index; *No. of locations where the entry has scored ≤5 and ≤3; **Promising index (PI) based on no. of locations where the entry had scored ≤3 and ≤5)

- **National Screening Nursery-Hills (NSN-Hills)**

A total of 97 entries including checks was evaluated under NSN-hills nursery at four different locations across India under hill ecosystem. The entries were screened under natural infection condition at all the locations. The location severity index and frequency distribution of scores were presented in the Table 2.3A. The disease pressure was moderate (LSI 3.0-6.0) at two locations *viz*., Lonavala (4.5) and Almora (3.7). The disease pressure was low at Ponnampet (2.8) and Imphal (2.8) and hence data from these two locations not considered for selection of promising entries. The entries found resistant with SI≤3.0 and high PI listed in Table 2.3B, which included IET# 32326, 32333, 33334, 33335, 33336, 33342, 33346, 33371, 33374, 33375, 33376, 33351, 33353, 33358, 33360, 33362, 33364, 33365 and 33366.

Table 2.3A: Location severity index (LSI) and frequency distribution of neck blast scores of NSN-H, *Kharif* 2025

Score	Location/Frequency of scores (0-9)			
	ALM	IMP	LNV	PNP
0	0	0	0	0
1	0	32	1	26
2	0	0	0	18
3	55	45	38	28
4	0	1	0	2

Score	Location/Frequency of scores (0-9)			
	ALM	IMP	LNV	PNP
5	24	17	43	16
6	0	0	0	0
7	2	2	14	4
8	0	0	0	0
9	0	0	1	0
Total	**81**	**97**	**97**	**94**
LSI	**3.7**	**2.8**	**4.5**	**2.8**
Screening	**N**	**N**	**N**	**N**

(LSI-Location Severity Index; N-Natural; A-Artificial)

Table 2.3B: Promising entries with low susceptibility index (<=3.0) and high PI in NSN-H to neck blast, *Kharif* 2025

P.NO	Ent. No.	IET No.	Location/Frequency of scores (0-9)		SI	Total	<=3*	PI (<=3)**	<=5*	PI (<=5)**
			ALM	LNV						
4	2304	32326	3	3	**3.0**	2	2	100	2	100
6	2306	32333	3	3	**3.0**	2	2	100	2	100
12	2312	33334	3	3	**3.0**	2	2	100	2	100
13	2313	33335	3	3	**3.0**	2	2	100	2	100
15	2315	33336	3	3	**3.0**	2	2	100	2	100
21	2321	33342	3	3	**3.0**	2	2	100	2	100
25	2325	33346	3	3	**3.0**	2	2	100	2	100
35	2507	33371	3	3	**3.0**	2	2	100	2	100
38	2510	33374	3	3	**3.0**	2	2	100	2	100
39	2511	33375	3	3	**3.0**	2	2	100	2	100
40	2512	33376	3	3	**3.0**	2	2	100	2	100
63	2414	33351	3	3	**3.0**	2	2	100	2	100
65	2416	33353	3	3	**3.0**	2	2	100	2	100
71	2422	33358	3	3	**3.0**	2	2	100	2	100
73	2424	33360	3	3	**3.0**	2	2	100	2	100
75	2426	33362	3	3	**3.0**	2	2	100	2	100
77	2428	33364	3	3	**3.0**	2	2	100	2	100
78	2429	33365	-	3	**3.0**	1	1	100	1	100
79	+2430	33366	3	3	**3.0**	2	2	100	2	100
49	HR-12		-	7	**7.0**	1	0	0	0	0
82	Tetep		-	5	**5.0**	1	0	0	1	100
LSI			**3.7**	**4.5**						

(SI-Susceptibility Index; *No. of locations where the entry has scored ≤5 and ≤3;**Promising index (PI) based on no. of locations where the entry had scored ≤3 and ≤5).

➢ National Hybrid Screening Nursery (NHSN)

One hundred and twenty-four hybrids that included regional and pathology checks were evaluated at six locations against neck blast disease under national hybrid screening nursery. The entries were screened by natural infection conditions at most of the locations except at Mandya and Rajendranagar where artificial method of screening was followed. The frequency distribution of disease score and location severity index (overall LSI and LSI of susceptible checks) was presented in the Table 2.4A. The overall disease pressure disease pressure was moderate (LSI 3.0-6.0) at most of the locations and that included Mandya (5.9), Nawagam (5.0), Lonavala (4.6) and Jagdalpur (4.0).

The LSI of susceptible checks was very high at Mandya (7.5); it was moderate at Nawagam (5.4), Lonavala (4.9), Jagdalpur (3.7). The overall disease pressure and of susceptible checks was very low at Rajendranagar and Imphal, hence performance of entries from these locations was not considered for selecting the promising entries.

Based on the performance of entries across the four locations, the entries found resistant (SI≤3.0) to neck blast included IET# 34013, 34030, 32596 and 34047. Other moderate resistant entries with overall SI of <4.0 and high PI across locations were presented in table 2.4B, which included IET# 34014, 34016, 34027, 34032, 34009, 34012, 34037, 34006 and 34026 (Table 2.4B).

Table 2.4A: Location severity index (LSI) and frequency distribution of neck blast scores of NHSN, *Kharif* 2025

Score	Location/Frequency of scores (0-9)					
	IMP	JDP	LNV	MND	NWG	RNR
0	0	0	0	0	0	26
1	44	0	5	8	0	29
2	0	0	3	0	0	0
3	59	71	41	12	23	30
4	0	0	1	0	0	0
5	18	40	42	47	81	26
6	0	0	9	0	0	0
7	3	8	17	31	20	11
8	0	0	0	0	0	0
9	0	2	6	25	0	2
Total	**124**	**121**	**124**	**123**	**124**	**124**
Overall LSI	**2.7**	**4.0**	**4.6**	**5.9**	**5.0**	**2.8**
HR-12	3.8	3.4	6.4	9.0	5.8	5.0
CO-39	1.8	3.4	4.6	7.0	5.4	2.8
T(N1)	1.8	3.4	4.2	8.2	5.4	2.2
IR-50	1.4	5.0	5.4	8.2	6.2	4.2
BPT5204	1.4	3.8	5.0	5.8	5.0	0.4
Swarna	3.0	3.0	3.6	7.0	4.6	1.0
LSI (Susc. Check)	**2.2**	**3.7**	**4.9**	**7.5**	**5.4**	**2.6**
Screening	**N**	**N**	**N**	**A**	**N**	**A**

(LSI-Location Severity Index; N-Natural; A-Artificial)

Table 2.4B: Promising entries with low susceptibility index (≤3.8) and high PI in NHSN to Neck blast, *Kharif* 2025.

S.No.	Br. No.	IET No.	Location/Frequency of scores (0-9)				SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
			JDP	LNV	MND	NWG						
29	IHRT-ME-2902	34013	3	1	1	5	**2.5**	4	3	75	4	100
55	IHRT-ME-2922	34030	3	3	3	3	**3.0**	4	4	100	4	100
83	IHRT-M-3012	32596	3	3	3	3	**3.0**	4	4	100	4	100
84	IHRT-M-3013	34047	3	3	1	5	**3.0**	4	3	75	4	100
30	IHRT-ME-2903	34014	3	2	3	5	**3.3**	4	3	75	4	100
32	IHRT-ME-2905	34016	3	5	3	3	**3.5**	4	3	75	4	100
45	IHRT-ME-2918	34027	3	3	3	5	**3.5**	4	3	75	4	100
57	IHRT-ME-2924	34032	5	3	3	3	**3.5**	4	3	75	4	100
17	IHRT-E-2817	34009	7	3	1	3	**3.5**	4	3	75	3	75
28	IHRT-ME-2901	34012	3	3	1	7	**3.5**	4	3	75	3	75
63	IHRT-ME-2930	34037	3	1	5	5	**3.5**	4	2	50	4	100
13	IHRT-E-2813	34006	3	4	5	3	**3.8**	4	2	50	4	100
44	IHRT-ME-2917	34026	3	6	1	5	**3.8**	4	2	50	3	75
117	**Tetep**		3	3	1	5	**3.0**	4	3	75	4	100
100	**HR-12**		5	7	9	7	**7.0**	4	0	0	1	25
Overall LSI			**4.0**	**4.6**	**5.9**	**5.0**						
LSI (Susceptible Check)			**3.7**	**4.9**	**7.5**	**5.4**						

(SI-Susceptibility Index; *No. of locations where the entry has scored ≤5 and ≤3;**Promising index (PI) based on no. of locations where the entry had scored ≤3 and ≤5)

- **Donor Screening Nursery (DSN)**

The donor screening nursery comprised of 217 entries including pathology checks were evaluated at six locations. The frequency distribution of disease scores, the representative overall location severity index (LSI), location severity index of susceptible checks (LSI of S checks) are presented in the Table 2.5A. The overall location severity index was moderate (LSI 3.0-6.0) Mandya (5.6), Lonavala (5.1), Nawagam (4.9) and Jagdalpur (4.0); low at Rajendranagar (2.2) and Imphal (1.1).

The location severity index of susceptible checks was high (LSI ≥6.0) at Mandya (6.4); moderate (LSI 3.0-6.0) at Lonavala (4.8), Nawagam (4.8), Jagdalpur (4.4). The overall LSI and LSI of susceptible checks was very low at Rajendranagar and Imphal; hence, data from these locations were not included in selection of promising entries.

Based on the performance of donors across the four locations, donors *viz*., ISHB-16, BPT 3354, NLR 3881, NLR 3774, NVSR 6529 and HKP-MLL-93R-57 were found resistant (SI<3.0). Other donors with severity index ≤3.5 with high PI across locations were considered as promising and presented in table 2.5B and that included BPT 3270, BPT 3607, JGL 47856, JGL 41652, HKP 93 R, HKP-M11-93R-52, NWGR-17008, ISHB-17, BPT 3745, BPT 3344, 5559 and NL RBB-1 (Table 2.5B).

Table 2.5A: Location severity index (LSI) and frequency distribution of Neck blast scores of DSN, *Kharif* 2025.

Score	Location/Frequency of scores (0-9)					
	IMP	JDP	LNV	MND	NWG	RNR
0	64	0	0	0	0	70
1	103	13	0	5	0	53
2	1	0	0	0	0	0
3	40	83	58	28	44	36
4	0	0	0	0	0	0
5	2	105	97	107	138	34
6	0	0	1	0	0	0
7	0	8	55	43	31	20
8	0	0	0	0	0	0
9	0	0	6	28	0	0
Total	**210**	**209**	**217**	**211**	**213**	**213**
LSI	**1.1**	**4.0**	**5.1**	**5.6**	**4.9**	**2.2**
HR-12	1.6	4.6	4.6	8.0	4.6	5.8
CO-39	1.0	4.5	4.0	6.0	4.5	3.8
T(N1)	0.5	4.3	5.0	8.0	5.0	2.0
IR-50	0.3	4.0	5.0	6.5	5.0	5.0
BPT5204	0.0	4.5	4.5	5.5	3.5	1.0
Swarna	1.0	4.5	4.5	5.5	5.5	0.0
LSI (Susc. Check)	**0.8**	**4.4**	**4.8**	**6.4**	**4.8**	**2.9**
Screening	**N**	**N**	**N**	**A**	**N**	**A**

(LSI-Location Severity Index; N-Natural; A-Artificial)

Table 2.5B: Promising entries with low susceptibility index (≤3.5) and high PI in DSN to Neck blast, *Kharif* 2025.

S. No.	Br No.	Location/Frequency of scores (0-9)				SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
		JDP	LNV	MND	NWG						
157	ISHB-16	3	3	3	3	**3.0**	4	4	100	4	100
10	BPT 3354	1	3	5	3	**3.0**	4	3	75	4	100
15	NLR 3881	1	3	3	5	**3.0**	4	3	75	4	100
17	NLR 3774	1	3	5	3	**3.0**	4	3	75	4	100
31	NVSR 6529	3	3	1	5	**3.0**	4	3	75	4	100
36	HKP-MLL-93R-57	3	3	1	5	**3.0**	4	3	75	4	100
3	BPT 3270	3	3	5	3	**3.5**	4	3	75	4	100
7	BPT 3607	3	3	3	5	**3.5**	4	3	75	4	100
20	JGL 47856	3	3	3	5	**3.5**	4	3	75	4	100
24	JGL 41652	3	3	3	5	**3.5**	4	3	75	4	100
33	HKP 93 R	3	5	3	3	**3.5**	4	3	75	4	100
48	HKP-M11-93R-52	3	3	5	3	**3.5**	4	3	75	4	100
50	NWGR-17008	3	3	5	3	**3.5**	4	3	75	4	100
158	ISHB-17	3	3	3	5	**3.5**	4	3	75	4	100
2	BPT 3745	1	3	5	5	**3.5**	4	2	50	4	100
6	BPT 3344	1	5	5	3	**3.5**	4	2	50	4	100
42	5559	1	3	5	5	**3.5**	4	2	50	4	100
13	NL RBB-1	1	5	1	7	**3.5**	4	2	50	3	75
210	Tetep	5	7	5	5	**5.5**	4	0	0	3	75
101	HR-12	5	7	9	5	**6.5**	4	0	0	2	50
Overall LSI		**4.0**	**5.1**	**5.6**	**4.9**						
LSI (Susc. Check)		**4.4**	**4.8**	**6.4**	**4.8**						

(SI-Susceptibility Index; *No. of locations where the entry has scored ≤5 and ≤3; **Promising index (PI) based on no. of locations where the entry had scored ≤3 and ≤5)

TRIAL No.3: SCREENING FOR BROWN SPOT RESISTANCE

➢ National Screening Nursery-1 (NSN-1)

The National Screening Nursery (NSN-1) comprised of 373 entries evaluated at 16 locations across India under different-agro ecological Zones. The entries were screened under natural infection conditions at most of the centres except at Coimbatore, Chinsurah, Gangavathi, IIRR, Ludhiana and Pusa; where entries were screened with artificial inoculation with spore suspension. The frequency distribution of disease scores and the representative location severity index (Overall LSI and LSI of susceptible checks) were presented in Table 3.1A. The overall disease pressure was highest at Gangavathi (8.4), while it was lowest at Bikramganj (2.6). The disease pressure was high (LSI 6.0-7.0) at IIRR (6.9) and Pusa (6.5); moderate (LSI 3.0-6.0) at Khudwani (5.7), Jagdalpur (5.1), Chatha (5.0), Rewa (4.9), Coimbatore (4.8), Gudalur (4.8), Chinsurah (4.7), Ludhiana (4.7), Lonavala (4.3), Bankura (3.6), Sabour (3.2) and Ponnampet (3.1). The location severity index of susceptibility checks was high at Gangavathi (8.3), IIRR (7.8) and Pusa (6.1); moderate at remaining most of the locations.

The selection of promising entries was done based on the data of those locations where overall LSI was more than 3.0 and LSI of susceptible checks more than 4.0; accordingly, data from Bankura, Bikramgunj, Jagdalpur, Ludhiana, Sabour, Ponnampet were not considered in slecetion of promising entries.

The promising entries with a low susceptibility index (SI ≤ 4.7) and high PI across the locations were considered as promising and presented in Table 2.1B. None of the entry was found resistant (SI≤3.0) against brown spot disease under NSN-1; however, a few promising entries with low SI (≤4.7) across the centres included IET# 30692, 33838, 32526, 32776, 32964, 29577(R), 32780, 32467, 31456 (H)(R), 27P63 (HC) and 32046 (R) (Table 3.1B).

➢ NSN-2

A total of 711 entries including national, local and pathology checks were screened under NSN- 2 at 11 locations across the India for brown spot disease. The entries were screened under artificial inoculation conditions at Coimbatore, Gangavathi, IIRR, Ludhiana and Pusa; while it was under natural infection condition at remaining locations. The frequency distribution of disease scores and the representative location severity index (overall LSI and LSI of susceptible checks) were presented in the Table 3.2A. The overall disease pressure was very high (LSI≥7.0) at Ganagavathi (8.5) and IIRR (7.1); high (LSI 6.0-7.0) at Pusa (6.6) and Ludhiana (6.3); moderate (LSI 3.0-6.0) at Coimbatore (5.1), Jagdalpur (5.1), Chatha (4.9), Rewa (4.9), Sabour (3.7) and Ponnampet (3.0) (Table 3.2A). The location severity index of susceptible checks was highest and lowest at Gangavathi (8.3) and Ponnampet (2.5) respectively. The location severity index of susceptible checks was high at Gangavathi (8.3), IIRR (7.9) and Pusa (6.9); moderate at most of the locations.

The Performance of entries at Bikramgunj, Ponnampet and Sabour was not considered for selection of promising entries; where the disease pressure on susceptible checks was very low (less than 4.0).

The promising entries with a low susceptibility index (SI≤4.9) and high PI across the locations were considered as promising and presented in Table 3.2B. None of the entries were found resistant, however some of the promising entries included IET# 33670, 33930, 33921, 33933, 33429, 33582, 33658, 33401, 33814, 33404, 33977, 33462 and 33534 (Table 3.2B).

Table 3.1A: Location severity index (LSI) and frequency distribution of brown spot scores of NSN-1, *Kharif* 2025

Score	Location/Frequency of scores (0-9)															
	BKG	**BNK**	**CBT**	**CHN**	**CHT**	**GDL**	**GNV**	**IIRR**	**JDP**	**KHD**	**LDN**	**LNV**	**PNP**	**PSA**	**REW**	**SBR**
0	23	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
1	87	74	0	0	1	0	0	0	0	0	2	0	17	0	0	24
2	102	61	0	0	14	0	0	0	6	0	0	42	89	3	42	0
3	67	104	17	40	29	19	0	0	40	2	115	68	124	10	64	294
4	32	22	103	88	73	101	0	4	64	32	0	94	99	20	68	0
5	26	37	166	213	144	163	1	32	107	128	163	80	32	42	74	38
6	13	22	78	5	68	81	11	124	84	134	0	67	0	69	50	0
7	16	24	0	19	32	0	12	95	57	67	86	22	0	152	29	8
8	0	4	0	0	4	0	142	70	0	10	0	0	0	75	25	0
9	0	25	0	0	4	0	161	39	0	0	1	0	0	2	21	3
Total	**366**	**373**	**364**	**365**	**369**	**364**	**327**	**364**	**359**	**373**	**367**	**373**	**361**	**373**	**373**	**367**
Overall LSI	**2.6**	**3.6**	**4.8**	**4.7**	**5.0**	**4.8**	**8.4**	**6.9**	**5.1**	**5.7**	**4.7**	**4.3**	**3.1**	**6.5**	**4.9**	**3.2**
HR-12	2.5	2.7	4.8	5.7	3.8	4.8	8.3	7.7	3.5	6.7	5.8	4.7	3.0	5.8	5.0	4.7
CO-39	3.8	1.7	4.8	5.2	4.7	4.8	8.2	8.0	3.5	5.8	4.3	4.7	2.5	6.5	4.2	3.0
T(N1)	3.0	4.8	4.6	4.3	3.7	4.6	8.4	6.8	3.4	5.7	3.7	4.0	2.6	7.2	3.8	3.0
IR-50	3.0	4.8	4.8	5.0	5.7	4.7	8.0	8.5	4.2	5.3	3.3	3.5	2.8	5.7	4.2	2.7
BPT5204	3.2	3.8	4.5	4.0	3.3	4.5	8.7	7.7	4.2	5.2	3.0	4.3	3.2	5.7	6.3	2.3
Swarna	2.3	1.8	5.2	4.7	5.5	5.5	8.2	8.2	3.5	5.8	2.7	4.8	3.5	5.8	5.5	2.7
LSI (S Check)	**3.0**	**3.3**	**4.8**	**4.8**	**4.4**	**4.8**	**8.3**	**7.8**	**3.7**	**5.8**	**3.6**	**4.3**	**2.9**	**6.1**	**4.8**	**3.1**
Screening	**N**	**N**	**A**	**A**	**N**	**N**	**A**	**A**	**N**	**N**	**A**	**N**	**N**	**A**	**N**	**N**

(LSI-Location Severity Index; N-Natural; A-Artificial; S Check- Susceptible check)

Table 3.1B: Promising entries with low susceptibility index (≤4.7) and high PI in NSN-1 to brown spot, *Kharif* 2025

P. No.	Br. No.	IET No.	Location/Frequency of scores (0-9)										SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
			CBT	CHN	CHT	GDL	GNV	IIRR	KHD	LNV	PSA	REW						
76	3501	30692*	4	6	4	4	-	6	6	3	3	3	**4.3**	**9**	**3**	**33**	**6**	**67**
340	5112	33838	3	-	3	3	-	-	6	4	6	7	**4.6**	**7**	**3**	**43**	**4**	**57**
63	3731	32526	4	3	4	4	9	6	6	2	6	2	**4.6**	**10**	**3**	**30**	**6**	**60**
162	4713	32776	4	4	4	4	9	6	4	2	6	3	**4.6**	**10**	**2**	**20**	**7**	**70**
329	5101	32964*	3	5	6	3	-	5	5	4	8	3	**4.7**	**9**	**3**	**33**	**7**	**78**
250	5409	29577* (R)	3	5	5	3	-	5	5	5	7	4	**4.7**	**9**	**2**	**22**	**8**	**89**
159	4710	32780	4	3	5	4	-	7	4	3	8	4	**4.7**	**9**	**2**	**22**	**7**	**78**
95	3520	32467	-	5	5	-	-	-	5	2	7	4	**4.7**	**6**	**1**	**17**	**5**	**83**
85	3510	31456 (H) (R)	5	3	5	5	9	7	5	3	2	3	**4.7**	**10**	**4**	**40**	**8**	**80**
194	4307	27P63 (HC)	4	3	5	4	9	7	4	4	5	2	**4.7**	**10**	**2**	**20**	**8**	**80**
350	5122	32046 (R)	4	4	3	4	8	6	5	4	7	2	**4.7**	**10**	**2**	**20**	**7**	**70**
361	**CO-39**		5	7	6	5	8	8	6	5	7	6	**6.3**	**10**	**0**	**0**	**3**	**30**
366	**Tetep**		5	5	6	5	8	5	7	3	5	6	**5.5**	**10**	**1**	**10**	**6**	**60**
LSI			**4.8**	**4.7**	**5.0**	**4.8**	**8.4**	**6.9**	**5.7**	**4.3**	**6.5**	**4.9**						
LSI (S Check)			**4.8**	**4.8**	**4.4**	**4.8**	**8.3**	**7.8**	**5.8**	**4.3**	**6.1**	**4.8**						

(SI-Susceptibility Index; *No. of locations where the entry has scored ≤5 and ≤3; **Promising index (PI) based on no. of locations where the entry had scored ≤3 and ≤5)

Table 3.2A: Location severity index (LSI) and frequency distribution of brown spot scores of NSN-2, *Kharif* 2025

Score	Location/Frequency of scores (0-9)										
	BKG	**CBT**	**CHT**	**GNV**	**IIRR**	**JDP**	**LDN**	**PNP**	**PSA**	**REW**	**SBR**
0	56	0	0	0	0	0	0	0	0	0	0
1	110	0	0	0	0	0	0	35	0	0	15
2	182	0	39	0	0	0	0	208	0	86	0
3	151	9	82	0	0	70	6	215	1	104	510
4	88	106	183	1	2	156	0	184	37	130	0
5	60	401	152	19	6	210	237	53	98	138	117
6	36	176	129	7	155	171	0	1	162	104	0
7	19	14	75	25	295	90	444	2	265	70	40
8	4	0	27	187	212	0	0	0	111	49	0
9	0	0	11	397	30	0	3	0	29	30	21
Total	**706**	**706**	**698**	**636**	**700**	**697**	**690**	**698**	**703**	**711**	**703**
Overall LSI	**2.8**	**5.1**	**4.9**	**8.5**	**7.1**	**5.1**	**6.3**	**3.0**	**6.6**	**4.9**	**3.7**
HR-12	2.7	5.4	4.3	8.7	7.4	5.1	6.7	3.0	6.9	5.3	4.7
CO-39	2.8	5.1	4.1	8.5	8.3	3.8	5.9	2.6	7.3	4.7	3.3
T(N1)	2.9	5.0	3.7	8.3	7.3	4.4	5.9	2.1	7.1	4.3	3.3
IR-50	2.9	5.0	4.3	8.1	8.4	4.3	5.7	2.3	6.6	3.9	3.0
BPT5204	2.6	4.9	3.6	7.0	7.6	4.0	5.9	2.0	7.3	5.6	2.7
Swarna	2.4	5.4	5.3	8.2	8.1	5.0	4.7	3.3	6.1	5.9	2.7
LSI (S Check)	**2.7**	**5.1**	**4.2**	**8.3**	**7.9**	**4.5**	**5.8**	**2.5**	**6.9**	**4.9**	**3.3**
Screening	**N**	**A**	**N**	**A**	**A**	**N**	**A**	**N**	**A**	**N**	**N**

(LSI-Location Severity Index; N-Natural; A-Artificial; S Check- Susceptible check)

Table 3.2B: Promising entries with low susceptibility index (≤4.9) and high PI in NSN-2 to brown spot, *Kharif* 2025

P.No.	Br No.	IET No.	Location/Frequency of scores (0-9)								SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
			CBT	CHT	GNV	IIRR	JDP	LDN	PSA	REW						
322	4252	33670	5	4	-	-	-	-	5	2	**4.0**	4	1	25	4	100
691	5741	33930	6	3	-	-	-	5	4	3	**4.2**	5	2	40	4	80
681	5731	33921	5	3	-	6	3	5	7	3	**4.6**	7	3	43	5	71
694	5744	33933	5	3	-	6	5	5	5	3	**4.6**	7	2	29	6	86
254	3453	33429	5	3	9	5	4	5	4	2	**4.6**	8	2	25	7	88
154	4022	33582	5	4	-	6	4	3	7	4	**4.7**	7	1	14	5	71
309	4239	33658	5	4	-	6	5	5	4	4	**4.7**	7	0	0	6	86
225	3424	33401	4	2	-	-	-	-	8	5	**4.8**	4	1	25	3	75
476	5011	33814	3	5	5	7	4	3	6	5	**4.8**	8	2	25	6	75
228	3427	33404	4	3	7	7	4	5	6	2	**4.8**	8	2	25	5	63
447	5945	33977	5	2	-	6	4	5	7	5	**4.9**	7	1	14	5	71
87	3624	33462	6	2	8	7	4	5	5	2	**4.9**	8	2	25	5	63
35	3835	33534	5	6	4	5	7	5	5	2	**4.9**	8	1	13	6	75
704	**Tetep**		5	4	9	5	4	5	6	6	**5.5**	8	0	0	5	63
102	**CO-39**		6	4	9	8	5	5	9	6	**6.5**	8	0	0	3	38
Overall LSI			**5.1**	**4.9**	**8.5**	**7.1**	**5.1**	**6.3**	**6.6**	**4.9**						
LSI (S Check)			**5.1**	**4.2**	**8.3**	**7.9**	**4.5**	**5.8**	**6.9**	**4.9**						

(SI-Susceptibility Index; *No. of locations where the entry has scored ≤5 and ≤3; **Promising index (PI) based on no. of locations where the entry had scored ≤3 and ≤5)

➢ **National Screening Nursery-Hills (NSN-Hills)**

The National Screening Nursery - Hills (NSN-H) was evaluated for their resistance to brown spot at six locations *viz*., Almora, Coimbatore, IIRR, Khudwani, Lonavala and Ponnampet. These entries were screened through natural method in all the locations except at IIRR and Coimbatore, where disease was created artificially by inoculating pathogen. The frequency distribution of disease scores and location severity indices are presented in Table 3.3A. The disease pressure was high (LSI 6.0-7.0) at Almora (6.2), Lonavala (6.2) and IIRR (6.7); while it was moderate (LSI 3.0-6.0) at Khudwani (5.9), Coimbatore (5.0), and Ponnampet (4.4). None of the entries found resistant against brown spot (SI≤3.0); however, few entries having moderate resistance reaction included IET# 32340, 33341, 32356, 32317, 33348, 33364, 33335, 31386, and 32354 (Table 3.3B).

Table 3.3A: Location severity index (LSI) and frequency distribution of brown spot scores of NSN-H, *Kharif* 2025

Score	Location/Frequency of scores (0-9)					
	ALM	CBT	IIRR	KHD	LNV	PNP
0	0	0	0	0	0	0
1	0	0	0	0	0	0
2	0	0	0	0	0	6
3	0	6	0	0	0	23
4	5	12	4	1	5	20
5	29	59	6	35	20	27
6	23	9	37	40	33	7
7	26	8	23	16	27	11
8	14	0	21	5	11	0
9	0	0	6	0	1	0
Total	**97**	**94**	**97**	**97**	**97**	**94**
LSI	**6.2**	**5.0**	**6.7**	**5.9**	**6.2**	**4.4**
Screening	**N**	**A**	**A**	**N**	**N**	**N**

(LSI-Location Severity Index; N-Natural; A-Artificial)

Table 3.3B: Promising entries with low susceptibility index (≤5.2) and high PI in NSN-H to brown spot, *Kharif* 2025

P. No	Ent. No.	IET No.	Location/Frequency of scores (0-9)											
			ALM	CBT	IIRR	KHD	LNV	PNP	SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
52	2403	32340	5	7	5	5	5	3	**5.0**	6	1	17	5	83
20	2320	33341	7	4	5	5	6	3	**5.0**	6	1	17	4	67
54	2405	32356	5	3	6	6	5	5	**5.0**	6	1	17	4	67
7	2307	32317	6	4	5	5	5	5	**5.0**	6	0	0	5	83
27	2327	33348	8	5	6	5	4	3	**5.2**	6	1	17	4	67
77	2428	33364	5	6	7	5	5	3	**5.2**	6	1	17	4	67
13	2313	33335	6	3	6	6	6	4	**5.2**	6	1	17	2	33
3	2303	31386	7	5	5	5	4	5	**5.2**	6	0	0	5	83
53	2404	32354	5	5	6	6	5	4	**5.2**	6	0	0	4	67
85	CO-39		6	5	8	5	7	5	**6.0**	6	0	0	3	50
82	Tetep		5	5	4	5	6	2	**4.5**	6	1	17	5	83
LSI			**6.2**	**5.0**	**6.7**	**5.9**	**6.2**	**4.4**						

(SI-Susceptibility Index; *No. of locations where the entry has scored ≤5 and ≤3;**Promising index (PI) based on no. of locations where the entry had scored ≤3 and ≤5)

- **National Hybrid Screening Nursery (NHSN)**

One hundred and twenty-four hybrids that included regional and pathology checks were evaluated at 12 locations against brown spot disease under national hybrid screening nursery. The frequency distribution of disease scores, the representative overall location severity index (LSI), location severity index of susceptible checks (LSI of S checks) are presented in the Table 3.4A. The overall location severity index (LSI) was very high (LSI≥7.0 at IIRR (7.2) and Pusa (7.0); moderate at Khudwani (5.7), Chatha (5.2), Coimbatore (5.0), Lonavala (4.9), Bankura (4.6), Jagdalpur (4.4), Chinsurah (4.3) and Rewa (3.5); low at Bikramgunj (2.9) and Ludhiana (2.8).

The location severity index of susceptible checks was very high (LSI of S checks ≥7.0) at IIRR (7.9) and Pusa (7.0); moderate at most of the locations. The Performance of entries at Bankura, Bikramgunj, Ludhiana and Rewa was not considered for identifying promising entries; where the disease pressure on susceptible checks was very low (less than 4.0).

None of the hybrid entries found resistant (SI≤3.0) against brown spot in NHSN; however, entries with SI≤5.0 with high PI across the locations considered promising and that included IET# 34025, 34039, 34027, 34038, 34010, 34037, 34042, 34056, 34002, 34021, 34011, 34060 and 34043 (Table 3.4B).

- **Donor Screening Nursery (DSN)**

The donor screening nursery comprised of 217 entries including pathology checks were evaluated at 11 locations for brown spot resistance. The frequency distribution of disease scores, the representative overall location severity index (LSI), location severity index of susceptible checks (LSI of S checks) are presented in the Table 3.5A. The overall location severity index was highest at IIRR (7.0) and it was lowest at Bikramgunj (1.8). The overall location severity index was high (LSI 6.0-7.0) at IIRR (7.0), Ludhiana (6.9) and Almora (6.4); and in most of the centres it was moderate (LSI 3.0-6.0).

The location severity index of susceptible checks was very high (LSI≥7.0) at IIRR (8.1); it was high (LSI 6.0-7.0) at Ludhiana (6.5) and Almora (6.1); moderate (LSI 4.0-6.0) at Coimbatore (5.1), Chatha (4.4) and Lonavala (4.0); it was low at Jagdalpur (3.9), Rewa (3.3), Sabour (3.2) and Bikramgunj (2.1). The Performance of entries from Jagdalpur, Rewa, Sabour and Bikramgunj were not considered for selection of promising entries; where the disease pressure on susceptible checks was low (less than 4.0).

None of the donors were found resistant (SI≤3.0) against brown spot in DSN; however, entries with SI≤4.6 with high PI across the locations considered promising and that included BPT 3507, BPT 3278, NLR 3881, 8298.IRBB5, BPT 3270, BPT 3354, JGL 47953, NL RBB-3, NLR 3894, SAH-12, HKP-MLL-93R-39, JGL 47856, HKP-MLL-93R-2, RP PATHO-12 and RP-BIO PATHO-3 (Table 3.5B).

Table 3.4A: Location severity index (LSI) and frequency distribution of brown spot scores of NHSN, *Kharif* 2025

Score	Location/Frequency of scores (0-9)											
	BKG	BNK	CBT	CHN	CHT	IIRR	JDP	KHD	LDN	LNV	PSA	REW
0	9	0	0	0	0	0	0	0	0	0	0	0
1	23	12	0	2	0	0	0	0	11	1	0	0
2	30	1	0	2	6	0	0	0	0	7	0	27
3	22	55	4	27	8	0	25	0	112	16	0	35
4	12	0	26	28	19	2	39	11	0	24	0	32
5	9	18	61	53	45	8	40	44	1	32	16	30
6	11	0	27	12	27	21	13	47	0	27	15	0
7	5	18	4	0	10	37	3	19	0	15	48	0
8	2	0	0	0	6	46	0	3	0	0	38	0
9	0	18	0	0	3	10	0	0	0	2	7	0
Total	**123**	**122**	**122**	**124**	**124**	**124**	**120**	**124**	**124**	**124**	**124**	**124**
Overall LSI	**2.9**	**4.6**	**5.0**	**4.3**	**5.2**	**7.2**	**4.4**	**5.7**	**2.8**	**4.9**	**7.0**	**3.5**
HR-12	3.2	3.8	4.4	4.6	4.2	7.0	3.8	7.0	2.6	5.0	6.8	3.6
CO-39	2.4	3.4	5.2	4.0	4.8	8.6	4.0	5.4	3.0	4.6	6.6	3.6
T(N1)	4.2	1.8	4.8	4.6	4.8	7.6	3.6	4.4	3.0	5.0	7.4	3.6
IR-50	3.2	5.4	5.2	4.2	5.0	8.0	3.4	5.4	2.6	4.6	7.0	2.8
BPT5204	2.6	3.8	5.0	2.6	4.6	7.8	4.6	5.8	2.6	5.4	7.0	3.4
Swarna	3.2	3.8	5.2	4.2	6.2	8.6	4.2	4.8	3.0	5.4	7.2	4.0
LSI (S Check)	**3.1**	**3.7**	**5.0**	**4.0**	**4.9**	**7.9**	**3.9**	**5.5**	**2.8**	**5.0**	**7.0**	**3.5**
Screening	**N**	**N**	**A**	**N**	**N**	**A**	**N**	**N**	**A**	**N**	**A**	**N**

(LSI-Location Severity Index; N-Natural; A-Artificial; S Check- Susceptible check)

Table 3.4B: Promising entries with low susceptibility index (≤5.0) and high PI in NHSN to brown spot, *Kharif* 2025.

P No	Ent No.	IET NO.	Location/Frequency of scores (0-9)								SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
			CBT	CHN	CHT	IIRR	JDP	KHD	LNV	PUSA						
70	IHRT-M-3005	-	5	4	2	5	4	5	3	5	**4.1**	8	2	25	8	100
43	IHRT-ME-2916	34025	4	4	6	5	-	5	1	5	**4.3**	7	1	14	6	86
66	IHRT-M-3001	34039	5	5	4	6	3	5	2	6	**4.5**	8	2	25	6	75
45	IHRT-ME-2918	34027	4	1	5	7	4	4	4	7	**4.5**	8	1	13	6	75
64	IHRT-ME-2931	34038	4	5	4	5	4	6	4	5	**4.6**	8	0	0	7	88
18	IHRT-E-2818	34010	5	6	3	6	4	5	3	6	**4.8**	8	2	25	5	63
63	IHRT-ME-2930	34037	5	4	6	6	5	5	2	5	**4.8**	8	1	13	6	75
69	IHRT-M-3004	34042	3	5	6	5	3	5	5	7	**4.9**	8	2	25	6	75
97	IHRT-MS-3105	34056	5	5	2	7	4	5	3	8	**4.9**	8	2	25	6	75
9	IHRT-E-2809	34002	5	3	5	6	5	4	6	5	**4.9**	8	1	13	6	75
38	IHRT-ME-2911	34021	4	3	5	7	3	5	5	8	**5.0**	8	2	25	6	75
20	IHRT-E-2820	34011	4	3	5	6	4	5	5	8	**5.0**	8	1	13	6	75
109	IHRT-MS-3111	34060	4	5	5	5	3	6	6	6	**5.0**	8	1	13	5	63
71	IHRT-M-3006	34043	5	5	5	5	4	6	4	6	**5.0**	8	0	0	6	75
117	Tetep	Tetep	5	4	3	5	3	6	2	7	**4.4**	8	3	38	6	75
112	CO-39	CO-39	6	3	4	9	5	5	7	7	**5.8**	8	1	13	4	50
Overall LSI			**5.0**	**4.3**	**5.2**	**7.2**	**4.4**	**5.7**	**4.9**	**7.1**						
LSI (Susceptible Check)			**5.2**	**4.3**	**5.1**	**7.3**	**4.6**	**5.9**	**5.4**	**7.0**						

(SI-Susceptibility Index; *No. of locations where the entry has scored ≤5 and ≤3;**Promising index (PI) based on no. of locations where the entry had scored ≤3 and ≤5)

Table 3.5A: Location severity index (LSI) and frequency distribution of brown spot scores of DSN, *Kharif* 2025

Score	Location/Frequency of scores (0-9)										
	ALM	BKG	CBT	CHT	IIRR	JDP	LDN	LNV	PSA	REW	SBR
0	0	41	0	0	0	0	0	0	0	0	0
1	0	29	0	0	0	8	0	1	0	0	3
2	0	61	0	14	0	28	0	27	0	45	0
3	1	27	19	19	0	40	0	52	1	83	150
4	7	8	41	47	5	38	0	67	15	40	0
5	44	7	95	48	11	42	42	37	52	38	39
6	60	4	43	49	48	30	0	27	86	6	0
7	56	0	15	24	87	23	141	6	59	3	16
8	44	0	0	8	50	0	0	0	4	2	0
9	0	0	0	6	14	0	28	0	0	0	4
Total	**212**	**177**	**213**	**215**	**215**	**209**	**211**	**217**	**217**	**217**	**212**
Overall LSI	**6.4**	**1.8**	**5.0**	**5.1**	**7.0**	**4.2**	**6.9**	**4.0**	**5.9**	**3.5**	**3.8**
HR-12	6.2	3.0	4.8	4.4	7.4	4.2	7.4	3.6	6.4	2.2	4.2
CO-39	7.0	2.0	5.5	4.3	8.8	4.0	7.0	4.5	6.5	2.3	2.5
T(N1)	5.0	1.5	4.3	2.5	7.3	2.7	6.3	3.8	6.3	2.8	3.7
IR-50	5.8	2.3	5.8	5.0	8.0	4.0	7.0	3.8	6.3	3.5	3.0
BPT5204	6.0	1.5	4.8	5.0	8.0	3.8	6.2	4.0	5.8	4.4	3.0
Swarna	6.2	2.6	5.4	4.4	9.0	4.2	5.0	4.4	6.2	4.4	3.0
LSI (S Check)	**6.1**	**2.1**	**5.1**	**4.4**	**8.1**	**3.9**	**6.5**	**4.0**	**6.1**	**3.3**	**3.2**
Screening	**N**	**N**	**A**	**N**	**A**	**N**	**A**	**N**	**A**	**N**	**N**

(LSI-Location Severity Index; N-Natural; A-Artificial; S Check- Susceptible check)

Table 3.5B: Promising entries with low susceptibility index (≤4.6) and high PI in DSN to brown spot, *Kharif* 2025.

S.No.	Designations	Location/Frequency of scores (0-9)								SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
		ALM	CBT	CHT	IIRR	JDP	LDN	LNV	PSA						
9	BPT 3507	-	-	4	-	-	-	2	4	**3.3**	3	1	33	3	100
1	BPT 3278	4	5	3	5	3	-	3	5	**4.0**	7	3	43	7	100
15	NLR 3881	6	3	3	6	2	5	3	6	**4.3**	8	4	50	5	63
40	8298.IRBB5	6	3	4	7	1	7	2	4	**4.3**	8	3	38	5	63
3	BPT 3270	4	5	2	6	3	5	4	6	**4.4**	8	2	25	6	75
10	BPT 3354	5	7	2	6	3	5	4	4	**4.5**	8	2	25	6	75
26	JGL 47953	4	5	5	7	2	7	2	4	**4.5**	8	2	25	6	75
14	NL RBB-3	7	4	2	6	2	5	4	6	**4.5**	8	2	25	5	63
12	NLR 3894	6	5	2	5	4	5	4	5	**4.5**	8	1	13	7	88
178	SAH-12	5	5	3	6	-	5	2	6	**4.6**	7	2	29	5	71
37	HKP-MLL-93R-39	6	3	3	7	2	7	2	7	**4.6**	8	4	50	4	50
20	JGL 47856	6	6	3	6	2	5	3	6	**4.6**	8	3	38	4	50
35	HKP-MLL-93R-2	6	5	6	6	1	5	3	5	**4.6**	8	2	25	5	63
91	RP PATHO-12	7	4	5	5	4	5	2	5	**4.6**	8	1	13	7	88
94	RP-BIO PATHO-3	6	5	4	5	5	5	3	4	**4.6**	8	1	13	7	88
203	CO-59	8	5	5	9	5	7	4	7	**6.3**	8	0	0	4	50
210	Tetep	4	6	8	4	4	7	5	6	**5.5**	8	0	0	4	50
LSI		**6.4**	**5.0**	**5.1**	**7.0**	**4.2**	**6.9**	**4.0**	**5.9**						
LSI (Susceptible Check)		**6.4**	**5.1**	**5.5**	**7.2**	**4.9**	**7.0**	**3.9**	**6.1**						

(SI-Susceptibility Index; *No. of locations where the entry has scored ≤5 and ≤3; **Promising index (PI) based on no. of locations where the entry had scored ≤3 and ≤5)

❖ TRIAL No.4: SCREENING FOR SHEATH BLIGHT RESISTANCE

➢ NSN-1

The National Screening Nursery-1 (NSN-1) was evaluated for resistance to sheath blight at 22 locations across India. The entries were screened by artificial inoculation at most of the centres except Bikramgunj where the entries were evaluated under natural condition. The highest disease pressure was recorded at Gangavati (8.0) and lowest at Karjat (1.3). The frequency distribution of disease scores and location severity indices (LSI) were presented in Table 4.1A. The disease pressure was very high (LSI >7) at Gangavati (8.0), Maruteru (7.5), Cuttack (7.3) Ludhiana (7.2); high (LSI: 6 - 7), Aduthurai (6.8), Chiplima (6.8), Pattambi (6.8), Mandya (6.6), Pantnagar (6.6) Chinsurah (6.5), IIRR (6.4), Navasari (6.1), Kaul (6.0), Moncompu (6.0), Masodha (6.0); moderate (LSI 3-6) at New Delhi (5.9), Raipur (5.3), Varanasi (5.2), Bikramgunj (4.2), Titabar (4.2), Bankura (3.9) and less (LSI <3) at Karjat (1.3). The selection of best entries in NSN-1 was done based on the reaction at those locations where LSI was ≥3. Some of the promising entries with SI ≤ 5.2 are presented in the Table 4.1B. Promising entries (SI≤5.0) viz., IET Nos. 33840 (Swarna-Shbl-NIL), 31972, 32980 (Dhan53-Shbl-NIL), 31639, 31709, 32822, 32823 30882(H)(R), 31889(R), 32752, 31714-(H), 29860, 32492, 32896, 32510, 33839 (BPT 5204-Shbl-NIL) and 31633 were identified as better that tolerant check Tetep.

➢ NSN-2

The National Screening Nursery-2 (NSN-2) was evaluated for its resistance to sheath blight at 18 locations. The entries were screened by artificial inoculation at most of the centres except Bikramgunj where the entries were evaluated under natural conditions. The frequency distribution of disease scores and location severity index (LSI) are presented in Table 4.2A. The disease pressure was very high (LSI >7) at Mandya (7.8), Gangavati (7.8), Maruteru (7.7), Ludhiana (7.0); and; high (LSI 6 - 7) at Pattambi (6.9), Masodha (6.8), IIRR (6.6), Aduthurai (6.3), Navsari (6.3), Kaul (6.2), and moderate (LSI 3-6) at Varanasi (5.6), Moncompu (5.4), Pant Nagar (5.3), Raipur (5.1), and Titabar (4.5), Bikramgunj (4.2); and low (LSI <3) at Arundhutinagar (2.3), Karjat (1.8). The selection of promising entries in NSN-2 was done based on the reaction at those locations where LSI was ≥3.0. None of the entries were resistant (SI≤3.0) against sheath blight based on similarity index. Some of the promising entries with SI ≤ 5.0 were found better than tolerant check Tetep viz., IETs 33711, 33926, 33891, 33691, 33974, 33703, 33980, 33507, 33913, 33576, 33693, 33570 and 33759 (Table 4.2B).

Table 4.1A: Location severity index and frequency distribution of sheath blight disease score for NSN1 entries, *Kharif*-2025

Score	NSN-1 Locations / Frequency of Score (0-9)																					
	ADT	**BKG**	**BNK**	**CHN**	**CHP**	**CTK**	**GNV**	**IIRR**	**KJT**	**KUL**	**LDN**	**MNC**	**MND**	**MSD**	**MTU**	**NDL**	**NVS**	**PNT**	**PTB**	**RPR**	**TTB**	**VRN**
-	19	8	0	8	23	5	5	2	12	53	7	1	10	0	24	0	13	8	7	0	3	13
0	12	4	0	0	0	0	0	0	261	0	0	7	0	0	0	0	0	0	1	0	0	0
1	14	5	55	0	1	8	0	0	0	0	0	10	0	0	0	0	0	0	0	0	20	0
2	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	44	164	207	10	11	26	2	14	34	13	0	39	11	12	5	27	27	10	8	3	208	82
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	47	151	37	117	94	36	24	137	50	147	10	98	149	177	28	176	105	105	115	316	77	174
6	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	54	40	28	191	152	126	121	164	15	146	302	182	107	164	192	142	225	190	144	53	34	87
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	183	0	43	47	92	172	221	56	1	14	54	36	96	20	124	28	3	60	98	1	31	17
Total	**373**	**373**	**373**	**373**	**373**	**373**	**373**	**373**	**373**	**373**	**373**	**373**	**373**	**373**	**373**	**373**	**373**	**373**	**373**	**373**	**373**	**373**
Over all LSI	**6.8**	**4.2**	**3.9**	**6.5**	**6.8**	**7.3**	**8.0**	**6.4**	**1.3**	**6.0**	**7.2**	**6.0**	**6.6**	**6.0**	**7.5**	**5.9**	**6.1**	**6.6**	**6.8**	**5.3**	**4.2**	**5.2**
TN1	8.2	3.7	6.7	7.0	7.8	8.3	8.3	8.7	3.0	5.8	7.7	7.0	7.0	8.0	8.6	5.3	6.6	6.7	7.5	6.0	4.6	6.3
IR50	7.0	4.6	2.7	8.7	7.3	8.3	8.0	8.3	2.5	7.8	8.3	7.0	6.3	7.0	8.0	6.7	6.7	7.0	8.3	5.3	5.7	7.4
BPT5204	8.2	2.5	5.0	6.7	6.3	7.3	7.0	5.7	0.5	5.8	7.0	5.7	5.3	6.0	7.7	5.7	5.4	6.3	6.7	5.0	3.3	5.7
Swarna	6.5	4.0	4.3	7.0	5.4	5.7	7.3	6.0	2.0	5.8	7.0	3.7	8.7	5.0	7.4	6.0	6.6	7.0	7.0	5.3	3.3	4.0
SC -LSI	**7.4**	**3.7**	**4.7**	**7.3**	**6.7**	**7.4**	**7.7**	**7.2**	**2.0**	**6.3**	**7.5**	**5.8**	**6.8**	**6.5**	**7.9**	**5.9**	**6.3**	**6.8**	**7.4**	**5.4**	**4.2**	**5.8**
Screening	**A**	**N**	**A**	**A**	**A**	**A**	**A**	**A**	**-**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**

(N- Natural; A- Artificial; LSI- Location Severity Index)

Table 4.1B: Promising entries with low susceptibility index (SI≤5.2) and high promising index in NSN1 to sheath blight, *Kharif*-2025

P. No	IET-No.	Location/Frequency of scores (0-9)																							
		ADT	BNK	CHN	CTK	IIRR	KUL	LDN	MNC	MND	MSD	MTU	NDL	NVS	PNT	PTB	RPR	TTB	VRN	SI	Total	<=3	PI (<=3)	<=5	PI (<=5)
343	33840	3	5	7	9	3	3	7	1	5	5	3	7	3	3	5	3	5	5	**4.6**	**18**	**8**	**44.4**	**14**	**77.8**
284	31972	3	1	5	7	5	5	7	7	5	5	7	5	5	7	5	5	1	3	**4.9**	**18**	**4**	**22.2**	**13**	**72.2**
353	32980-(R)-	3	7	5	9	3	3	7	7	7	5	5	5	3	3	5	3	3	7	**5.0**	**18**	**7**	**38.9**	**12**	**66.7**
38	31639*	7	3	3	9	5	5	7	1	5	5	7	5	7	5	5	5	3	3	**5.0**	**18**	**5**	**27.8**	**13**	**72.2**
114	31709-(H)*	9	1	5	7	5	5	7	5	5	5	7	3	7	5	5	5	1	3	**5.0**	**18**	**4**	**22.2**	**13**	**72.2**
179	32822	9	1	5	9	5	5	7	3	5	5	7	5	7	5	3	5	3	3	**5.1**	**18**	**5**	**27.8**	**13**	**72.2**
185	32823	9	1	5	7	7	5	7	3	5	5	5	7	3	5	7	5	3	3	**5.1**	**18**	**5**	**27.8**	**12**	**66.7**
117	30882(H)*(R-)	3	1	5	7	7	5	7	7	3	5	7	5	7	5	7	5	3	3	**5.1**	**18**	**5**	**27.8**	**11**	**61.1**
172	31889-(R-)	7	1	5	5	5	5	7	7	9	7	7	5	7	3	3	5	1	3	**5.1**	**18**	**5**	**27.8**	**11**	**61.1**
235	32752	7	7	5	7	5	7	7	3	5	3	7	5	5	5	3	7	1	3	**5.1**	**18**	**5**	**27.8**	**11**	**61.1**
116	31714-(H)*	1	1	7	9	7	7	7	5	3	5	7	7	5	5	7	5	1	3	**5.1**	**18**	**5**	**27.8**	**10**	**55.6**
27	29860*	5	3	3	5	5	3	7	5	5	5	5	9	7	5	7	5	3	5	**5.1**	**18**	**4**	**22.2**	**14**	**77.8**
45	32492	7	3	3	9	5	5	7	5	5	5	5	5	7	7	5	5	1	3	**5.1**	**18**	**4**	**22.2**	**13**	**72.2**
328	**32896**	7	1	5	7	7	5	7	3	5	5	9	5	5	5	5	5	3	3	**5.1**	**18**	**4**	**22.2**	**13**	**72.2**
342	33839	5	3	5	9	3	5	7	5	9	7	5	7	3	3	5	5	3	5	**5.2**	**18**	**5**	**27.8**	**13**	**72.2**
64	32530	7	3	5	3	5	5	7	7	9	3	7	5	7	5	5	5	3	3	**5.2**	**18**	**5**	**27.8**	**12**	**66.7**
181	32802	1	1	7	7	5	5	7	7	5	7	9	3	3	5	7	5	3	7	**5.2**	**18**	**5**	**27.8**	**10**	**55.6**
41	31643*	5	3	5	5	5	7	7	3	7	5	5	5	7	7	7	5	3	3	**5.2**	**18**	**4**	**22.2**	**12**	**66.7**
28	29877*	5	3	5	1	7	5	7	3	7	7	7	5	5	5	9	5	1	7	**5.2**	**18**	**4**	**22.2**	**11**	**61.1**
193	32680	5	1	7	7	5	7	7	5	7	5	3	5	5	7	5	5	3	5	**5.2**	**18**	**3**	**16.7**	**12**	**66.7**
57	32510	5	5	3	3	5	-	5	1	3	3	9	7	7	7	3	5	3	3	**4.5**	**17**	**8**	**47.1**	**13**	**76.5**
34	31633*	7	3	3	3	5	7	9	1	7	5	7	7	-	5	5	5	3	5	**5.1**	**17**	**5**	**29.4**	**11**	**64.7**
137	31768	3	3	7	7	5	-	7	7	3	5	5	7	7	5	5	5	5	3	**5.2**	**17**	**4**	**23.5**	**11**	**64.7**
130	31760*	3	3	7	5	5	-	7	5	5	7	7	5	7	5	5	5	5	3	**5.2**	**17**	**3**	**17.6**	**12**	**70.6**
366	Tetep	0	3	5	7	5	7	5	3	5	5	5	5	5	7	5	5	3	5	**4.7**	**18**	**4**	**22.2**	**15**	**83.3**
371	Swarnadhan	1	3	7	7	5	5	7	3	7	7	5	5	-	7	5	5	3	3	**5.0**	**17**	**5**	**29.4**	**11**	**64.7**
203	T(N1)	5	9	7	7	9	5	9	7	7	9	7	7	7	7	9	7	5	9	**7.3**	**18**	**0**	**0.0**	**3**	**16.7**
54	IR-50	9	3	9	9	9	9	9	9	7	7	9	7	7	7	7	7	5	5	**7.4**	**18**	**1**	**5.6**	**3**	**16.7**
344	Swarna-(RP)	9	3	9	7	9	9	7	5	9	5	-	7	9	9	5	9	5	3	**7.0**	**17**	**2**	**11.8**	**6**	**35.3**
354	DRR-Dhan-53-(RP)	9	3	5	7	9	9	7	5	7	7	9	7	9	7	7	7	5	5	**6.9**	**18**	**1**	**5.5**	**5**	**27.8**
330	BPT-5204-(RP)	9	5	7	7	9	5	7	3	7	5	9	7	9	9	5	7	3	5	**6.6**	**18**	**2**	**11.1**	**7**	**38.9**

(SI- Susceptibility Index; Promising Index (PI) based on percentage of locations the entry has scored ≤3* and ≤5**; RC-Resistant check; SC-Susceptible check)

Table 4.2A: Location severity index and frequency distribution of sheath blight disease score for NSN2 entries, *Kharif*-2025

Score	NSN-2 Locations/Frequency of Score (0-9)																	
	ADT	**ARD**	**BKG**	**GNV**	**IIRR**	**KJT**	**KUL**	**LDN**	**MNC**	**MND**	**MSD**	**MTU**	**NVS**	**PNT**	**PTB**	**RPR**	**TTB**	**VRN**
-	**15**	**63**	**7**	**27**	**4**	**38**	**20**	**28**	**2**	**15**	**11**	**29**	**20**	**11**	**7**	**4**	**4**	**26**
0	29	16	2	0	0	419	0	0	9	0	0	0	0	0	0	0	0	0
1	45	193	9	0	0	0	0	0	57	0	0	0	0	0	0	0	38	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	121	434	330	2	9	74	11	0	102	6	8	3	16	100	13	6	326	115
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	99	5	278	59	212	136	326	54	201	42	200	56	204	417	216	652	176	318
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	81	0	85	280	393	41	294	582	302	309	332	310	471	173	274	49	109	185
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	321	0	0	343	93	3	60	47	38	339	160	313	0	10	201	0	58	67
Total	711	711	711	711	711	711	711	711	711	711	711	711	711	711	711	711	711	711
Over all LSI	**6.3**	**2.3**	**4.2**	**7.8**	**6.6**	**1.8**	**6.2**	**7.0**	**5.4**	**7.8**	**6.8**	**7.7**	**6.3**	**5.3**	**6.9**	**5.1**	**4.5**	**5.6**
TN1	7.6	2.7	4.1	8.4	8.7	2.5	7.0	7.3	7.6	8.7	7.4	7.8	7.0	4.7	8.7	5.3	5.9	7.0
IR50	8.4	2.3	4.4	8.7	9.0	1.6	7.3	7.3	6.1	8.1	6.4	8.0	6.0	6.4	8.1	5.6	5.9	6.1
BPT5204	8.4	2.4	4.1	7.7	6.1	0.0	5.9	7.0	5.6	7.6	7.0	7.3	6.4	4.7	6.1	5.0	3.0	5.3
Swarna	6.3	2.0	3.6	8.2	8.1	3.8	5.0	7.0	4.0	9.0	7.0	7.8	6.1	5.9	5.6	4.7	3.0	5.6
SC-LSI	**7.7**	**2.4**	**4.1**	**8.3**	**8.0**	**1.9**	**6.3**	**7.1**	**5.8**	**8.4**	**6.9**	**7.7**	**6.4**	**5.4**	**7.1**	**5.1**	**4.4**	**6.0**
Screening	**A**	**-**	**N**	**A**	**A**	**-**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**

(N- Natural; A- Artificial; LSI- Location Severity Index)

Table 4.2B: Promising entries with low susceptibility index (SI≤5.1) and high promising index in NSN2 to sheath blight, *Kharif*-2025

P.No.	IET No.	Location/Frequency of scores (0-9)																				
		ADT	BKG	GNV	IIRR	KUL	LDN	MNC	MND	MSD	MTU	NVS	PNT	PTB	RPR	VRN	SI	Total	<=3	PI (<=3)	<=5	PI (<=5)
364	33711	1	3	7	3	5	7	0	5	5	7	5	3	5	5	5	4.4	15	5	33.3	12	80.0
686	33926	0	3	-	5	5	5	1	7	5	7	5	5	5	5	7	4.6	14	3	21.4	11	78.6
646	33891	5	5	9	5	5	5	1	7	7	3	5	3	3	5	3	4.7	15	5	33.3	12	80.0
343	33691	1	3	5	7	5	7	1	7	7	5	7	3	5	5	3	4.7	15	5	33.3	10	66.7
444	33974	0	3	9	5	5	7	3	7	5	5	5	5	5	5	3	4.8	15	4	26.7	12	80.0
356	33703	5	3	7	5	5	7	0	7	7	5	5	3	5	5	3	4.8	15	4	26.7	11	73.3
450	33980	0	3	7	5	5	7	3	7	5	7	5	5	5	5	3	4.8	15	4	26.7	11	73.3
7	33507	0	1	7	5	5	5	3	7	7	7	-	5	5	5	-	4.8	13	3	23.1	9	69.2
672	33913	1	3	-	5	5	7	1	9	5	7	7	5	5	5	3	4.9	14	4	28.6	10	71.4
148	33576	3	-	5	5	5	7	1	5	5	7	5	5	5	5	5	4.9	14	2	14.3	12	85.7
345	33693	3	3	7	5	5	5	1	7	3	5	5	5	9	5	5	4.9	15	4	26.7	12	80.0
141	33570	1	3	7	5	5	7	3	7	7	5	5	5	5	5	3	4.9	15	4	26.7	11	73.3
101	HR-12	0	3	5	5	5	7	9	9	5	-	5	3	5	5	3	4.9	14	4	28.6	11	78.6
555	33759	0	5	7	7	5	7	1	7	5	7	5	3	5	5	5	4.9	15	3	20.0	10	66.7
161	33588	3	7	5	5	5	7	1	7	7	9	3	3	3	5	5	5.0	15	5	33.3	10	66.7
158	33586	5	3	7	5	5	7	1	9	3	5	7	5	5	5	3	5.0	15	4	26.7	11	73.3
438	33969	1	5	5	5	5	7	3	7	5	9	5	3	5	5	5	5.0	15	3	20.0	12	80.0
357	33704	7	5	7	3	5	7	1	5	7	5	5	5	5	5	3	5.0	15	3	20.0	11	73.3
704	Tetep	0	3	-	5	5	5	7	7	3	7	7	7	5	5	5	5.1	14	3	21.4	9	64.3
709	Swarnadhan	7	5	7	5	5	7	1	9	5	5	-	3	5	5	3	5.1	14	3	21.4	10	71.4
203	TN1	9	5	9	9	7	7	9	9	-	7	7	5	9	7	9	7.7	14	0	0.0	2	14.3
404	IR-50	9	5	9	9	9	-	7	7	7	9	7	5	9	7	7	7.6	14	0	0.0	2	14.3
	Over all LSI	6.3	4.2	7.8	6.6	6.2	7.0	5.4	7.8	6.8	7.7	6.3	5.3	6.9	5.1	5.6						
	LSI SC	7.7	4.1	8.3	8.0	6.3	7.1	5.8	8.4	6.9	7.7	6.4	5.4	7.1	5.1	6.0						

(SI- Susceptibility Index; Promising Index (PI) based on percentage of locations the entry has scored ≤3* and ≤5**; RC-Resistant check; SC-Susceptible check)

- **NSN-H**

The National Hybrid Screening Nursery (NHSN) was evaluated for their resistance to sheath blight at 23 varied locations. The entries were screened by artificial inoculation at most of the centres except at Bikramgunj, Karjat, and Lonavla where the entries were evaluated under natural incidence. The frequency distribution of disease score and location severity index (LSI) are presented in the Table 4.3A. The disease pressure was very high (LSI >7) at Gangavathi (8.1), Mandya (7.8), Maruteru (7.4), Ludhiana (7.0); High (LSI 6-7) at New Delhi (6.9), Cuttack (6.8), IIRR (6.6), Masodha (6.3), Pantnagar (6.3) Kaul (6.1), Chinsurah (6.0), Navasari (6.0); moderate (LSI 3-6) at Pattambi (5.9), Aduthurai (5.9), Varanasi (5.6), Moncompu (5.2), Raipur (5.2) and Bankura (4.2), Bikramgunj (4.1), Lonavla (3.8), Titabar (3.8), Karjat (3.5); and and low (LSI <3) at Arundhatinagar (2.3). The selection of promising entries in DSN was done based on the reaction at those locations where LSI was ≥3.0. None of the entries were showed resistance against sheath blight based on the 0-9 disease screening scale (Table 4.3B). Some of the selected promising entries *viz*., IETs 33357, 31386, 33368, 33335, 32344, 32333, 33336, and 33338 were found better than tolerant checks.

Table 4.3A: Location severity index (LSI) and frequency distribution of sheath blight scores of NSN-H, *Kharif* 2025

Score	NSN-H Locations/Frequency of Score (0-9)				
	CTK	IIRR	KJT	PNT	LNV
-	2	0	11	0	0
0	0	0	46	0	0
1	2	0	0	0	6
2	0	0	0	0	2
3	8	1	3	1	67
4	0	0	0	0	0
5	12	18	19	35	22
6	0	0	0	0	0
7	32	62	16	51	0
8	0	0	0	0	0
9	41	16	2	10	0
Total	**97**	**97**	**97**	**97**	**97**
LSI	**7.1**	**6.9**	**2.7**	**6.4**	**3.3**
Screening method	**A**	**A**	**N**	**A**	**N**

(N- Natural; A- Artificial; LSI- Location Severity Index)

Table 4.3B: Promising entries with low susceptibility index (<=5.0) and high PI in NSN-H to sheath blight, *Kharif* 2025

P. No	IET No.	Location/Frequency of scores (0-9)									
		CTK	IIRR	PNT	LNV	SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
70	33357	1	7	5	5	4.5	4	1	25	2	50
3	31386	3	7	7	3	5.0	4	2	50	1	25
30	33368	3	7	7	3	5.0	4	2	50	1	25
13	33335	7	5	5	3	5.0	4	1	25	3	75
58	32344	7	5	5	3	5.0	4	1	25	3	75
6	32333	5	7	5	3	5.0	4	1	25	2	50
15	33336	5	5	7	3	5.0	4	1	25	2	50
17	33338	5	7	5	3	5.0	4	1	25	2	50
19	33340	3	7	5	5	5.0	4	1	25	2	50
24	33345	5	7	5	3	5.0	4	1	25	2	50
26	33347	5	7	5	3	5.0	4	1	25	2	50
38	33374	7	7	5	1	5.0	4	1	25	2	50
62	33350	3	7	5	5	5.0	4	1	25	2	50
90	Nidhi	5	7	5	3	5.0	4	1	25	2	50
76	33363	-	7	7	1	5.0	3	1	33	1	33
82	Tetep	9	5	7	3	6.0	4	1	25	2	50
92	Swarna Dhan	7	5	5	5	5.5	4	0	0	3	75
89	TN-1	7	9	7	3	6.5	4	1	25	1	25
91	IR-50	-	9	5	3	5.7	3	1	33	2	67
	LSI	**7.1**	**6.9**	**6.5**	**3.3**						

(SI- Susceptibility Index; Promising Index (PI) based on percentage of locations the entry has scored ≤3* and ≤5**)

- **NHSN**

The National Hybrid Screening Nursery (NHSN) was evaluated for their resistance to sheath blight at 23 varied locations. The entries were screened by artificial inoculation at most of the centres except at Bikramgunj, Karjat, and Lonavla where the entries were evaluated under natural incidence. The frequency distribution of disease score and location severity index (LSI) are presented in the Table 4.4A. The disease pressure was very high (LSI >7) at Gangavathi (8.1), Mandya (7.8), Maruteru (7.4), Ludhiana (7.0); High (LSI 6-7) at New Delhi (6.9), Cuttack (6.8), IIRR (6.6), Masodha (6.3), Pantnagar (6.3) Kaul (6.1), Chinsurah (6.0), Navasari (6.0); moderate (LSI 3-6) at Pattambi (5.9), Aduthurai (5.9), Varanasi (5.6), Moncompu (5.2), Raipur (5.2) and Bankura (4.2), Bikramgunj (4.1), Lonavla (3.8), Titabar (3.8), Karjat (3.5); and and low (LSI <3) at Arundhatinagar (2.3). The selection of promising entries in DSN was done based on the reaction at those locations where LSI was ≥3.0. None of the entries were showed resistance against sheath blight based on the 0-9 disease screening scale (Table 4.4B). Some of the selected promising entries are namely, IET 34049, 34055. 34046, 34013, 34051, 34015, 34030, 34054, 34042, and 34059.

- **DSN**

The Donor Screening Nursery (DSN) was evaluated for resistance to sheath blight at 20 disease hot spot locations in India. The entries were screened by artificial inoculation at all the centers except Bikramgunj, Karjat, and Lonavla, where the entries were evaluated under natural conditions. The frequency distribution of disease scores and location severity index (LSI) were presented in Table 4.5A. The disease pressure was very high (LSI >7) at Gangavati (7.4), New Delhi (7.1), Maruteru (7.1), and; high (LSI 6-7) at Mandya (6.8), Ludhiana (6.7), Chiplima (6.4), Masodha (6.1), Navasari (6.1), Pant Nagar (6.1), Pattambi (6.1); and moderate (LSI 3-6) at IIRR (5.9), Raipur (5.3), Varanasi (5.1), Moncompu (5.0), Aduthurai (4.9), Lonavla (4.6) Bikramgunj (4.0), Titabar (3.2); and low (LSI <3) at Arundhatinagar (1.5), Karjat (0.8). The selection of promising entries in DSN was done based on the reaction at those locations where LSI was ≥3.0. None of the entries showed resistant (≤3) against sheath blight. However, some of the entries were found better than Tetep and promising (≤5) namely, BPT 3482, NLRBB-1, NLR 3881, NLR 3895, ISHB-28, SAH-21, ISHB-10, ISHB-2, ISHB-17, ISHB-35, BPT 3745, BPT 3178, CB 22141, CB 22141, BE-812, BPT 3270, ISHB-29, BPT 3463, ISHB-11, NLR 3889, ISHB-9, BPT 3607, ISHB-8, and DBT-1129 in DSN-2025 (Table 4.5B).

Table 4.4A: Location severity index and frequency distribution of sheath blight disease score for NHSN entries, *Kharif*-2025

Score	NHSN Locations/Frequency of Score (0-9)																						
	ADT	**ARD**	**BKG**	**BNK**	**CHN**	**CTK**	**GNV**	**IIRR**	**KJT**	**KUL**	**LNV**	**LDN**	**MNC**	**MND**	**MSD**	**MTU**	**NDL**	**NVS**	**PNT**	**PTB**	**RPR**	**TTB**	**VRN**
-	**6**	**2**	**1**	**2**	**0**	**3**	**0**	**0**	**2**	**3**	**0**	**0**	**0**	**1**	**0**	**4**	**0**	**5**	**0**	**0**	**0**	**0**	**8**
0	11	4	0	1	0	0	0	0	51	0	1	0	2	0	0	0	0	0	0	0	0	0	0
1	10	52	2	6	0	3	0	0	0	0	22	0	11	0	0	0	0	0	0	0	0	12	0
2	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	16	49	58	61	10	10	0	0	8	5	49	1	25	6	12	0	0	10	4	5	0	69	17
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
5	18	17	54	23	51	17	7	46	25	51	33	28	31	4	40	13	24	38	51	67	113	27	59
6	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	9	0	9	14	53	58	43	57	29	59	15	68	47	48	50	72	80	71	53	45	10	12	30
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	54	0	0	11	10	33	74	21	9	6	4	27	8	65	21	35	20	0	16	7	1	4	10
Total	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124
Over all LSI	**5.9**	**2.3**	**4.1**	**4.2**	**6.0**	**6.8**	**8.1**	**6.6**	**3.5**	**6.1**	**3.8**	**7.0**	**5.2**	**7.8**	**6.3**	**7.4**	**6.9**	**6.0**	**6.3**	**5.9**	**5.2**	**3.8**	**5.6**
TN1	9.0	1.8	5.0	3.6	5.4	7.0	8.6	9.0	5.2	5.8	4.2	7.8	7.0	8.6	8.6	7.4	7.0	6.6	5.8	7.8	5.8	5.0	7.0
IR50	9.0	1.4	4.2	4.6	6.2	7.0	8.6	9.0	6.6	7.0	4.2	7.8	7.8	9.0	7.8	7.7	7.0	7.0	7.4	7.4	7.4	5.4	7.4
BPT 5204	3.0	1.6	3.8	3.2	6.2	5.0	7.8	6.2	3.4	5.8	4.6	5.8	5.0	7.4	6.6	7.4	7.8	5.8	6.6	5.8	5.0	3.4	5.4
Swarna	1.8	1	4.2	4.4	8.2	7.8	7.4	5.4	4.2	7	4.2	5.8	3.8	9	5	7	7.8	5	5.4	6.6	5	2.6	4.2
SC-LSI	**5.7**	**1.5**	**4.3**	**4.0**	**6.5**	**6.8**	**8.1**	**7.4**	**4.9**	**6.4**	**4.3**	**6.8**	**5.9**	**8.5**	**7.0**	**7.4**	**7.4**	**6.1**	**6.3**	**6.9**	**5.8**	**4.1**	**6.0**
Screening	**A**	**A**	**N**	**A**	**A**	**A**	**A**	**A**	**N**	**A**	**N**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**

(N- Natural; A- Artificial; LSI- Location Severity Index)

Table 4.4B: Promising entries with low susceptibility index (SI≤5.1) and high promising index in NHSN to sheath blight, *Kharif*-2025

S.No.	IET-No.	Location/Frequency of scores (0-9)																																
		ADT	BKG	BNK	CHN	CTK	ADT	BKG	BNK	CHN	CTK	GNV	IIRR	KJT	KUL	LNV	LDN	MNC	MND	MSD	MTU	NDL	NVS	PNT	PTB	RPR	TTB	VRN	SI	Total	<=3	PI (<=3)	<=5	PI (<=5)
87	34049	5	3	3	5	5	5	3	3	5	5	7	5	0	7	3	7	1	5	3	7	7	5	5	5	5	1	-	**4.4**	**26**	**9**	**34.6**	**21**	**80.8**
95	34055	0	5	3	3	5	0	5	3	3	5	9	5	5	7	1	5	7	7	5	7	7	5	3	5	5	1	5	**4.5**	**27**	**9**	**33.3**	**21**	**77.8**
117	Tetep	0	3	1	3	7	0	3	1	3	7	9	5	7	5	5	7	5	5	5	9	5	7	9	5	5	1	5	**4.7**	**27**	**9**	**33.3**	**19**	**70.4**
80	34046	7	3	2	7	7	7	3	2	7	7	9	5	0	5	3	5	0	7	5	5	9	3	5	5	5	1	5	**4.8**	**27**	**9**	**33.3**	**18**	**66.7**
29	34013	3	3	3	5	9	3	3	3	5	9	9	7	3	5	5	5	3	3	7	7	7	3	5	5	5	3	3	**4.9**	**27**	**12**	**44.4**	**20**	**74.1**
89	34051	1	1	5	7	7	1	1	5	7	7	7	5	0	-	7	7	5	-	5	9	9	5	5	5	5	1	-	**4.9**	**24**	**6**	**25.0**	**15**	**62.5**
31	34015	5	3	3	5	1	5	3	3	5	1	9	7	0	5	3	9	3	7	7	7	9	7	7	5	5	5	5	**5.0**	**27**	**9**	**33.3**	**18**	**66.7**
55	34030	3	5	3	7	7	3	5	3	7	7	7	7	0	3	3	7	1	7	3	7	7	5	7	5	5	5	5	**5.0**	**27**	**9**	**33.3**	**16**	**59.3**
93	34054	1	5	1	5	3	1	5	1	5	3	7	7	0	7	7	7	5	9	7	7	7	7	5	5	5	5	7	**5.0**	**27**	**7**	**25.9**	**16**	**59.3**
69	34042	3	5	3	3	5	3	5	3	3	5	7	5	0	3	1	7	5	9	9	7	9	7	9	5	5	3	7	**5.0**	**27**	**10**	**37.0**	**18**	**66.7**
107	34059	1	7	3	5	7	1	7	3	5	7	9	5	0	5	9	5	1	9	7	7	5	5	5	7	5	3	3	**5.0**	**27**	**8**	**29.6**	**17**	**63.0**
34	34018	9	1	3	5	5	9	1	3	5	5	9	7	0	5	3	7	5	7	7	7	5	5	5	5	5	3	5	**5.0**	**27**	**7**	**25.9**	**19**	**70.4**
1	33996	9	3	3	3	3	9	3	3	3	3	9	7	3	5	3	7	3	7	7	7	7	7	5	7	5	3	3	**5.1**	**27**	**13**	**48.1**	**16**	**59.3**
109	34060	3	5	3	3	9	3	5	3	3	9	9	5	3	5	5	3	1	9	7	7	7	5	7	5	5	3	5	**5.1**	**27**	**10**	**37.0**	**19**	**70.4**
67	34040	3	5	3	5	7	3	5	3	5	7	7	7	0	5	5	7	3	9	5	7	5	7	7	5	5	3	5	**5.1**	**27**	**7**	**25.9**	**18**	**66.7**
63	34037	3	5	7	5	7	3	5	7	5	7	7	7	3	5	0	5	1	7	5	9	7	5	5	5	5	3	5	**5.1**	**27**	**6**	**22.2**	**18**	**66.7**
91	34052	0	5	9	5	7	0	5	9	5	7	7	5	0	7	7	5	1	7	3	7	5	5	7	7	5	3	5	**5.1**	**27**	**6**	**22.2**	**16**	**59.3**
46	34028	7	3	3	5	7	7	3	3	5	7	7	7	5	5	1	5	1	9	5	5	9	7	7	5	5	1	5	**5.1**	**27**	**7**	**25.9**	**17**	**63.0**
56	34031	0	7	3	5	7	0	7	3	5	7	7	7	5	7	1	7	5	7	5	7	7	5	5	5	5	3	7	**5.1**	**27**	**6**	**22.2**	**15**	**55.6**
117	Tetep	0	3	1	3	7	0	3	1	3	7	9	5	7	5	5	7	5	5	5	9	5	7	9	5	5	1	5	**4.7**	**27**	**9**	**33.3**	**19**	**70.4**
122	Swarnadhan	1	3	-	9	9	1	3	-	9	9	9	5	0	7	7	7	5	7	5	5	7	7	7	7	5	3	5	**5.7**	**25**	**6**	**24.0**	**12**	**48.0**
113	TN1	9	7	6	7	7	9	7	6	7	7	9	9	7	5	7	9	7	9	9	9	7	5	9	9	5	7	7	**7.4**	**27**	**0**	**0.0**	**3**	**11.1**
77	IR-50	9	5	5	7	7	9	5	5	7	7	9	9	7	9	9	7	7	9	7	9	7	7	9	9	7	3	9	**7.4**	**27**	**1**	**3.7**	**5**	**18.5**
Over all LSI		**5.9**	**4.1**	**4.2**	**6.0**	**6.8**	**5.9**	**4.1**	**4.2**	**6.0**	**6.8**	**8.1**	**6.6**	**3.6**	**6.1**	**3.8**	**7.0**	**5.2**	**7.8**	**6.3**	**7.4**	**6.9**	**6.0**	**6.3**	**5.9**	**5.2**	**3.8**	**5.6**						
LSI (SC)		**6.5**	**4.3**	**4.8**	**6.1**	**6.7**	**6.5**	**4.3**	**4.8**	**6.1**	**6.7**	**8.2**	**6.6**	**5.0**	**5.9**	**3.2**	**7.1**	**5.5**	**8.1**	**6.5**	**7.6**	**7.0**	**6.4**	**6.2**	**5.8**	**5.1**	**4.6**	**5.6**						

(SI- Susceptibility Index; Promising Index (PI) based on percentage of locations the entry has scored ≤3* and ≤5**; RC-Resistant check; SC-Susceptible check)

Table 4.5A: Location severity index and frequency distribution of sheath blight disease score for DSN entries, *Kharif*-2025

Score	DSN Locations/Frequency of Score (0-9)																			
	ADT	**ARD**	**BKG**	**CHP**	**GNV**	**IIRR**	**KJT**	**LDN**	**LNV**	**MNC**	**MND**	**MSD**	**MTU**	**NDL**	**NVS**	**PNT**	**PTB**	**RPR**	**TTB**	**VRN**
-	**8**	**7**	**38**	**13**	**3**	**2**	**16**	**5**	**0**	**0**	**6**	**9**	**17**	**0**	**12**	**4**	**2**	**0**	**4**	**14**
0	26	12	3	0	0	0	172	0	0	11	0	0	0	0	0	0	0	0	0	0
1	22	139	6	1	0	0	0	0	14	17	0	0	0	0	0	0	0	0	35	0
2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
3	49	59	84	7	1	13	2	1	67	35	8	3	4	2	12	1	2	0	137	59
4	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	32	0	76	75	30	107	15	37	87	68	62	102	48	40	72	100	111	187	25	86
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	17	0	10	86	101	78	12	163	41	73	79	91	92	124	121	110	84	30	13	46
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	63	0	0	35	81	17	0	11	7	13	62	12	56	51	0	2	18	0	3	12
Total	217	217	217	217	217	217	217	217	217	217	217	217	217	217	217	217	217	217	217	217
Over all LSI	**4.9**	**1.5**	**4.0**	**6.4**	**7.4**	**5.9**	**0.8**	**6.7**	**4.6**	**5.0**	**6.8**	**6.1**	**7.0**	**7.1**	**6.1**	**6.1**	**6.1**	**5.3**	**3.2**	**5.1**
T(N1)	4.5	1.6	2.7	3.5	6.0	7.2	0.0	5.3	4.0	5.6	6.0	5.3	5.8	6.4	4.3	4.3	5.8	4.4	2.4	5.3
IR-50	6.0	2.0	3.7	7.5	8.0	9.0	4.3	7.5	5.0	6.5	7.5	7.0	9.0	6.5	6.3	6.0	8.0	5.5	5.5	7.0
BPT5204	4.0	1.5	5.0	6.5	8.0	6.5	0.0	6.5	5.5	5.5	6.0	5.5	8.0	7.0	5.0	6.5	6.0	5.0	3.0	5.5
Swarna	1.8	2.0	3.0	5.0	7.0	5.5	1.3	7.0	4.0	6.0	8.5	5.0	7.0	8.0	6.5	6.5	6.5	5.0	2.0	3.0
SC-LSI	**4.0**	**1.8**	**3.5**	**5.9**	**7.2**	**7.1**	**1.4**	**6.6**	**4.6**	**5.9**	**7.1**	**5.7**	**7.4**	**6.9**	**5.5**	**5.8**	**6.6**	**4.9**	**3.2**	**5.2**
Screening	**A**	**A**	**N**	**A**	**A**	**A**	**N**	**A**	**N**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**

(N- Natural; A- Artificial; LSI- Location Severity Index)

Table 4.5B: Promising entries with low susceptibility index (SI≤5.2) and high promising index in DSN to sheath blight, *Kharif*-2025

P.No.	Designation	Location/Frequency of scores (0-9)																					
		ADT	CHP	GNV	IIRR	LDN	LNV	MNC	MND	MSD	MTU	NDL	NVS	PNT	PTB	RPR	VRN	SI	Total	<=3	PI (<=3)	<=5	PI (<=5)
8	BPT 3482	0	3	7	5	7	1	3	7	5	-	5	7	7	5	5	3	4.7	15	5	33.3	10	66.7
13	NL RBB-1	0	5	7	5	5	7	1	3	5	3	7	7	9	3	5	3	4.7	16	6	37.5	11	68.8
15	NLR 3881	0	3	7	5	7	1	1	7	5	3	9	7	7	5	5	3	4.7	16	6	37.5	10	62.5
11	NLR 3895	0	5	7	5	5	3	7	5	5	5	5	7	5	5	5	3	4.8	16	3	18.8	13	81.3
169	ISHB-28	3	7	7	3	3	3	0	5	7	9	7	5	7	5	5	3	4.9	16	6	37.5	10	62.5
186	SAH-21	3	5	7	7	7	3	0	7	3	5	7	5	5	5	5	5	4.9	16	4	25.0	11	68.8
145	ISHB-10	0	5	7	5	7	5	1	5	5	7	5	5	5	7	5	5	4.9	16	2	12.5	12	75.0
137	ISHB-2	5	5	5	5	7	1	3	5	5	7	9	5	5	5	5	3	5.0	16	3	18.8	13	81.3
158	ISHB-17	5	7	7	5	5	3	3	5	5	5	7	5	5	5	5	3	5.0	16	3	18.8	13	81.3
175	ISHB-35	3	5	9	5	5	5	1	5	5	5	7	5	7	5	5	3	5.0	16	3	18.8	13	81.3
2	BPT 3745	1	3	5	5	5	3	5	5	5	7	7	7	7	5	5	5	5.0	16	3	18.8	12	75.0
4	BPT 3178	0	7	7	3	5	3	3	7	7	7	5	5	7	5	5	5	5.1	16	4	25.0	10	62.5
197	CB 22141	0	5	7	7	5	7	1	5	5	5	9	5	7	5	5	3	5.1	16	3	18.8	11	68.8
134	BE-812	3	3	5	5	7	3	3	5	5	7	5	7	7	5	5	7	5.1	16	4	25.0	11	68.8
3	BPT 3270	1	7	7	3	5	5	1	7	5	7	7	7	7	5	5	3	5.1	16	4	25.0	9	56.3
170	ISHB-29	1	7	7	3	5	1	7	7	5	7	5	7	5	5	5	5	5.1	16	3	18.8	10	62.5
5	BPT 3463	1	5	5	7	5	1	3	7	7	7	5	-	7	5	5	7	5.1	15	3	20.0	9	60.0
146	ISHB-11	1	3	7	3	7	3	0	7	7	7	9	7	5	7	7	3	5.2	16	6	37.5	7	43.8
16	NLR 3889	0	7	7	3	7	5	7	5	7	3	7	5	7	5	5	3	5.2	16	4	25.0	9	56.3
144	ISHB-9	0	5	7	7	7	3	3	7	5	5	7	7	5	7	5	3	5.2	16	4	25.0	9	56.3
7	BPT 3607	0	5	5	5	5	3	5	7	7	7	5	5	7	7	5	5	5.2	16	2	12.5	11	68.8
143	ISHB-8	0	5	7	3	7	9	1	7	5	7	7	-	5	7	5	3	5.2	15	4	26.7	8	53.3
126	DBT-1129	0	7	5	5	7	3	7	5	3	-	9	7	5	5	5	5	5.2	15	3	20.0	10	66.7
210	Tetep	0	5	7	5	5	3	7	5	5	-	5	5	5	5	5	5	4.8	15	2	13.3	13	86.7
215	Swarnadhan	3	5	7	5	7	5	5	7	5	5	5	5	7	7	5	3	5.4	16	2	12.5	11	68.8
153	T(N1)	9	7	9	9	7	3	7	9	7	9	9	5	5	9	7	7	7.4	16	1	6.3	3	18.8
207	IR-50	9	7	7	9	9	5	7	9	7	9	9	-	7	9	7	7	7.8	15	0	0.0	1	6.7
Over all LSI		4.9	6.5	7.4	5.9	6.7	4.6	5.0	6.8	6.1	7.0	7.1	6.1	6.1	6.1	5.3	5.1						
LSI SC		4.5	6.2	7.6	5.8	6.6	4.7	5.3	6.8	5.9	6.1	7.3	6.0	5.6	6.0	4.9	5.1						

(SI- Susceptibility Index; Promising Index (PI) based on percentage of locations the entry has scored ≤3* and ≤5**; RC-Resistant check; SC-Susceptible check)

❖ TRIAL No.5: SCREENING FOR SHEATH ROT RESISTANCE

➢ NSN-1

The National Screening Nursery-1 consisting of 373 entries were evaluated against sheath rot disease at 10 locations across the country. Screening was done artificially in some centers viz., Bankura, Chinsurah, Navasari, Pusa, Raipur and Titabar. In Coimbatore and Rajendranagar, inoculation done by thick inoculum spray before panicle intiation. In Chinsurah, Navasari and Raipur, inoculation done by grain culture plugging at booting stage. It was done under natural conditions at Aduthurai, Karjat, Lonavala and Nawagam.

High disease pressure was recorded at Aduthurai (6.7) Chinsurah (6.3) Raipur (6.3); and moderate disease pressure at Navasari (5.9) and Nawagam (5.3), Bankura (3.5) and Titabar (3.3). The disease pressure was very low (LSI≤ 3) at Lonavala (2.9) Karjat (1.2), and Pusa (2.2), hence the data from these centres were not considered for selecting the resistant entries for sheath rot disease. The frequency distribution of sheath rot scores is presented in the (Table 5.1A) along with location severity indices.

Table 5.1A: Location severity index (LSI) and frequency distribution of sheath rot scores of NSN-1, *Kharif*-2025

Score	ADT	BNK	CHN	KJT	LNV	NVS	NWG	PSA	RPR	TTB
0	**57**	**0**	**3**	**258**	**0**	**0**	**0**	**0**	**0**	**0**
1	1	102	13	0	65	0	0	185	0	6
2	0	0	0	0	5	0	0	0	0	0
3	17	172	19	44	250	22	32	151	3	283
4	0	0	0	0	0	0	0	0	0	0
5	36	33	89	42	53	170	257	37	173	59
6	0	0	0	0	0	0	0	0	0	0
7	26	31	189	16	0	150	78	0	146	1
8	0	0	0	0	0	0	0	0	0	0
9	217	35	52	1	0	18	2	0	51	0
Total	354	373	365	361	373	360	369	373	373	349
LSI	**6.7**	**3.5**	**6.3**	**1.3**	**2.9**	**5.9**	**5.3**	**2.2**	**6.3**	**3.3**
LSI (S Checks)	**8.5**	**3.6**	**7.2**	**1.2**	**3.2**	**5.5**	**5.6**	**2.2**	**6.4**	**3.7**
Screening	**N**	**A**	**A**	**N**	**N**	**A**	**N**	**A**	**A**	**A**

(LSI-Location Severity Index; N-Natural; A-Artificial)

The selection of promising entries was done based on the disease data of those locations where the disease pressure was moderate to high. A few promising entries with high promising index are presented in the Table 5.1B, they include IET# 32823, 31640, 32465, 33071, 32467, 32587, 31972, 32945, 31436, 32537 and 32443.

Table 5.1B: Promising entries with low susceptibility index (≤ 4.0) and high PI in NSN-1 to Sheath rot, *Kharif*-2025

S.No.	Entry No.	IET No.	Location/Frequency of scores (0-9)							SI	Total	<=3*	PI (<-3) **	<=5*	PI (<-5) **
			ADT	BNK	CHN	NVS	NWG	RPR	TTB						
185	4920	32823	0	1	7	5	3	3	-	**3.2**	6	4	67	5	83
39	3713	31640*	0	3	1	5	5	5	-	**3.2**	6	3	50	6	100
94	3519	32465	0	3	1	5	5	7	3	**3.4**	7	4	57	6	86
72	3740	33071 (H)	0	1	5	5	5	5	3	**3.4**	7	3	43	7	100
95	3520	32467	0	1	5	5	5	5	3	**3.4**	7	3	43	7	100
124	3912	32587	0	1	7	5	3	7	3	**3.7**	7	4	57	5	71
284	5220	31972	0	1	3	7	7	7	1	**3.7**	7	4	57	4	57
218	5811	32945	0	3	5	5	5	5	3	**3.7**	7	3	43	7	100
366	Tetep	Tetep	0	3	5	5	5	5	3	**3.7**	7	3	43	7	100
1	3301	31436 (H)*	0	1	7	5	5	5	3	**3.7**	7	3	43	6	86
206	Swarna	Swarna	0	1	9	-	5	5	3	**3.8**	6	3	50	5	83
371	Swarnadhan	Swarnadhan	0	3	5	-	5	7	3	**3.8**	6	3	50	5	83
65	3733	32537	0	1	7	5	5	5	-	**3.8**	6	2	33	5	83
89	3514	32443	3	1	5	5	5	5	3	**3.9**	7	3	43	7	100
203	T(N1)	T(N1)	9	9	7	7	7	5	3	**6.7**	7	1	14	2	29
LSI			**6.7**	**3.5**	**6.3**	**5.9**	**5.3**	**6.3**	**3.3**						
LSI (S Checks)			**8.5**	**3.6**	**7.2**	**5.5**	**5.6**	**6.4**	**3.7**						

(SI- Susceptibility Index; Promising Index (PI) based on percentage of locations the entry has scored ≤3* and ≤5**)

➢ NSN-2

The NSN -2 nursery consisting of 711 entries was evaluated only at six locations and screening was done under natural conditions at Aduthurai, Karjat and Nawagam. Artificial screening was done at Navasari, Pusa and Raipur. High disease pressure was recorded at Aduthurai (6.8), Raipur (6.2), Navasari (5.8) and Nawagam (5.4) and very low disease pressure at Karjat and Pusa (2.3), hence the data from these centers was not considered for selecting the resistant entries for sheath rot (Table 5.2A).

The selection of promising entries was done based on the disease data of those locations where the disease pressure was moderate to high. A few promising entries with high promising index are presented in the Table 5.2B. These entries are IET# 33661, 33608, 33582, 33444, 33570, 33616 and 33434.

Table 5.2A: Location severity index (LSI) and frequency distribution of sheath rot scores of NSN-2, *Kharif*-2025

Score	ADT	KJT	NVS	NWG	PSA	RPR
0	**105**	**531**	**0**	**0**	**0**	**0**
1	5	0	0	0	313	0
2	0	0	0	0	0	0
3	37	23	33	56	306	6
4	0	0	0	0	0	0
5	35	68	367	448	84	325
6	0	0	0	0	0	0
7	102	50	269	197	0	333
8	0	0	0	0	0	0
9	411	1	22	2	0	43
Total	695	673	691	703	703	707
LSI	**6.8**	**1.1**	**5.8**	**5.4**	**2.3**	**6.2**
LSI (S Checks)	**8.1**	**0.5**	**5.5**	**5.7**	**2.7**	**5.9**
Screening	**N**	**N**	**A**	**N**	**A**	**A**

(LSI-Location Severity Index; N-Natural; A-Artificial)

Table 5.2B: Promising entries with low susceptibility index (≤ 4.0) and high PI in NSN-2 to Sheath rot, *Kharif*-2025

P.No.	Entry No.	IET No.	Location/Frequency of scores (0-9)				SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
			ADT	NVS	NWG	RPR						
312	4242	33661	0	-	3	5	**2.7**	3	2	67	3	100
182	4050	33608	0	3	5	3	**2.8**	4	3	75	4	100
154	4022	33582	0	7	3	3	**3.3**	4	3	75	3	75
68	3605	33444	0	3	5	5	**3.3**	4	2	50	4	100
141	4009	33570	0	5	3	5	**3.3**	4	2	50	4	100
190	4058	33616	0	5	3	5	**3.3**	4	2	50	4	100
259	3458	33434	0	3	5	5	**3.3**	4	2	50	4	100
306	Swarna		0	5	3	5	**3.3**	4	2	50	4	100
159	4027	Pusa 44	1	5	3	5	**3.5**	4	2	50	4	100
403	TN1	TN1	9	7	7	7	**7.5**	4	0	0	0	0
LSI			**6.8**	**5.8**	**5.4**	**6.2**						
LSI (S Checks)			**8.1**	**5.5**	**5.7**	**5.9**						

(SI- Susceptibility Index; Promising Index (PI) based on percentage of locations the entry has scored ≤3* and ≤5**)

➢ NSN-H

Screening for sheath rot under NSN- hills was conducted at Karjat and Lonavala under natural infection conditions. The location severity index was moderate at Karjat (LSI-3.2) and Lonavala (LSI 3.0) (Table 9). At Lonavala 69 entries showed score of 3.

Table 9: Location severity index (LSI) and frequency distribution of sheath rot scores of NSN-H, *Kharif* 2025

Score	Location/Frequency of scores (0-9)	
	KJT	LNV
0	30	0
1	0	14
2	0	1
3	11	69
4	0	0
5	38	12
6	0	0
7	7	1
8	0	0
9	0	0
Total	86	97
LSI	**3.2**	**3.0**
Screening	**N**	**N**

(LSI-Location Severity Index; N-Natural; A-Artificial)

➢ NHSN

The NHSN trial consisted of 124 entries including checks. The entries were evaluated at 10 locations representing different geographical regions. The frequency distribution of disease scores and the LSI are presented in Table 5.4A. The disease pressure was very high at Aduthurai (7.4); high at Chinsurah (6.9), Raipur (6.6), Navasari (5.9), Nawagam (5.3), Titabar (3.4) and Bankura (3.0). The disease pressure was very low (LSI≤ 3) at Karjat and Pusa, data from these centres were not considered for selecting the resistant entries.

The promising entries were selected based on the disease data of those locations where the disease pressure was moderate and high. The promising entries that had an SI less than 5.0 are IET Nos. 34055, 34039, 34024, 34023, 34018, 34047, 34028 and 34048 (Table 5.4B).

Table 5.4A: Location severity index (LSI) and frequency distribution of sheath rot scores of NSN-2, *Kharif*-2025

Score	ADT	BNK	CHN	KJT	LNV	NVS	NWG	PSA	RPR	TTB
0	10	0	1	76	0	0	0	0	0	0
1	0	19	2	0	7	0	0	39	0	5
2	0	1	0	0	0	0	0	0	0	0
3	6	60	3	12	48	3	11	62	0	62
4	0	0	0	0	1	0	0	0	0	0
5	6	17	22	21	58	60	83	21	44	19
6	0	0	0	0	0	0	0	0	0	0
7	19	14	66	12	10	55	30	2	63	3
8	0	0	0	0	0	0	0	0	0	0
9	77	11	30	1	0	1	0	0	17	0
Total	118	122	124	122	124	119	124	124	124	89
LSI	7.4	4.0	6.9	1.9	4.2	5.9	5.3	2.8	6.6	3.4
LSI (S Checks)	6.8	3.0	7.2	2.2	4.0	6.6	5.8	2.2	6.2	3.5
Screening	**N**	**A**	**A**	**N**	**N**	**A**	**N**	**A**	**A**	**A**

(LSI-Location Severity Index; N-Natural; A-Artificial)

Table 5.4B: Promising entries with low susceptibility index (≤ 4.8) and high PI in NHSN to Sheath rot, *Kharif*-2025

P. No	Ent No.	IET No.	Location/Frequency of scores (0-9)								SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
			ADT	BNK	CHN	LNV	NVS	NWG	RPR	TTB						
95	IHRT-MS-3103	34055	0	3	7	5	5	5	5	1	**3.9**	8	3	38	7	88
66	IHRT-M-3001	34039	0	3	7	3	5	5	7	3	**4.1**	8	4	50	6	75
42	IHRT-ME-2915	34024	3	3	7	3	5	5	5	3	**4.3**	8	4	50	7	88
41	IHRT-ME-2914	34023	9	1	5	1	5	5	5	3	**4.3**	8	3	38	7	88
53	SWARNA		0	5	7	3	7	3	9	1	**4.4**	8	4	50	5	63
7	IHRT-E-2807	-	-	3	7	3	5	5	5	3	**4.4**	7	3	43	6	86
34	IHRT-ME-2907	34018	5	3	5	3	5	7	5	3	**4.5**	8	3	38	7	88
84	IHRT-M-3013	34047	3	9	5	3	5	5	5	3	**4.8**	8	3	38	7	88
46	IHRT-ME-2919	34028	5	5	7	3	5	3	7	3	**4.8**	8	3	38	6	75
85	IHRT-M-3014	34048	5	3	7	5	5	3	7	3	**4.8**	8	3	38	6	75
113	TN1	TN1	9	9	9	3	7	5	7	3	**6.5**	8	2	25	3	38
		LSI	**7.4**	**4.0**	**6.9**	**4.2**	**5.9**	**5.3**	**6.6**	**3.4**						
		LSI (S Checks)	**6.8**	**3.0**	**7.2**	**4.0**	**6.6**	**5.8**	**6.2**	**3.5**						

(SI- Susceptibility Index; Promising Index (PI) based on percentage of locations the entry has scored ≤3* and ≤5**)

- **DSN**

The DSN trial consisted of 217 entries including checks were screened at seven locations across the country. The frequency distribution of disease scores and the LSI are presented in the Table 5.5A. The nursery was screened under natural conditions at Aduthurai, Karjat, Lonavala, Nawagam and artificially done in remaining locations viz., Navasari, Pusa, and Raipur. High disease pressure was recorded at Raipur (6.4), Aduthurai (6.3), Navasari (5.7), and Nawagam (5.4). Moderate disease pressure was recorded at Lonavala (3.7) and very low disease pressure was observed Pusa (2.2) and Karjat (0.6) during the season, so the data from these two locations not considered for the selection of resistant lines for sheath rot disease.

The selection of promising entries were done based on the data of those locations where the disease pressure was moderate to high. The promising entries with SI≤4 are presented in the Table 5.5B. Some of the promising lines were ISHB-12, ISHB-8, DBT-1517, NL RBB-1, NLR 3889, 5559, ISHB-30, CB 22157, CB 22141, RTCNP-120, CB 22140, NLR 3895, DBT-1129, ISHB-9, ISHB-10, ISHB-20, SAH-21 and CB 22108.

Table 5.5A: Location severity index (LSI) and frequency distribution of sheath rot scores of DSN, *Kharif*-2025

Score	ADT	KJT	LNV	NVS	NWG	PSA	RPR
0	44	181	0	0	0	0	0
1	2	0	10	0	0	111	0
2	0	0	0	0	0	0	0
3	17	5	131	9	23	87	3
4	0	0	0	0	0	0	0
5	14	4	64	116	124	19	87
6	0	0	0	0	0	0	0
7	29	11	12	77	66	0	99
8	0	0	0	0	0	0	0
9	102	0	0	3	0	0	28
Total	208	201	217	205	213	217	217
LSI	**6.3**	**0.6**	**3.7**	**5.7**	**5.4**	**2.2**	**6.4**
LSI (S Checks)	**6.0**	**0.0**	**3.0**	**6.0**	**5.8**	**1.4**	**5.7**
Screening	N	N	N	A	N	A	A

(LSI-Location Severity Index; N-Natural; A-Artificial)

Table 5.5B: Promising entries with low susceptibility index (≤ 4.0) and high PI in DSN to Sheath rot, *Kharif*-2025

S.No.	Designation	Location/Frequency of scores (0-9)					SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
		ADT	LNV	NVS	NWG	RPR						
147	ISHB-12	0	1	5	5	5	**3.2**	5	2	40	5	100
143	ISHB-8	0	1	-	7	5	**3.3**	4	2	50	3	75
129	DBT-1517	0	3	7	3	5	**3.6**	5	3	60	4	80
13	NL RBB-1	0	3	5	5	5	**3.6**	5	2	40	5	100
16	NLR 3889	0	3	5	5	5	**3.6**	5	2	40	5	100
42	5559	0	3	5	5	5	**3.6**	5	2	40	5	100
171	ISHB-30	0	3	5	5	5	**3.6**	5	2	40	5	100
195	CB 22157	0	3	5	5	5	**3.6**	5	2	40	5	100
197	CB 22141	0	3	5	5	5	**3.6**	5	2	40	5	100
132	RTCNP-120	3	3	3	5	5	**3.8**	5	3	60	5	100
196	CB 22140	0	3	7	3	7	**4.0**	5	3	60	3	60
11	NLR 3895	0	3	5	5	7	**4.0**	5	2	40	4	80
126	DBT-1129	0	3	7	5	5	**4.0**	5	2	40	4	80
144	ISHB-9	0	3	5	5	7	**4.0**	5	2	40	4	80
145	ISHB-10	0	3	7	5	5	**4.0**	5	2	40	4	80
161	ISHB-20	0	3	7	5	5	**4.0**	5	2	40	4	80
186	SAH-21	0	7	5	3	5	**4.0**	5	2	40	4	80
193	CB 22108	0	5	5	5	5	**4.0**	5	1	20	5	100
153	T(N1)	9	3	7	7	5	**6.2**	5	1	20	2	40
LSI		**6.3**	**3.7**	**5.7**	**5.4**	**6.4**						
LSI (S Checks)		**6.0**	**3.0**	**6.0**	**5.8**	**5.7**						

(SI- Susceptibility Index; Promising Index (PI) based on percentage of locations the entry has scored ≤3* and ≤5**)

TRIAL No.6: SCREENING FOR BACTERIAL BLIGHT RESISTANCE

➢ NSN-1

The National Screening Nursery-1 (NSN-1) consisted of 373 entries including national, regional and pathology checks. The entries were evaluated at 25 Bacterial Blight (BB) hot spot locations across the country. The entries were evaluated through artificial inoculation at all the locations. The frequency distribution of the disease scores and location severity indices (overall LSI and LSI of susceptible checks) are presented in Table 6.1A. The disease pressure (overall LSI) was very high (LSI ≥8.0) at Pantnagar (8.0); high (LSI: 6.0-8.0) at Gangavathi (7.9), Maruteru (7.7), Pattambi (7.1), Chiplima (6.9), Raipur (6.9), Chinsurah (6.4), IIRR (6.0) and Nawagam (6.0); moderate (LSI: 3.0-6.0) at Ludhiana (5.8), Navasari (5.6), Chatah (5.5), Cuttack (5.5), Karjat (5.4), Masodha (5.2), Varanasi (5.1), Nellore (4.8), Rajendranagar (4.7), Titabar (4.3), Karaikal (4.1), Bankura (4.0), Moncompu (4.0) and Aduthurai (3.8).

A set of susceptible checks (HR-12, Co-39, T(N1), IR-50, BPT 5204, and Swarna) was repeated at regular intervals among the test entries. The mean of location severity index of these susceptible checks (S checks LSI) is presented in Table 6.1A. The LSI of susceptible checks was highest at Gangavathi (8.4) and it was lowest at Bikramgunj (2.9). The LSI of susceptible checks was very high (>8.0) at Gangavathi (8.4), Maruteru (8.2) and Pantnagar (8.1); high (LSI 6.0-8.0) at Chinsurah (7.6), Raipur (7.4), IIRR (7.1) and Ludhiana (7.0); and it was moderate (4.0-6.0) at most of the locations. The selection of superior entries was made only when the LSI of susceptible checks was above 4.0, accordingly data from Bikramgunj and Sabour were not considered for selection of best entries in NSN-1.

The promising entries which exhibited an SI of 4.8 or less, and which showed a disease score of 5 at or more than 75% locations are presented in Table 6.1B. One entry IET# 33838 performed better than resistant check DRR Dhan 53 across 11 locations. Other promising entries included IET #32823, 33063 (H), 31480 (H)*, 32795, 32990*, 31479 (H)*, 32917 (H), 32399, 32503, 31659*, 32860, 32421, 32754, 33046 (H), 32523 and 32465 (Table 6.1B).

➢ NSN-2

The National Screening Nursery-2 (NSN-2) consisted of 672 entries including different check entries. The entries were evaluated at 19 BB hot spot locations across the country. The entries were evaluated using artificial inoculation at all the centres. The frequency distribution of the disease scores and location severity indices (overall LSI and LSI of susceptible checks) are presented in Table 6.2A. The disease pressure was very high (LSI> 8.0) at Maruteru (8.4), and Raipur (8.1); high (LSI: 6.0-8.0) at Pantnagar (7.8), Gangavathi (7.7), Pattambi (7.5), IIRR (6.3), Nawagam (6.1); moderate (LSI: 3.0-6.0) at Navasari (5.9), Nellore (5.7), Ludhiana (5.6), Karjat (5.5), Chatha (5.3), Varanasi (5.1), Masodha (4.9), Titabar (4.7), Aduthurai (4.0), Moncompu (3.5) and very low (LSI < 3.0) at Sabour (2.5) and Bikramgunj (2.4).

The location severity index of susceptible checks was very high (LSI> 8.0) at Maruteru (8.7), Pantnagar (8.4), Raipur (8.3); high (LSI: 6.0-8.0) Gangavathi (7.5), Pattambi (7.0), Ludhiana (6.7), IIRR (6.5), and Nawagam (6.0); and it was moderate (LSI 4.0-6.0) at most of the locations. The LSI of susceptible checks was very low (LSI<4.0) at Aduthurai (3.7), Moncompu (3.5), Sabour (3.2) and Bikramgunj (2.3); accordingly, data of these locations was not considered in selection of promising entries. At Maruteru and Raipur, the overall disease pressure was exceptionally high (LSI>8.0) where more than 90% of the entries showed highly susceptible BB reaction with a disease score of 7-9. This needs to be reconfirmed. However, the data of this centre were included for selection of best entries. The promising entries with SI of ≤5.1 and the entries which exhibited a score of 5 at or more than 50% of the locations are presented in Table 6.2B**.** Some of the highly promising entries which performed better than resistant check DRR Dhan 53 included IET 33616, 33397 and 33611. Other entries which exhibited an SI of ≤5.1 with a disease score of 5 at more than 50% test locations are considered as promising and which included IET # 33552, 33563, 33469, 33812, 33609, 33487, 33457, 33560, 33473, 33591, 33803 and 33675 (Table 6.2B).

➢ **NSN-Hills (NSN-H)**

The National Screening Nursery-Hills (NSN-Hills) consisted of 97 entries including different checks. The entries were evaluated at four locations such as Cuttack, Karjat, IIRR and Pantnagar. The entries were evaluated using artificial inoculation at all the four locations. The frequency distribution of the disease scores and location severity indices are presented in Table 6.3A. The disease pressure was high (LSI- 6.0-8.0) at all the locations *viz*., Cuttack (7.7), Karjat (7.1), Pantnagar, (6.6) and IIRR (6.4). For selection of best entries, the disease reactions from all the locations were considered. The entries with SI of less or equal to 6.0 and a score of 5 at or more than 50% of the locations with high PI are presented in Table 6.3B. The promising entries included IET# 31431, 33342, 32371, 31389, 33339, 32317, 33377, 33357, 33362, 33343, 33364, 32325 and 33340 (Table 6.3 B)**.**

➢ **NHSN**

The National Hybrid Screening Nursery (NHSN) consisted of 124 entries including different checks. The entries were evaluated at 22 BB hot spot locations across the country. The entries were evaluated using artificial inoculation at all the centres. The frequency distribution of the disease scores and location severity indices (overall LSI and LSI of susceptible checks) are presented in Table 6.4A**.** The disease pressure was very high (LSI>8.0) at Maruteru (8.9) and Raipur (8.4); high (LSI: 6.0-8.0) at Gangavathi (7.8), Cuttack (7.1), Pattambi (7.0), Chinsurah (6.8), Pantnagar (6.4), Rajendranagar (6.4), IIRR (6.2) and Nawagam (6.1); moderate (LSI: 3.0-6.0) at Navasari (5.8), Karjat (5.7), Chatha (5.6), Ludhiana (4.8), Masodha (4.8), Varanasi (4.8), Aduthurai (4.5), Bankura (4.4), Titabar (3.9) and very low (LSI<3.0) at Moncompu (2.9), Bikramgunj (2.3) and Arundatinagar (0.5).

The location severity index of susceptible checks was very high (>8.0) at Maruteru (9.0), Raipur (8.6) and Gangavathi (8.1); high (6.0-8.0) at Cuttack (7.5), Pattambi (7.4), Chinsurah (7.3), IIRR (7.2), Rajendranagar (6.8) and Karjat (6.5); it was moderate (LSI 4.0-6.0) at most of the locations. The data from Moncompu, Bikramgunj and Arundatinagar was not considered for selection of best entries, because in these locations overall location severity index was <3.0 and location severity index of susceptible checks was less than 4.0.

At Maruteru, Raipur and Gangavathi, the overall disease pressure was very high (LSI ≥ 8.0) where more than 90% of the entries exhibited susceptible reaction with a disease score of 7-9, this needs to be reconfirmed. However, the data of these centre were included for selection of best entries. The promising entries with SI of 5.5 or less and which exhibited a score of 5 at or more than 50% of the locations are presented in Table 6.4B. None of the entries performed better than resistant check DRR Dhan 53 (SI-3.9); however, some of the promising entries included IET # 34024, 34025, 34052, 33997, 34018, 32596, 34028, 34042, 33001, 34041, 34032, 34023 and 34060.

Table 6.1A: Location severity index (LSI) and frequency distribution of bacterial blight scores of NSN 1, *Kharif'* 2025

Score	Location/Frequency of scores (0-9)																								
	ADT	**BKG**	**BNK**	**CHN**	**CHP**	**CHT**	**CTK**	**GNV**	**IIRR**	**KJT**	**KRK**	**LDN**	**MNC**	**MSD**	**MTU**	**NLR**	**NVS**	**NWG**	**PNT**	**PTB**	**RPR**	**RNR**	**SBR**	**TTB**	**VRN**
0	57	18	0	1	0	0	0	0	0	0	25	0	32	0	0	0	0	0	0	0	0	19	0	0	0
1	27	126	56	0	4	2	14	0	40	17	31	10	41	0	0	7	0	0	0	0	0	22	165	12	0
2	0	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	114	153	189	54	24	52	70	1	33	38	133	73	103	57	1	83	32	2	18	11	6	60	95	161	70
4	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	92	51	31	79	78	173	122	48	30	165	93	56	120	217	45	215	195	181	46	79	62	169	88	152	200
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	38	18	43	155	132	129	103	107	240	137	75	210	70	95	142	53	129	184	39	161	243	82	18	38	88
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	26	0	41	76	112	11	40	212	25	4	10	15	6	4	173	7	4	2	262	115	62	7	1	7	2
Total	**354**	**366**	**373**	**365**	**350**	**369**	**349**	**368**	**368**	**361**	**367**	**364**	**372**	**373**	**361**	**365**	**360**	**369**	**365**	**366**	**373**	**359**	**367**	**370**	**360**
Overall LSI	**3.8**	**2.6**	**4.0**	**6.4**	**6.9**	**5.5**	**5.5**	**7.9**	**6.0**	**5.4**	**4.1**	**5.8**	**4.0**	**5.2**	**7.7**	**4.8**	**5.6**	**6.0**	**8.0**	**7.1**	**6.9**	**4.7**	**2.8**	**4.3**	**5.1**
HR-12	7.3	2.5	5.3	8.3	7.0	6.7	7.0	8.0	8.0	7.0	5.2	7.8	5.3	5.7	8.7	5.7	6.2	6.3	9.0	6.3	7.3	7.0	6.0	4.0	5.4
CO-39	6.7	3.7	3.0	8.0	7.0	5.3	6.0	8.7	7.3	6.0	5.0	7.0	6.0	6.0	8.7	5.0	5.0	6.7	9.0	6.3	7.3	6.0	3.0	6.7	5.7
T(N1)	7.4	4.3	4.0	7.7	6.6	6.7	6.0	8.7	7.0	7.0	4.0	7.0	7.0	6.7	8.3	4.6	5.4	6.3	9.0	8.6	8.0	5.8	4.7	6.2	6.0
IR-50	5.3	1.4	4.3	7.0	7.0	5.3	6.3	8.3	7.3	6.3	4.7	6.0	5.0	5.0	8.7	5.3	5.3	6.3	8.3	7.7	7.7	6.0	1.7	5.3	4.6
BPT5204	4.2	2.8	5.7	7.3	6.3	5.3	4.0	8.3	6.7	5.3	2.3	7.0	1.7	4.3	7.7	4.3	5.4	5.3	6.7	6.0	7.7	4.8	2.7	3.7	3.3
Swarna	0.2	2.7	3.3	7.3	6.6	3.7	5.7	8.7	6.3	4.7	3.5	7.0	1.2	4.0	7.3	3.7	5.8	5.0	6.3	5.3	6.3	3.7	1.0	2.3	4.7
LSI (S Checks)	**5.2**	**2.9**	**4.3**	**7.6**	**6.8**	**5.5**	**5.8**	**8.4**	**7.1**	**6.1**	**4.1**	**7.0**	**4.4**	**5.3**	**8.2**	**4.8**	**5.5**	**6.0**	**8.1**	**6.7**	**7.4**	**5.5**	**3.2**	**4.7**	**4.9**
Screening	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**

(LSI-Location Severity Index; N-Natural; A-Artificial); S check- Susceptible checks

Table 6.1B: NSN 1 entries with low susceptibility index (SI ≤4.8) with score ≤5 to BB at more than 75% of the locations

P.No.	IET No	Location/Frequency of scores (0-9)																							SI	PI(≤3)	PI (≤5)
		ADT	BNK	CHN	CHP	CHT	CTK	GNV	IIRR	KJT	KRK	LDN	MNC	MSD	MTU	NLR	NVS	NWG	PNT	PTB	RPR	RNR	TTB	VRN			
340	33838	-	3	-	-	7	-	5	-	-	1	-	0	5	-	-	5	-	-		7	0	3	3	**3.5**	**55**	**82**
185	32823	0	1	5	3	7	3	7	3	5	3	3	0	5	5	3	5	5	5	5	5	1	3	5	**3.8**	**48**	**91**
71	33063 (H)	1	3	3	5	5	9	9	1	1	3	1	3	5	5	3	5	7	7	3	5	1	1	3	**3.9**	**57**	**83**
31	31480 (H)*	1	7	3	7	3	3	9	1	1	7	1	3	3	5	5	5	5	3	3	3	7	3	3	**4.0**	**61**	**78**
177	32795	0	3	5	3	3	-	7	3	5	3	5	0	5	7	5	5	7	5	5	5	1	3	5	**4.1**	**41**	**86**
309	32990*	5	1	3	9	5	1	5	1	1	5	3	3	5	7	5	5	5	3	9	7	5	3	3	**4.3**	**43**	**83**
30	31479 (H)*	3	3	3	5	5	5	9	1	7	5	3	1	5	5	5	5	5	5	5	5	3	5	5	**4.5**	**30**	**91**
208	32917 (H)	3	3	3	9	5	7	5	1	3	3	3	5	3	7	3	3	7	3	5	5	5	5	7	**4.5**	**48**	**78**
12	32399	3	3	3	1	7	5	9	1	5	3	3	3	5	7	5	7	5	5	5	7	1	5	5	**4.5**	**39**	**78**
47	32503	5	3	5	7	5	5	5	1	1	3	3	5	7	7	3	5	5	9	5	5	3	5	3	**4.6**	**35**	**83**
42	31659*	7	3	3	7	5	7	9	3	1	3	3	5	5	5	3	7	5	3	5	5	3	3	5	**4.6**	**43**	**78**
294	32860	3	3	3	7	5	1	5	7	5	3	3	1	5	7	5	5	5	5	7	7	3	5	5	**4.6**	**35**	**78**
17	32421	-	3	5	-	5	3	9	1	3	5	3	1	7	7	3	7	5	5	5	7	-	5	3	**4.6**	**40**	**75**
237	32754	0	3	5	5	5	5	7	7	5	1	5	3	5	7	3	5	5	9	7	5	3	3	3	**4.6**	**35**	**78**
111	33046 (H)	7	9	3	3	5	-	9	1	3	0	5	0	3	5	5	5	5	9	5	5	5	5	5	**4.6**	**32**	**82**
61	32523	3	3	3	5	4	9	7	5	3	3	3	5	5	7	5	5	5	5	7	5	5	3	5	**4.8**	**30**	**83**
94	32465	1	7	3	5	5	3	9	3	5	7	5	3	5	5	5	5	5	9	5	5	5	3	3	**4.8**	**30**	**83**
369	DRR Dhan 53	-	1	3	5	5	5	7	1	1	3	1	1	5	5	7	5	5	3	7	5	0	3	5	**3.8**	**45**	**86**
203	T(N1)	7	9	9	7	7	7	9	7	7	3	7	9	7	9	3	3	7	9	9	7	5	7	7	**7.0**	**13**	**17**
LSI		**3.8**	**4.0**	**6.4**	**6.9**	**5.5**	**5.5**	**7.9**	**6.0**	**5.4**	**4.1**	**5.8**	**4.0**	**5.2**	**7.7**	**4.8**	**5.6**	**6.0**	**8.0**	**7.1**	**6.9**	**4.7**	**4.3**	**5.1**			
LSI (S checks)		**5.1**	**4.3**	**7.6**	**6.8**	**5.5**	**5.8**	**8.4**	**7.1**	**6.0**	**4.1**	**6.9**	**4.4**	**5.3**	**8.2**	**4.8**	**5.5**	**6.0**	**8.1**	**6.7**	**7.4**	**5.6**	**4.7**	**4.9**			

(SI-Susceptibility Index; *Promising index (PI): Percentage of locations based on no. of locations where the entry had scored ≤3 and ≤5)

Table 6.2A: Location severity index (LSI) and frequency distribution of bacterial blight scores of NSN-2, *Kharif'* 2025

	Location/Frequency of scores (0-9)																		
Score	**ADT**	**BKG**	**CHT**	**GNV**	**IIRR**	**KJT**	**LDN**	**MNC**	**MSD**	**MTU**	**NLR**	**NVS**	**NWG**	**PNT**	**PTB**	**RPR**	**SBR**	**TTB**	**VRN**
0	95	70	0	0	0	0	0	145	0	0	0	0	0	0	0	0	0	0	0
1	99	253	1	0	33	9	7	64	0	0	4	0	0	0	0	0	342	26	0
2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	169	266	96	0	55	98	169	166	145	0	49	28	6	32	5	4	209	229	152
4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
5	139	94	414	95	22	313	152	214	447	13	395	321	314	118	92	8	131	294	356
6	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	133	22	177	257	539	230	336	119	101	185	212	332	379	75	319	307	21	141	172
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	61	0	8	332	6	23	20	1	7	493	40	10	4	475	284	388	0	18	5
Total	**696**	**705**	**698**	**684**	**655**	**673**	**684**	**709**	**700**	**691**	**701**	**691**	**703**	**700**	**700**	**707**	**703**	**708**	**685**
Overall LSI	**4.0**	**2.4**	**5.3**	**7.7**	**6.3**	**5.5**	**5.6**	**3.5**	**4.9**	**8.4**	**5.7**	**5.9**	**6.1**	**7.8**	**7.5**	**8.1**	**2.5**	**4.7**	**5.1**
HR-12	5.0	2.1	5.9	7.3	7.7	6.2	7.7	3.9	5.3	8.4	6.7	5.8	5.9	9.0	7.3	8.1	6.7	5.3	4.3
CO-39	4.4	1.2	5.6	7.3	5.7	6.7	6.4	4.4	5.9	8.6	6.1	5.4	6.4	9.0	6.7	8.1	3.6	6.1	6.1
T(N1)	5.3	1.7	5.7	7.6	7.0	7.0	7.0	5.9	7.0	9.0	6.7	6.0	6.7	9.0	7.6	8.7	4.7	6.1	5.9
IR-50	4.7	3.0	5.0	7.3	7.0	6.1	6.3	3.6	5.0	9.0	5.9	5.7	6.1	8.4	7.3	9.0	1.6	4.7	6.7
BPT5204	2.9	3.6	4.4	7.7	6.2	5.6	6.4	3.0	5.0	8.7	4.7	5.6	5.6	9.0	7.3	7.9	1.6	4.7	3.6
Swarna	0.0	2.1	4.1	7.8	5.9	3.3	6.1	0.4	3.0	8.7	5.3	5.6	5.3	6.1	5.9	8.1	1.0	2.4	3.6
LSI (S Check)	**3.7**	**2.3**	**5.1**	**7.5**	**6.5**	**5.8**	**6.7**	**3.5**	**5.1**	**8.7**	**5.9**	**5.7**	**6.0**	**8.4**	**7.0**	**8.3**	**3.2**	**4.9**	**5.0**
Screening	**A**	**A**	**A**	**A**	**A**	**N**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**

(LSI-Location severity Index; N-Natural; A-Artificial; S check- Susceptible checks)

Table 6.2B: NSN-2 entries with low susceptibility index (SI ≤5.1) with score <u>≤</u>5 to BB at more than 50% of the locations

P.No.	Br No.	IET No	Location/Frequency of scores (0-9)															SI	Total	PI (≤3)	PI (≤5)
			CHT	GNV	IIRR	KJT	LDN	MSD	MTU	NLR	NVS	NWG	PNT	PTB	RPR	TTB	VRN				
190	4058	33616	5	5	1	3	3	3	5	9	5	5	3	7	7	3	5	**4.6**	**15**	**40**	**80**
221	3420	33397	5	9	1	1	3	5	7	5	5	5	3	7	7	3	3	**4.6**	**15**	**40**	**73**
185	4053	33611	5	5	1	5	3	3	7	5	7	5	5	7	7	1	3	**4.6**	**15**	**33**	**73**
54	3854	33552	5	7	1	-	3	3	7	5	5	7	5	7	7	3	3	**4.9**	**14**	**36**	**64**
134	4002	33563	3	5	5	5	7	3	9	3	7	5	5	5	5	3	3	**4.9**	**15**	**33**	**80**
94	3631	33469	5	7	7	3	5	3	5	5	3	5	5	7	7	3	3	**4.9**	**15**	**33**	**73**
474	5009	33812	5	5	3	7	3	5	7	5	3	7	3	5	7	5	3	**4.9**	**15**	**33**	**73**
183	4051	33609	5	5	1	7	3	7	7	5	5	5	5	5	7	3	3	**4.9**	**15**	**27**	**73**
119	3650	33487	5	5	3	5	3	5	9	3	7	5	5	7	7	1	5	**5.0**	**15**	**27**	**73**
81	3618	33457	3	9	7	5	3	3	7	1	5	5	7	7	7	3	3	**5.0**	**15**	**40**	**60**
62	3862	33560	5	9	3	5	7	3	9	3	5	3	5	5	9	1	5	**5.1**	**15**	**33**	**73**
98	3635	33473	5	7	5	3	3	5	7	5	7	3	7	5	7	3	5	**5.1**	**15**	**27**	**67**
164	4032	33591	5	7	7	3	3	3	7	3	5	5	9	7	7	3	3	**5.1**	**15**	**40**	**60**
532	4825	33803	3	7	3	3	3	3	7	5	7	7	9	5	7	5	3	**5.1**	**15**	**40**	**60**
327	4257	33675	7	7	1	3	3	7	7	7	5	5	3	7	9	3	3	**5.1**	**15**	**40**	**53**
603	TN1		5	9	7	7	7	7	9	7	7	7	9	9	9	7	7	**7.5**	**15**	**0**	**7**
707	DRR Dhan 53		5	-	1	3	1	3	7	7	5	7	3	7	7	3	7	**4.7**	**14**	**43**	**57**
	LSI		**5.3**	**7.7**	**6.3**	**5.5**	**5.6**	**4.9**	**8.4**	**5.7**	**5.9**	**6.1**	**7.8**	**7.5**	**8.1**	**4.7**	**5.1**				
	LSI (S checks)		**5.1**	**7.5**	**6.5**	**5.8**	**6.7**	**5.1**	**8.7**	**5.9**	**5.7**	**6.0**	**8.4**	**7.0**	**8.3**	**4.9**	**5.0**				

(SI-Susceptibility Index; *Promising index (PI): Percentage of locations based on no. of locations where the entry had scored ≤3 and ≤5)

Table 6.3A: Location severity index (LSI) and frequency distribution of Bacterial blight scores of NSN-H, *Kharif* 2025

Score	Location/Frequency of scores (0-9)			
	KJT	IIRR	PNT	CTK
0	0	0	0	0
1	1	7	0	0
2	0	0	0	0
3	3	3	9	2
4	0	0	0	0
5	11	1	27	6
6	0	0	0	0
7	48	77	35	46
8	0	0	0	0
9	23	0	26	41
Total	**86**	**88**	**97**	**95**
LSI	**7.1**	**6.4**	**6.6**	**7.7**
Screening	**A**	**A**	**A**	**A**

(LSI-Location Severity Index; N-Natural; A-Artificial)

Table 6.3B: Promising entries with low susceptibility index (≤ 6.0) and high PI in NSN-H to Bacterial blight, *Kharif* 2025

P.No	Ent. No.	IET No.	Location/Frequency of scores (0-9)				SI	Total	PI (<-3)**	PI (<-5)**
			KJT	IIRR	PNT	CTK				
42	2601	31431	5	1	3	7	**4.0**	4	50	75
21	2321	33342	3	1	5	9	**4.5**	4	50	75
44	2603	32371	7	-	3	5	**5.0**	3	33	67
2	2302	31389	5	1	7	7	**5.0**	4	25	50
18	2318	33339	3	7	3	9	**5.5**	4	50	50
7	2307	32317	5	3	5	9	**5.5**	4	25	75
46	2605	33377	7	-	3	7	**5.7**	3	33	33
70	2421	33357	9	1	5	9	**6.0**	4	25	50
75	2426	33362	9	7	3	5	**6.0**	4	25	50
22	2322	33343	7	1	7	9	**6.0**	4	25	25
77	2428	33364	7	7	7	3	**6.0**	4	25	25
9	2309	32325	5	7	5	7	**6.0**	4	0	50
19	2319	33340	5	7	5	7	**6.0**	4	0	50
96	**DRR Dhan-53**		1	1	3	-	**1.7**	3	100	100
80	**TN1**		9	7	9	9	**8.5**	4	0	0
	LSI		**7.1**	**6.4**	**6.6**	**7.7**				

(SI-Susceptibility Index; *No. of locations where the entry has scored ≤5 and ≤3;**Promising index (PI) based on no. of locations where the entry had scored ≤3 and ≤5)

Table 6.4A: Location severity index (LSI) and frequency distribution of bacterial blight scores of NHSN, *Kharif'* 2025

Score	Location/Frequency of scores (0-9)																					
	ADT	**ARD**	**BKG**	**BNK**	**CHN**	**CHT**	**CTK**	**GNV**	**IIRR**	**KJT**	**LDN**	**MNC**	**MSD**	**MTU**	**NVS**	**NWG**	**PNT**	**PTB**	**RPR**	**RNR**	**TTB**	**VRN**
0	8	88	18	0	0	0	0	0	0	0	0	38	0	0	0	0	0	0	0	0	0	0
1	9	20	42	9	0	0	0	0	21	4	1	7	0	0	0	0	0	0	0	2	10	0
2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	42	14	38	62	9	12	6	0	6	18	53	30	40	0	7	0	14	6	1	20	63	33
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	20	0	21	16	28	66	21	21	2	34	29	40	61	1	60	58	38	20	4	22	40	61
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	27	0	4	17	55	42	54	33	63	61	40	9	20	7	52	65	41	66	29	48	10	21
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	12	0	0	16	32	4	42	69	27	5	0	0	3	115	0	1	31	32	90	31	1	1
Total	**118**	**122**	**123**	**122**	**124**	**124**	**123**	**123**	**119**	**122**	**123**	**124**	**124**	**123**	**119**	**124**	**124**	**124**	**124**	**123**	**124**	**116**
Overall LSI	**4.5**	**0.5**	**2.3**	**4.4**	**6.8**	**5.6**	**7.1**	**7.8**	**6.2**	**5.7**	**4.8**	**2.9**	**4.8**	**8.9**	**5.8**	**6.1**	**6.4**	**7.0**	**8.4**	**6.4**	**3.9**	**4.8**
HR-12	7.0	0.4	1.6	4.2	8.6	5.8	8.2	7.8	7.5	6.5	6.6	5.0	5.8	9.0	5.5	6.2	6.6	8.6	8.6	7.8	2.6	4.5
CO-39	7.4	0.6	2.8	4.6	7.8	5.0	8.6	7.8	7.5	8.0	7.0	4.2	4.6	9.0	6.2	6.2	5.4	8.2	9.0	7.8	5.4	3.8
T(N1)	6.6	0.6	3.0	4.8	8.6	5.4	7.0	7.8	7.5	7.0	7.0	4.6	6.6	9.0	5.4	6.6	9.0	8.2	9.0	7.0	5.4	4.6
IR-50	5.4	0.0	3.6	3.8	6.2	4.6	6.6	8.6	7.5	7.4	5.0	4.2	5.0	9.0	6.5	6.2	5.4	7.8	9.0	6.6	5.8	5.0
BPT5204	1.4	0.0	3.4	4.6	6.6	4.6	6.2	8.2	7.4	5.4	3.4	1.6	5.0	9.0	5.8	5.4	5.0	6.2	8.2	5.8	2.6	4.2
Swarna	1.2	0.6	2.0	4.6	6.2	4.6	8.2	8.2	6.2	5.0	3.0	1.6	3.4	9.0	5.4	5.0	3.4	5.4	7.8	5.8	2.2	5.0
LSI (S Checks)	**4.8**	**0.4**	**2.7**	**4.4**	**7.3**	**5.0**	**7.5**	**8.1**	**7.2**	**6.5**	**5.3**	**3.5**	**5.1**	**9.0**	**5.8**	**5.9**	**5.8**	**7.4**	**8.6**	**6.8**	**4.0**	**4.5**
Screening	**A**	**N**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**

(LSI-Location Severity Index; N-Natural; A-Artificial); S check- Susceptible check

Table 6.4B: NHSN entries with low susceptibility index (SI ≤5.5) with score <u>≤</u>5 to BB at or more than 50% of the locations

P.No.	Br. No.	IET No	Location/Frequency of scores (0-9)																						
			ADT	BNK	CHN	CHT	CTK	GNV	IIRR	KJT	LDN	MSD	MTU	NVS	NWG	PNT	PTB	RPR	RNR	TTB	VRN	SI	Total	PI (<-3)**	PI (<-5)**
42	IHRT-ME-2915	34024	3	9	3	5	5	5	1	3	3	3	9	5	5	5	7	3	3	1	3	**4.3**	19	53	84
43	IHRT-ME-2916	34025	7	3	5	7	5	5	1	3	-	3	9	5	7	5	3	9	3	3	3	**4.8**	18	44	72
90	IHRT-M-3019	-	1	1	5	5	9	9	1	1	3	5	7	5	7	5	7	9	5	3	5	**4.9**	19	32	68
91	IHRT-M-3020	34052	3	3	7	5	9	-	1	3	3	3	-	7	5	5	9	5	7	5	5	**5.0**	17	35	71
2	IHRT-E-2802	33997	1	3	3	5	9	9	1	3	3	5	7	7	7	9	5	9	3	3	3	**5.0**	19	47	63
34	IHRT-ME-2907	34018	3	3	7	3	3	5	1	5	7	5	9	3	7	7	5	9	9	1	5	**5.1**	19	37	63
83	IHRT-M-3012	32596	3	5	3	7	7	9	1	1	1	3	9	7	5	5	7	7	9	5	5	**5.2**	19	32	58
46	IHRT-ME-2919	34028	3	3	7	5	3	5	7	5	3	5	9	5	5	9	7	9	3	3	5	**5.3**	19	32	68
69	IHRT-M-3004	34042	3	3	5	7	5	9	1	3	3	9	9	5	5	5	7	7	5	3	7	**5.3**	19	32	63
65	IHRT-ME-2932	33001	3	9	3	7	7	9	1	3	3	5	9	5	7	9	3	7	1	3	7	**5.3**	19	42	53
36	IHRT-ME-2909	-	-	3	5	7	7	9	1	3	3	3	9	7	7	5	7	9	5	1	-	**5.4**	17	35	53
68	IHRT-M-3003	34041	5	3	5	5	7	9	1	3	3	5	9	7	7	5	7	9	5	3	5	**5.4**	19	26	63
108	IHRT-MS-3110	-	1	3	5	5	5	5	7	5	3	5	9	5	7	7	7	9	7	3	5	**5.4**	19	21	63
57	IHRT-ME-2924	34032	3	3	5	5	9	9	7	5	3	5	9	7	7	3	7	7	3	3	5	**5.5**	19	32	58
41	IHRT-ME-2914	34023	9	7	3	7	5	9	1	7	3	5	7	5	7	5	7	7	3	5	3	**5.5**	19	26	53
109	IHRT-MS-3111	34060	3	3	7	5	7	7	7	5	3	7	9	5	7	3	7	7	7	3	3	**5.5**	19	32	47
120	**DRR Dhan 53**		1	5	3	7	5	7	1	1	3	3	7	5	5	3	7	5	1	3	3	**3.9**	19	53	79
24	**TN1**		7	7	7	5	9	5	9	7	7	9	9	5	7	9	9	9	7	5	5	**7.2**	19	0	26
	Overall LSI		**4.5**	**4.4**	**6.8**	**5.6**	**7.1**	**7.8**	**6.2**	**5.7**	**4.8**	**4.8**	**8.9**	**5.8**	**6.1**	**6.4**	**7.0**	**8.4**	**6.4**	**3.9**	**4.8**				
	LSI (S checks)		**4.8**	**4.4**	**7.3**	**5.0**	**7.5**	**8.1**	**7.2**	**6.5**	**5.3**	**5.1**	**9.0**	**5.8**	**5.9**	**5.8**	**7.4**	**8.6**	**6.8**	**4.0**	**4.5**				

(SI-Susceptibility Index; *No. of locations where the entry has scored ≤5 and ≤3; **Promising index (PI) based on no. of locations where the entry had scored ≤3 and ≤5)

➢ **DSN**

The Donor Screening Nursery (DSN) consisted of 217 entries including different checks. The entries were evaluated at 22 BB hot spot locations across the country. The entries were evaluated using artificial inoculation at all the centres. The frequency distribution of the disease scores and location severity indices (overall LSI and LSI of susceptible checks) are presented in Table 6.5A**.** The overall disease pressure was high (LSI: 6.0-8.0) at Maruteru (7.9), Gangavathi (7.8), Pantnagar (7.7), Pattambi (7.3), Chiplima (6.7), Raipur (6.7), Ludhiana (6.4), Cuttack (6.1), Nawagam (6.1); moderate (LSI: 3.0-6.0) at remaining all the locations except at Bikramgunj (2.6) and Sabour (2.4), where the overall LSI was less than 3.0.

The location severity index of susceptible checks was very high (>8.0) at Pantnagar (8.7) and Maruteru (8.6); high (LSI 6-8) at IIRR (7.3), Raipur (7.3), Ludhiana (7.2), Pattambi (7.2), Chiplima (7.1), Cittack (7.1), Gangavathi (6.9), Rajendranagar (6.3) and Nawagam (6.1); it was moderate (LSI 4-6) at remaining locations except at Bikramgunj (2.9) and Sabour (2.5); where the LSI of susceptible checks was less than 4.0.

For selection of the promising entries, data of those locations, where LSI of susceptible checks was less than 4.0 were not considered; accordingly, the data from Sabour and Bikramgunj were not considered for selection of promising entries in DSN. The promising entries with SI less than or equal to 4.9 and which exhibited a score of 5 at or more than 70% of the locations are presented in Table 6.5B**.** One donor viz., RP-Bio Path-3 (SI-4.0) found highly promising which performed better than resistant check, DRR Dhan 53 (SI-4.2). Other promising donors with overall SI ≤5.0 and high PI at more than 70% locations included donors *viz*., IRTR 194, RP-BIO PATHO-9, NL RBB-1, HKP ISM, JGL 41652, 1220.IRBB13, RP-BIO PATHO-5, ISHB-10, BB-42, ISHB-30, DBT-264, ISHB-6, CB MAS 22071, ISHB-12, NL RBB-3, NLR 3881 and 1220 (Table 6.5B).

Table 6.5A: Location severity index (LSI) and frequency distribution of bacterial blight scores of DSN, *Kharif'* 2025

Score	Location/Frequency of scores (0-9)																				
	ADT	**BKG**	**CHP**	**CHT**	**CTK**	**GNV**	**IIRR**	**KJT**	**LDN**	**MNC**	**MSD**	**MTU**	**NLR**	**NVS**	**NWG**	**PNT**	**PTB**	**RPR**	**RNR**	**SBR**	**TTB**	**VRN**
0	22	11	0	0	0	0	0	0	0	47	0	0	0	0	0	0	0	0	0	0	0	0
1	8	63	1	0	0	0	50	12	2	24	0	0	0	0	0	0	0	0	16	99	28	0
2	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	53	66	6	30	26	1	16	36	20	49	60	0	31	8	0	15	0	9	32	82	120	41
4	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	43	27	71	123	72	33	1	102	39	59	113	15	115	118	104	37	35	46	90	22	58	117
6	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	63	8	67	58	85	57	144	48	136	38	33	79	54	78	105	19	113	128	60	9	7	45
8	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	20	0	59	1	26	121	3	3	16	0	2	113	7	1	4	142	63	34	10	0	0	0
Total	**209**	**177**	**204**	**215**	**209**	**214**	**214**	**201**	**213**	**217**	**208**	**207**	**207**	**205**	**213**	**213**	**211**	**217**	**208**	**212**	**213**	**203**
Overall LSI	**4.8**	**2.6**	**6.7**	**5.3**	**6.1**	**7.8**	**5.3**	**4.9**	**6.4**	**3.4**	**4.8**	**7.9**	**5.4**	**5.7**	**6.1**	**7.7**	**7.3**	**6.7**	**5.2**	**2.4**	**3.4**	**5.0**
HR-12	8.0	2.0	6.5	6.0	8.0	4.8	7.0	6.5	7.5	5.0	5.0	9.0	6.3	6.3	7.0	7.5	7.0	7.5	6.5	6.0	5.5	5.0
CO-39	7.5	4	7.5	5.5	8	7.5	7	6.5	7	4.25	5	8.5	5.67	5.5	6.5	9	7.5	8	7	3	5	5.5
T(N1)	7.0	3.0	9.0	5.0	6.0	7.5	7.7	7.0	7.5	5.0	5.7	8.5	5.0	5.7	7.0	9.0	7.7	7.5	6.3	1.7	4.0	6.0
IR-50	5.5	3.3	7.0	5.5	7.0	7.5	7.5	6.0	6.5	3.8	5.5	9.0	5.5	5.7	6.5	9.0	8.5	7.5	6.5	2.0	5.0	5.5
BPT5204	3.5	2.3	9.0	3.5	7.0	8.0	7.5	4.0	7.5	4.0	5.0	8.5	5.0	6.0	5.0	9.0	6.5	7.0	6.0	1.0	3.5	4.5
Swarna	3.5	3.0	5.0	6.0	6.5	6.0	7.0	5.5	7.0	3.3	3.5	8.0	4.0	6.0	5.0	8.5	6.0	6.0	5.5	1.0	1.5	4.0
LSI (S Check)	**5.7**	**2.9**	**7.1**	**5.3**	**7.1**	**6.9**	**7.3**	**5.9**	**7.2**	**4.2**	**4.9**	**8.6**	**5.2**	**5.9**	**6.1**	**8.7**	**7.2**	**7.3**	**6.3**	**2.5**	**4.1**	**5.0**
Screening	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**

(LSI-Location severity Index; N-Natural; A-Artificial); S check- Susceptible check

Table 6.5B: DSN entries with low susceptibility index (SI ≤4.9) with score <5 to BB at or more than 70% of the locations

P.No.	Design. No.	Location/Frequency of scores (0-9)																				SI	PI (≤3)	PI (≤5)
		ADT	CHP	CHT	CTK	GNV	IIRR	KJT	LDN	MNC	MSD	MTU	NLR	NVS	NWG	PNT	PTB	RPR	RNR	TTB	VRN			
94	RP-BIO PATHO-3	0	5	5	5	7	1	1	5	0	5	5	5	5	5	7	5	7	1	1	5	**4.0**	30	85
79	IRTR 194	5	5	3	5	7	1	3	3	0	3	5	5	7	7	3	7	5	5	1	5	**4.3**	40	80
100	RP-BIO PATHO-9	1	5	5	7	5	1	1	3	3	3	7	5	7	7	5	7	7	3	1	3	**4.3**	45	70
13	NL RBB-1	0	5	3	5	5	3	5	5	0	5	5	3	7	7	7	5	7	5	1	5	**4.4**	30	80
34	HKP ISM	5	5	3	3	5	1	-	3	3	5	7	5	5	7	3	9	7	3	1	5	**4.5**	42	79
24	JGL 41652	5	5	5	3	9	3	3	3	1	3	-	5	3	7	9	7	7	3	1	3	**4.5**	53	74
41	1220.IRBB13	3	5	5	5	9	1	3	3	3	5	7	5	5	5	5	7	5	3	3	3	**4.5**	40	85
96	RP-BIO PATHO-5	3	5	5	7	7	1	1	3	3	3	5	7	7	7	5	5	7	3	1	5	**4.5**	40	70
145	ISHB-10	0	9	5	7	9	1	3	7	0	3	5	5	7	5	3	7	5	1	3	5	**4.5**	40	70
38	BB-42	3	5	3	7	9	3	1	7	1	5	7	7	5	5	5	5	5	5	1	3	**4.6**	35	75
171	ISHB-30	3	7	5	5	5	1	5	3	0	5	7	3	5	5	9	7	7	3	3	-	**4.6**	37	74
118	DBT-264	0	5	5	5	7	7	5	7	0	3	5	5	5	5	7	5	5	5	3	5	**4.7**	20	80
141	ISHB-6	3	5	3	3	9	3	3	5	3	5	7	5	3	7	9	5	7	3	3	3	**4.7**	50	75
201	CB MAS 22071	5	-	5	7	9	1	5	3	3	3	7	3	5	5	5	7	7	3	3	-	**4.8**	39	72
147	ISHB-12	3	9	5	7	9	1	5	3	1	7	7	5	5	5	5	7	3	1	3	5	**4.8**	35	70
14	NL RBB-3	0	5	3	3	7	7	5	7	1	3	5	5	7	5	9	7	5	5	3	5	**4.9**	30	70
15	NLR 3881	0	7	7	5	7	7	3	5	0	5	5	5	5	5	9	7	5	5	3	3	**4.9**	25	70
44	1220	1	7	5	3	9	3	5	7	0	7	5	3	5	5	5	9	7	5	3	5	**5.0**	30	70
213	**DRR DHAN 53**	7	9	5	5	9	1	3	1	0	3	7	7	5	5	3	5	3	1	1	3	**4.2**	50	75
153	**T(N1)**	7	9	7	7	9	7	9	9	5	7	9	5	5	7	9	7	5	7	7	7	**7.2**	0	20
	LSI	**4.8**	**6.7**	**5.3**	**6.1**	**7.8**	**5.3**	**4.9**	**6.4**	**3.4**	**4.8**	**7.9**	**5.4**	**5.7**	**6.1**	**7.7**	**7.3**	**6.7**	**5.2**	**3.4**	**5.0**			
	LSI (S checks)	**5.7**	**7.1**	**5.3**	**7.1**	**6.9**	**7.3**	**5.9**	**7.2**	**4.2**	**4.9**	**8.6**	**5.2**	**5.9**	**6.1**	**8.7**	**7.2**	**7.3**	**6.3**	**4.1**	**5.0**			

(SI-Susceptibility Index; *No. of locations where the entry has scored ≤5 and ≤3; **Promising index (PI) based on no. of locations where the entry had scored ≤3 and ≤5)

❖ TRIAL NO.7: RICE TUNGRO VIRUS DISEASE

➢ NSN-1

The national screening nursery 1 (NSN-1) trial consisting of 373 entries including checks was proposed and conducted at 2 locations *viz*., Coimbatore and IIRR. At both the locations the nursery was evaluated artificially by insect transmission tests in the glass house. The frequency distribution of disease scores and location severity indices are presented in Table 7.1A. The disease pressure recorded was high with LSI 5.6 at IIRR and LSI 5.2 at Coimbatore locations

Table 7.1A: Location severity index (LSI) and frequency distribution of Rice tungro disease scores of NSN-1, *Kharif* 2025

Score	Location/Frequency of scores (0-9)	
	CBT	IIRR
1	0	0
3	34	23
5	268	206
7	62	138
9	0	0
Total	364	367
LSI	**5.2**	**5.6**
Screening method	A	A

(N- Natural; A- Artificial)

The entries performed better than the resistant check Vikramarya and showed resistance reaction to rice tungro disease are IET 32378, 32396, 32399, 32433, 33052 (H), 31686 (H)*, 32616, 32780, 31878, 31494 (H), 32729, 32884, 31979, 31980, 32855, 32846 and 33994 (Table 7.1B).

Table 7.1B: Promising entries with low susceptibility index (<=3.0) and high PI in NSN-1 to Rice tungro disease, *Kharif* 2025

S.No	Breeding No.	Location/Frequency of scores (0-9)			SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
		IET No.	CBT	IIRR						
5	3305	32378	3	3	**3.0**	2	2	100	2	100
11	3311	32396	3	3	**3.0**	2	2	100	2	100
12	3312	32399	3	3	**3.0**	2	2	100	2	100
20	3320	32433	3	3	**3.0**	2	2	100	2	100
69	3737	33052 (H)	3	3	**3.0**	2	2	100	2	100
113	3901	31686 (H)*	3	3	**3.0**	2	2	100	2	100
141	4117	32616	3	3	**3.0**	2	2	100	2	100
159	4710	32780	3	3	**3.0**	2	2	100	2	100
167	4901	31878*	3	3	**3.0**	2	2	100	2	100
188	4301	31494 (H)*	3	3	**3.0**	2	2	100	2	100

S.No	Breeding No.	Location/Frequency of scores (0-9)			SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
		IET No.	CBT	IIRR						
233	4510	32729	3	3	**3.0**	2	2	100	2	100
259	5418	32884	3	3	**3.0**	2	2	100	2	100
275	5211	31979*	3	3	**3.0**	2	2	100	2	100
276	5212	31980*	3	3	**3.0**	2	2	100	2	100
290	5226	32855	3	3	**3.0**	2	2	100	2	100
316	5709	**32846**	3	3	**3.0**	2	2	100	2	100
319	5712	33994	3	3	**3.0**	2	2	100	2	100
362	T(N1)	T(N1)	-	7	**7.0**	1	0	0	0	0
373	Vikramarya	Vikramarya	5	3	**4.0**	2	1	50	2	100
		LSI	**5.2**	**5.6**						

(SI- Susceptibility Index; Promising Index (PI) based on percentage of locations the entry has scored ≤3 and ≤5)

- **NSN-2**

The national screening nursery 2 (NSN-2) trial consisting of 711 entries including checks was conducted only at IIRR and 5 lines did not germinate. The disease pressure recorded was high with LSI 5.6 (Table 7.2A)

Table 7.2A: Location severity index (LSI) and frequency distribution of Rice tungro disease scores of NSN-2, *Kharif* 2025

Score	Location/Frequency of scores (0-9)
	IIRR
1	0
2	0
3	29
5	434
7	243
9	0
Total	706
LSI	**5.6**
Screening method	**N**

(N- Natural; A- Artificial)

Out of 711 lines tested, only 29 lines showed score 3 and 203 lines showed 5 score against RTD. The lines that was succumbed to RTD were 410. Best performing lines included IET Nos 33506, 33507, 33508, 33509, 33510, 33511, 33512, 33513, 33514, 33515, 33516, 33517, 33518, 33519, 33520, 33521, 33522, 33523, 33524, 33525, 33526, NDR 359 (NC), 33527, 33528, 33529, 33530, 33531,33532 and 33533 (Table 7.2B).

Table 7.2B: NSN-2 entries with low susceptibility index (SI $\leq$ 3) against rice tungro disease at IIRR during *Kharif,* 2025.

S.No.	Breeding No.	IET No.	Frequency of scores (0-9)
6	3806	33506	3
7	3807	33507	3
8	3808	33508	3
9	3809	33509	3
10	3810	33510	3
11	3811	33511	3
12	3812	33512	3
13	3813	33513	3
14	3814	33514	3
15	3815	33515	3
16	3816	33516	3
17	3817	33517	3
18	3818	33518	3
19	3819	33519	3
20	3820	33520	3
21	3821	33521	3
22	3822	33522	3
23	3823	33523	3
24	3824	33524	3
25	3825	33525	3
26	3826	33526	3
27	3827	NDR 359 (NC)	3
28	3828	33527	3
29	3829	33528	3
30	3830	33529	3
31	3831	33530	3
32	3832	33531	3
33	3833	33532	3
34	3834	33533	3

(A- Artificial)

- **NHSN**

The National Hybrid Screening Nursery (NHSN) consisted of 124 entries including checks. The entries were tested at two centers viz., Coimbatore and IIRR. The frequency distribution of disease scores and LSI are presented in Table 7.3A. The disease pressure was moderate at IIRR (LSI 5.5) and at CBT (LSI 5.2).

Table 7.3A: Location severity index (LSI) and frequency distribution of Rice tungro disease scores of NHSN, *Kharif* 2025

Score	Location/Frequency of scores (0-9)	
	CBT	IIRR
0	0	0
2	0	0
3	12	19
5	86	57
7	24	48
8	0	0
Total	122	124
LSI	**5.2**	**5.5**
Screening method	**A**	**A**

(N- Natural; A- Artificial)

For the selection of promising entries both the locations were taken into consideration. The best entries which showed overall SI< 3.0 are listed in Table 7.3B. The promising entries are 34002, 34026, 34034, 31700 and 34048,

Table 7.3B: Promising entries with low susceptibility index (<=5.0) and high PI in NHSN to Rice tungro disease, *Kharif* 2025.

S.No.	Breeding No.	IET No.	Location/ Frequency of scores (0-9)			Total	<=3 *	PI (<-3)**	<=5 *	PI (<-5)**
			CBT	IIRR	SI					
9	IHRT-E-2809	34002	3	3	3.0	2	2	100	2	100
21	IHRT-E-2821	-	3	3	3.0	2	2	100	2	100
44	IHRT-ME-2917	34026	3	3	3.0	2	2	100	2	100
59	IHRT-ME-2926	34034	3	3	3.0	2	2	100	2	100
82	IHRT-M-3011	31700	3	3	3.0	2	2	100	2	100
85	IHRT-M-3014	34048	3	3	3.0	2	2	100	2	100
50	TN1	TN1	7	7	7.0	2	0	0	0	0
124	Vikramarya	Vikramarya	5	3	4.0	2	1	50	2	100
		LSI	**5.2**	**5.5**						

(SI- Susceptibility Index; Promising Index (PI) based on percentage of locations the entry has scored ≤3 and ≤5)

- **DSN**

Donor screening nursery (DSN) comprising of 217 entries including checks were tested at Coimbatore and IIRR. The frequency distribution of disease scores and LSI are presented in Table 7.4A. The disease pressure was moderate at Coimbatore (LSI 5.3) and IIRR (LSI 5.2)

Table 7.4A: Location severity index (LSI) and frequency distribution of Rice tungro disease scores of DSN, *Kharif* 2025

Score	Location/Frequency of scores (0-9)	
	CBT	IIRR
1	0	0
3	20	38
5	140	118
7	53	61
9	0	0
Total	**213**	**217**
LSI	**5.3**	**5.2**
Screening method	**A**	**A**

(N- Natural; A- Artificial)

The DSN entries that showed a moderate level of resistance to rice tungro disease are listed in Table 7.4B. The promising entries included are NLR 3889, NVSR 6529, 5559, NWGR-17008, WGL 1923, RP 6469-173, RP PATHO-5, ISHB-15, ISHB-16, ISHB-22, ISHB-31, SAH-13, SN-87 and CB MAS 2207.

Table 7.4B: Promising entries with low susceptibility index (<=3.0) and high PI in DSN to rice tungro disease, *Kharif* 2025

S.No	Breeding No.	Location/Frequency of scores (0-9)		SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
		CBT	IIRR						
16	NLR 3889	3	3	3.0	2	2	100	2	100
31	NVSR 6529	3	3	3.0	2	2	100	2	100
42	5559	3	3	3.0	2	2	100	2	100
50	NWGR-17008	3	3	3.0	2	2	100	2	100
58	WGL 1923	3	3	3.0	2	2	100	2	100
71	RP 6469-173	3	3	3.0	2	2	100	2	100
84	RP PATHO-5	3	3	3.0	2	2	100	2	100
150	ISHB-15	3	3	3.0	2	2	100	2	100
157	ISHB-16	3	3	3.0	2	2	100	2	100
163	ISHB-22	3	3	3.0	2	2	100	2	100
172	ISHB-31	3	3	3.0	2	2	100	2	100
179	SAH-13	3	3	3.0	2	2	100	2	100
187	SN-87	3	3	3.0	2	2	100	2	100
201	CB MAS 22071	3	3	3.0	2	2	100	2	100
103	T(N1)	7	7	7.0	2	0	0	0	0
217	Vikramarya	5	3	4.0	2	1	50	2	100
	LSI	**5.3**	**5.2**						

SI- Susceptibility Index; Promising Index (PI) based on percentage of locations the entry has scored ≤3 and ≤5)

❖ GLUME DISCOLOURATION

Glume discolouration (GD) was observed at four locations viz., Chatha, Lonavala, Navasari, and Nawagam during *Kharif* 2025. National screening nurseries were tested for GD under natural conditions at all the four locations.

➢ NSN-1

In NSN1, 373 entries including checks were screened against glume discolouration under natural conditions. Moderate disease pressure was observed at Nawagam (LSI 5.1), Chatha (LSI 4.8) Navasari (LSI 4.4), and Lonavala (LSI 1.1). The frequency distribution of glume discolouration scores are presented in the Table 7A.1 along with location severity indices.

Table 7A.1: Location severity index (LSI) and frequency distribution of glume discoloration scores of NSN-1, *Kharif* 2025

Score	Location/Frequency of scores (0-9)			
	CHT	LNV	NVS	NWG
0	**0**	**131**	**0**	**0**
1	1	166	0	0
2	2	0	0	0
3	64	76	126	44
4	0	0	0	0
5	205	0	213	261
6	1	0	0	0
7	31	0	21	64
8	0	0	0	0
9	1	0	0	0
Total	305	373	360	369
LSI	**4.8**	**1.1**	**4.4**	**5.1**
Screening method	N	N	N	N

(LSI-Location Severity Index; N-Natural)

The promising entries found in NSN 1 for glume discolouration are IET nos. 32505, 32654, 32944 (H), 31102(R), 31108 (R), 31973, 31980, 32980 (R), 31501, 32492, 32509, 33038 (H), 33048 (H), 32780, 31878, 32823, 32009, 32889, 31107, 31985, 32855, 28P67 (RP), 32980 (R) (Table 7A.2).

Table 7A.2: Promising entries with low susceptibility index (<=3.7) and high PI in NSN-1 to glume discoloration, *Kharif* 2025

S.No.	IET No.	Location/Frequency of scores (0-9)								
		CHT	NVS	NWG	SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
48	32505	3	3	3	3.0	3	3	100	3	100
143	32654	3	3	3	3.0	3	3	100	3	100
216	32944 (H)	3	3	3	3.0	3	3	100	3	100
265	31102* (R)	3	3	3	3.0	3	3	100	3	100
267	31108* (R)	-	3	3	3.0	2	2	100	2	100
272	31973*	3	3	3	3.0	3	3	100	3	100
276	31980*	3	3	3	3.0	3	3	100	3	100
353	32980 (R)	2	3	5	3.3	3	2	67	3	100
3	31501*	5	3	3	3.7	3	2	67	3	100
45	32492	3	5	3	3.7	3	2	67	3	100

S.No.	IET No.	Location/Frequency of scores (0-9)								
		CHT	NVS	NWG	SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
50	32509	5	3	3	3.7	3	2	67	3	100
110	33038 (H)	5	3	3	3.7	3	2	67	3	100
112	33048 (H)	3	3	5	3.7	3	2	67	3	100
159	32780	3	3	5	3.7	3	2	67	3	100
167	31878*	5	3	3	3.7	3	2	67	3	100
185	32823	5	3	3	3.7	3	2	67	3	100
247	32009*	3	5	3	3.7	3	2	67	3	100
261	32889	3	3	5	3.7	3	2	67	3	100
266	31107*	3	5	3	3.7	3	2	67	3	100
279	31985*	3	3	5	3.7	3	2	67	3	100
290	32855	3	5	3	3.7	3	2	67	3	100
310	28P67 (RP)	3	3	5	3.7	3	2	67	3	100
323	32980 (R)	5	3	3	3.7	3	2	67	3	100
103	T(N1)	7	5	7	6.3	3	0	0	1	33
	LSI	**4.8**	**4.4**	**5.1**						

(SI-Susceptibility Index; *No. of locations where the entry has scored ≤5 and ≤3;**Promising index (PI) based on no. of locations where the entry had scored ≤3 and ≤5)

- **NSN-2**

The national screening nursery 2 (NSN-2) trial consisting of 711 entries including checks was conducted only at Chatha, Navasari and Navagam. The disease pressure recorded was moderate at Nawagam (LSI 5.1), Navasari (4.8) Chatha (LSI 4.4) and (Table 7A.3).

Table 7A.3: Location severity index (LSI) and frequency distribution of glume discoloration scores of NSN-2, *Kharif* 2025

Score	Location/Frequency of scores (0-9)		
	CHT	NVS	NWG
0	**0**	**0**	**0**
1	18	3	0
2	2	0	0
3	186	197	67
4	2	0	0
5	298	352	526
6	3	0	0
7	62	138	110
8	0	0	0
9	0	1	0
Total	571	691	703
LSI	**4.4**	**4.8**	**5.1**
Screening method	**N**	**N**	**N**

(LSI-Location Severity Index; N-Natural)

Best performing lines against glume discolouration included IET nos 33587, 33606, 33507, 33535, 33445, 33452, 33581, 33662, 33688, 33793, 33777, 32019(R), 33909, 33924, 33596, 33609, 33388, 33709, 33958, 33902 and 33919 (Table 7A.4).

Table 7A.4: Promising entries with low susceptibility index (<=3.0) and high PI in NSN-2 to glume discoloration, *Kharif* 2025

S.No.	Breeding No.	IET No.	Location/Frequency of scores (0-9)								
			CHT	NVS	NWG	SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
160	4028	33587	-	1	3	**2.0**	2	2	100	2	100
180	4048	33606	1	3	3	**2.3**	3	3	100	3	100
7	3807	33507	-	-	3	**3.0**	1	1	100	1	100
36	3836	33535	-	3	3	**3.0**	2	2	100	2	100
69	3606	33445	3	3	3	**3.0**	3	3	100	3	100
76	3613	33452	3	3	3	**3.0**	3	3	100	3	100
153	4021	33581	-	3	3	**3.0**	2	2	100	2	100
313	4243	33662	-	3	3	**3.0**	2	2	100	2	100
340	4407	33688	3	3	3	**3.0**	3	3	100	3	100
518	4811	33793	3	3	3	**3.0**	3	3	100	3	100
575	4641	33777	-	3	3	**3.0**	2	2	100	2	100
660	5632	32019(R)	-	3	3	**3.0**	2	2	100	2	100
668	5640	33909	3	3	3	**3.0**	3	3	100	3	100
684	5734	33924	-	3	-	**3.0**	1	1	100	1	100
169	4037	33596	1	3	5	**3.0**	3	2	67	3	100
183	4051	33609	3	1	5	**3.0**	3	2	67	3	100
211	3410	33388	1	3	5	**3.0**	3	2	67	3	100
362	4429	33709	1	3	5	**3.0**	3	2	67	3	100
426	5924	33958	3	1	5	**3.0**	3	2	67	3	100
661	5633	33902	1	3	5	**3.0**	3	2	67	3	100
679	5729	33919	1	3	5	**3.0**	3	2	67	3	100
403	TN1	TN1	7	7	7	**7.0**	3	0	0	0	0
		LSI	**4.4**	**4.8**	**5.1**						

(SI-Susceptibility Index; *No. of locations where the entry has scored ≤5 and ≤3; **Promising index (PI) based on no. of locations where the entry had scored ≤3 and ≤5)

- **NHSN**

National Hybrid Screening Nursery (NHSN) consisted of 97 entries including checks were screened for glume discolouration reaction at 4 locations. The screening was done by natural conditions at Chatha, Lonavla, Navasari and Nawagam. The frequency distribution of disease scores and location severity indices are presented in Table 7A.5. The disease pressure was moderate at all locations viz., Nawagam (LSI 5.1), Chatha (LSI 5.0), Navasari (LSI 4.7) and Lonavala (LSI 2.1).

Table 7A.5: Location severity index(LSI) and frequency distribution of glume discoloration scores of NHSN, *Kharif* 2025

Score	Location/Frequency of scores (0-9)			
	CHT	LNV	NVS	NWG
0	0	13	0	0
1	1	56	1	0
2	0	0	0	0

Score	Location/Frequency of scores (0-9)			
	CHT	LNV	NVS	NWG
3	24	39	29	17
4	0	0	0	0
5	67	14	77	82
6	1	0	0	0
7	25	2	12	25
8	0	0	0	0
9	0	0	0	0
Total	118	124	119	124
LSI	**5.0**	**2.1**	**4.7**	**5.1**
Screening method	**N**	**N**	**N**	**N**

(LSI-Location Severity Index; N-Natural)

Some of the promising entries selected from NHSN are IET Nos. 34030, 34021, 34038, 34043, IR-50, 34049, 34050 and 34053 (Table 7A.6).

Table 7A.6: Promising entries with low susceptibility index (<=3.7) and high PI in NHSN to glume discoloration, *Kharif* 2025

S.No	Br.No	IET.No	Location/Frequency of scores (0-9)			SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
			CHT	NVS	NWG						
81	IHRT-M-3010	-	3	3	3	**3.0**	3	3	100	3	100
55	IHRT-ME-2922	34030	1	5	3	**3.0**	3	2	67	3	100
38	IHRT-ME-2911	34021	3	3	5	**3.7**	3	2	67	3	100
64	IHRT-ME-2931	34038	3	3	5	**3.7**	3	2	67	3	100
71	IHRT-M-3006	34043	3	5	3	**3.7**	3	2	67	3	100
77	IR-50	IR-50	3	3	5	**3.7**	3	2	67	3	100
87	IHRT-M-3016	34049	3	5	3	**3.7**	3	2	67	3	100
88	IHRT-M-3017	34050	3	3	5	**3.7**	3	2	67	3	100
92	IHRT-M-3021	34053	5	3	3	**3.7**	3	2	67	3	100
102	TN1	TN1	7	7	7	**7.0**	3	0	0	0	0
		LSI	**5.0**	**4.7**	**5.1**						

(SI-Susceptibility Index; *No. of locations where the entry has scored ≤5 and ≤3; **Promising index (PI) based on no. of locations where the entry had scored ≤3 and ≤5)

- **DSN**

Donor Screening Nursery (DSN) comprising of 217 entries including checks were tested against glume discolouration at 4 locations *viz.,* Chatha, Lonavala, Navasari and Nawagam. The frequency distribution of disease scores and LSI are presented in Table 7A.7. The disease pressure was moderate at Nawagam (LSI 5.1), Navasari (LSI 4.8), Chatha (LSI 4.4), and Lonavala (LSI 1.7)

Table 7A.7: Location severity index(LSI) and frequency distribution of glume discoloration scores of DSN, *Kharif* 2025

Score	Location/Frequency of scores (0-9)			
	CHT	LNV	NVS	NWG
0	0	33	0	0
1	15	108	0	0
2	2	0	0	0
3	35	62	62	22
4	0	0	0	0
5	62	14	105	155
6	0	0	0	0
7	24	0	38	36
8	0	0	0	0
9	1	0	0	0
Total	**139**	**217**	**205**	**213**
LSI	**4.4**	**1.7**	**4.8**	**5.1**
Screening method	**N**	**N**	**N**	**N**

(LSI-Location Severity Index; N-Natural)

Some of the entries that are found to be promising are SAH-15, BPT 3507, RP PATHO-4, RP-BIO PATHO-4, AE-1266, JGL 47856, 5559.IRBB5, RP 6469-171, DBT-1102, DBT-1164, AE1261, ISHB-2, ISHB-31, NPA-47, CB 22141, BPT5204, NVSR 6529, SAH-13 and NPA-70 (Table 7A.8).

Table7A.8: Promising donors with low susceptibility index (<=3.7) and high PI in DSN to glume discoloration, *Kharif* 2025

S.No	Breeding no.	Location/Frequency of scores (0-9)			SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
		CHT	NVS	NWG						
181	SAH-15	1	3	-	**2.0**	2	2	100	2	100
9	BPT 3507	-	3	-	**3.0**	1	1	100	1	100
83	RP PATHO-4	1	3	5	**3.0**	3	2	67	3	100
95	RP-BIO PATHO-4	1	5	3	**3.0**	3	2	67	3	100
133	AE-1266	2	3	5	**3.3**	3	2	67	3	100
20	JGL 47856	3	3	5	**3.7**	3	2	67	3	100
39	5559.IRBB5	3	3	5	**3.7**	3	2	67	3	100
70	RP 6469-171	3	3	5	**3.7**	3	2	67	3	100
125	DBT-1102	3	3	5	**3.7**	3	2	67	3	100
127	DBT-1164	3	5	3	**3.7**	3	2	67	3	100
130	AE1261	3	3	5	**3.7**	3	2	67	3	100
137	ISHB-2	3	3	5	**3.7**	3	2	67	3	100
172	ISHB-31	3	5	3	**3.7**	3	2	67	3	100
190	NPA-47	3	5	3	**3.7**	3	2	67	3	100

S.No	Breeding no.	Location/Frequency of scores (0-9)			SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
		CHT	NVS	NWG						
197	CB 22141	3	5	3	**3.7**	3	2	67	3	100
208	BPT5204	5	3	3	**3.7**	3	2	67	3	100
31	NVSR 6529	1	5	5	**3.7**	3	1	33	3	100
179	SAH-13	1	5	5	**3.7**	3	1	33	3	100
192	NPA-70	1	5	5	**3.7**	3	1	33	3	100
153	T(N1)	7	5	7	**6.3**	3	0	0	1	33
	LSI	**4.4**	**4.8**	**5.1**						

(SI-Susceptibility Index; *No. of locations where the entry has scored ≤5 and ≤3; **Promising index (PI) based on no. of locations where the entry had scored ≤3 and ≤5)

❖ MULTIPLE DISEASE RESISTANCE

In NSN-1, a total of 16 entries had shown resistant/moderately resistant reaction to two or more than two diseases. The IET No 33838 (MR to NB, BS, BB & GD) showed moderate resistance to four diseases and IET# 32492 (MR to LB, SHB & GD), 32823 (MR to SHB, BB & SHR) and 32780 (MR to BS, RTD & GD) showed resistance to three diseases.

The other entries viz., IET# 31972 (MR to SHB& SHR), 32467 (MR to BS&SHR), 32510 (MR to LB& SHB), 30692 (MR to NB & BS), 31452 (H) (MR to LB &NB), 31686 (H) (MR to LB &NB), 33071 (MR to LB &SHR), 32399 (MR to BB & RTD), 32421 (MR to LB & BB), 32465 (MR to BB & SHR), 32855 (MR to RTD & GD), 31480 (MR to LB &BB) showed reaction to two diseases.

Multiple disease resistant lines in NSN-1, *Kharif* -2025

Sl. No.	IET No.	Disease reaction							
		LB	NB	ShB	BS	BB	ShR	RTD	GD
1	31972	-	-	4.9	-	-	3.7	-	-
2	32467	-	-	-	4.7	-	3.4	-	-
3	32492	3.8	-	5.1	-	-	-	-	3.7
4	32510	3.9	-	4.5	-	-	-	-	-
5	32823	-	-	5.1	-	3.8	3.2	-	-
6	33838	-	3.0	-	4.6	3.5	-	-	3.7
7	30692*	-	3.6	-	4.3	-	-	-	-
8	31452 (H)*	3.9	3.6	-	-	-	-	-	-
9	31686 (H)*	3.7	3.4	-	-	-	-	-	-
10	33071 (H)	3.7	-	-	-	-	3.4	-	-
11	32399	-	-	-	-	4.5	-	3	-
12	32421	3.9	-	-	-	4.6	-	-	-
13	32465	-	-	-	-	4.8	3.4	-	-
14	32780	-	-	-	4.7	-	-	3	3.7
15	32855	-	-	-	-	-	-	3	3.7
16	31480 (H)*	3.6	-	-	-	4	-	-	-

(LB-Leaf blast; NB-Neck blast; ShB-Sheath blight; BS-Brown spot; BB-Bacterial blight; ShR-Sheath rot; RTD-Rice tungro; GD-Glume discouration)

In NSN-2, a total of 11 entries had shown resistant/moderately resistant reaction to two or more diseases. The entries IET# No. 33570 (R to NB, MR to ShB & ShR) showed reaction to three diseases. The other entries viz., IET# No. 33588 (R to NB, MR to ShB), 33704 (R to NB, MR to ShB), 33711 (R to NB, MR to ShB), 33563 (R to NB, MR to BB), 33591 (R to NB, MR to BB), 33582 (MR to BS & ShR), 33457 (MR to LB & BB), 33507 (MR to ShB & GD), 33609 (MR to BB & GD) and 33616 (MR to BB & ShR) showed reaction to two diseases.

Multiple disease resistant lines in NSN-2, *Kharif* -2025

Sl. No.	IET No.	Disease reaction						
		LB	NB	ShB	BS	BB	ShR	GD
1	33570	-	2.0	4.9	-	-	3.3	-
2	33582	-	-		4.7	-	3.3	-
3	33588	-	2.5	5.0	-	-	-	-
4	33704	-	2.3	5.0	-	-	-	-
5	33711	-	2.5	4.4	-	-	-	-
6	33457	4.0	-		-	5	-	-
7	33507	-	-	4.8	-	-	-	3
8	33563	-	2.8		-	4.9	-	-
9	33591	-	2.5		-	5.1	-	-
10	33609	-	-		-	4.9	-	3
11	33616	-	-		-	4.6	3.3	-

(LB-Leaf blast; NB-Neck blast; ShB-Sheath blight; BS-Brown spot; BB-Bacterial blight; ShR-Sheath rot; RTD-Rice tungro; GD-Glume discouration)

In NSN-H, a total of 19 entries had shown resistant (R)/moderately resistant (MR) reaction to two or more diseases. The entry IET# No. 33364 (R to NB, MR to LB, BS & BB) showed reaction to four diseases. The entries IET# No. 33335 (R to NB, MR to ShB & BS), 33342 (R to NB & MR to LB & BB) and 33362 (R to NB & MR to LB & BB) showed reaction to three diseases.

The other entries viz., IET# No. 31386 (MR to ShB & BS), 32317 (MR to BS & BB), 32333 (R to NB & MR to ShB), 32340 (MR to LB & BS), 32356 (MR to LB & BS), 33336 (R to NB & MR to ShB), 33340 (MR to ShB & BB), 33341 (MR to LB & BS), 33343 (MR to LB & BB), 33345 (MR to LB & ShB), 33351 (MR to LB & R to NB), 33357 (MR to ShB & BB), 33363 (MR to LB & ShB), 33374 (R to NB & MR to ShB) and 33376 (R to NB & MR to LB) showed reaction to two diseases.

Multiple disease resistant lines in NSN-H, *Kharif* -2025

Sl. No.	IET No.	Disease reaction				
		LB	NB	ShB	BS	BB
1	31386	-	-	5.0	5.2	-
2	32317	-	-	-	5.0	5.5
3	32333	-	3.0	5.0	-	-
4	32340	3.4	-	-	5.0	-
5	32356	4.0	-	-	5.0	-
6	33335	-	3.0	5.0	5.2	-
7	33336	-	3.0	5.0	-	-
8	33340	-	-	5.0	-	6.0
9	33341	3.7	-	-	5.0	-
10	33342	3.4	3.0	-	-	4.5
11	33343	3.7	-	-	-	6.0
12	33345	3.9	-	5.0	-	-
13	33351	3.9	3.0	-	-	-

Sl. No.	IET No.	Disease reaction				
		LB	NB	ShB	BS	BB
14	33357	-	-	4.5	-	6.0
15	33362	3.8	3.0	-	-	6.0
16	33363	3.3	-	5.0	-	-
17	33364	3.1	3.0	-	5.2	6.0
18	33374	-	3.0	5.0	-	-
19	33376	3.9	3.0	-	-	-

(LB-Leaf blast; NB-Neck blast; ShB-Sheath blight; BS-Brown spot; BB-Bacterial blight)

In NHSN, a total of 28 entries had shown resistant (R)/moderately resistant (MR) reaction to two or more diseases. The entries IET# No. 32596 (R to NB, MR to LB, BB & RTD), 34025 (MR to LB, BS, BB & RTD) and 34047 (R to NB, MR to LB, ShR & RTD) showed reaction to four diseases. The entries IET No. 34013 (R to NB, MR to LB & ShB), 34018 (MR to ShB, BB & ShR), 34021 (MR to LB, BS & GD), 34024 (MR to BB, ShR & RTD), 34026 (MR to LB & NB, R to RTD), 34028 (MR to ShB, BB & ShR), 34030 (R to NB, MR to ShB & GD), 34032 (MR to LB, NB & BB), 34037 (MR to NB, ShB & BS), 34042 (MR to ShB, BS & BB), 34052 (MR to LB, ShB & BB) and 34060 (MR to ShB, BS & BB) showed reaction to three diseases.

The other entries viz., IET# No. 31700 (MR to LB & R to RTD), 34002 (MR to BS & R to RTD), 34014 (MR to LB & NB), 34015 (MR to LB & ShB), 34016 (MR to LB & NB), 34023 (MR to BB & ShR), 34027 (MR to NB, BS & RTD), 34038 (MR to BS & GD), 34039 (MR to BS & ShR), 34043 (MR to BS & GD), 34048 (MR to ShR & R to RTD), 34049 (MR to ShB & GD) and 34055 (MR to ShB & ShR) showed reaction to two diseases.

Multiple disease resistant lines in NHSN, *Kharif* -2025

Sl. No.	IET No.	Disease reaction							
		LB	NB	ShB	BS	BB	ShR	RTD	GD
1	31700	4.1	-	-	-	-	-	3.0	-
2	32596	4.0	3.0	-	-	5.2	-	4.0	-
3	34002	-	-	-	4.9	-	-	3.0	-
4	34013	3.7	2.5	4.9	-	-	-	-	-
5	34014	3.8	3.3	-	-	-	-	-	-
6	34015	3.7	-	5.0	-	-	-	-	-
7	34016	4.1	3.5	-	-	-	-	-	-
8	34018	-	-	5.0	-	5.1	4.5	-	-
9	34021	3.8	-	-	5.0	-	-	-	3.7
10	34023	-	-	-	-	5.5	4.3	-	-
11	34024	-	-	-	-	4.3	4.3	4.0	-
12	34025	3.8	-	-	4.3	4.8	-	4.0	-
13	34026	3.7	3.8	-	-	-	-	3.0	-
14	34027	-	3.5	-	4.5	-	-	4.0	-
15	34028	-	-	5.1	-	5.3	4.8	-	-
16	34030	-	3.0	5.0	-	-	-	-	3.0
17	34032	4.0	3.5	-	-	5.5	-	-	-

Sl. No.	IET No.	Disease reaction							
		LB	NB	ShB	BS	BB	ShR	RTD	GD
18	34037	-	3.5	5.1	4.8	-	-	-	-
19	34038	-	-	-	4.6	-	-	-	3.7
20	34039	-	-	-	4.5	-	4.1	-	-
21	34042	-	-	5.0	4.9	5.3	-	-	-
22	34043	-	-	-	5.0	-	-	-	3.7
23	34047	4.1	3.0	-	-	-	4.8	4.0	-
24	34048	-	-	-	-	-	4.8	3.0	-
25	34049	-	-	4.4	-	-	-	-	3.7
26	34052	4.1	-	5.1	-	5.0	-	-	-
27	34055	-	-	4.5	-	-	3.9	-	-
28	34060	-	-	5.1	5.0	5.5	-	-	-

(LB-Leaf blast; NB-Neck blast; ShB-Sheath blight; BS-Brown spot; BB-Bacterial blight; ShR-Sheath rot; RTD-Rice tungro; GD-Glume discolouration)

In DSN, a total of 37 entries had shown resistant (R)/moderately resistant (MR) reaction to two or more diseases. The entry NLR 3881 (R to NB, MR to ShB & BS, RTD) and NL RBB-1 (MR to LB, NB, ShB & ShR), showed reaction to four diseases. The entries IET No. 5559 (MR to NB & ShR, R to RTD), JGL 47856 (MR to NB & BS, GD), BPT 3270 (MR to NB, ShB & BS), BPT 3507 (R to LB & RTD, MR to BS), CB 22141 (MR to ShB & ShR, GD), ISHB-8 (MR to ShB & ShR, RTD), NLR 3889 (MR to ShB & ShR, R to RTD), NVSR 6529 (R to NB & RTD, MR to GD) and RTCNP-120 (MR to LB, ShR & RTD), showed reaction to three diseases.

The other entries viz., IET# No. AE1261 (MR to RTD & GD), BPT 3278 (MR to LB & BS), BPT 3354 (R to NB & MR to BS), BPT 3607 (MR to NB & ShB), BPT 3745 (MR to NB & ShB), DBT-1129 (MR to ShB & ShR), HKP-MLL-93R-2 (MR to LB & BS), HKP-MLL-93R-39 (MR to LB & BS), HKP-MLL-93R-57 (MR to LB & R to NB), ISHB-10 (MR to ShB & ShR), ISHB-16 (R to NB & RTD), ISHB-17 (MR to NB & ShB), ISHB-2 (MR to ShB & GD), ISHB-31 (R to RTD & MR to GD), ISHB-9 (MR to ShB & ShR), NLR 3774 (MR to LB & R to NB), NLR 3895 (MR to ShB & ShR), NWGR-17008 (MR to NB & R to RTD), RP 6469-171 (MR to RTD & GD), RP 6469-173 (MR to LB & R to RTD), RP PATHO-2 (MR to LB & RTD), RP-BIO PATHO-3 (MR to LB & BS), RP-BIO PATHO-4 (MR to RTD & R to GD), SAH-13 (R to RTD & MR to GD), SAH-15 (MR to LB & R to GD) and SAH-21 (MR to ShB & ShR) showed reaction to two diseases.

Multiple disease resistant lines in DSN, *Kharif* -2025

Sl. No.	IET No.	Disease Reaction						
		LB	NB	ShB	BS	ShR	RTD	GD
1	5559	-	3.5	-	-	3.6	3.0	-
2	JGL 47856	-	3.5	-	4.6	-	-	3.7
3	AE1261	-	-	-	-	-	4.0	3.7
4	BPT 3270	-	3.5	5.1	4.4	-	-	-
5	BPT 3278	3.7	-	-	4.0	-	-	-
6	BPT 3354	-	3.0	-	4.5	-	-	-

Sl. No.	IET No.	Disease Reaction						
		LB	NB	ShB	BS	ShR	RTD	GD
7	BPT 3507	2.8	-	-	3.3	-	-	3.0
8	BPT 3607	-	3.5	5.2	-	-	-	-
9	BPT 3745	-	3.5	5.0	-	-	-	-
10	CB 22141	-	-	5.1	-	3.6	-	3.7
11	DBT-1129	-	-	5.2	-	4.0	-	-
12	HKP-MLL-93R-2	3.9	-	-	4.6	-	-	-
13	HKP-MLL-93R-39	3.7	-	-	4.6	-	-	-
14	HKP-MLL-93R-57	3.9	3.0	-	-	-	-	-
15	ISHB-10	-	-	4.9	-	4.0	-	-
16	ISHB-16	-	3.0	-	-	-	3.0	-
17	ISHB-17	-	3.5	5.0	-	-	-	-
18	ISHB-2	-	-	5.0	-	-	-	3.7
19	ISHB-31	-	-	-	-	-	3.0	3.7
20	ISHB-8	-	-	5.2	-	3.3	4.0	-
21	ISHB-9	-	-	5.2	-	4.0	-	-
22	NL RBB-1	3.9	3.5	4.7	-	5.2	-	-
23	NLR 3774	3.2	3.0	-	-	-	-	-
24	NLR 3881	-	3.0	4.7	4.3	-	4.0	-
25	NLR 3889	-	-	5.2	-	3.6	3.0	-
26	NLR 3895	-	-	4.8	-	4.0	-	-
27	NVSR 6529	-	3.0	-	-	-	3.0	3.7
28	NWGR-17008	-	3.5	-	-	-	3.0	-
29	RP 6469-171	-	-	-	-	-	4.0	3.7
30	RP 6469-173	4.0	-	-	-	-	3.0	-
31	RP PATHO-2	3.7	-	-	-	-	4.0	-
32	RP-BIO PATHO-3	3.7	-	-	4.6	-	-	-
33	RP-BIO PATHO-4	-	-	-	-	-	4.0	3.0
34	RTCNP-120	4.0	-	-	-	3.8	4.0	-
35	SAH-13	-	-	-	-	-	3.0	3.7
36	SAH-15	4.0	-	-	-	-	-	2.0
37	SAH-21	-	-	4.9	-	4.0	-	-

(LB-Leaf blast; NB-Neck blast; ShB-Sheath blight; BS-Brown spot; BB-Bacterial blight; ShR-Sheath rot; RTD-Rice tungro; GD-Glume discolouration)

II: FIELD MONITORING OF VIRULENCE

❖ TRIAL NO.8: LEAF BLAST - *Pyricularia oryzae*

The experiment was conducted at 21 locations across India during *Kharif* 2025 to monitor the virulence pattern of *Pyricularia oryzae* population, the causal pathogen of rice blast. The nursery included 39 cultivars consisting of near isogenic lines, international differentials, donors and commercial cultivars possessing different gene/gene combinations for blast resistance. Susceptible checks (HR 12, CO-39) and resistant check (Tetep, Rasi, IR 64) were also included in the trial. The reaction of 39 differentials at twenty-five locations during the crop season on blast reaction is presented in Table 8.1. The disease pressure was high (LSI>6.0) at Lonavala (LSI 6.3). The location severity index was moderate (LSI 5-6) at Almora, Coimbatore, Gudalur, Hazaribagh, Khudwani, Navasari, Nawagam and Uppershillong. The overall disease pressure was less than 5.0 at Bikramgunj, Gangavathi, IIRR, Karjat, Mandya, Mugad, New Delhi, Pattambi, Rajendranagar and Ranchi. Significant spatial variation in virulence was evident, with locations such as Lonavara, Hazaribagh**,** Navasari, Coimbatore, Gudalur showing higher disease pressure and greater gene breakdown, whereas IIRR, Mugad, Rajendranagar**,** exhibited comparatively lower virulence levels. The severity trends are depicted in Table 8.1 and Fig. 8.1A. Differentials such as Tetep, RP BioPath-3, Tadukan, IR-64, Raminad str-3, RP BioPath-2, PRS-58, Zenith, RP BioPath-1, RP BioPath-4 exhibited moderate to high resistance across locations, with a severity index (SI) of ≤4.0. Tetep emerged as the most stable genotype across the environments, with a low severity index (SI 2.5), showing resistance at the majority of locations (PI_3 - 86%, PI_5 - 95%). Tetep demonstrated high resistance at 18 locations; it was moderately resistant at Pattambi and New Delhi; while it was moderately susceptible at Ranchi.

RP BioPath-3 (Pi2) also demonstrated consistent resistance reaction across the 60% of the locations with SI of 3.3. It showed resistant to moderate resistance reactions across all the locations (PI5 95%) except at Lonavala, where it showed susceptible reaction. Tadukan (Pi-ta) and IR 64 exhibited moderate resistance, though occasional susceptibility was observed at certain locations. RP BioPath-3, RP BioPath-1, RP Patho lines possessing Pi2 gene maintained relatively stable resistance across locations, indicating its continued effectiveness against prevailing pathogen populations. This gene conferred resistance to most isolates except at Bikramgunj, Coimbatore, Gudalur, Hazaribagh, Khudwani and Uppershillong where it showed moderate susceptible to susceptible reaction. The susceptible checks, HR-12 and Co-39, exhibited susceptibility at most locations; except at Mugad, and Bikramgunj, HR 12 showed resistance to moderate resistant reaction. The resistant check, Rasi, showed a range of reactions from moderately resistant to susceptible across locations, with susceptibility at Almora, Hazaribagh, Mandya, Navasari, Rajendranagar. Other resistant check IR 64 was found to be susceptible at Navasari, Nawagam, New Delhi and Bikramgunj.

Table 8.1: Reaction of rice differentials to *Pyricularia oryzae* across the locations in India during *Kharif* -2025

Differentials		ALM	BKJ	CBT	GNV	GDL	HZB	IIRR	IMP	JDP	KJT	KHD	SI	<=3*	<=5*	Total	PI 3	PI 5
Tetep	*Pi-kh+*	2.0	1.0	3.0	1.5	3.0	3.0	1.0	3.0	1.0	2.0	2.0	**2.5**	**18**	**20**	**21**	**86**	**95**
RP Biopatho-3	*Pi2*	4.5	3.0	3.0	2.5	3.0	4.0	3.0	4.0	4.5	4.0	4.0	**3.3**	**13**	**20**	**21**	**62**	**95**
Tadukan	*Pi-ta*	3.0	7.0	-	3.5	-	4.0	2.0	4.5	3.0	1.5	5.0	**3.5**	**10**	**17**	**19**	**53**	**89**
IR - 64	Resistant	4.0	7.0	2.5	2.0	3.0	4.0	3.0	5.0	2.5	3.0	4.0	**3.7**	**11**	**17**	**21**	**52**	**81**
Raminad -STR -3	-	5.0	5.0	5.0	5.5	5.0	5.0	2.0	6.0	2.5	4.5	6.0	**3.9**	**7**	**17**	**21**	**33**	**81**
RP Biopatho-2	*Pi54*	2.5	3.0	6.5	3.0	6.0	4.0	3.0	3.5	4.5	4.0	5.0	**3.9**	**9**	**17**	**21**	**43**	**81**
PRS-58	*Pi9*	3.5	2.0	5.0	2.5	5.0	5.0	3.0	5.0	4.5	4.5	5.0	**4.0**	**8**	**19**	**21**	**38**	**90**
Zenith	*Pi-z + Pi-a + Pi-i*	6.0	6.0	6.0	2.5	6.0	6.0	3.0	3.0	0.5	5.5	3.5	**4.0**	**7**	**15**	**21**	**33**	**71**
RP Biopatho-1	*Pi2*	3.0	3.0	5.5	2.0	5.0	4.0	3.0	4.0	3.5	4.5	4.0	**4.0**	**7**	**17**	**21**	**33**	**81**
RP Biopatho-4	*Pi54*	2.0	4.0	4.5	1.5	4.5	4.0	2.0	4.0	3.5	5.5	4.0	**4.0**	**6**	**17**	**21**	**29**	**81**
PRS-17	*(Pi9+Pi54)*	3.5	4.0	6.0	3.5	6.0	6.0	2.0	4.5	3.5	2.5	6.0	**4.1**	**6**	**15**	**21**	**29**	**71**
RP Patho-3	*Pi54*	6.0	5.0	5.0	3.5	5.0	4.0	3.0	4.5	2.5	5.0	5.0	**4.1**	**6**	**19**	**21**	**29**	**90**
PRS-59	*Pi9*	2.0	4.0	6.0	5.0	6.0	6.0	3.0	4.0	5.5	3.5	5.0	**4.3**	**5**	**13**	**21**	**24**	**62**
PRS-50	*Pi54*	4.0	3.0	6.5	4.5	6.0	4.0	3.0	3.5	5.0	4.5	6.0	**4.3**	**7**	**15**	**21**	**33**	**71**
RIL - 10	*Pi-12*	7.5	5.0	3.0	3.0	3.0	6.0	3.0	-	4.5	2.5	5.0	**4.3**	**8**	**14**	**20**	**40**	**70**
NP - 125	-	4.5	6.0	4.5	4.5	5.0	7.0	3.0	5.0	3.5	3.5	4.5	**4.4**	**5**	**17**	**21**	**24**	**81**
BL-122	*Pi-1 + Pi-2*	5.5	5.0	5.5	2.0	5.5	5.0	3.0	5.0	3.5	3.5	4.0	**4.4**	**4**	**15**	**21**	**19**	**71**
RP Patho-8	*Pi2*	4.0	5.0	4.5	4.5	4.0	5.0	3.0	4.5	5.5	5.0	4.5	**4.5**	**5**	**17**	**21**	**24**	**81**
Dular	*Pi-ka+*	5.5	4.0	7.5	3.5	7.5	7.0	2.0	5.5	3.0	4.5	5.0	**4.5**	**5**	**15**	**21**	**24**	**71**
Rasi	Resistant	7.0	5.0	4.0	3.5	4.0	7.0	3.0	3.5	4.0	2.5	4.0	**4.5**	**3**	**16**	**21**	**14**	**76**
C101 A51	*Pi-2*	4.5	6.0	6.0	2.0	6.5	7.0	3.0	3.0	4.5	2.0	6.0	**4.6**	**6**	**12**	**20**	**30**	**60**
C101 LAC	*Pi-1*	5.5	5.0	5.0	3.0	5.0	6.0	2.0	5.0	6.0	2.0	5.0	**4.6**	**6**	**15**	**21**	**29**	**71**
RP Patho-2	*Pi2*	4.5	5.0	7.0	2.5	7.0	5.0	3.0	4.0	2.0	4.5	5.0	**4.6**	**5**	**16**	**21**	**24**	**76**
RIL - 29	*Pi-7*	6.0	7.0	4.5	3.0	5.0	4.0	3.0	3.5	5.5	2.5	5.5	**4.6**	**5**	**12**	**21**	**24**	**57**
RP Patho-7	*Pi1*	5.0	4.0	5.0	3.5	5.0	5.0	3.0	5.0	3.5	5.0	7.0	**4.7**	**6**	**16**	**21**	**29**	**76**
BL-245	*Pi-2 + Pi-4*	5.5	4.0	5.5	5.5	5.0	7.0	3.0	4.0	5.0	2.5	5.0	**4.7**	**3**	**16**	**21**	**14**	**76**
RP Patho-1	*Pi1*	5.0	4.0	6.0	2.5	6.0	5.0	3.0	4.5	2.5	5.5	5.0	**4.7**	**4**	**14**	**21**	**19**	**67**
O. minuta	*Pi-9*	7.0	6.0	5.5	3.5	5.5	4.0	3.0	4.0	3.0	4.5	5.0	**4.8**	**6**	**12**	**21**	**29**	**57**
Kanto - 51	*Pi-k*	4.0	5.0	7.0	5.5	7.0	6.0	2.0	4.5	3.5	4.0	7.0	**4.9**	**3**	**13**	**21**	**14**	**62**
C101 TTP	*Pi-4b*	7.5	5.0	5.5	2.5	5.5	6.0	2.0	3.0	5.0	2.0	6.0	**4.9**	**5**	**11**	**21**	**24**	**52**
C101 PKT	*Pi-3*	5.0	7.0	5.0	2.5	5.0	6.0	3.0	4.5	5.0	2.5	5.0	**4.9**	**4**	**13**	**21**	**19**	**62**
A 57	*Pi-1 + Pi-2 + Pi-4*	5.5	6.0	5.0	6.0	5.0	7.0	3.0	4.0	4.0	1.5	5.0	**4.9**	**3**	**14**	**21**	**14**	**67**
RP Patho-9	*Pi54*	5.5	6.0	4.5	2.5	4.5	5.0	3.0	5.5	6.0	4.0	4.0	**5.1**	**4**	**12**	**21**	**19**	**57**
Calaro	*Pi-ks*	7.0	5.0	7.0	5.0	7.0	7.0	3.0	5.0	5.0	5.0	7.0	**5.2**	**3**	**14**	**21**	**14**	**67**
C104 PKT		7.0	6.0	5.0	3.5	5.0	8.0	3.0	3.5	5.5	2.0	5.0	**5.5**	**3**	**9**	**21**	**14**	**43**
USEN	*Pi-a+*	8.0	5.0	6.5	2.5	6.5	9.0	2.0	4.0	4.5	4.0	6.0	**5.5**	**4**	**10**	**21**	**19**	**48**
Shi-tia-tao	*Pi-ks*	7.0	7.0	6.5	6.0	6.5	9.0	3.0	4.0	5.5	4.0	8.0	**5.7**	**3**	**6**	**21**	**14**	**29**
Co - 39	Susceptible	6.5	4.0	7.5	5.5	7.0	8.0	3.0	5.0	7.5	7.5	8.0	**6.5**	**2**	**6**	**21**	**10**	**29**
HR - 12	Susceptible	6.0	5.0	8.0	5.5	8.0	9.0	9.0	6.0	7.5	7.0	7.0	**7.3**	**1**	**2**	**21**	**5**	**10**
	Min score	2.0	1.0	2.5	1.5	3.0	3.0	1.0	3.0	0.5	1.5	2.0						
	Max Score	8.0	7.0	8.0	6.0	8.0	9.0	9.0	6.0	7.5	7.5	8.0						
	LSI	**5.1**	**4.8**	**5.4**	**3.5**	**5.4**	**5.7**	**2.9**	**4.3**	**4.1**	**3.8**	**5.2**						

(Contd.) Table 8.1: Reaction of rice differentials to *Pyricularia oryzae* at across the locations in India during *Kharif* -2025

Differentials		LNV	MND	MGD	NVS	NWG	NDL	PTB	RNR	RNC	USG	SI	<=3*	<=5*	Total	PI 3	PI 5
Tetep	*Pi-kh+*	1.5	0.0	1.0	3.0	3.0	5.0	4.5	2.0	6.0	3.0	**2.5**	**18**	**20**	**21**	**86**	**95**
RP Biopatho-3	*Pi2*	6.5	1.5	3.0	4.5	3.0	1.0	3.0	2.0	1.5	3.0	**3.3**	**13**	**20**	**21**	**62**	**95**
Tadukan	*Pi-ta*	2.5	1.0	3.0	3.5	3.0	5.0	3.0	1.5	5.0	6.0	**3.5**	**10**	**17**	**19**	**53**	**89**
IR - 64	Resistant	4.5	1.5	1.0	6.5	6.0	7.0	3.0	2.0	3.5	2.0	**3.7**	**11**	**17**	**21**	**52**	**81**
Raminad -STR -3	-	2.5	1.5	1.0	3.5	3.0	0.0	4.0	6.0	5.0	4.0	**3.9**	**7**	**17**	**21**	**33**	**81**
RP Biopatho-2	*Pi54*	7.5	1.5	3.0	6.5	3.5	5.0	3.0	1.5	2.0	4.0	**3.9**	**9**	**17**	**21**	**43**	**81**
PRS-58	*Pi9*	8.0	0.0	3.0	6.0	5.0	2.0	3.0	4.5	2.0	5.0	**4.0**	**8**	**19**	**21**	**38**	**90**
Zenith	*Pi-z + Pi-a + Pi-i*	5.0	3.5	3.0	4.0	3.5	3.0	4.0	3.5	2.0	4.0	**4.0**	**7**	**15**	**21**	**33**	**71**
RP Biopatho-1	*Pi2*	7.0	1.5	3.0	4.5	6.0	2.0	4.0	4.0	6.5	4.0	**4.0**	**7**	**17**	**21**	**33**	**81**
RP Biopatho-4	*Pi54*	8.0	0.0	5.0	5.5	4.5	5.0	4.0	3.0	6.5	3.0	**4.0**	**6**	**17**	**21**	**29**	**81**
PRS-17	*(Pi9+Pi54)*	7.0	0.0	3.0	5.5	4.5	5.0	4.0	3.5	3.0	3.0	**4.1**	**6**	**15**	**21**	**29**	**71**
RP Patho-3	*Pi54*	9.0	2.5	3.0	3.5	5.0	2.0	4.0	1.0	3.5	5.0	**4.1**	**6**	**19**	**21**	**29**	**90**
PRS-59	*Pi9*	7.0	0.0	3.0	5.5	5.5	2.0	3.5	6.0	3.5	4.0	**4.3**	**5**	**13**	**21**	**24**	**62**
PRS-50	*Pi54*	7.0	1.5	3.0	4.5	4.5	2.0	3.0	6.0	3.0	6.0	**4.3**	**7**	**15**	**21**	**33**	**71**
RIL - 10	*Pi-12*	5.5	7.5	1.0	5.5	4.5	3.0	5.0	2.0	4.0	6.0	**4.3**	**8**	**14**	**20**	**40**	**70**
NP - 125	-	5.5	2.5	3.0	5.5	4.5	5.0	4.0	2.5	3.0	5.0	**4.4**	**5**	**17**	**21**	**24**	**81**
BL-122	*Pi-1 + Pi-2*	6.0	3.5	3.0	5.5	5.0	4.0	5.0	2.5	5.5	5.0	**4.4**	**4**	**15**	**21**	**19**	**71**
RP Patho-8	*Pi2*	9.0	2.5	3.0	6.5	3.5	4.0	3.0	3.0	6.0	4.0	**4.5**	**5**	**17**	**21**	**24**	**81**
Dular	*Pi-ka+*	3.5	2.0	3.0	5.5	5.0	5.0	3.0	4.0	4.5	5.0	**4.5**	**5**	**15**	**21**	**24**	**71**
Rasi	Resistant	4.5	6.5	1.0	7.0	5.0	5.0	4.0	7.0	4.0	4.0	**4.5**	**3**	**16**	**21**	**14**	**76**
C101 A51	*Pi-2*	5.5	5.5	1.0	4.5	4.0	5.0	4.0	-	2.0	9.0	**4.6**	**6**	**12**	**20**	**30**	**60**
C101 LAC	*Pi-1*	5.0	4.5	3.0	6.0	5.0	7.0	5.0	1.5	2.5	7.0	**4.6**	**6**	**15**	**21**	**29**	**71**
RP Patho-2	*Pi2*	8.0	3.5	5.0	5.0	4.0	2.0	4.0	3.0	6.5	6.0	**4.6**	**5**	**16**	**21**	**24**	**76**
RIL - 29	*Pi-7*	5.5	3.5	1.0	6.5	4.0	7.0	5.0	2.5	6.0	7.0	**4.6**	**5**	**12**	**21**	**24**	**57**
RP Patho-7	*Pi1*	9.0	2.5	5.0	7.0	5.5	7.0	3.0	3.0	2.5	3.0	**4.7**	**6**	**16**	**21**	**29**	**76**
BL-245	*Pi-2 + Pi-4*	4.5	4.5	5.0	4.5	5.5	5.0	5.0	3.0	4.5	5.0	**4.7**	**3**	**16**	**21**	**14**	**76**
RP Patho-1	*Pi1*	9.0	4.5	5.0	6.0	6.0	5.0	4.0	3.5	1.0	6.0	**4.7**	**4**	**14**	**21**	**19**	**67**
O. minuta	*Pi-9*	6.5	7.5	3.0	6.5	5.0	3.0	6.0	3.0	5.5	3.0	**4.8**	**6**	**12**	**21**	**29**	**57**
Kanto - 51	*Pi-k*	4.5	4.0	3.0	5.0	6.0	7.0	4.5	2.0	4.5	6.0	**4.9**	**3**	**13**	**21**	**14**	**62**
C101 TTP	*Pi-4b*	5.5	6.5	3.0	5.0	5.0	7.0	5.0	5.5	5.5	5.0	**4.9**	**5**	**11**	**21**	**24**	**52**
C101 PKT	*Pi-3*	5.5	4.5	5.0	6.0	5.5	7.0	4.0	2.5	6.0	7.0	**4.9**	**4**	**13**	**21**	**19**	**62**
A 57	*Pi-1 + Pi-2 + Pi-4*	5.0	3.5	5.0	6.5	5.0	5.0	3.0	6.0	4.5	8.0	**4.9**	**3**	**14**	**21**	**14**	**67**
RP Patho-9	*Pi54*	9.0	6.5	5.0	4.5	7.0	7.0	5.0	3.0	2.0	8.0	**5.1**	**4**	**12**	**21**	**19**	**57**
Calaro	*Pi-ks*	7.5	4.5	3.0	4.5	5.0	5.0	5.0	2.0	4.5	6.0	**5.2**	**3**	**14**	**21**	**14**	**67**
C104 PKT		8.5	7.5	3.0	6.5	6.0	7.0	6.0	6.0	4.0	7.0	**5.5**	**3**	**9**	**21**	**14**	**43**
USEN	*Pi-a+*	8.5	8.5	3.0	6.5	5.0	7.0	4.0	2.0	6.0	7.0	**5.5**	**4**	**10**	**21**	**19**	**48**
Shi-tia-tao	*Pi-ks*	5.5	5.5	5.0	6.5	7.0	7.0	6.0	1.5	2.0	7.0	**5.7**	**3**	**6**	**21**	**14**	**29**
Co - 39	Susceptible	8.5	7.5	5.0	7.5	7.5	9.0	6.0	3.0	7.5	5.0	**6.5**	**2**	**6**	**21**	**10**	**29**
HR - 12	Susceptible	7.5	8.5	3.0	7.0	8.5	9.0	7.0	8.0	8.0	8.0	**7.3**	**1**	**2**	**21**	**5**	**10**
	Min score	1.5	0.0	1.0	3.0	3.0	0.0	3.0	1.0	1.0	2.0						
	Max Score	9.0	8.5	5.0	7.5	8.5	9.0	7.0	8.0	8.0	9.0						
	LSI	**6.3**	**3.7**	**3.2**	**5.5**	**5.0**	**4.9**	**4.2**	**3.4**	**4.2**	**5.3**						

Hierarchical clustering based on virulence patterns of *Magnaporthe oryzae* grouped the isolates from 21 locations into three major clusters at a 30% dissimilarity coefficient (Fig 8.1B). The isolate from Navasari and Lonavala are more severe unique, exhibited greater divergence and tended to form independent clusters at lower dissimilarity levels. Isolates from Coimbatore, Gudalur, Navasari and Lonavala formed a distinct cluster with greater divergence, suggesting the presence of highly virulent and unique pathogen populations. In contrast, isolates from IIRR, Mugad, Imphal, Karjat, Pattambi, Gangavathi and Jagdalpur formed a closely related cluster, indicating similar and relatively low virulence patterns. The remaining nine intermediate clusters comprising isolates *viz*., Nawagam, Khudwani, New Delhi, Bikramgunj, Ranchi, Mandya, Uppershillong, Almora and Hazaribagh exhibited moderate virulence reaction. The study highlights geographical variability in *Pyricularia oryzae* virulence, with Lonavala, Navasari, Coimbatore, Gudalur, Almora, Hazaribagh, Khudwani emerging as hotspots for high disease pressure. While Tetep, RP BioPath-3, Tadukan, IR 64, Raminad str-3, RP BioPath-2 demonstrated stable resistance. The breakdown of resistance in Rasi and IR 64 at certain locations suggests potential shifts in the pathogen population. This information is crucial for breeding programs and disease management strategies.

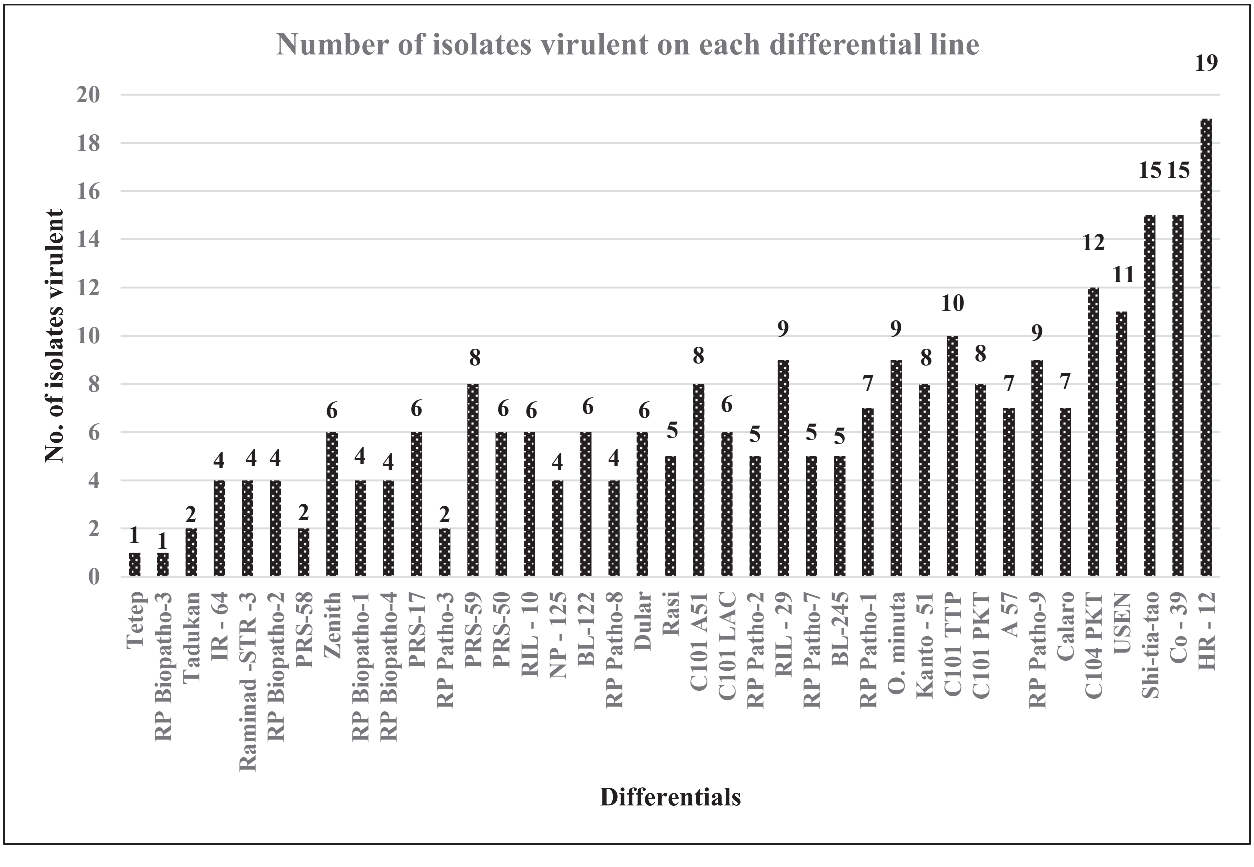

Figure 8.1A: Differential reaction of hosts to rice blast pathogen (*Pyricularia oryzae)* at different locations - *Kharif* 2025

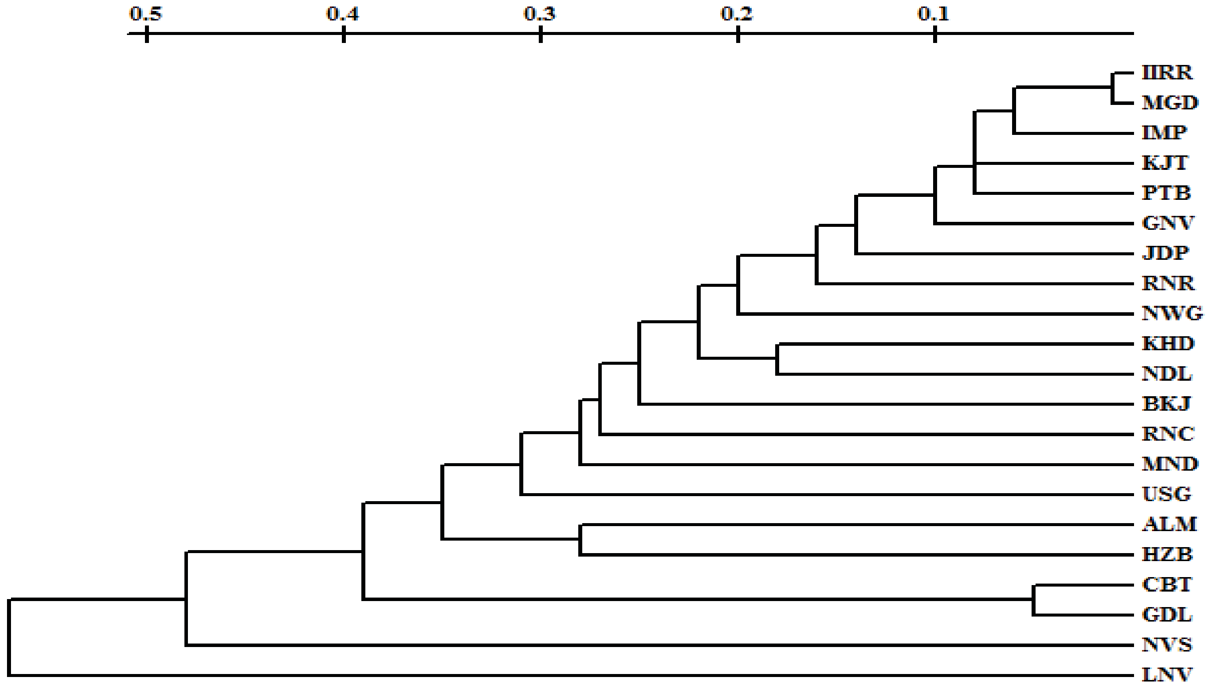

Figure 8.1B: Dendrogram showing relatedness of different reactions of *P. oryzae* at different locations during *Kharif* -2025

❖ TRIAL NO.9: BACTERIAL BLIGHT (BB) - *Xanthomonas oryzae* pv. *oryzae* (*Xoo*)

Trial on monitoring virulence of bacterial blight (BB) pathogen, *Xanthomonas oryzae* pv. *oryzae* (*Xoo*) was proposed at 25 hot spot locations across India during *Kharif* season of 2025. However, data were received from 22 locations. At Ludhiana, the trial was conducted with 10 established strains/pathotypes of *Xoo*. The rice differentials used in this trial consisted of eleven near isogenic lines (IRBB lines) possessing different single BB resistance genes in the genetic background of rice cultivar IR 24. Reactions of the *Xoo* isolates were also recorded on rice differentials possessing different combinations of five *Xa/xa* genes viz., *Xa4*, *xa5*, *Xa7*, *xa13* and *Xa21*. The virulence analyses and categorization of the isolates was done based on the reaction of *Xoo* isolates on differentials possessing single BB resistance genes (Table 9.1)**.** Susceptible checks like IR 24 and TN1 and resistant check like Improved Samba Mahsuri were included in the trial. Based on the reactions of the isolates on differentials possessing single BB resistance genes, the isolates from Maruteru, IIRR-Hyderabad, Chiplima and Raipur were categorized as highly virulent as they produced LSI (Location Severity Index) greater than 7. All these isolates produced a highly susceptible reaction on susceptible check TN1 with a disease score of 9. These isolates produced susceptible reactions on 12-14 differentials out of 14 differentials. These isolates produced susceptible reactions on IRBB 21 possessing BB resistance gene, Xa21. The isolate from Maruteru produced susceptible reaction on all the differentials including ISM which possesses three BB resistance genes, *Xa21*, *xa13* and *xa5*. The isolate from Chiplima produced susceptible reaction on IRBB 13 in addition to IRBB 21. The isolate from Raipur also produced susceptible reaction (score of 7) on resistant check Improved Samba Mahsuri possessing three BB resistance genes viz., *Xa21*, *xa13* and *xa5*.

The isolates from Pattambi, Chinsurah, New Delhi, Navsari, Gangavathi, Pantnagar, Bikramgunj, Titabar, Masodha, Nawagam, Karjat, Chatha, Coimbatore, Rajendranagar, Sabour, Aduthurai and all the strains from Ludhiana were categorized as moderately virulent and these isolates produced an LSI ranging from 4.3-6.9 on rice differentials possessing single BB resistance genes. These isolates produced susceptible reactions on 1-13 differentials. Majority of these isolates (except isolates from Navsari, Nawagam, Chatha, Gangavathi, Titabar and Ludhiana-Strain LDN Xo-8) showed moderate to high level of resistance to IRBB13. Similarly, isolates from Pattambi, New Delhi, Gangavathi, Pantnagar and Strains # 3, 4 & 5 from Ludhiana showed moderate to high level of susceptibility on IRBB 21 possessing BB resistance gene, Xa21. The isolates from Moncompu were categorized as less virulent as they produced an LSI of below 3 and produced BB disease score of less than 5 on all differentials except TN1.

Table 9.1: Reaction of rice differentials possessing different single BB resistance genes to *Xanthomonas oryzae* pv. *oryzae* at different locations during *Kharif*'2025

	Highly virulent				Moderately virulent											
Differentials	**MTU**	**IIRR**	**CHP**	**RPR**	**PTB**	**CHN**	**NDL**	**NVS**	**GGV**	**LUD-7**	**LUD-5**	**PNT**	**BKJ**	**TTB**	**LUD-4**	**LUD-9**
IR 24	9	9	7	7	9	7	7	-	8	7	7	9	7	5	5	7
IRBB 1	9	9	8	7	7	9	9	7	8	7	7	9	6	7	7	5
IRBB 3	9	9	9	7	7	7	7	-	8	7	7	5	7	7	7	7
IRBB 4	9	9	8	7	7	7	7	-	6	7	7	7	9	7	5	7
IRBB 5	7	9	9	5	6	7	7	7	6	7	7	9	6	3	7	7
IRBB 7	9	9	8	7	6	9	7	6	7	7	7	5	5	5	7	7
IRBB 8	9	9	8	7	7	9	9	7	6	7	7	7	7	7	3	5
IRBB 10	9	9	9	9	7	9	7	-	6	7	7	3	9	7	7	7

	Highly virulent				Moderately virulent											
Differentials	MTU	IIRR	CHP	RPR	PTB	CHN	NDL	NVS	GGV	LUD-7	LUD-5	PNT	BKJ	TTB	LUD-4	LUD-9
IRBB 11	9	9	8	7	7	5	9	7	6	7	5	5	7	7	7	5
IRBB 13	8	5	7	5	5	5	5	8	7	5	3	5	3	7	3	3
IRBB 14	8	9	8	7	7	7	1	-	8	7	7	6	5	5	7	7
IRBB 21	6	7	6	7	7	3	7	-	6	5	7	6	5	5	7	5
ISM	8	1	3	7	6	3	5	4	3	5	5	5	5	5	5	5
TN1	9	9	8	9	9	9	9	8	9	7	7	9	7	9	7	7
LSI	**8.4**	**8.0**	**7.6**	**7.0**	**6.9**	**6.9**	**6.9**	**6.8**	**6.7**	**6.6**	**6.4**	**6.4**	**6.3**	**6.1**	**6.0**	**6.0**
Min Score	**6**	**1**	**3**	**5**	**5**	**3**	**1**	**4**	**3**	**5**	**3**	**3**	**3**	**3**	**3**	**3**
Max Score	**9**	**9**	**9**	**9**	**9**	**9**	**9**	**8**	**9**	**7**	**7**	**9**	**9**	**9**	**7**	**7**
# of entries>5	**14**	**12**	**13**	**12**	**13**	**10**	**11**	**7**	**13**	**11**	**11**	**8**	**9**	**8**	**9**	**8**

(Cont.) Table 9.1: Reaction of rice differentials possessing different single BB resistance genes to *Xanthomonas oryzae* pv. *oryzae* at different locations during *Kharif*'2025

	Moderately virulent														Less Virulent
Differentials	LUD-8	MSD	NWG	LUD-6	LUD-10	KJT	CHT	LUD-1	CBE	RNR	SBR	LUD-3	LUD-2	ADU	MNC
IR 24	5	7	7	7	7	7	6	5	7	5	7	3	5	3	3
IRBB 1	7	7	7	7	5	7	5	5	5	4	7	5	3	6	1
IRBB 3	7	6	6	7	7	7	4	7	6	5	7	7	5	4	5
IRBB 4	3	5	6	5	7	5	5	5	6	5	3	3	5	1	1
IRBB 5	1	5	7	5	5	5	7	7	6	4	3	5	5	3	0
IRBB 7	7	7	6	7	5	7	6	5	5	4	5	7	5	-	1
IRBB 8	7	5	5	5	7	7	3	3	4	5	5	3	3	4	1
IRBB 10	7	7	5	7	5	5	6	7	4	7	5	5	3	1	3
IRBB 11	7	7	5	5	5	7	4	3	6	6	7	3	3	-	3
IRBB 13	7	5	7	3	3	3	8	3	4	4	3	3	3	-	0
IRBB 14	7	4	5	7	7	5	5	7	6	6	3	5	5	8	0
IRBB 21	5	4	3	3	5	5	4	5	3	5	1	7	3	1	3
ISM	5	3	3	5	5	1	3	5	3	3	5	3	5	9	5
TN1	7	9	9	7	7	8	9	7	7	7	7	7	7	7	9
LSI	**5.9**	**5.8**	**5.8**	**5.7**	**5.7**	**5.6**	**5.4**	**5.3**	**5.1**	**5.0**	**4.9**	**4.7**	**4.3**	**4.3**	**2.5**
Min Score	**1**	**3**	**3**	**3**	**3**	**1**	**3**	**3**	**3**	**3**	**1**	**3**	**3**	**1**	**0**
Max Score	**7**	**9**	**9**	**7**	**7**	**8**	**9**	**7**	**7**	**7**	**7**	**7**	**7**	**9**	**9**
# of entries>5	**9**	**7**	**8**	**7**	**6**	**7**	**6**	**5**	**7**	**4**	**5**	**4**	**1**	**4**	**1**

The reactions of all these isolates to differentials possessing different combinations of BB resistance genes are presented in Table 9.2. Most of the differentials possessing different combination of BB resistance genes showed moderate to good level of resistance across the locations except at Maurteru where all the differentials possessing different gene combinations also showed high level of susceptibility (Table 9.2).

Cluster analysis of *Xoo* reaction on differentials possessing different single BB resistance genes at various locations was done and is presented in Fig 9.1A. The analysis grouped the isolates into 5 major groups at 50% dissimilarity. The isolate from Maruteru was totally different from rest of the isolates and formed a separate cluster. The isolates from Pattambi and Raipur and isolates from Chiplima, Gangavathi and Navsari were quite different and formed separate clusters (Fig 9.1B). Most of the isolates which were categorized as highly virulent were grouped nearby except isolate from Raipur.

Table 9.2: Reaction of rice differentials possessing different combinations of BB resistance genes to *Xanthomonas oryzae* pv. *oryzae* at different locations during *Kharif*'2025

	Highly virulent	Moderately virulent														
Differentials	**MTU**	**BKJ**	**GGV**	**PTB**	**NWG**	**CHT**	**CHP**	**NDL**	**CBE**	**RNR**	**MSD**	**TTB**	**RPR**	**NVS**	**LUD-9**	**LUD-7**
IR 24	9	7	8	9	7	6	7	7	7	5	7	5	7	-	7	7
IRBB 50	7	6	6	5	7	5	6	5	5	4	4	5	5	7	5	5
IRBB 51	7	3	6	5	4	3	5	5	3	4	4	3	3	5	3	3
IRBB 52	-	9	4	6	6	5	6	5	5	5	4	3	3	-	3	5
IRBB 53	8	5	5	5	4	4	6	5	6	5	5	5	5	4	-	-
IRBB 54	7	5	8	5	5	5	6	7	4	4	4	5	3	-	3	5
IRBB 55	9	9	6	5	5	8	5	5	4	5	5	3	5	3	-	3
IRBB 56	9	3	4	5	4	6	6	5	6	6	5	3	3	3	-	3
IRBB 57	9	5	7	5	5	3	5	5	4	4	4	3	3	-	7	3
IRBB 58	7	3	4	5	5	5	4	5	5	5	5	5	-	3	-	3
IRBB 59	7	7	4	5	4	4	3	1	7	4	4	5	5	5	-	3
IRBB 60	7	9	6	5	4	5	3	1	5	4	5	5	3	3	3	3
IRBB 61	7	9	6	5	7	6	5	5	4	6	5	5	7	-	7	7
IRBB 62	7	6	4	5	6	6	5	7	4	4	5	3	3	6	3	3
IRBB 63	7	3	6	3	4	4	4	5	3	4	3	3	3	5	3	3
IRBB 64	7	3	6	3	5	5	4	5	4	4	3	5	5	-	3	3
IRBB 65	7	5	5	3	4	3	4	1	3	4	3	5	3	2	3	1
IRBB 66	7	9	4	3	3	5	3	1	3	4	3	5	3	-	1	3
ISM	8	5	3	6	3	3	3	5	3	3	3	5	7	4	5	5
TN1	9	7	9	9	9	9	8	9	7	7	9	9	9	8	7	7
LSI	**7.6**	**5.9**	**5.6**	**5.1**	**5.1**	**5.0**	**4.9**	**4.7**	**4.6**	**4.6**	**4.5**	**4.5**	**4.5**	**4.5**	**4.2**	**3.9**
Min Score	**7**	**3**	**3**	**3**	**3**	**3**	**3**	**1**	**3**	**3**	**3**	**3**	**3**	**2**	**1**	**1**
Max Score	**9**	**9**	**9**	**9**	**9**	**9**	**8**	**9**	**7**	**7**	**9**	**9**	**9**	**8**	**7**	**7**
# of entries>5	**19**	**10**	**11**	**4**	**6**	**6**	**7**	**4**	**5**	**3**	**2**	**1**	**4**	**3**	**4**	**3**

(Cont.) Table 9.2: Reaction of rice differentials possessing different combinations of BB resistance genes to *Xanthomonas oryzae* pv. *oryzae* at different locations during *Kharif*'2025

	Moderately virulent								Less virulent						
Differentials	**PNT**	**SBR**	**LUD-6**	**CHN**	**LUD-10**	**IIRR**	**LUD-5**	**ADU**	**KJT**	**LUD-1**	**LUD-4**	**LUD-8**	**LUD-2**	**LUD-3**	**MNC**
IR 24	9	7	7	7	7	9	7	3	7	5	5	5	5	3	3
IRBB 50	4	3	3	3	3	7	5	6	3	3	3	3	1	1	3
IRBB 51	5	3	5	5	3	3	3	4	3	3	3	1	3	3	0
IRBB 52	3	3	3	3	3	7	3	5	3	3	3	3	1	1	1
IRBB 53	4	3	3	5	3	7	-	3	3	-	-	-	-	-	1
IRBB 54	5	3	3	3	3	1	1	7	3	-	-	3	3	-	0
IRBB 55	1	3	3	3	-	1	1	1	3	1	1	5	3	3	0
IRBB 56	3	5	3	3	3	1	-	0	3	1	1	3	1	1	1
IRBB 57	2	3	5	3	5	1	-	1	3	-	-	1	1	-	0
IRBB 58	3	3	3	1	-	1	3	3	1	1	1	1	1	1	0
IRBB 59	5	3	-	1	-	1	-	5	1	-	-	3	-	-	0
IRBB 60	1	3	1	1	3	1	3	1	1	1	1	1	1	3	1
IRBB 61	5	3	-	3	3	7	-	1	3	3	3	1	3	1	0
IRBB 62	1	5	3	5	3	5	3	3	1	3	3	1	3	3	0
IRBB 63	4	5	3	5	3	1	3	3	3	1	1	1	1	3	6
IRBB 64	3	3	3	5	3	3	3	1	3	1	1	1	1	1	1
IRBB 65	3	3	3	1	1	1	1	1	3	1	1	1	1	1	3
IRBB 66	2	3	5	3	1	1	3	1	1	1	1	1	1	1	0
ISM	5	5	5	3	5	1	5	9	1	5	5	5	5	3	5
TN1	9	7	7	9	7	9	7	7	8	7	7	7	7	7	9
LSI	**3.9**	**3.8**	**3.8**	**3.6**	**3.5**	**3.4**	**3.4**	**3.3**	**2.9**	**2.5**	**2.5**	**2.5**	**2.3**	**2.3**	**1.7**
Min Score	**1**	**3**	**1**	**1**	**1**	**1**	**1**	**0**	**1**	**1**	**1**	**1**	**1**	**1**	**0**
Max Score	**9**	**7**	**7**	**9**	**7**	**9**	**7**	**9**	**8**	**7**	**7**	**7**	**7**	**7**	**9**
# of entries>5	**2**	**2**	**2**	**2**	**2**	**6**	**2**	**4**	**2**	**1**	**1**	**1**	**1**	**1**	**2**

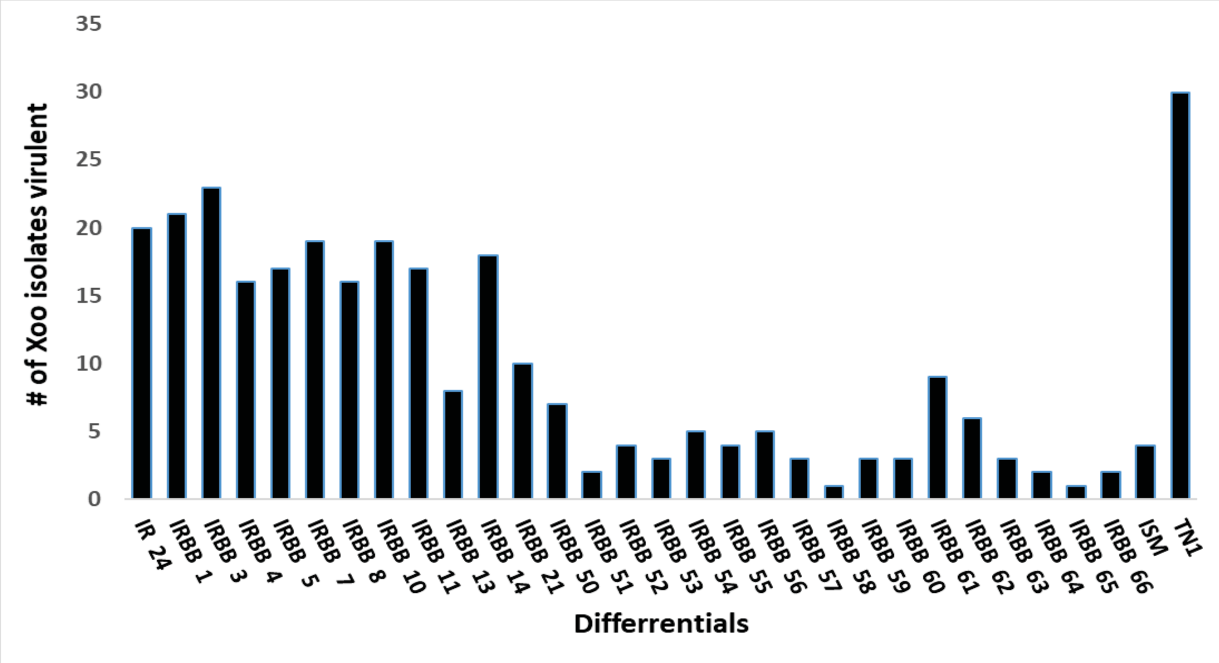

Figure 9.1A: Number of *Xoo* isolates showing moderate to high virulence on different BB resistance genes and their combinations during *Kharif*'2025

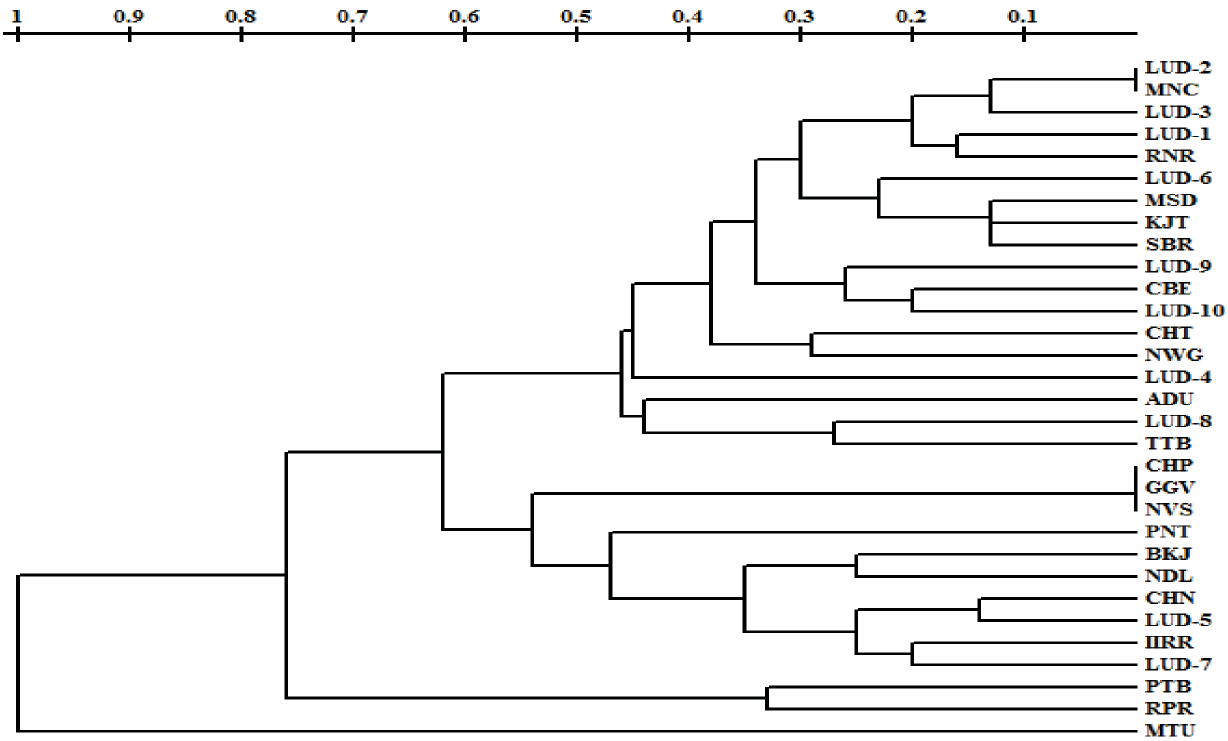

Figure 9.1B: Dendrogram (based on reactions of differentials possessing single BB resistance genes) showing the relatedness of different *Xanthomonas oryzae* pv. *oryzae* isolates from various locations during *Kharif*' 2025

III. DISEASE OBSERVATION NURSERY ON TRAP CROP – *Kharif*-2025

Disease Observation Nursery (DON) trials were carried out across multiple sites with staggered sowing schedules viz., early, normal, and late, adapted to the local conditions. The objective was to assess how varying planting dates influence the incidence and intensity of rice diseases in endemic regions. The study focused on both transplanted and direct-seeded rice systems, recognizing that disease development is shaped by the interaction of three key factors: the presence of a susceptible host, the availability of a virulent pathogen, and favourable environmental conditions. To capture this dynamic, a location-specific susceptible variety was sown at three different times, and disease progression was monitored throughout the season. Observations were recorded as Percent Disease Index (PDI) for major rice diseases. Understanding how particular diseases emerge in specific regions under different sowing windows provides valuable insights for tailoring effective management strategies. The daily weather data also recorded to study the effect of rainfall, temperature and relative humidity on the development of the different diseases on a particular local variety.

The trial was proposed at 12 locations *i.e.,* Bankura, Bikramgaunj, Chatha, Chinsurah, Kaul, Malan, Mandya, Maruteru, Moncompu, Nawagam, Pusa and Raipur. The data however was received from 8 centres for this trial. The salient features of this study are presented on location-wise below.

CHATHA:

At Chatha, three different sowing dates viz., 06.06.25, 16.06.25 and 27.06.25 were followed as early, normal and late sowing periods respectively. The variety Basmati 370 was used to study the disease progress of different diseases in transplanted rice conditions. The diseases that were prevalent in this centre were Sheath blight, Sheath rot, brown spot and Bacterial blight (BB). The observations were taken at 10 days interval from 30 DAT to 110 DAT. Bacterial blight incidence was started 60 days after transplanting in early and normal sown crops, where as in late sown crops, the BB incidence was started at 40 days after transplanting (Table 10.1). At 40 DAT, disease initiation was minimal, with only slight BB occurrence (4.55%) in the late sowing condition. From 50 DAT onwards, disease severity began to increase, particularly in late-sown crops (L), followed by normal (N) and early (E) sowings. Highest disease incidence was observed in late sown crops (4.55% to 49.15% DS) followed by early sown crop (6.25% to 40.25% DS).

Brown spot disease incidence was observed at the tillering to grain filling stages (50 to 100 DAT) and more in the late sown crop (11.5 to 61.25% DS) when compared to early sown crop (3.25 to 49.88% PDI) and normal sown crops (8%-47.75% DS) (Table 10.1). Among the sowing dates, late sowing consistently recorded the highest disease severity, while early sowing showed comparatively lower infection levels. Overall, the results suggest that delayed sowing favours higher disease development, likely due to more conducive environmental conditions for pathogen proliferation.

Table 10.1: Occurrence of different rice diseases in disease observation nursery at different test locations, *Kharif*- 2025-Chatha

Location/ Date of sowing	DAT	Percentage of Disease severity					
		Brown spot			BB		
V/DOS		(E)	(N)	(L)	(E)	(N)	(L)
Basmati 370	**30 DAT**	0.00	0.00	0.00	0.00	0.00	0.00
E:06.06.2025	**40 DAT**	0.00	0.00	0.00	0.00	0.00	4.55
N:16.06.2025	**50 DAT**	3.25	8.00	11.50	0.00	0.00	12.60
L: 27.06.2025	**60 DAT**	11.25	16.63	18.00	6.25	5.25	20.50
	70 DAT	20.75	21.60	25.15	17.00	9.75	30.50

	80 DAT	27.38	33.35	32.88	21.50	13.88	36.13
	90 DAT	37.00	38.00	41.75	27.75	21.00	42.50
	100 DAT	43.25	43.50	50.10	32.25	26.00	42.75
	110 DAT	49.88	47.75	61.25	40.25	33.20	49.15

(DAT-Date of transplanting, E-Early; N-normal; L-late sowing, DOS-date of sowing)

CHINSURAH

At Chinsurah, three different sowing dates viz., 06.06.25, 16.06.25 and 27.06.25 were followed as early, normal and late sowing periods respectively. The variety MTU 7029 was used to study the disease progress of different diseases in both transplanted and direct seeded rice conditions. The diseases that were prevalent in this centre were Sheath blight, Sheath rot, brown spot and Bacterial blight (BB). The observations were taken at 10 day interval from 30 DAT to 110 DAT. This table presents brown spot disease incidence (%) data for rice variety MTU 7029 in a disease observation nursery during *Kharif* 2025 at Chinsurah and Pusa locations. Observations are recorded at days after transplanting (DAT) for early (E: sown 06.06.25), normal (N: 16.06.25), and late (L: 27.06.25) sowing dates; Brown spot disease incidence was generally less in all the sowings, and it was observed at the tillering to grain filling stages (70 to 100 DAT) and more in the late sown crop (2.5 to 26.50% PDI) when compared to early sown crop (2.5 to 9.0% PDI).

Table 10.2: Occurrence of different rice diseases in disease observation nursery at different test locations, *Kharif*- 2025-Chinsurah and Pusa

Location/ Date of sowing	CHINSURAH			
V/DOS	Brown spot			
MTU 7029		(E)	(N)	(L)
E:06.06.25	**30 DAT**	-	-	-
N:16.06.25	**40 DAT**	-	-	-
L: 27.06.25	**50 DAT**	-	-	-
	60 DAT	-	-	-
	70 DAT	-	-	2.50
	80 DAT	2.50	4.50	9.00
	90 DAT	4.50	8.50	13.50
	100 DAT	9.00	11.00	19.00
	110 DAT			26.50

(AT-Date of transplanting, E-Early; N-normal; L-late sowing, DOS-date of sowing)

MANDYA

The progression of three diseases (leaf blast, sheath blight and neck blast) was studied at three different sowing dates i.e., 15-07-2025 (early), 07.08.2025 (normal) and 16.09.2025 (late) by using two different susceptible varieties like MTU-1001 and IR-64. The leaf blast incidence was very low in Kharif 2025 in all sowing periods.

MTU 1001showed better tolerance for blast disease and late sown crop effected much (17%PDI) compared to early (11.0%PDI) and normal sown crop (9%PDI) in the variety IR 64. In case of MTU 1001, the late sown crop showed more leaf blast disease severity (14% PDI) compared to early (9.50% PDI) and normal sown crops (5.50% PDI). Similarly, the late sown crop of variety MTU 1001 showed more sheath blight disease severity (75% PDI) as compared to early and normal sown crops (Table 10.5). The severity of sheath blight disease is more in MTU 1001 compared to IR 64. Sheath blight disease progression was more in normal sown crops (16.5% to 64% in MTU 1001; 13% to 72% PDI in IR 64) as compared to early and late sown crops. The early sown crop also recorded on par disease severity with normal sown crop (55% PDI in MTU 1001 & 71% PDI in IR 64) (Table 10.3). Like sheath blight disease, the neck blast disease severity was more in normal sown crop (19% PDI in

MTU 1001 & 28.5% PDI in IR 64) compared to the early and late sown crops (Tabel 10.3). This indicates the late and early sown crops escapes the critical stage of disease occurrence.

Table 10.3: Occurrence of different rice diseases in disease observation nursery at different test locations, *Kharif*- 2025-Mandya

Location/ Date of sowing	DAT	Percentage of Disease severity								
		Leaf blast			Sheath blight			Neck blast		
V/DOS		(E)	(N)	(L)	(E)	(N)	(L)	(E)	(N)	(L)
MTU-1001	**30 DAT**	1	0	1	0	0	0	0	0	0
E:15-07-2025	**40 DAT**	1	1	1	0	0	0	0	0	0
N:07-08-2025	**50 DAT**	1	1	0	0	0	0	0	0	0
L:16-09-2025	**60 DAT**	2	1.5	0	0	0	0	0	0	0
	70 DAT	0	0	0	13	16.5	0	0	0	0
	80 DAT	0	0	0	14.5	20	20.5	0	3.5	0
	90 DAT	0	0	0	29	25.5	21.5	2.5	3.5	4
	100 DAT	0	0	0	41.5	40	23.5	3.5	6	16
	110 DAT	0	0	0	55	64	0	16	19	17
IR 64	**30 DAT**	1	1	1	0	0	0	0	0	0
15-07-2025	**40 DAT**	1	1	1.5	0	0	0	0	0	0
07-08-2025	**50 DAT**	1.5	1	0	0	0	0	0	0	0
16-09-2025	**60 DAT**	4	2.5	0	0	13	0	0	0	0
	70 DAT	0	2	0	17.5	15.5	15	0	0	0
	80 DAT	0	0	0	24.5	22	16	0	3.5	0
	90 DAT	0	0	0	33	29.5	22.5	2	4.5	4
	100 DAT	0	0	0	57.5	59	24	5.5	6.5	20
	110 DAT	0	0	0	71	72	0	24.5	28.5	21

DAT-Date of transplanting, E-Early; N-normal; L-late sowing, DOS-date of sowing

MARUTERU

Two varieties viz., BPT5204 and Swarna (MTU 7029) were tested in Maruteru under three different sowing dates i.e, 20.06.2025 (early), 30.06.2025 (normal) and 10.07.2025 (late), for the variations in the percent disease incidence of the two major rice diseases of this region i.e., Sheath blight and BB. The crop sown in the late season was having more disease severity (sheath blight) than the crops sown during the normal and late periods.

Among the two varieties tested, the variety BPT5204 was found to be more susceptible to BB viz., BB (81.75% PDI), when compared to the variety Swarna 78.70% PDI. Sheath blight severity was more in late sown crop (65.19 % in Swarna) compared to normal and late sown crops. The Bacterial blight severity was more in late sown crop (78.70% PDI in Swarna & 81.75% PDI in BPT 5204) compared to early and normal sown crops (Table 10.4). The normal sown crop showed the on-par disease severity with the late sown crop for both the diseases like sheath blight and BB. The early sown crop may escape the critical point of disease infection for both the diseases.

Table 10.4: Occurrence of different rice diseases in disease observation nursery at different test locations, *Kharif*- 2025-Maruteru

Location/ Date of sowing	DAT	Percentage of Disease Severity					
		SHB			BB		
V/DOS		(E)	(N)	(L)	(E)	(N)	(L)
MTU 7029	30 DAT	0.00	0.00	0.00	0.00	0.00	0.00
E:20-06-2025	40 DAT	0.00	0.00	27.78	0.00	0.00	0.00
N:30-06-2025	50 DAT	0.00	54.82	6.67	0.00	0.00	0.00
L:10-07-2025	60 DAT	47.78	0.00	0.00	0.00	0.00	0.00
	70 DAT	42.60	52.96	7.78	0.00	0.00	0.00
	80 DAT	0.00	0.00	11.48	0.00	0.00	38.52
	90 DAT	17.04	32.59	0.00	0.00	0.00	0.00
	100 DAT	0.00	36.30	0.00	0.00	37.41	0.00
	110 DAT	20.00	0.00	65.19	28.52	0.00	78.70
	120 DAT		63.34		0.00	77.26	0.00
BPT 5204	30 DAT	0.00	0.00	0.00	0.00	0.00	0.00
E:20-06-2025	40 DAT	0.00	0.00	2.59	0.00	0.00	0.00
N:30-06-2025	50 DAT	0.00	13.34	2.22	0.00	0.00	0.00
L:10-07-2025	60 DAT	25.19	0.00	0.00	0.00	0.00	0.00
	70 DAT	20.00	7.04	2.96	0.00	0.00	0.00
	80 DAT	0.00	0.00	7.04	0.00	0.00	45.19
	90 DAT	11.85	16.30	0.00	0.00	0.00	0.00
	100 DAT	0.00	20.00	0.00	0.00	41.11	0.00
	110 DAT	12.59	0.00	60.00	34.08	0.00	81.75
	120 DAT		65.93		0.00	75.44	0.00

DAT-Date of transplanting, E-Early; N-normal; L-late sowing, DOS-date of sowing

MONCOMPU

Two different varieties i.e., Pournami and Uma were sown on different dates i.e, 19.06.2025 (early), 30.06.2025 (normal) and 11.07.2025 (late) for the studies on the effect of the different time of sowing on Sheath blight and BB incidence on rice. The intensity of the disease was very less this year, may be because of the relatively dry weather conditions during the entire cropping seasons.

Among the different sowing period, BB disease severity was relatively high during the fag end of the crop in the late sown crop of Uma and Pournami compared to early and normal sown crops (61.67% and 46.57% PDI). The disease progression was more in late sown crop of Uma (4.33% to 61.67% PDI) compared to the late sown crop of Pournami (3.87% to 46.57% PDI). But in case of sheath blight disease, the variety Pournami having highest disease progression in early sown crop (2.50% to 51.66% PDI) compared to normal (2.5% to 25% PDI) and late sown crop (2.85% to 37.71% PDI) (Table 10.5). but in Uma variety, the late sown crop having the more disease of sheath blight (32% PDI) compared to early (28.33% PDI) and normal (13.33% PDI) sown crops (Table 10.5).

Table 10.5: Occurrence of different rice diseases in disease observation nursery at different test locations, *Kharif*- 2025- Moncompu

Location/ Date of sowing	DAT	Percentage of Disease Severity					
		BB			SHB		
V/DOS		(E)	(N)	(L)	(E)	(N)	(L)
Pournami	30 DAT	0.00	0.00	0.00	-	-	-
E:19-06-2025	40 DAT	0.00	0.00	0.00	-	-	-
N:30-06-2025	50 DAT	0.00	0.00	3.87	2.50	0.00	-

Location/ Date of sowing	DAT	Percentage of Disease Severity					
		BB			SHB		
V/DOS		(E)	(N)	(L)	(E)	(N)	(L)
L:11-07-2025	60 DAT	0.00	1.22	8.25	5.65	-	2.85
	70 DAT	4.46	3.51	13.72	13	2.5	6.4
	80 DAT	10.06	7.44	20.15	24.95	3.55	13.95
	90 DAT	13.65	10.42	28.17	32.85	13.3	21.65
	100 DAT	26.80	15.37	35.65	46.9	21	30.65
	110 DAT	28.52	0.00	78.70	51.665	25	37.71
	120 DAT	30.00	18.33	46.57			
	130 DAT						
Uma	30 DAT	0.00	0.00	0.00	-	-	-
E:19-06-2025	40 DAT	0.00	0.00	4.33	-	-	-
N:30-06-2025	50 DAT	0.00	0.00	12.89	2.00	0.10	-
L:11-07-2025	60 DAT	0.62	0.65	18.78	0.70	0.25	1.90
	70 DAT	4.90	3.77	26.79	2.80	1.00	12.05
	80 DAT	8.52	7.50	35.61	9.70	3.40	18.05
	90 DAT	13.37	10.35	42.75	14.30	6.10	25.35
	100 DAT	17.95	14.12	53.53	21.35	10.90	50.45
	110 DAT	34.08	0.00	81.75	28.33	13.33	32.00
	120 DAT	23.33	17.33	61.67			
	130 DAT						

DAT-Date of transplanting, E-Early; N-normal; L-late sowing, DOS-date of sowing

NAWAGAM

Two varieties viz., Gurjari and P-203 were used as test varieties for the purpose of estimating the effects of sowing period viz., early (05.06.2025), normal (15.06.2025) and late (25.06.2025) on the occurrence of Sheath rot disease in Nawagam. In the case of variety Gurjari, it was observed that the incidence of the disease was relatively more in the late stages of the crop (60 to 100 DAT) in late sown crop (17.33 to 48.33% PDI) and normal (15 to 37.93% PDI) and comparatively low incidence was observed from 60 to 100 DAT in early sowing periods (5 to 33.73% PDI). Among the three sowing periods, the incidence of Sheath rot was found to be maximum in the late sown crop (48.33% PDI).

The disease was significantly less in the variety P-203 compared to Gurjari, with the initial symptoms started to appear about 60 DAT in the early and nromal sown crops, progressing gradually thereafter. But in case of late sown crop, symptoms appear at 70 DAT. Further, the percentage disease index was relatively less in the case of the variety P-203 (maximum of 40.00 % PDI) when compared to the variety Gurjari (maximum of 48.33% PDI). (Table 10.6). The same trend was followed in the case of variety P-203 like the late sown crop was more affected by the sheath rot incidence compared to normal and early sown crops.

Table 10.6: Occurrence of different rice diseases in disease observation nursery at different test locations, *Kharif*- 2025- Nawagam

Location/ Date of sowing	DAT	Percentage of Disease severity							
		Sheath rot							
V/DOS		(E)	(N)	(L)	V/DOS		(E)	(N)	(L)
Gurjari	**30 DAT**	-	-	-	**P-203**	**30 DAT**	-	-	-
05-06-2025	**40 DAT**	-	-	-	05-06-2025	**40 DAT**	-	-	-
15-06-2025	**50 DAT**	-	-	-	15-06-2025	**50 DAT**	-	-	-
25-06-2025	**60 DAT**	5.00	15.00	0.00	25-06-2025	**60 DAT**	5.00	5.00	0.00
	70 DAT	13.33	20.00	17.33		**70 DAT**	6.67	14.00	11.00
	80 DAT	18.33	24.28	25.00		**80 DAT**	15.00	20.43	15.00
	90 DAT	30.00	27.85	37.14		**90 DAT**	21.00	25.00	20.72
	100 DAT	33.73	37.93	48.33		**100 DAT**	25.00	28.57	30.95
	110 DAT	-	-	-		**110 DAT**	30.72	35.00	40.00

DAT-Date of transplanting, E-Early; N-normal; L-late sowing, DOS-date of sowing

RAIPUR

Two varieties viz., Swarna and Rajeshwari were tested in Raipur under three different sowing dates i.e.,10-06-2025 (early), 05-07-2025 (normal) and 30-07-2025 (late), for the variation in the percent disease incidence of the major rice disease of this region i.e., Sheath blight under transplanted conditions.

Both the verities showed same level of disease progression for the sheath blight disease. Sheath blight disease severity was more in early and late sown crop of variety Rajeshwari (15.90% and 19.60% PDI) than normal sown crop. In case of variety Swarna the late sown crop showed more sheath blight disease severity (19.10% PDI) (Table 10.7). both the varieties followed the same progression like late sown and early sown crops produced more disease compared to the normal sown crop.

Table 10.7: Occurrence of different rice diseases in disease observation nursery at different test locations, *Kharif*- 2025-Raipur

Location/ Date of sowing	DAT	Percentage of Disease severity							
		Sheath blight							
V/DOS		(E)	(N)	(L)	V/DOS		(E)	(N)	(L)
Swarna	**30 DAT**	-	-	0.00	**Rajeshwari**	**30 DAT**	-	-	0.25
10.06.2025	**40 DAT**		0.00	1.25	10.06.2025	**40 DAT**		0.00	1.60
05.07.2025	**50 DAT**	0.50	1.40	4.15	05.07.2025	**50 DAT**	0.50	2.35	3.90
30.07.2025	**60 DAT**	1.75	2.5	6.65	30.07.2025	**60 DAT**	1.85	3.00	5.90
	70 DAT	5.65	4.15	9.25		**70 DAT**	4.90	4.35	8.10
	80 DAT	8.75	5.1	11.65		**80 DAT**	7.10	5.65	9.90
	90 DAT	11.75	6.4	14.6		**90 DAT**	10.40	6.60	13.50
	100 DAT	14	7.65	16.4		**100 DAT**	13.65	8.15	16.00
	110 DAT	16.75	8.1	19.1		**110 DAT**	15.90	8.40	19.60

(DAT-Date of transplanting, E-Early; N-normal; L-late sowing, DOS-date of sowing)

PUSA

Variety Sugandha was used as the susceptible variety against brown leaf spot and the crop was sown in i.e., 16.06.2025 (early), 01.07.2025 (normal) and 15.07.2025 (late). The incidence of brown leaf spot was started at 40 days after transplanting. The incidence of brown leaf spot was more in late sown crop (31% PDI) compared to normal (11% PDI) and early sown crops (16.0% PDI) (Table 10.10).

Table 10.7: Occurrence of different rice diseases in disease observation nursery at different test locations, *Kharif*- 2025-Pusa

Location/ Date of sowing	DAT	PUSA		
		Brown spot		
V/DOS		(E)	(N)	(L)
Sugandha	**30 DAT**	-	-	-
16.06.2025	**40 DAT**	-	-	4.50
01.07.2025	**50 DAT**	-	-	13.50
15.07.2025	**60 DAT**			21.00
	70 DAT	3.50	2.00	23.00
	80 DAT	7.50	4.00	25.50
	90 DAT	10.00	6.00	27.50
	100 DAT	12.00	9.00	28.50
	110 DAT	16.00	11.00	31.00

(DAT-Date of transplanting, E-Early; N-normal; L-late sowing, DOS-date of sowing)

INFLUENCE OF WEATHER PARAMETERS AND DATE OF SOWING ON DIFFERENT DISEASES AT DIFFERENT LOCATIONS

Rice, being a staple food crop across diverse agro-climatic regions, is highly vulnerable to several diseases that significantly reduce yield and quality. Among these, leaf blast, sheath blight, brown spot, and Bacterial blight are the most destructive, often influenced by environmental conditions and crop management practices. Weather parameters such as temperature, relative humidity, rainfall, and sunshine hours play a decisive role in pathogen development, spore dispersal, and host susceptibility. Similarly, the date of sowing determines the crop's exposure to critical weather windows, thereby influencing the intensity and timing of disease outbreaks.

Understanding the interaction between weather variability and sowing time across different locations is essential for predicting disease dynamics and designing effective management strategies. Comparative analysis of multi-location trials provides insights into how specific climatic factors and sowing schedules either exacerbate or mitigate disease pressure. Such knowledge forms the basis for location-specific recommendations, integrating bio-control agents with agronomic practices to achieve sustainable disease management in rice production systems.

CHATHA: In Chatha centre, the disease severity of bacterial blight and brown spot diseases were collected from highly susceptible variety of Basmati 370 and correlated with the weather parameters. Results indicated that with increasing the rainfall, the disease progression of brown spot and BB diseases were decreasing and with increased relative humidity, the progress of these diseases were increased (Table 10.11).

Table 10.11: Disease Progression with respect to weather factors at Chatha

Sowing time	Chatha					AUDPC	
	Temperature		Relative Humidity		Rain Fall	Brown spot	BB
	max	min	max	min			
Early	31.20	19.17	86.19	57.26	1453.40	1678	1249
Normal	30.77	18.92	87.67	58.51	1423.40	1850	925
Late	30.12	18.50	89.65	60.25	1423.40	2100	2141

MANDYA: The highly susceptible varieties like MTU 1001 and IR 64 were used to measure the progress of neck blast and sheath blight diseases in Mandya centre. With decreased rainfall, the progression of the neck blast disease was more and with increasing in the rainfall, the progression of sheath blight disease more (Table 10.12).

Table 10.12: Disease Progression with respect to weather factors at Mandya

Sowing time	Mandya			AUDPC			
	Temperature		Rain Fall	Neck Blast		Sheath blight	
	Max	Min		V1	V2	V1	V2
Early	28.45	19.08	379.4	140	198	1255	1680
Normal	28.44	18.80	338.4	225	288	1340	1750
Late	28.50	18.38	251	285	345	655	775

(V1-MTU 1001; V2-IR 64)

MARUTERU

The varieties like MTU 7029 and BPT 5204 were used to study the progression of the sheath blight and Bacterial blight disease and the progress of the disease was correlated with the weather parameters. Results showed that with decrease in rainfall, the severity of the bacterial blight was increasing (Table 10.13).

Table 10.13: Disease Progression with respect to weather factors at Maruteru

Sowing time	Maruteru			AUDPC			
	Temperature		Rain Fall	Sheath blight		BB	
	max	min		V1	V2	V1	V2
Early	30.22	25.15	911	1274	696	285	341
Normal	29.51	24.93	809	2083	896	760	788
Late	29.26	24.81	650	1189	748	1172	1269

(V1-MTU 7029; V2-BPT 5204)

MONCOMPU

In Moncompu centre, the severity of the BB was increasing with decreased rainfall in both the varieties and the sheath blight disease severity was increased with increasing rainfall in Pournami variety (Table 10.14).

Table 10.14: Disease Progression with respect to weather factors at Moncompu

Sowing time	MONCOMPU					AUDPC			
	Relative humidity		Temperature		Rain Fall	BB		Sheath blight	
	Max	Min	Max	Min		V1	V2	V1	V2
Early	80.51	71.48	31.86	24.33	1686	985	911	1517	650
Normal	80.68	71.51	31.84	24.28	1410	471	451	529	284
Late	80.72	71.29	31.74	24.29	1323	2118	3073	944	1238

(V1-Pournami; V2-Uma)

RAIPUR

In Raipur centre, Swarna and Rajeshwari varieties were used to study the progress of the sheath blight disease severity. The weather parameters were correlated with the disease progression, results indicated that the sheath blight disease progression was increased with the decreasing rainfall and the increase in the relative humidity may favour the development of sheath blight disease development (Table 10.15).

Table 10.15: Disease Progression with respect to weather factors at Raipur

Sowing time	RAIPUR					AUDPC	
	Relative humidity		Temperature		Rain Fall	Sheath blight	
	Max	Min	Max	Min		V1	V2
Early	85.56	52.11	31.40	20.72	1267	508	464
Normal	89.14	53.57	29.90	19.21	1042	313	343
Late	89.00	49.67	30.02	18.22	552	735	688

(V1-Swarna; V2-Rajeshwari)

IV. DISEASE MANANGMENT TRIALS-2025

TRIAL NO.11: EVALUATION OF COMBINATION FUNGICIDES AGAINST LOCATION SPECIFIC DISEASES

The trial was conducted with the objective of evaluating commercially available combination fungicides registered under the Central Insecticides Board (CIB), Government of India (GOI), for their efficacy against major rice diseases. The study aimed to identify the most effective fungicidal molecule and suitable methods of application for disease management. The specific objectives of the study were viz., 1. To assess the bio-efficacy of fungicides when applied as seed treatment against rice diseases. 2. To evaluate the effectiveness of fungicides when applied as seed treatment followed by one foliar spray. Three combination fungicides, namely, metiram (55%)+pyraclostrobin (5%) WG, tebuconazole (50%)+trifloxystrobin (25%) WG, and hexaconazole (4%)+zineb (68%) WP, were evaluated in comparison with carbendazim 50% WP as a standard check. These fungicides represent different formulations, including wettable powder (WP) and water-dispersible granules (WG). Fungicides were applied as seed treatment at a dosage of 2 g per kg of rice seed in all 8 treatments. In addition, a single foliar spray was administered at the maximum tillering stage in respective chemical treatment. The trial was conducted during *Kharif* 2025 using a Randomized Block Design (RBD) with three replications at each centre. The experiment was carried out with a net plot size of 5 m × 2 m and a plant spacing of 15 cm × 15 cm.

The trial was proposed at 34 centres *viz.,* Aduthurai, Bankura, Chatha, Chinsurah, Chiplima, Coimbatore, Cuttack, Faizabad (Masodha), Gangavati, Ghaghraghat, ICAR-IIRR, Jagdalpur, Kaul, Lonavala, Ludhiana, Malan, Mandya, Maruteru, Moncompu, Mugad, Navsari, Nawagam, Nellore, Pantnagar, Pattambi, Ponnampet, Pusa, Raipur, Rajendranagar, Ranchi, Rewa, Sabour, Titabar and Varanasi across the rice growing regions in India. Among 34 centres only 30 centres conducted the experiments except Ghaghraghat, Malan, Mugad and Nellore. The experiment was conducted with locally popular rice varieties among the farmers at each testing location. In general, sowings were taken up during June and July across the locations except in Gangavati and Ponnampet, where sowing was done in the month of August. At Aduthurai sowing was done late in the month of September. The details related to diseases against these chemicals were tested, test variety used, date of sowing, date of transplanting, method of screening, date of initial symptoms observed, number of spray, spraying dates, disease observation and date of harvesting are mentioned in the Table 11.1.

All the test location followed the standard operating protocols (SOPs) recommended in the plant pathology technical programmes for seeds and foliar spraying of fungicides and conducting field experiments. The fungicides were evaluated against leaf blast (7 locations), neck blast (8 locations), sheath blight (14 locations), brown spot (eight locations), sheath rot (five locations), grain discoloration (two locations), false smut (one) and stem rot (one location).

Table 11.1: Experimental details of fungicidal evaluation against location-specific diseases of rice during, *Kharif*-2025

S. No	Location	Disease Recorded	Test Variety	Screening	Date of activities					
					Sowing/ Transplanting	Inoculation	Initial symptom	Spraying	Observation	Harvesting
1	Aduthurai	Brown spot/ Sheath rot	ADT-38	Natural	22.09.2025/ 26.10.2025	-	-	24-12-2025	09-01-2026	29.01.2026
2	Bankura	Brown spot/ Sheath blight	TN1	Artificial	16-06-2025/ 10-07-2025	12-08-2025	16-08-2025(BS) 18-08-2025(SHB)	14-08-2025 22-08-2025	16-08-2025 22-08-2025 08-09-25(BS), 18-08-2025 22-08-2025 09-09-25(SHB)	25.09.2025
3	Chatha	Brown spot	Basmati-370	Natural	18-06-2025 12-07-2025	-	-	24-08-2025	05-09-2025	-
4	Coimbatore	Leaf blast	CO55	Natural	24-07-2025/ 19-08-2025	-	26-09-2025	28-09-2025 12-10-2025	10-10-2025 19-10-2025	16-11-2025
5	Chinsurah	Sheath blight	Swarna (MTU 7029)	Artificial	23-06-2025 16-07-2025	21-08-2025	08-09-2025	11.09.2025	25-09-2025	07.11.2025
6	Chiplima	Sheath blight/ Brown Spot	Swarna	Artificial(SHB) Natural-BS	12-07-2025/ 12-08-2025	22-09-2025	30-09-2025(SHB) 27-10-2025(BS)	6.10.2025(SHB) 6.10.2025(BS)	22.10.2025 21-11-25(SHB), 27-10-2025 18-11-2025(BS)	11.12.2025
7	Cuttack (ICAR-NRRI)	Sheath blight	Tapaswini	Artificial	1-07-2025/ 31-07-2025	2-09-2025	13-09-2025	24-09-2025 6-10-2025	17-10-2025 28-10-2025	26-11-2025
8	ICAR-IIRR	Leaf blast	HR-12	Artificial	12-06-2025 20-07-2025	30-08-2025	12-09-2025	12-09-2025 15-10-2025	15-09-2025 25-09-2025	20-12-2025
		Sheath blight	BPT-5204	Artificial	10-08-25 03-09-25	11-11-25	-	-	12-12-25	27-12-25
9	Faizabad (Masodha)	Sheath blight	BPT-5204	Artificial	28.-06-2025 24-07-2025	30-09-2025	10-10-2025	15-10-2025	10-11-2025	25-11-2025
10	Gangavati	Sheath blight	GNV-1089	Artificial	16-07-2025 17-08-2025	06-10-2025	18-10-2025	20-10-2025	27-10-2025	26-12-2025
11	Jagadalpur	Leaf blast/ Neck blast	Swarna	Natural	22-06-2025 19-07-2025	-	21-08-2025	18-09-2025 07-10-2025 23-10-2025	19-09-2025 08-10-2025 24-10-2025	19-12-2025
12	Kaul	Neck blast	CSR-30	Natural	21-06-2025 21-07-2025	-	09-10-2025	12-10-2025	10-11-2025	20-11-2025
13	Lonavala	Neck blast	EK-70	Natural	-	-	05-09-2025	07-09-2025 23-09-2025	18-09-2025 28-09-2025	02-11-2025
14	Ludhiana	Sheath blight	PR114	Artificial	17-06-2025 18-07-2025	11.09.2025	15-09-2025	15-09-2025	05-10-2025	25-10-2025
15	Mandya	Sheath blight/ Neck blast	Jyothi	Artificial	07-08-2025 03-09-2025	22-10-2025(SHB)	17-10-2025(SHB) 16-11-25(NB)	27-10-2025	19-10-2025 10-11-2025 25-11-2025	26-12-2025

S. No	Location	Disease Recorded	Test Variety	Screening	Date of activities					
					Sowing/ Transplanting	Inoculation	Initial symptom	Spraying	Observation	Harvesting
16	Maruteru	Sheath blight Neck blast SHR FS	Swarna (MTU 7029)	Artificial	30-06-2025 1-08-2025	3-09-2025	09-09-2025	19-9-2025	09-09-2025 04-10-2025 06-11-2025	24-11-2025
17	Moncompu	Sheath blight/ Grain discolouration	Uma(MO 16)	Natural	19-06-2025 08-07-2025	-	-	10-09-25(SHB) 09-10-2025(GD)	09-09-2025 25-10-25(SHB) 09-09-2025 11-03-25(GD)	06-11-2025
18	Navasari	Sheath rot	GR-11	Natural	11-07-2025 06-08-2025	-	25-09-2025	03-10-2025 13-10-2025	10-10-2025 19-10-2025	06-12-2025
19	Nawagam	Leaf blast/ Sheath rot	Gurjari	Artificial (LB)/ Natural-Shr	17-07-2025 18-08-2025	17-09- 2025(LB)	29-09-2025(LB) 28-09-2025(SHR)	29-09-2025	29-09-2025 14-10-2025(LB) 28-09-2025 13-10- 2025(SHR)	09-12-2025
20	Pantnagar	Sheath blight	Pant Dhan-4	Artificial	12-06-2025 08-07-2025	18.08.2025	25-08-2025	-	02-09-2025	31-10-2025
21	Pattambi	Brown Spot	Uma	Natural	10-07-2025 31-07-2025	-	05-09-2025	09-09-2025	18-09-2025	22-11-2025
22	Ponnampet	Leaf blast/ Neck blast	Intan	Natural	28-07-2025 25-08-2025	-	05-10-2025(LB) 08-12-2025(NB)	18-10-2025 20-12-2025	30-10-2025 02-01-2026	-
23	Pusa	Brown spot	Pankaj	Natural	19-06-2025 21-07-2025	-	-	-	-	-
24	Raipur	Sheath blight	Swarna	Artificial	05-07-2025 02-08-2025	16-09-2025	-	20-09-2025 01-10-25	29-09-2025 12-10-2025	22-11-2025
25	Rajendranagar	Sheath blight/ Neck Blast	Tellahamsa	Artificial	19-07-2025 14-08-2025	01-10- 2025(SHB)	07.10.2025(SHB)	08.10.2025	15-10-2025 23-10- 2025(SHB) 1-11-2025(NB)	18-11-2025 19-11-2025
26	Ranchi	Leaf blast/ Neck blast	Pusa sugandha-3	Artificial	03-07-2025 07-08-2025	15-09-2025	18-09-2025	18-09-2025 30-09-2025	10-10-2025 18-10-2025(LB) 25-11-25(NB)	02-12-2025
27	Rewa	Leaf blast	PS4	Artificial	28-08-2025 18-07-2025	20-08-2025	05-09-2025	07-09-2025 24-09-2025	10-09-2025 04-10-2025	20-11-2025
28	Sabour	Brown spot	RajendraShweta	Natural	27.06.2025/ 02-08-2025	-	10-09-2025	11.09.2025 25.09.2025	10-10-2025	09-11-2025
29	Titabar	Sheath rot/Stem rot	LUIT	Artificial	24-06-2025 30-07-2025	20-10-2025	28-10-2025	29-10-2025	-	-
30	Varanasi	Brown spot	HUR 156	Natural	07-07-2025 11-08-2025	-	15-09-2025	01-10-2025	-	10-11-2025

Leaf blast: The combination of fungicides and delivery methods were evaluated against leaf blast disease at seven locations across the rice growing region of the country. In all the centres applications of treatments were followed uniformly as per the technical program.

Both disease severity and incidence were observed at Nawagam and Rewa. The treatments were tested against the disease under artificial inoculation of blast pathogen at IIRR, Ranchi and Rewa and natural infection at Nawagam, Coimbatore, Jagdalpur, and Ponnampet. Disease incidence in check plot at Rewa was about 26.3% and Nawagam about 95.2%. Disease severity at test locations in check plots varied from 25.1% (Rewa) to 67.8% (IIRR). Severity on check plot was very high (>50%) at IIRR (67.8%), and Ponnampet (52.5%); high (>30-50%) at Nawagam (43.2%), Ranchi (40.3%), Jagdalpur (39.1%), and Coimbatore (33.0%); moderate (20-30%) at Rewa (25.1%). All eight fungicidal treatments were significantly reduced the disease severity and incidence at all test locations when compared to control.

Among the treatments, T4-(Tebuconazole 50%+ trifloxystrobin 25% WG: Seed treatment + one foliar spray), showed minimum average blast severity (DS: 16.1%) from all 7 test locations with reduction 62.5% severity compared to control (DS: 43%). However, T4 treatment significantly reduced the severity at six locations viz., Coimbatore (13.3%), Jagadalpur (31.1%), Nawagam (12.6%), Ponnampet (16.9%), Ranchi (8.3%), and Rewa (10.9%), and on par with IIRR (19.3%). In addition, treatment T2-Metiram (55%) + pyraclostrobin (5%) WG: Seed treatment + one foliar spray also found in minimising the averages disease severity to19.4% from all the locations with reduction of 54.8%. The same, T2 was found significantly reducing the diseases severity at IIRR (18.5%) and on par with Nawagam (14.3%) and Ranchi (9.9%). Similarly, treatment T4 and T2 showed minimum average blast incidence of 22.4% and 30% respectively from Nawagam and Rewa with reduction of 63.1% and 50.6%. However, T4 and T2 significantly reduced the incidence in Nawagam (30.5%) and Rewa (13.3%), respectively (Fig.11.1A and Table 11.2).

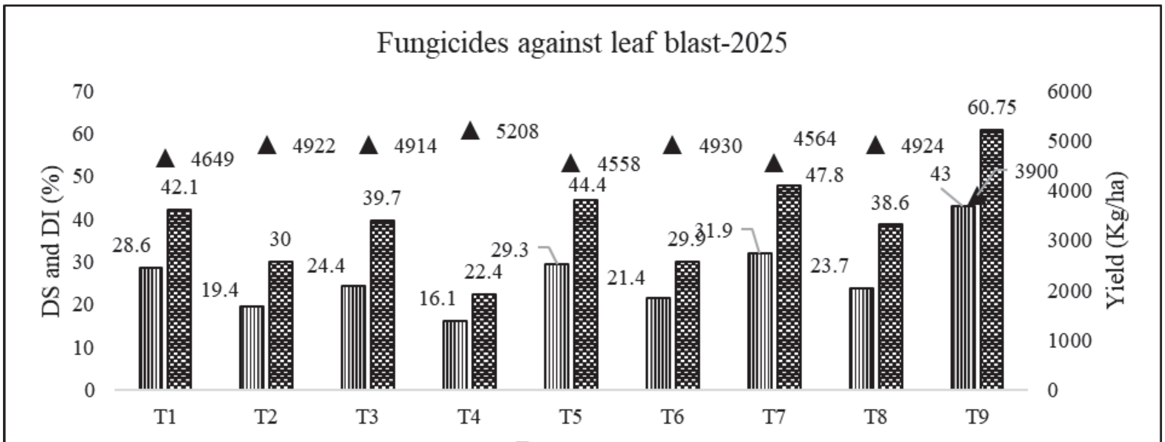

Figure 11.1A: Fungicides against Leaf blast, K-2025

The grain yield data was recorded at all the seven test locations and observed that all the treated plots were superior to check plot (3900 Kg/ha). Treatment T4, was superior in increasing the yield (5208 Kg/ha) compared to the other treatments followed by T2 (Table 11.3).

Table 11.2: Evaluation of fungicides against leaf blast disease of rice, *Kharif*, 2025

Treatments	Dosage (g) / (Kg/L)	Leaf blast- DI			Leaf blast - Disease severity / PDI							
		NWG	REW	Mean	IIRR	CBT	JDP	NWG	PNP	RCI	REW	Mean
T1 - Metiram (55%) + pyraclostrobin (5%) WG: Seed treatment (@ 2 g/Kg of seeds)	2g/Kg	66.7 (54.7)	17.5 (4.3)	**42.1**	43.7 (41.4)	21.1 (27.3)	36.1 (36.9)	24.0 (29.3)	35.5 (36.5)	23.7 (29.0)	16.3 (4.2)	**28.6**
T2 - Metiram (55%) + pyraclostrobin (5%) WG: Seed treatment (@ 2 g/Kg of seeds) followed by one foliar application (@ 2g/l) at maximum tillering stage	2g/Kg: 2g/L	46.7 (43.1)	13.3 (3.8)	**30.0**	18.5 (25.5)	15.5 (23.1)	34.4 (35.9)	14.3 (22.1)	30.5 (33.5)	9.9 (17.8)	12.4 (3.7)	**19.4**
T3 - Tebuconazole 50% + trifloxystrobin 25% WG: Seed treatment(@1.0g/Kg of seeds)	1g/Kg	61.0 (51.4)	18.4 (4.4)	**39.7**	43.7 (41.4)	20.2 (26.6)	32.2 (34.6)	19.5 (26.2)	23.0 (28.6)	16.6 (23.8)	15.7 (4.1)	**24.4**
T4 - Tebuconazole 50% + trifloxystrobin 25% WG: Seed treatment(@1.0g/Kg of seeds) followed by one foliar application (@ 2g/l) at maximum tillering stage	1g/Kg: 0.4g/L	30.5 (33.4)	14.3 (3.9)	**22.4**	19.3 (26)	13.3 (21.4)	31.1 (33.9)	12.6 (20.7)	16.9 (24.2)	8.3 (16.3)	10.9 (3.4)	**16.1**
T5 - Hexaconazole 4% + Zineb 68% WP: Seed treatment(@2g/Kg of seeds)	2g /Kg	69.5 (56.7)	19.3 (4.5)	**44.4**	48.1 (43.9)	22.4 (28.2)	37.2 (37.6)	26.3 (30.8)	27.7 (31.7)	28.4 (32.0)	15.2 (4.0)	**29.3**
T6 - Hexaconazole 4% + Zineb 68% WP: Seed treatment(@2g/Kg of seeds)followed by one foliar application (@ 2g/l) at maximum tillering stage	2g/Kg: 2g/L	42.9 (40.9)	16.9 (4.2)	**29.9**	20.0 (26.5)	15.9 (23.4)	33.9 (35.5)	17.5 (24.6)	25.2 (30.1)	21.0 (27.1)	16.3 (4.2)	**21.4**
T7 - Carbendazim 50% WP: Seed treatment (@ 2g/kg of seeds)	2g/Kg	73.6 (59.2)	22.0 (4.8)	**47.8**	43.7 (41.4)	25.3 (30.2)	35.6 (36.6)	28.2 (32.1)	41.1 (39.9)	30.2 (33.2)	19.1 (4.5)	**31.9**
T8 - Carbendazim 50% WP: Seed treatment (@ 2g/Kg of seeds) followed by one foliar application (@ 2g/l) at maximum tillering stage	2g/Kg: 2g/L	59.0 (50.3)	18.2 (4.4)	**38.6**	20.0 (26.5)	15.3 (23.0)	37.2 (37.6)	23.2 (28.7)	39.7 (39.1)	12.8 (20.8)	17.9 (4.3)	**23.7**
T9- Untreated control	-	95.2 (77.8)	26.3 (5.2)	**60.75**	67.8 (55.4)	33.0 (35.0)	39.1 (38)	43.2 (41.0)	52.5 (46.4)	40.3 (39.4)	25.1 (5.1)	**43.0**
General Mean		**60.6**	**18.5**	-	**36.1**	**20.2**	**35.2**	**23.2**	**32.4**	**21.2**	**16.5**	-
LSD @ 5% *(P=0.05)*		5.8	0.2	-	2.7	1.2	2.5	3.9	2.8	6.1	0.2	-
C.V.		6.4	2.7	-	4.2	3.1	4.7	7.9	5.6	15.7	3.3	-
Transformation		AT	ST	-	AT	AT	AT	AT	AT	AT	ST	-
A/N		N	A	-	A	N	N	N	N	A	A	-

(Figures in the parenthesis indicate transformed means; AT- Arc sine transformation; ST- Square root transformation)

Table 11.3: Evaluation of fungicides against leaf blast disease of rice, *Kharif*, 2025

Treatments	Dosage (g) / (Kg/L)	Leaf blast - Yield							
		JDP	CBT	NWG	PNP	IIRR	RCI	REW	Mean
T1 - Metiram (55%) + pyraclostrobin (5%) WG: Seed treatment (@ 2 g/Kg of seeds)	2g/Kg	4933	4125	6193	3175	4933	5391	3795	**4649**
T2 - Metiram (55%) + pyraclostrobin (5%) WG: Seed treatment (@ 2 g/Kg of seeds) followed by one foliar application (@ 2g/l) at maximum tillering stage	2g/Kg: 2g/L	5594	4258	6502	3252	5594	5773	3481	**4922**
T3 -Tebuconazole 50% + trifloxystrobin 25% WG: Seed treatment(@1.0g/Kg of seeds)	1g/Kg	5283	4092	6167	4057	5283	5634	3883	**4914**
T4 - Tebuconazole 50% + trifloxystrobin 25% WG: Seed treatment(@1.0g/Kg of seeds) followed by one foliar application (@ 2g/l) at maximum tillering stage	1g/Kg: 0.4g/L	5898	4238	6490	4582	5898	5877	3476	**5208**
T5 - Hexaconazole 4% + Zineb 68% WP: Seed treatment(@2g/Kg of seeds)	2g /Kg	4973	4170	5636	3455	4973	4905	3795	**4558**
T6 -Hexaconazole 4% + Zineb 68% WP: Seed treatment(@2g/Kg of seeds)followed by one foliar application (@ 2g/l) at maximum tillering stage	2g/Kg: 2g/L	5071	4305	6419	3793	5071	5547	4304	**4930**
T7 -Carbendazim 50% WP: Seed treatment (@ 2g/kg of seeds)	2g/Kg	5122	4007	5224	2926	5122	5208	4340	**4564**
T8 - Carbendazim 50% WP: Seed treatment (@ 2g/Kg of seeds) followed by one foliar application (@ 2g/l) at maximum tillering stage	2g/Kg: 2g/L	6073	4169	5427	3099	6073	5712	3915	**4924**
T9- Untreated control	-	4514	3284	4680	2301	4514	4722	3287	**3900**
General Mean		**5273**	**4072**	**5860**	**3405**	**5273**	**5419**	**3808**	-
LSD @ 5% *(P=0.05)*		356.9	161.9	N/A	163.4	356.9	678.1	119.4	-
C.V.		4.6	2.7	14.3	3.3	4.6	8.5	1.8	-

Neck blast: The trials were conducted at eight locations to know the efficacy of the test product against neck blast disease. One spray of fungicidal treatments was given at all the centres. The test fungicidal products were evaluated against the disease incidence under natural condition at all locations except at Maruteru and Ranchi, where disease was augmented through artificial inoculation. The disease incidence was observed at locations Jagdalpur, Kaul, Lonavala, Maruteru, Rajendranagar, and Ranchi. Disease incidence was very high (>50%) at Kaul (52.4%) and Lonavala (57.4%); High (>30-50%) at Jagadalpur (49.7%); moderate (20-30%) at Ranchi (20.5%), and Rajendranagar (26.2%); and low (<20%) at Maruteru (13.9%) in check plot. The performance of all eight treatments were superior in reducing the neck blast incidence at all the test locations compared to control plot (DI: 36.7%) except at Jagdalpur, Maruteru, and Ranchi. Disease severity was recorded at locations Mandya and Ponnampet. Disease severity in check plots was High (>30-50%) at Mandya (40.3%) and Ponnampet (42.7%).

The treatment T4-(Tebuconazole 50%+ trifloxystrobin 25% WG: Seed treatment + one foliar spray), spray showed minimum average disease incidence of 20.8% at all six locations and reduced the incidence from all the test locations at 43.3% compared to control. The T4 treatment significantly reduced the incidence of the neck blast at one location *viz.,* Kaul (20.7%). The treatment T2-Metiram (55%) + pyraclostrobin (5%) WG: Seed treatment + one foliar spray was found second best treatment in reducing the average disease incidence of 21.4% at all six locations (Table 11.4).

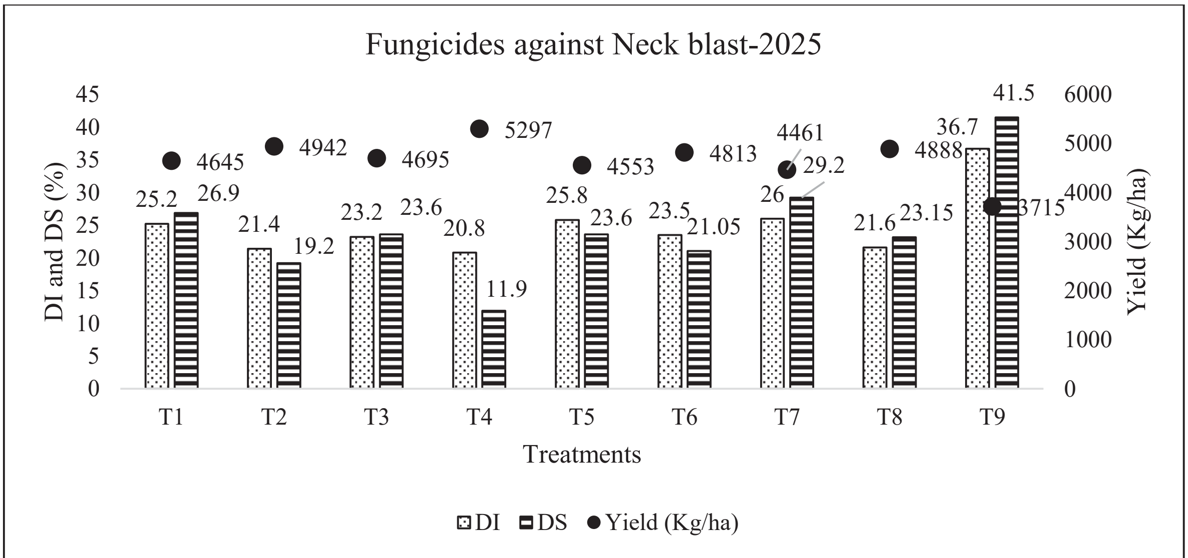

Figure 11.1B: Fungicides against Neck blast, K-2025

All the treatments significantly reduced neck blast severity compared to control across all the two test locations. Among all the treatments T4 showed the maximum reduction of 71.3% compared to control. The same treatment showed the lowest average minimum disease severity (11.3%), with significant disease reduction at Mandya (8.3%) and Ponnampet (15.5%). Besides, the treatment T2 was also exhibited a lower mean disease severity of 19.2%. Grain yield data was recorded at all eight centres. Fungicide-sprayed plots showed significantly higher yield compared to control plot (3715 Kg/ha). Highest yield was obtained from plots where treatment T4 (5297 Kg/ha) applied followed by T2 (4942 Kg/ha) (Table 11.5; Fig 11.1B).

Table 11.4: Evaluation of fungicides against Neck blast disease of rice, *Kharif*, 2025

Treatments	Dosage (g) / (Kg/L)	Neck blast – Disease incidence							NB – (DS / PDI)		
		JDP	KUL	LNV	MTU	RNR	RCI	MEAN	MND	PNP	MEAN
T1 - Metiram (55%) + pyraclostrobin (5%) WG: Seed treatment (@ 2 g/Kg of seeds)	2g/Kg	47.1 (43.2)	27.3 (31.5)	30.2 (33.3)	13.6 (20.6)	20.7 (4.6)	12.5 (3.6)	**25.2**	24.0 (29.3)	29.8 (33.0)	**26.9**
T2 - Metiram (55%) + pyraclostrobin (5%) WG: Seed treatment (@ 2 g/Kg of seeds) followed by one foliar application (@ 2g/l) at maximum tillering stage	2g/Kg: 2g/L	42.0 (40.4)	23.7 (29.1)	28.2 (32.1)	11.5 (19.7)	16.5 (4.2)	6.3 (2.7)	**21.4**	10.0 (18.4)	28.4 (32.2)	**19.2**
T3 - Tebuconazole 50% + trifloxystrobin 25% WG: Seed treatment(@1.0g/Kg of seeds)	1g/Kg	45.5 (42.3)	24.2 (29.4)	31.6 (34.2)	11.8 (19.8)	17.2 (4.2)	9.0 (3.1)	**23.2**	26.7 (31.0)	20.5 (26.9)	**23.6**
T4 - Tebuconazole 50% + trifloxystrobin 25% WG: Seed treatment(@1.0g/Kg of seeds) followed by one foliar application (@ 2g/l) at maximum tillering stage	1g/Kg: 0.4g/L	36.7 (37.2)	20.7 (27.1)	29.4 (32.8)	13.3 (21.0)	19.6 (4.5)	4.8 (2.3)	**20.8**	8.3 (16.7)	15.5 (23.2)	**11.9**
T5 - Hexaconazole 4% + Zineb 68% WP: Seed treatment(@2g/Kg of seeds)	2g /Kg	48.0 (43.8)	34.5 (35.9)	27.5 (31.6)	11.3 (18.9)	17.7 (4.3)	16.0 (4.2)	**25.8**	21.0 (27.2)	26.2 (30.7)	**23.6**
T6 - Hexaconazole 4% + Zineb 68% WP: Seed treatment(@2g/Kg of seeds)followed by one foliar application (@ 2g/l) at maximum tillering stage	2g/Kg: 2g/L	48.8 (44.3)	31.1 (33.9)	26.9 (31.2)	9.9 (17.4)	12.8 (3.7)	11.8 (3.5)	**23.5**	23.3 (28.8)	18.8 (25.6)	**21.05**
T7 - Carbendazim 50% WP: Seed treatment (@ 2g/kg of seeds)	2g/Kg	44.1 (41.4)	33.2 (35.2)	27.7 (31.7)	12.9 (19.8)	21.2 (4.7)	16.8 (4.2)	**26.0**	22.3 (28.1)	36.1 (36.9)	**29.2**
T8 - Carbendazim 50% WP: Seed treatment (@ 2g/Kg of seeds) followed by one foliar application (@ 2g/l) at maximum tillering stage	2g/Kg: 2g/L	41.2 (39.9)	29.2 (32.7)	26.4 (30.9)	9.7 (17.1)	16.0 (4.1)	7.0 (3.0)	**21.6**	13.7 (21.6)	32.6 (34.8)	**23.15**
T9- Untreated control	-	49.7 (44.8)	52.4 (46.3)	57.4 (49.2)	13.9 (21.7)	26.2 (5.2)	20.5 (3.8)	**36.7**	40.3 (39.4)	42.7 (40.8)	**41.5**
General Mean		**44.8**	**30.7**	**31.7**	**12.0**	**18.7**	**11.6**	-	**21.1**	**27.8**	-
LSD @ 5% *(P=0.05)*		N/A	2.1	1.4	N/A	0.7	N/A	-	4.3	1.7	-
C.V.		12.0	4.2	2.9	25.2	11.2	25.6	-	9.3	3.7	-
Transformation		AT	AT	AT	AT	ST	ST	-	AT	AT	-
A/N		N	N	N	N	N	A	-	N/A	N	-

(Figures in the parenthesis indicate transformed means; AT- Arc sine transformation; ST- Square root transformation)

Table 11.5: Evaluation of fungicides against Neck blast disease of rice, *Kharif*, 2025

Treatments		Grain Yield (Kg/Ha)								
	Dosage (g) / (Kg/L)	**JDP**	**KUL**	**LNV**	**PNP**	**RCI**	**RNR**	**MND**	**MTU**	**MEAN**
T1 - Metiram (55%) + pyraclostrobin (5%) WG: Seed treatment (@ 2 g/Kg of seeds)	2 g/Kg	4933	3525	4200	3170	5392	6009	4661	5269	**4645**
T2 - Metiram (55%) + pyraclostrobin (5%) WG: Seed treatment (@ 2 g/Kg of seeds) followed by one foliar application (@ 2g/l) at maximum tillering stage	2g/Kg	5594	3726	4243	3252	5773	5565	5514	5868	**4942**
T3 - Tebuconazole 50% + trifloxystrobin 25% WG: Seed treatment(@1.0g/Kg of seeds)	2g/Kg: 2g/L	5283	3605	4313	4057	5634	5282	4165	5220	**4695**
T4 - Tebuconazole 50% + trifloxystrobin 25% WG: Seed treatment(@1.0g/Kg of seeds) followed by one foliar application (@ 2g/l) at maximum tillering stage	1g/Kg	5898	3858	4490	4582	5877	6226	5759	5685	**5297**
T5 - Hexaconazole 4% + Zineb 68% WP: Seed treatment(@2g/Kg of seeds)	1g/Kg: 0.4g/L	4973	2982	4098	3455	4905	5275	5420	5318	**4553**
T6 - Hexaconazole 4% + Zineb 68% WP: Seed treatment(@2g/Kg of seeds)followed by one foliar application (@ 2g/l) at maximum tillering stage	2g /Kg	5071	3130	4320	3793	5547	6584	4421	5641	**4813**
T7 - Carbendazim 50% WP: Seed treatment (@ 2g/kg of seeds)	2g/Kg: 2g/L	5122	3001	4270	2926	5208	5069	4790	5301	**4461**
T8 - Carbendazim 50% WP: Seed treatment (@ 2g/Kg of seeds) followed by one foliar application (@ 2g/l) at maximum tillering stage	2g/Kg	6073	3344	4395	3099	5712	6410	4357	5711	**4888**
T9- Untreated control	-	4514	2525	3768	2301	4722	4357	2833	4699	**3715**
General Mean		**5273**	**3300**	**4233**	**3404**	**5419**	**5642**	**4658**	**5412**	-
LSD @ 5% *(P=0.05)*		356.9	288.0	189.9	163.4	678.1	1319.5	989	N/A	-
C.V.		4.6	5.9	3.1	3.3	8.5	15.9	12.2	17.5	-

Sheath blight: Commercially available four combination fungicides were evaluated against sheath blight disease at 14 hot spot locations with two different method of applications. The experiment was conducted under artificial inoculation at all the test locations except Moncompu. Both disease severity and incidence was observed at seven locations *viz.,* Bankura, Cuttack, Faizabad (Masodha), Ludhiana, Moncompu, Maruteru, and Pantnagar. Only disease severity was observed at seven locations namely, Chinsurah, Chiplima, Gangavathi, IIRR, Mandya, Raipur, and Rajendranagar. Disease severity in check plots varied between 51.0% (Maruteru) and 87.4% (Gangavathi). Disease severity on check plot was very high (>50%) at all the locations *viz.,* Gangavathi (87.4%), Ludhiana, Mandya (76.3%), Rajendranagar (74.3%), Masodha (74.2%), Chinsurah (73.0%), Pantnagar (72.2%), Moncompu (71.0%), Cuttack (68.6%), IIRR (63.3%), Bankura (61.8%), Chiplima (55.9%), Raipur (52.6%), Maruteru (51.0%). Disease incidence in check plots varied between 17.8% (Moncompu) and 100% (Ludhiana and Bankura). It was very high at Ludhiana and Bankura (100%), Pantnagar (91.2%), Cuttack (71.4%), Masodha (67.4%), and Maruteru (67.1%); and low (<20) at Moncompu (17.8%).

All the treatments significantly reduced the sheath blight severity compared to control (DS: 68.4%) across the test locations. Among all, treatment T4-(Tebuconazole 50%+ trifloxystrobin 25% WG: Seed treatment + one foliar spray) showed minimum average disease severity from 14 test locations with reduction of 60% compared to control. The same treatment significantly reduced the disease severity at 6 locations *viz.,* Chinsurah (32.3%), Chiplima (17.8%), IIRR (24.9%), Ludhiana (20%), Mandya (17.3%), Pantnagar (27.5%), Raipur (11.9%) and on par with the other best treatment at four locations *viz.,* Cuttack, Gangavathi, Maruteru and Moncompu. Besides, T6 was also found in maximum reducing the locations average disease severity and significant at 3 locations *viz.*, Maruteru (40.4%), Moncompu (32.1%), Rajendranagar (16.7%) and on par with other best treatments at one locations such as Raipur (14.1%) (Table 11.6).

All the treatments where significantly reduced the sheath blight incidence compared to control (DI: 73.6%) across the test locations except Maruteru where treatments are not significant to each other. Treatment T4, maximum reduced the incidence from all the test locations at 42.2% compared to control and significant at two locations *viz.,* Ludhiana (34.0%), and Pantnagar (51.7%) and on par with other best treatment at Cuttack, and Masodha. Similar to the disease severity, T6 was also found reduction maximium average incidence from all the test locations at 37.6% compared to control and observed significant disease incidence at Moncompu (6.4%), Cuttack (24.8%), and Masodha (36.4%) (Table 11.7).

Table 11.6: Evaluation of fungicides against sheath blight severity or Percent Disease index (PDI) of rice, *Kharif*, 2025

Treatments	Dosage (g) / (Kg/L)	Sheath blight (DS / PDI)														
		BNK	**CHN**	**CHP**	**CTK**	**GNV**	**IIRR**	**LDN**	**MND**	**MTU**	**MSD**	**MNC**	**PNT**	**RPR**	**RNR**	**Mean**
T1 - Met (55%) + Pyr (5%) WG: ST	2g/Kg	41.8 (40.3)	55.3 (48)	36.3 (37)	29.2 (32.6)	63.4 (52.7)	37.3 (37.6)	65.6 (54.1)	61.3 (51.5)	38.5 (38.5)	51.4 (45.8)	43.5 (43.7)	55.8 (48.3)	20.5 (26.9)	53.1 (46.7)	**46.6**
T2 - Met (55%) + Pyr (5%) WG: ST + 1 FS	2g/Kg: 2g/L	19.6 (26.3)	38.3 (38.1)	27.8 (31.8)	17.6 (24.8)	30 (33.2)	31.8 (34.3)	34.1 (35.7)	19.0 (25.8)	37.3 (37.3)	25.5 (30.3)	32.9 (32.9)	41.7 (40.2)	16.3 (23.6)	47.7 (42.5)	**30.0**
T3 -Teb (50%) + Tri (25%) WG: ST	1g/Kg	39.0 (38.6)	45.3 (42.2)	30.4 (33.4)	33.4 (35.2)	67 (54.9)	32 (34.4)	53.7 (47.1)	55.7 (48.3)	40.8 (40.8)	48.2 (43.9)	42.1 (42.1)	52.7 (46.5)	20.0 (26.6)	50.4 (44)	**43.6**
T4 - Teb (50%) + Tri (25%) WG: ST + 1 FS	1g/Kg: 0.4g/L	22.0 (28)	32.3 (34.6)	17.8 (24.9)	19.8 (26.3)	34 (35.7)	24.9 (29.9)	20 (26.5)	17.3 (24.6)	40.7 (40.7)	32.4 (34.6)	33.8 (33.8)	27.5 (31.6)	11.9 (20.1)	42.1 (40.2)	**26.9**
T5 - Hex (4%) +Zin (68%) WP : ST	2g /Kg	48.7 (44.2)	49.3 (44.5)	32.2 (34.6)	35.6 (36.6)	72.3 (58.2)	33.4 (35.3)	55.2 (48.1)	54.3 (47.5)	41 (41)	54.5 (47.5)	44.8 (44.7)	53 (46.7)	17.8 (24.8)	67.5 (55.3)	**47.1**
T6 - Hex (4%) +Zin (68%) WP : ST + 1 FS	2g/Kg: 2g/L	24.4 (29.6)	44.8 (42)	25.9 (30.5)	22.0 (27.9)	40.4 (39.4)	28.6 (32.3)	33.7 (35.3)	29.3 (32.7)	40.4 (40.4)	31.3 (34)	32.1 (32.1)	32.9 (35)	14.1 (21.9)	16.7 (23.5)	**29.8**
T7 - Car (50%) WP: ST	2g/Kg	45.3 (42.3)	53.0 (46.7)	41.5 (40.1)	37.3 (37.6)	75.5 (60.3)	39.1 (38.7)	63.7 (53)	65.0 (53.9)	42.1 (42.1)	56.3 (48.6)	47.4 (47.4)	48.7 (44.2)	19.3 (25.5)	72.2 (58.3)	**50.5**
T8 - Car (50%) WP: ST +1 FS	2g/Kg: 2g/L	39.4 (38.9)	34.8 (36.1)	30.4 (33.4)	24.4 (29.5)	47.9 (43.8)	35.8 (36.7)	32.6 (34.8)	21.3 (27.5)	41.5 (41.5)	39.3 (38.8)	42.1 (40.9)	37.5 (37.7)	15.6 (23.1)	41.6 (40)	**34.6**
T9 - Untreated control	-	61.8 (51.8)	73.0 (58.7)	55.9 (48.4)	68.6 (55.9)	87.4 (69.3)	63.3 (52.7)	76.3 (60.9)	76.3 (61)	51.0 (51)	74.2 (59.6)	71.0 (57.4)	72.2 (58.1)	52.6 (46.5)	74.3 (59.5)	**68.4**
General Mean		**38.0**	**47.3**	**33.1**	**32.0**	**57.5**	**36.2**	**48.3**	**44.4**	**41.5**	**45.9**	**43.3**	**46.9**	**20.9**	**51.7**	-
LSD @ 5% *(P=0.05)*		0.9	4.9	4.3	4.0	4.0	3.6	7.1	7.1	6.2	4.9	12.9	2.1	6.4	12.9	-
C.V.		1.4	7.6	7.1	8.0	4.6	5.5	9.2	9.8	10.2	6.7	21.2	2.8	13.8	19.3	-
Transformation		AT	AT	AT	AT	AT	AT	AT	AT	NT	AT	AT	AT	AT	AT	-
Artificial / Natural infection		A	A	A	A	A	A	A	A	A	A	N	A	A	A	-

(Figures in the parenthesis indicate transformed means; AT- Arc sine transformation; ST- Square root transformation)

Table 11.7: Evaluation of fungicides against sheath blight incidence of rice, *Kharif,* 2025

Treatments	Dosage (g) / (Kg/L)	Sheath blight (Disease incidence)							
		BNK	**CTK**	**LDN**	**MTU**	**MSD**	**MNC**	**PNT**	**Mean**
T1-Metiram (55%) + pyraclostrobin (5%) WG: Seed treatment	2g/Kg	100.0 (10.1)	30.0 (33.2)	78.4 (62.3)	57.3 (49.2)	53.9 (47.2)	12.2 (2.4)	83.3 (65.9)	**59.3**
T2-Metiram (55%) + pyraclostrobin (5%) WG: Seed treatment followed by one foliar application at maximum tillering stage	2g/Kg: 2g/L	89.3 (9.5)	21.2 (27.3)	46.4 (42.9)	51.0 (45.5)	34.8 (36.1)	8.5 (1.8)	65.1 (53.7)	**45.2**
T3-Tebuconazole 50%+ trifloxystrobin 25% WG: Seed treatment	1g/Kg	100.0 (10.1)	34.6 (36)	74.8 (60)	57.2 (49.2)	50.2 (45.1)	13.2 (2.5)	71.7 (57.8)	**57.4**
T4-Tebuconazole 50%+ trifloxystrobin 25% WG: Seed treatment followed by one foliar application at maximum tillering stage	1g/Kg: 0.4g/L	92.9 (9.7)	22.0 (27.8)	34.0 (35.6)	51.1 (45.6)	38.5 (38.3)	7.4 (1.6)	51.7 (46)	**42.5**
T5-Hexaconazole 4% + Zineb 68% WP: Seed treatment	2g /Kg	100.0 (10.1)	37.2 (37.5)	77.8 (61.9)	60.3 (50.9)	56.8 (48.9)	11.1 (2.2)	76.5 (61)	**60.0**
T6-Hexaconazole 4% + Zineb 68% WP: Seed treatment followed by one foliar application at maximum tillering stage	2g/Kg: 2g/L	97.5 (9.9)	24.8 (29.8)	44.4 (41.7)	55.3 (48.1)	36.4 (37.1)	6.4 (1.6)	56.6 (48.8)	**45.9**
T7-Carbendazim 50% WP: Seed treatment	2g/Kg	100.0 (10.1)	39.4 (38.8)	88.2 (70.1)	60.0 (51)	57.7 (49.4)	10.9 (2.1)	71.5 (57.7)	**61.1**
T8-Carbendazim 50% WP: Seed followed by one foliar application at maximum tillering stage	2g/Kg: 2g/L	100.0 (10.1)	27.6 (31.6)	40.8 (39.7)	57.8 (49.6)	40.1 (39.2)	8.9 (1.9)	61 .0 (51.4)	**45.9**
T9- Untreated control	-	100.0 (10.1)	71.4 (57.7)	100 (90)	67.1 (55.4)	67.4 (55.2)	17.8 (3.2)	91.2 (72.7)	**73.6**
General Mean		**97.8**	**34.2**	**65**	**57.4**	**48.4**	**10.7**	**69.8**	**-**
LSD @ 5% *(P=0.05)*		0.16	4.5	4.2	N/A	4.4	0.67	2.2	**-**
C.V.		0.94	8.6	4.3	10.2	5.8	21.3	2.2	**-**
Transformation		ST	AT	AT	AT	AT	SQ	AT	**-**
Artificial / Natural infection		A	A	A	A	A	N	A	**-**

(Figures in the parenthesis indicate transformed means; AT- Arc sine transformation; ST- Square root transformation)

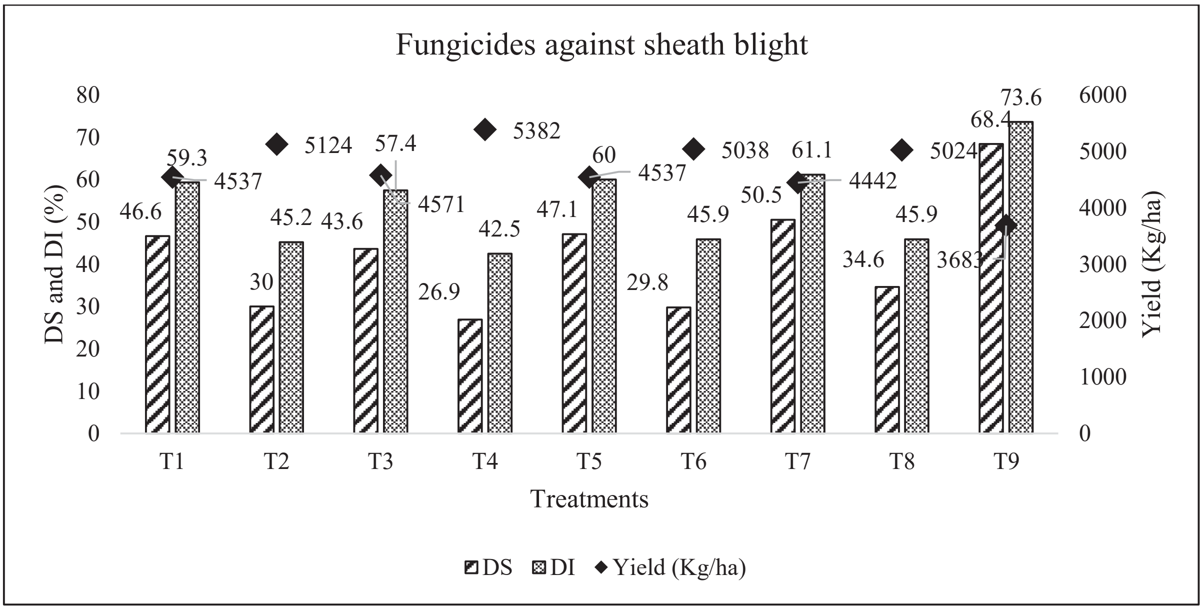

Figure 11.1C: Fungicides against sheath blight, K-2025

Grain yield in the experimental plots recorded at all the test locations. It was observed that grain yield was more in fungicides applied as seed treatment only or both seed treatment+ foliar spray treated plots compared to check plot (3683 Kg/ha). Highest yield was recorded in the plots where T4 treatment (5382 Kg/ha) applied plot followed by T2 treatment given (5124 Kg/ha) (Fig.11.1C; Table 11.8).

Brown spot: Test fungicidal products were evaluated against brown spot at eight different locations. Both disease incidence and severity were recorded at Bankura, and remaining seven centres only disease severity was recorded. Disease severity in control plot was very high (>50%) at Pattambi (75.6%), Chatha (62.5%), Aduthurai (55.6%), Bankura (54.6%), and high at Sabour (46.4%) and Chiplima (41.5%); and moderate at Pusa (37.3%). The very high disease incidence (100%) was noticed at Bankura. Bio-efficacy of the fungicides was tested under natural inoculation at most of the locations except at Bankura, where disease was augmented through artificial inoculation.

All eight fungicidal treatments were performed better in reducing the brown spot at all the centres compared to untreated control. The treatment, T4-(Tebuconazole 50%+ trifloxystrobin 25% WG: Seed treatment + one foliar spray), showed minimum average disease severity of 25% from all seven-test locations with 53.2% reduction in severity and 3.0% reduction in incidence compared to control. The same treatment (T4) ie., was significantly reduced the disease severity at two locations viz., Chiplima (17%), and Chata (13.7%) and on par with best ttreatments at four locations viz. Aduthurai (18%), Pattambi (64.4%), Pusa (24.3%), Sabour (13.8%). Treatment, T6-Hexaconazole 4% +Zineb 68% WP: Seed treatment + one foliar spray was found second best treatment in reducing the average disease severity from all the locations and significantly reduced the disease severity at two locations viz., Aduthurai (16.6%), Pattambi (61.1%), and on par with Bankura (22%), Chiplima (20.7%) and Pusa (25.7%). The lowest average minimum disease incidence was observed in the Treatment 6, Hexaconazole 4% +Zineb 68% WP: Seed treatment+ one foliar spray with significant disease reduction at Bankura (92.2%) and on par with Varanasi (31.1%) (Table 11.9).

Table 11.8: Evaluation of fungicides against sheath blight disease grain yield of rice, *Kharif*, 2025

Treatments	Dosage (g) / (Kg/L)	Sheath blight grain yield (Kg/ha)													
		BNK	**CHN**	**CHP**	**CTK**	**IIRR**	**LDN**	**MND**	**MTU**	**MSD**	**MNC**	**PNT**	**RPR**	**RNR**	**Mean**
T1 - Met (55%) + Pyr (5%) WG: ST	2g/Kg	3024	4190	4683	4660	4088	5052	4661	5269	3033	3411	4374	6533	6009	**4537**
T2 - Met (55%) + Pyr (5%) WG: ST + 1 FS	2g/Kg: 2g/L	3935	5450	5017	5120	3843	5774	5514	5868	4417	3870	5576	6666	5565	**5124**
T3 -Teb (50%) + Tri (25%) WG: ST	1g/Kg	3161	4550	5233	4440	4377	5406	4165	5220	3233	2913	4557	6883	5282	**4571**
T4 - Teb (50%) + Tri (25%) WG: ST + 1 FS	1g/Kg: 0.4g/L	3599	5817	5750	5040	5255	6541	5759	5685	4000	3536	6288	6466	6226	**5382**
T5 - Hex (4%) +Zin (68%) WP : ST	2g /Kg	2608	4147	4983	4350	4439	5383	5420	5318	3067	2805	4415	6766	5275	**4537**
T6 - Hex (4%) +Zin (68%) WP : ST + 1 FS	2g/Kg: 2g/L	3517	4677	5517	4970	4609	5760	4421	5641	4200	3171	5963	6466	6584	**5038**
T7 - Car (50%) WP: ST	2g/Kg	2803	4132	4417	4200	3565	5199	4790	5301	2833	4192	4582	6666	5069	**4442**
T8 - Car (50%) WP: ST +1 FS	2g/Kg: 2g/L	3102	5632	4967	4830	4289	6099	4357	5711	3767	3569	5773	6800	6410	**5024**
T9 - Untreated control	-	2083	3250	4217	3640	3611	4403	2833	4699	2267	1871	4185	6466	4357	**3683**
General Mean		**3092**	**4649**	**4976**	**4583**	**4231**	**5513**	**4658**	**5412**	**3424**	**3260**	**5079**	**6635**	**5642**	-
LSD @ 5% (P=0.05)		134	518.4	362	N/A	366.3	N/A	989	N/A	425.5	919.4	280.2	N/A	1,319	-
C.V.		2.5	7.6	4.2	10.5	5.0	17.5	12.2	17.5	7.1	18.8	3.2	6.2	15.9	-

Table 11.9: Evaluation of fungicides on Brown spot disease severity and incidence of rice, *Kharif,* 2025

Treatments	Dosage (g) / (Kg/L)	Brown Spot (DS / PDI)								Brown Spot (DI)		
		ADT	BNK	CHA	CHP	PTB	PSA	SAB	Mean	BNK	VAR	Mean
T1 - Met (55%) + Pyr (5%) WG: ST	2g/Kg	43 (41)	41.4 (40)	41 (39.8)	32.6 (34.7)	73 (58.7)	26.7 (31)	35.5 (36.5)	**41.9**	100 (10.1)	36.6 (37.2)	**68.3**
T2 - Met (55%) + Pyr (5%) WG: ST + 1 FS	2g/Kg: 2g/L	32.3 (34.6)	21.8 (27.8)	21.5 (27.6)	25.9 (30.5)	61.3 (51.5)	21.7 (27.7)	11.6 (19.8)	**28.0**	96.7 (9.9)	33.3 (35.2)	**65.0**
T3 -Teb (50%) + Tri (25%) WG: ST	1g/Kg	38 (38)	34.9 (36.2)	39.5 (38.9)	25.2 (30.1)	68.5 (55.9)	28.3 (32.1)	36.1 (36.9)	**38.6**	100 (10.1)	33.9 (35.6)	**67.0**
T4 - Teb (50%) + Tri (25%) WG: ST + 1 FS	1g/Kg: 0.4g/L	18 (25)	23.5 (29)	13.7 (21.7)	17 (24.3)	64.4 (53.4)	24.3 (29.5)	13.8 (21.7)	**25.0**	97 (9.9)	32.6 (34.8)	**64.8**
T5 - Hex (4%) + Zin (68%) WP : ST	2g /Kg	37.6 (37.8)	45.5 (42.4)	45.5 (42.4)	24.8 (29.8)	72.9 (58.7)	32 (34.4)	38.2 (38.2)	**42.4**	100 (10.1)	25.6 (30.1)	**62.8**
T6 - Hex (4%) + Zin (68%) WP : ST + 1 FS	2g/Kg: 2g/L	16.6 (24)	22 (28)	24 (29.3)	20.7 (27)	61.1 (51.4)	25.7 (30.4)	15.4 (23.1)	**26.5**	92.2 (9.7)	31.1 (33.9)	**61.7**
T7 - Car (50%) WP: ST	2g/Kg	42.6 (40.8)	46.1 (42.8)	47.6 (43.6)	33.3 (35.2)	65.9 (54.3)	31 (33.8)	39.7 (39)	**43.7**	100 (10.1)	37.8 (37.9)	**68.9**
T8 - Car (50%) WP: ST +1 FS	2g/Kg: 2g/L	27.3 (31.5)	40.5 (39.5)	29.5 (32.9)	28.5 (32.3)	66.7 (54.7)	23.3 (28.8)	18.7 (25.6)	**33.5**	100 (10.1)	41.5 (34.2)	**70.8**
T9 - Untreated control	-	55.6 (48.2)	54.6 (47.6)	62.5 (52.2)	41.5 (40.1)	75.6 (60.4)	37.3 (37.6)	46.4 (42.9)	**53.4**	100 (10.1)	34.2 (40)	**67.1**
General Mean		**34.5**	**36.6**	**36**	**28**	**67.7**	**27.8**	**28.4**	-	**98.4**	**34.1**	-
LSD @ 5% *(P=0.05)*		3.8	1.2	2.7	4.1	4.6	4.1	2.2	-	0.1	4.9	-
C.V.		6.2	1.9	4.2	7.5	4.7	7.4	4.1	-	0.6	7.9	-
Transformation		AT	AT	AT	AT	AT	AT	AT	-	ST	AT	-
Artificial / Natural infection		N	A	N	N	N	N	N	-	A	N	-

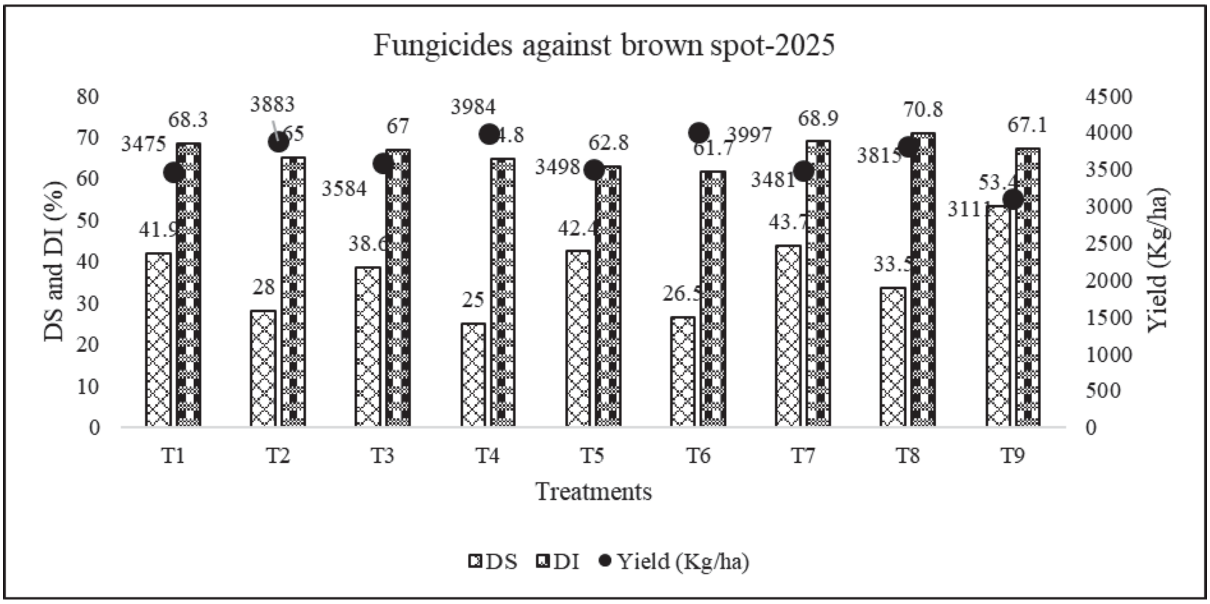

Figure 11.1D: Fungicides against Brown spot, K-2025

Grain yield data was recorded at all eight centres. Fungicide sprayed plots showed significantly higher yield compared to control plot (3111 Kg/ha). Highest yield (3997 Kg/ha) was obtained from plots where treatment 6 ie., Hexaconazole 4% +Zineb 68% WP: Seed treatment+ one foliar spray where applied (Fig. 11.1D; Table 11.10).

Sheath rot: The treatments were tested against sheath rot disease at five locations namely Aduthurai, Maruteru, Navasari, Nawagam, and Titabar. Both disease severity and incidence were recorded at Navasari and Nawagam. Only disease severity was observed at Aduthurai and only disease incidence was observed at Maruteru and Titabar. The treatments were evaluated against the disease under natural infestation at most of the locations except at Titabar, where disease was augmented through artificial inoculation. Disease severity in check plots was high (30-50%) at Aduthurai (35.7%); moderate at Navasari (25.6%) and Nawagam (26.3%). Incidence in check plots was varied from 64.1% to 3.1%. Incidence was very high at Nawagam (64.1%); moderate (20-30%) at Navasari (29.1%), and low (<20) at Titabar (17.1%) and Maruteru (3.1%). Treatment details were followed in all the centre as per the technical programme. All the treatments were significantly reduced the disease incidence and severity when compared to control plot (DS: 49.4%; DI: 41.6%) at all the test locations except Maruteru.

In overall, treatment T4-(Tebuconazole 50%+ trifloxystrobin 25% WG: Seed treatment + one foliar spray), maximum minimised average disease severity (17.6%) and incidence (19.6%) from all the five locations with reduction of 64.3% and 52.8%, respectively. The same treatment found significantly effective in reducing severity two locations viz., Nawagam (15.2%), Aduthurai (18.3%) and on par with Navasari (19.2%). Similarly, significantly reducing the incidence at two locations viz., Titabar (10.1%) and Nawagam (41.2%) and on par with at Navasari (23.3%) (Table 11.11).

Table 11.10: Evaluation of fungicides against Brown spot grain yield of rice, *Kharif,* 2025

Treatments	Dosage (g) / (Kg/L)	Brown spot grain yield (Kg/ha)								
		ADT	**BNK**	**CHA**	**CHP**	**PTB**	**PSA**	**SAB**	**VAR**	**MEAN**
T1 - Met (55%) + Pyr (5%) WG: ST	2g/Kg	3712	3049	2632	4683	3014	4426	2526	3757	**3475**
T2 - Met (55%) + Pyr (5%) WG: ST + 1 FS	2g/Kg: 2g/L	3959	3700	2960	5017	3516	5013	3167	3731	**3883**
T3 -Teb (50%) + Tri (25%) WG: ST	1g/Kg	3897	3263.3	2735	5233	3006	4223	1819	4497	**3584**
T4 - Teb (50%) + Tri (25%) WG: ST + 1 FS	1g/Kg: 0.4g/L	4282	3455.6	3230	5750	3427	4673	2278	4778	**3984**
T5 - Hex (4%) + Zin (68%) WP : ST	2g /Kg	3774	2791.6	2570	4983	3095	4246	1806	4717	**3498**
T6 - Hex (4%) + Zin (68%) WP : ST + 1 FS	2g/Kg: 2g/L	4515	3694	2850	5517	3497	4650	2236	5018	**3997**
T7 - Car (50%) WP: ST	2g/Kg	4040	2791.6	2505	4417	3143	4366	1781	4801	**3481**
T8 - Car (50%) WP: ST +1 FS	2g/Kg: 2g/L	4183	3033.3	2740	4967	3154	4773	2158	5513	**3815**
T9 - Untreated control	-	3625	2276.3	2382	4217	3045	3946	1756	3645	**3111**
General Mean		**3999**	**3117**	**2734**	**4976**	**3211**	**4480**	**2170**	**4462**	-
LSD @ 5% *(P=0.05)*		111.9	154.5	132.7	361.9	250.9	N/A	95.8	558.7	-
C.V.		1.6	2.8	2.7	4.1	4.4	13.8	2.0	7.1	-

Table 11.11: Evaluation of fungicides on sheath rot disease of rice, *Kharif,* 2025

Treatments	Dosage (g) / (Kg/L)	Sheath rot (DS / PDI)				Sheath rot (Disease Incidence)					Grain yield (Kg/ha)				
		ADT	NVS	NWG	Mean	MTU	NVS	NWG	TTB	Mean	ADT	MTU	NVS	NWG	Mean
T1 - Met (55%) + Pyr (5%) WG: ST	2g/Kg	52.6 (46.5)	26.4 (30.9)	27.7 (31.7)	**35.6**	2.5 (1.7)	28.6 (32.3)	72.4 (58.4)	18.7 (25.6)	**30.5**	3712	5269	5174	6193	**5087**
T2 - Met (55%) + Pyr (5%) WG: ST + 1 FS	2g/Kg: 2g/L	36.3 (37.0)	22.9 (28.6)	18.7 (25.6)	**26.0**	1.8 (1.7)	25.9 (30.6)	52.4 (46.4)	12.8 (21.0)	**23.2**	3959	5868	5280	6502	**5402**
T3 -Teb (50%) + Tri (25%) WG: ST	1g/Kg	42.0 (40.4)	24.3 (29.5)	24.5 (29.6)	**30.2**	3.0 (2.0)	28.5 (32.3)	63.8 (53.2)	18.0 (25.1)	**28.3**	3897	5220	5200	6167	**5121**
T4 - Teb (50%) + Tri (25%) WG: ST + 1 FS	1g/Kg: 0.4g/L	18.3 (25.3)	19.2 (25.9)	15.2 (22.9)	**17.6**	4.0 (2.0)	23.3 (28.8)	41.2 (39.9)	10.1 (18.5)	**19.6**	4282	5685	5684	6490	**5535**
T5 - Hex (4%) +Zin (68%) WP : ST	2g /Kg	39.0 (38.6)	23.7 (29.1)	29.3 (32.7)	**30.7**	3.5 (2.0)	26.0 (30.6)	59.0 (50.3)	18.9 (27.2)	**26.8**	3774	5318	5235	5636	**4991**
T6 - Hex (4%) +Zin (68%) WP : ST + 1 FS	2g/Kg: 2g/L	19.3 (26.0)	18.2 (25.2)	19.7 (26.3)	**19.1**	1.4 (1.5)	22.1 (28.1)	59.0 (50.3)	12.6 (21.1)	**23.8**	4515	5641	5909	6419	**5621**
T7 - Car (50%) WP: ST	2g/Kg	34.3 (35.8)	28.7 (32.4)	33.3 (35.2)	**32.1**	4.8 (2.1)	33.9 (35.6)	73.3 (59.2)	18.9 (25.8)	**32.7**	4040	5301	4818	5224	**4846**
T8 - Car (50%) WP: ST +1 FS	2g/Kg: 2g/L	28.3 (32.1)	27.8 (31.8)	26.2 (30.5)	**27.5**	3.1 (2.0)	32.4 (34.7)	64.8 (53.8)	12.6 (20.8)	**28.2**	4183	5711	4996	5427	**5079**
T9 - Untreated control	-	67.0 (54.9)	39.5 (38.9)	41.8 (40.2)	**49.4**	3.6 (2.2)	41.0 (39.8)	90.5 (72.9)	31.4 (34.1)	**41.6**	3625	4699	3901	4680	**4226**
General Mean		**37.5**	**25.6**	**26.3**	-	**3.1**	**29.1**	**64.1**	**17.1**	-	**3999**	**5412**	**5133**	**5860**	-
LSD @ 5% *(P=0.05)*		2.6	2.5	3.2	-	N/A	2.4	3.8	0.6	-	112.0	N/A	626.9	N/A	-
C.V.		4.0	4.8	6.0	-	29.8	4.2	4.0	1.6	-	1.6	17.5	7.0	14.3	-
Transformation		AT	AT	AT	-	ST	AT	AT	AT	-	-	-	-	-	-
Artificial / Natural infection		N	N	N	-	N	N	N	A	-	-	-	-	-	-

(Figures in the parenthesis indicate transformed means; AT- Arc sine transformation; ST- Square root transformation)

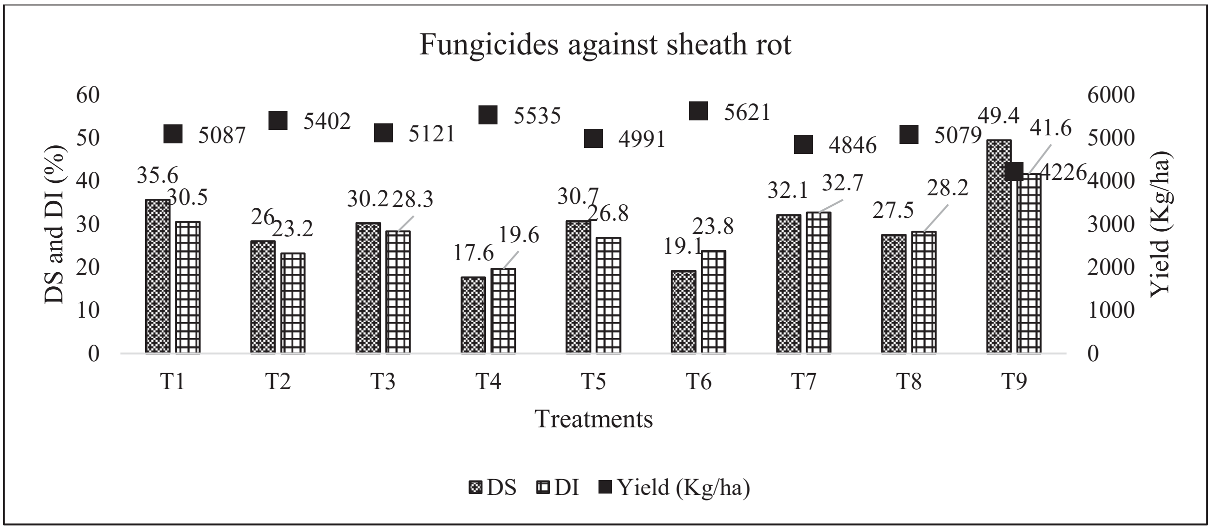

Figure 11.1E: Fungicides against Sheath rot, K-2025

Besides, treatment T6-Hexaconazole 4% +Zineb 68% WP: Seed treatment+ one foliar spray also effective in minimising the average severity (19.1%) from the locations with reduction of 61.3% and significantly reducing the severity at Navasari (18.2%) and on par with Aduthurai (19.3%). Similarly, T6 also found minimising the incidence at the rate of 42.7% from four locations with significantly reducing the incidence at Navasari (22.1%). The mean yield across the experimental locations in check plot was 4226 Kg/ha. Among the treatments, T6 yielded most (5921 Kg/ha) followed by T4 (5535 Kg/ha) when compared to other treatments (Table 11.11; Fig. 11.1E).

Grain Discoloration: Test fungicidal products were evaluated against grain discoloration at Moncompu only. All eight treatments performed better in reducing the grain discoloration compared to untreated control. Among eight different fungicidal treatments, lowest panicle infection and spikelet infection was observed from the application of treatment T6-Hexaconazole 4% + Zineb 68% WP: Seed treatment+ one foliar spray. Fungicide applied plots showed significantly higher yield compared to control plot (1871 Kg/ha). Highest yield (3870 Kg/ha) was obtained from plots where treatment (T2) applied (Table 11.12).

False smut: The chemicals were evaluated against false smut disease through natural incidence at Maruteru and recorded the disease incidence. All eight fungicidal treatments reduced the disease incidence compared to control. Among all treatment, T2 treatment reduced the disease incidence of 1.4% and gave the highest yield of 5868 Kg/ha (Table 11.12).

Stem rot: The chemicals were evaluated against stem rot disease through natural incidence at Titabar and recorded the disease incidence. All eight fungicidal treatments reduced the disease incidence compared to control. Among all treatment, T4 treatment reduced the disease incidence of 10.1% (Table 11.12).

Table11.12: Evaluation of fungicides against grain discoloration, false smut and stem rot, *Kharif*, 2025

Treatments	Dosage (g) / (Kg/L)	MNC- Grain discoloration			MTU (False Smut)		TTB (Stem rot)
		Panicle infection	Spikelet infection	Yield (Kg/ha)	DI	Yield (Kg/ha)	DI
T1 - Met (55%) + Pyr (5%) WG: ST	2g/Kg	1.4 (1.5)	2.2 (1.8)	3411	2.5 (1.8)	5269	29.9 (33.2)
T2 - Met (55%) + Pyr (5%) WG: ST + 1 FS	2g/Kg: 2g/L	1.6 (1.6)	1.8 (1.7)	3870	1.4 (1.5)	5868	12.5 (20.7)
T3 -Teb (50%) + Tri (25%) WG: ST	1g/Kg	2.6 (1.9)	2.2 (1.8)	2913	2.3 (1.7)	5220	29.4 (32.9)
T4 - Teb (50%) + Tri (25%) WG: ST + 1 FS	1g/Kg: 0.4g/L	1.5 (1.6)	2.1 (1.7)	3536	2.9 (1.9)	5685	10.1 (18.5)
T5 - Hex (4%) +Zin (68%) WP : ST	2g /Kg	2.7 (1.9)	2.1 (1.8)	2805	1.9 (1.6)	5318	29.0 (32.6)
T6 - Hex (4%) +Zin (68%) WP : ST + 1 FS	2g/Kg: 2g/L	0.3 (1.1)	1.4 (1.6)	3171	1.5 (1.5)	5641	12.8 (20.9)
T7 - Car (50%) WP: ST	2g/Kg	2.6 (1.9)	2 (1.7)	3784	3.0 (1.9)	5301	30.2 (33.3)
T8 - Car (50%) WP: ST +1 FS	2g/Kg: 2g/L	3.4 (2.1)	2 (1.7)	3569	1.9 (1.6)	5711	11.6 (20.0)
T9 - Untreated control	-	8 (3)	3.4 (2.1)	1871	2.2 (1.7)	4699	35.1 (41.2)
General Mean	-	**2.6**	**2.1**	**3214**	**2.2**	**5412**	**22.3**
LSD @ 5% *(P=0.05)*	-	0.3	0.1	930	N/A	N/A	1.2
C.V.	-	13.4	7.7	19	25.0	17.5	3.0
Transformation	-	ST	ST	-	ST	-	AT
A/N	-	N	N	N	N	-	N

(Figures in the parenthesis indicate transformed means; AT- Arc sine transformation; ST- Square root transformation)

TRIAL NO. 12: EVALUATION OF BIO-CONTROL FORMULATIONS AGAINST FUNGAL DISEASES

This is a multi-location field trial (Trial No. 12) for evaluating biocontrol formulations of *Trichoderma asperellum* TAIK1, *Bacillus cabrialesii* BIK3, and their consortia against major fungal diseases in a local high-yielding susceptible rice varieties as per the location tested. It compares the effectivity of the formulations to a chemical standard (T4) and untreated control (T5). Trials were conducted at 12 centres, under either transplanted rice (TPR) or direct-seeded rice (DSR) conditions, using a randomized block design (RBD) with 4 replications, net plot size 2x2 m, and 15x15 cm spacing. All biocontrol treatments (T1-T3) follow a three-step schedule: seed treatment @10 g/kg, soil application @1 kg/acre, and foliar spray @10 g/L. Timing adjusts for TPR vs. DSR.

The experiment was conducted with five different treatments viz., **T1**- Seed treatment @10 g/Kg followed by soil application @ 1kg/acre at 10-15 DAT (Transplanted Rice) or 40-45 DAS (DSR) and foliar spray (@ 10 g/l) at 45-50 DAT (Transplanted Rice) or 60-65 DAS (DSR) with *Trichoderma asperellum* TAIK1, **T2**- Seed treatment @10 g/Kg followed by soil application @ 1kg/acre at 10-15 DAT (Transplanted Rice) or 40-45 DAS (DSR) and foliar spray (@ 10 g/l) at 45-50 DAT Transplanted Rice) or 60-65 DAS (DSR) with *Bacillus cabrialesii* BIK3, **T3-** Seed treatment @10 g/Kg followed soil application @ 1kg/acre at 10-15 DAT (Transplanted Rice) or 40-45 DAS (DSR) and foliar spray (@ 10 g/l) at 45-50 DAT Transplanted Rice) or 60-65 DAS (DSR) with consortia formulation of *Trichoderma asperellum* TAIK1 and *Bacillus cabrialesii* BIK3, **T4-** Seed treatment with carbendazim @ 2g/Kg followed by foliar spray of tebuconazole 50%+ trifloxystrobin 25% WG @ 0.4 g/litre at booting stage for incidence of disease (s) and **T5-** Untreated Control.

Treatment Details

T. No.	Treatment
T1	Seed treatment + soil app. (10-15 DAT TPR / 40-45 DAS DSR) + foliar (45-50 DAT TPR / 60-65 DAS DSR) with *Trichoderma asperellum* TAIK1
T2	Same schedule with *Bacillus cabrialesii* BIK3
T3	Same schedule with consortia of TAIK1 + BIK3
T4 (Chemical)	Seed treatment carbendazim @2 g/kg + foliar tebuconazole 50% + trifloxystrobin 25% WG @0.4 g/L at booting
T5	Untreated control

Leaf blast:

The efficacy of bio control formulations was tested against leaf blast disease in Coimbatore, Rewa and Karaikal centres. In Karaikal and Coimbatore centres, evaluation was done under natural infected conditions and while in Rewa centre, evaluation was done under artificial inoculated conditions. The disease pressure was low in Coimbatore and Rewa centres compared to Karaikal centres.

Table 12.1: Efficacy evaluation bio-control formulations against Leaf blast disease at Coimbatore centre

T.NO	DI (%) *	Number of Tillers*	1000 Grain weight*	Root Length*	Shoot length*	Dry Matter Content (g/pl) *	Grain Yield (Kg/ha) *
T1	7.43 (15.81)	11.67	25.00	11.33	65.00	5.01	4,845
T2	6.40 (14.65)	11.67	24.00	11.13	64.00	5.11	4,841
T3	6.25 (14.47)	13.00	25.00	10.40	69.67	5.11	4,846

T.NO	DI (%) *	Number of Tillers*	1000 Grain weight*	Root Length*	Shoot length*	Dry Matter Content (g/pl) *	Grain Yield (Kg/ha) *
T4	6.18 (14.39)	10.33	24.33	6.20	56.33	4.42	4,605
T5	27.68 (31.74)	7.67	22.00	6.10	47.00	3.32	3,569
C.D.	1.713	0.89	1.975	2.18	7.829	0.536	133.184
SE(m)	0.55	0.269	0.596	0.658	2.364	0.162	40.216
SE(d)	0.777	0.38	0.843	0.931	3.343	0.229	56.873
C.V.	10.193	4.284	4.291	12.619	6.779	6.101	1.534

*Mean of four replications, DI-Diseases incidence, () values in parenthesis are transformed values

In Rewa centre, the leaf blast disease was artificially created and the efficacy of bio formulations were tested. Among all the treatments and across locations, the treatment T4 leads in increasing the yield by reducing the disease pressure. But the consortium T3 (T1+T2) performed good in controlling the disease by increasing the tiller number (13-coimbattore, 10 in Rewa), root length and yield (4846 and 4202 kg/ha respectively in Coimbatore and Rewa) under blast infection conditions (Table 12.2). Comparatively the Karaikal centre having highest disease pressure compared to Coimbatore and Rewa centres. The treatment T4 reduced the disease incidence by 85% and whereas the treatment T3 reduced the blast incidence by 74% compared to the control (Table 12.3). Among all the treatments across all the locations, the treatment T3 is the best in controlling the leaf blast disease and increasing the tiller number, root length and overall grain yield (Table 12.1,12.2 and 12.3). Results indicated that both the formulations demonstrate strong potential for integrated disease management against rice diseases with site-specific superiority. Integration T3 and T4 formulations in to disease management packages could enhance rice productivity.

Trial 12.2: Efficacy evaluation bio-control formulations against Leaf blast disease at Rewa centre

T.NO	DI (%) *	DS (%) *	Number of Tillers	1000 Grain weight	Root Length	Shoot length	Dry Matter Content (g/m^2)	Grain Yield (Kg/ha)
T1	15.47 (23.16)	10.80 (19.18)	9.13	26.13	27.53	113.90	1529.67	4,100
T2	15.71 (23.35)	13.17 (21.27)	8.90	26.20	27.37	111.50	1417.00	4,118
T3	14.30 (22.21)	11.80 (20.09)	9.83	27.20	28.27	112.90	1430.67	4,202
T4	14.23 (22.16)	16.80 (24.19)	9.30	27.90	28.10	110.37	1400.33	4,628
T5	19.89 (26.48)	17.13 (24.44)	8.40	26.33	25.37	108.40	1340.00	4,054
C.D.	3.803	2.08	N/A	N/A	N/A	0.759	44.686	N/A
SE(m)	1.148	0.628	0.273	0.474	0.629	0.229	13.493	147.3
SE(d)	1.624	0.888	0.386	0.67	0.89	0.324	19.082	208.31
C.V.	12.493	7.803	5.193	3.068	3.988	0.356	1.642	6.045

*Mean of four replications, DI-Diseases incidence, () values in parenthesis are transformed values

Trial 12.3: Efficacy evaluation bio-control formulations against Leaf blast, sheath rot and grain discolouration disease at Karaikal centre

T. No	Leaf blast	Sheath rot	Yield (kg/ha)	T. No	Grain discolouration	
	Disease incidence (%)	Disease severity (%)			Disease incidence (%)	Yield (kg/ha)
T1	18.41 (25.40)	13.22 (21.32)	3,725	**T1**	14.96 (22.75)	3,725
T2	15.62 (23.28)	10.59 (18.99)	3,925	**T2**	13.36 (21.43)	3,950
T3	9.39 (17.84)	7.99 (16.42)	4,700	**T3**	10.72 (19.11)	4,700
T4	5.40 (13.43)	4.76 (12.60)	4,395	**T4**	7.25 (15.62)	4,465
T5	36.08 (36.91)	31.50 (34.14)	3,025	**T5**	30.12 (33.28)	3,025
C.D.	3.852	2.296	358.68	C.D.	2.351	382.85
SE(m)	1.236	0.737	115.13	SE(m)	0.755	122.89
SE(d)	1.749	1.042	162.82	SE(d)	1.067	173.79
C.V.	14.565	10.827	5.823	C.V.	9.879	6.186

*Mean of four replications, DI-Diseases incidence, () values in parenthesis are transformed values

SHEATH ROT:

In Karaikal centre, the bio control consortia were tested against sheath rot and grain discolouration diseases and the results indicated that the treatment **T4** (Seed treatment with carbendazim @ 2g/Kg followed by foliar spray of tebuconazole 50%+ trifloxystrobin 25% WG @ 0.4 g/litre) has highest disease control compared to all the treatments tested (Table 12.3). among the consortia, the treatment **T3** (Seed treatment @10 g/Kg followed soil application @ 1kg/acre at 10-15 DAT (Transplanted Rice) or 40-45 DAS (DSR) and foliar spray (@ 10 g/l) at 45-50 DAT Transplanted Rice) or 60-65 DAS (DSR) with consortia formulation of *Trichoderma asperellum* TAIK1 and *Bacillus cabrialesii* BIK3) showed the lowest disease severity (7.99%) and highest grain yield (4700 kg/ha) compared to the remaining all treatments. The bio control formulations give the more yield compared to chemical treatment by improving the plant growth characteristics like tiller number, root length and shoot length.

GRAIN DISCOLOURATION:

The biological agents and their consortia were tested against grain discolouration disease in Karaikal centre. Among all the treatments, the treatment T4 showed the best result in reducing the disease (76% disease reduction over control). The treatment **T3** showed better result by reducing the disease incidence by 64.40% (Table 12.3) and increased the yield by 35.6% (Table 12.3) followed by the treatment T2 (Seed treatment @10 g/Kg followed by soil application @ 1kg/acre at 10-15 DAT (Transplanted Rice) or 40-45 DAS (DSR) and foliar spray (@ 10 g/l) at 45-50 DAT Transplanted Rice) or 60-65 DAS (DSR) with *Bacillus cabrialesii* BIK3).

SHEATH BLIGHT:

Sheath blight, caused by *Rhizoctonia solani*, is a major constraint in rice production. The present study evaluated the efficacy of bio-control consortia across eight centres (Chiplima, Maruteru, Moncompu, Navasari, Pantnagar, Gangavathi, Titabar and Pattambi) in reducing disease severity and improving grain yield. Treatments (T1–T5) were compared for disease suppression and yield enhancement under natural infection conditions.

Among the different centres that has reported sheath blight disease severity (DS%), Pantnagar has reported the highest DS of 75.48% followed by the Pattambi centre (70%) in untreated plots (control). The highest disease incidence was recorded at Moncompu centre in untreated control plots (Table 12.6&12.9). In Chiplima centre, the treatment T4 showed best in controlling the disease and increasing the tiller number and grain yield, but incase of consortium treatments, the treatment T1 showed best compared to remaining treatments, as this treatment increased the tiller number (10.25), root length (17.82 cm) and yield (6017 kg/ha) followed by the treatment T3 (combination of T1 & T2) which is giving 17% yield increase over untreated control (T5) (Table 12.9). in general, the combination of both the bio control agents gives the good result in controlling the sheath blight disease and increasing the yields compared to the one bio control agent alone.

In Gangavathi centre, there was significant difference existed among the treatments, the treatment T4 performed well in controlling the disease, almost 62% reduction in the disease severity as compared to the control treatment (Table 12.5). In case of consortia, the treatment T3, combination of both the biocontrol agents showed best result in reducing the disease (48% disease reduction), increased tiller number and root length as compared to the T1 & T2 (single biocontrol treatments). But in Titabar centre, the treatment T4 was the best in controlling the sheath blight disease incidence (79% reduction in disease incidence) (Table 12.5). Among consortia treatments, the treatment T3 performed well in controlling the sheath disease, as it produced very less disease incidence and disease severity (12.50% DS and 15.90% DI) followed by the treatment T1 (16.50% DS & 21.38% DI) (Table 12.5). Among all the treatments, across all the locations, treatment **T4** (Seed treatment with carbendazim @ 2g/Kg followed by foliar spray of tebuconazole 50%+ trifloxystrobin 25% WG @ 0.4 g/litre) gave good result in controlling the disease and increasing the yield (Table 12.9).

Table 12.4: Efficacy evaluation bio-control formulations against sheath blight disease at Chiplima centre

T.NO	Disease severity (%)	Number of Tillers	1000 Grain weight	Root Length	Shoot length	Dry Matter Content (g/pl)	Grain Yield (Kg/ha)
T1	27.78 (31.80)	10.25	17.77	17.82	109.45	1,615.00	6,017
T2	35.83 (36.77)	9.70	15.04	13.87	108.43	1,372.50	5,425
T3	33.33 (35.26)	9.70	15.00	14.74	104.28	1,320.00	5,667
T4	24.73 (29.82)	9.95	15.91	17.21	110.88	1,575.00	5,958
T5	58.63 (49.96)	8.90	13.56	12.71	102.28	1,242.50	4,842
C.D.	5.93	N/A	0.50	2.67	5.56	202.947	637.27
SE(m)	1.90	0.32	0.16	0.86	1.79	65.142	204.55
SE(d)	2.69	0.45	0.23	1.21	2.53	92.125	289.28
C.V.	10.55	6.58	2.07	11.22	3.34	9.143	7.329

*Mean of four replications, DI-Diseases incidence, () values in parenthesis are transformed values

Table 12.5: Efficacy evaluation bio-control formulations against sheath blight disease at Gangavathi and Titabar centres

	Gangavathi					Titabar	
T.NO	**Disease severity as PDI (%) ***	**Number of Tillers**	**1000 Grain weight**	**Root Length**	**Shoot length**	**Disease incidence (%)**	**Disease severity (%)**
T1	51.32	18.64	21.52	15.00	39.33	16.50 (23.96)	21.38
T2	70.52	17.16	20.25	14.00	38.77	17.20 (24.50)	21.30
T3	42.12	18.72	22.57	16.12	40.80	12.50 (20.70)	15.90
T4	30.70	20.03	23.21	17.33	40.60	10.50 (18.91)	10.30
T5	81.08	16.66	18.17	13	38.73	50.80 (45.45)	43.40
C.D.	8.27	0.98	1.563	1.264	N/A	1.213	1.859
SE(m)	2.65	0.30	0.472	0.382	0.586	0.389	0.597
SE(d)	3.75	0.42	0.667	0.54	0.829	0.551	0.844
C.V.	9.62	2.80	3.866	4.381	2.561	3.621	5.313

*Mean of four replications, DI-Diseases incidence, () values in parenthesis are transformed values

Table 12.6: Efficacy evaluation bio-control formulations against sheath blight disease at Maruteru and Moncompu centre

	MARUTERU			MONCOMPU	
	Disease incidence (%)	**Disease severity (%)**	**Yield (kg/ha)**	**Disease incidence (%)**	**Yield (kg/ha)**
T1	84.54 (66.85)	51.523	4,582.50	63.71 (52.95)	3,709
T2	82.19 (65.04)	51.383	4,347.50	38.64 (38.43)	3,827
T3	81.28 (64.36)	49.493	4,760.00	25.83 (30.54)	4,289
T4	79.673 (63.20)	43.71	4,630.00	24.83 (29.89)	4,031
T5	96.858 (79.78)	62.558	4,245.00	72.38 (58.30)	1,593
C.D.	N/A	5.675	N/A	17.841	1,117.41
SE(m)	4.788	1.822	268.342	5.727	358.67
SE(d)	6.771	2.576	379.493	8.099	507.235
C.V.	11.277	7.043	11.892	25.407	20.555

*Mean of four replications, DI-Diseases incidence, () values in parenthesis are transformed values

TRIAL 12.7: Efficacy evaluation bio-control formulations against sheath blight disease at Navasari centre

T.NO	Disease severity as PDI (%) *	Number of Tillers	1000 Grain weight	Root Length	Shoot length	Grain Yield (Kg/ha)
T1	27.25 (31.47)	10.85	22.12	19.65	92.775	5,208.25
T2	29.17 (32.69)	10.725	21.85	18.96	93.55	5,147.25
T3	22.85 (28.56)	13.15	25.47	22.54	100.1	5,499.25
T4	17.87 (25.00)	13.10	27.22	20.27	99.875	5,913.00
T5	41.95 (40.37)	7.725	18.12	13.27	80.4	4,028.75
C.D.	4.576	1.851	3.572	3.006	7.123	678.623
SE(m)	1.469	0.594	1.147	0.965	2.286	217.826
SE(d)	2.077	0.84	1.621	1.364	3.233	308.053
C.V.	10.56	10.696	9.987	10.188	4.899	8.444

*Mean of four replications, DI-Diseases incidence, () values in parenthesis are transformed values

In case of Pantnagar and Pattambi centres, highest disease pressure was recorded for sheath blight disease. At Pantnagar, treatment T4 performed well in reducing the disease (59.60% reduction in disease severituy) and increasing the yield of the crop in sheath blight infected conditions (Tabel 12.9). But at Pattmabi centre, the results were quiet contrast to the all the locations, the treatment T4 is the best in controlling the disease, as it produced least disease severity (49.98% DS) and higher grain yield (2565 kg/ha) as compared to the control (Table 12.8). in case of biological treatments, the treatment T1 performed well as it produced the lowest level of sheath blight disease severity (50.83% DS) and higher grain yield (2448 kg/ha) followed by the treatment T2 (Table 12.8) followed by the treatment T1. The consortia of both the biocontrol agents (Treatment T3) did not perform well at Pattambi centre as compared to single biocontrol treatments.

Trial 12.8: Efficacy evaluation bio-control formulations against sheath blight disease at Pantnagar and Pattambi centre

	Pantnagar			Pattambi	
	Disease incidence (%)	disease severity (%)	Yield (kg/ha)	Disease severity (%)	Yield (kg/ha)
T1	78.68 (62.50)	44.72	5,131	50.83	2,448.50
T2	76.4 (60.93)	42.15	5,303	58.61	2,381.00
T3	66.81 (54.82)	35.12	5,914	62.74	2,155.00
T4	53.75 (47.15)	30.50	6,206	49.98	2,565.50
T5	94.33 (76.22)	75.48	4,395	70.00	2,129.00
C.D.	2.47	2.33	275.357	7.303	284.607
SE(m)	0.79	0.75	88.385	2.344	91.354
SE(d)	1.12	1.059	124.995	3.315	129.194
C.V.	2.14	3.284	3.28	8.024	7.822

*Mean of four replications, DI-Diseases incidence, () values in parenthesis are transformed values

Results revealed significant variation among treatments and centres. Treatment T4 consistently demonstrated superior performance, with disease severity reductions ranging from 57–66% and yield increases up to 47% over control. Among the different treatments for the management of sheath blight disease, the Moncompu centre reported the highest percent disease control (65.69%) by the treatment T4 followed by the treatment T3 which shown 64.31% disease reduction over control (Table 12.9). Regarding the grain yield, the Moncompu centre reported highest increase in grain yield (169%) over the control when plants were applied with Seed treatment @10 g/Kg followed soil application @ 1kg/acre at 10-15 DAT (Transplanted Rice) and foliar spray (@ 10 g/l) at 45-50 DAT Transplanted Rice with consortia formulation of *Trichoderma asperellum* TAIK1 and *Bacillus cabrialesii* BIK3 (**T3**) (Table 12.10), showing location-specific effectiveness. Disease pressure in control (T5) was consistently high leading to high disease severity and poor yield outcomes. These findings highlight the potential of bio-control consortia, as a sustainable strategy for sheath blight management in rice. The consortia application led to better performance in reducing the disease and increasing the yield levels by promoting the plant growth characteristics like number of tillers, shoot and root length and 1000 grain weight. The results indicated that the biocontrol agents possess the ability to promote plant growth and disease suppression by inducing the host resistance mechanisms. *Rhizoctonia solani* being a soil borne pathogen, the seed treatment with biocontrol agent is very helpful to control the initial establishment of the pathogen when the plants were at seedling and tillering stages.

Table 12.9: Comparison of the effect of bio control consortia against sheath blight in different centres

	CHIPLIMA		MARUTERU		MONCOMPU		NAVASARI		PANTNAGAR		PATTAMBI	
T.NO	DS (%)	% decrease over control	DS (%)	% decrease over control	DI (%)	% decrease over control	DS (%) *	% decrease over control	DS (%)	% decrease over control	DS (%)	% decrease over control
T1	27.78	52.62	51.523	17.64	63.71	11.97	27.25	35.04	44.72	40.76	50.83	27.38
T2	35.83	38.89	51.383	17.86	38.64	46.61	29.175	30.45	42.153	44.16	58.61	16.27
T3	33.33	43.16	49.493	20.88	25.83	64.31	22.85	45.53	35.123	53.47	62.74	10.37
T4	24.73	57.83	43.71	30.13	24.83	65.69	17.875	57.39	30.498	59.60	49.98	28.60
T5	58.63		62.558		72.38		41.95		75.485		70.00	

Table 12.10: Comparison of the effect of bio control consortia on grain yield under sheath blight infection in different centres

	CHIPLIMA		MARUTERU		MONCOMPU		NAVASARI		PANTNAGAR		PATTAMBI	
T.NO	Yield (kg/ha)	% increase over control	Yield (kg/ha)	% increase over control	Yield (kg/ha)	% increase over control	Yield (kg/ha)	% increase over control	Yield (kg/ha)	% increase over control	Yield (kg/ha)	% increase over control
T1	6,017	24	4,582	8	3,709	133	5,208	29	5,131	17	2,448	15
T2	5,425	12	4,347	2	3,827	140	5,147	28	5,303	21	2,381	12
T3	5,667	17	4,760	12	4,289	169	5,499	37	5,914	35	2,155	1
T4	5,958	23	4,630	9	4,031	153	5,913	47	6,206	41	2,565	21
T5	4,842		4,245		1,593		4,029		4,395		2,129	

Brown spot:

Brown Spot (BS), caused by *Bipolaris oryzae*, is a significant disease affecting rice productivity. Bio-control formulations are increasingly being tested as sustainable alternatives to chemical fungicides. The biological consortia were tested against brown spot disease at Pusa and Coimbatore centres. The highest disease pressure was observed at Pusa centre (21.25%) compared to Coimbatore centre (20.88%). In both the centres, the treatment T4 performed well in controlling the brown spot disease severity and increasing the grain yield of the crop. The treatment T3 (combination of T1 and T2) performed well in controlling the brown spot disease severity (11.5% DS), increasing the tillering number (9.67), root length (14.17 cm) and gain yield (5573 kg/ha) of the crop followed by the treatment T1 (Table 12.11) in Pusa centre. Same trend is followed in Coimbatore centre, the treatment T3 performed well in controlling the disease, increasing the number of tillers, root length with an exception of increased grain yield was observed in T3 compared to treatment T4 (Table 12.12). Results indicated that both the formulations demonstrate strong potential for integrated disease management against rice diseases with site-specific superiority. Integration T3 and T4 formulations in to disease management packages could enhance rice productivity. Further multi-location trails are recommended to validate consistency across diverse agro-climates.

Trial 12.11: Efficacy evaluation bio-control formulations against Brown leaf spot disease at Pusa centre

T.NO	DS (%) *	Number of Tillers*	1000 Grain weight*	Root Length*	Shoot length*	Grain Yield (Kg/ha)*
T1	13.25 (21.34)	9.33	19.75	14.03	96.67	5,310
T2	14.25 (22.18)	8.67	19.40	13.03	92.67	5,003
T3	11.5 (19.82)	9.67	19.95	14.17	98.00	5,573
T4	11.25 (19.59)	10.00	20.91	14.27	98.33	5,937
T5	21.25 (27.45)	7.67	18.34	12.90	91.67	4,897
C.D.	3.359	N/A	N/A	N/A	N/A	N/A
SE(m)	1.078	0.699	1.241	0.59	3.908	267.951
SE(d)	1.525	0.989	1.755	0.834	5.527	378.94
C.V.	15.08	13.357	10.93	7.465	7.09	8.685

*Mean of four replications, DI-Diseases incidence, () values in parenthesis are transformed values

Trial 12.12: Efficacy evaluation bio-control formulations against Brown leaf spot disease at Coimbatore centre

T.NO	Disease Incidence as PDI (%) *	Number of Tillers	1000 Grain weight	Root Length	Shoot length	Dry Matter Content (g/pl)	Grain Yield (Kg/ha)
T1	6.20 (14.41)	11.67	25.00	11.33	65.00	5.01	4,845
T2	6.33 (14.57)	11.67	24.00	11.13	64.00	5.11	4,841
T3	5.45 (13.50)	13.00	25.00	10.40	69.67	5.11	4,846
T4	4.55 (12.31)	10.33	24.33	6.20	56.33	4.42	4,605

T.NO	**Disease Incidence as PDI (%) ***	**Number of Tillers**	**1000 Grain weight**	**Root Length**	**Shoot length**	**Dry Matter Content (g/pl)**	**Grain Yield (Kg/ha)**
T5	20.88 (27.19)	7.67	22.00	6.10	47.00	3.32	3,569
C.D.	1.63	0.89	1.975	2.18	7.829	0.536	133.184
SE(m)	0.523	0.269	0.596	0.658	2.364	0.162	40.216
SE(d)	0.74	0.38	0.843	0.931	3.343	0.229	56.873
C.V.	12.059	4.284	4.291	12.619	6.779	6.101	1.534

*Mean of four replications, DI-Diseases incidence, () values in parenthesis are transformed values

TRIAL NO.13: INTEGRATED PEST MANAGEMENT IN DIRECT SEEDED RICE – *Kharif* – 2025

The integrated pest management trial was formulated to validate the location-specific IPM practices to demonstrate the management of pests in a holistic way (including insects, diseases and weeds) under Direct Seeded Rice (DSR) method of cultivation. The trial was conducted against rice diseases under direct seeded rice conditions at four different zones *viz*., Zone II (Northern zone - Kaul); Zone IV – (North Eastern zone - Arundhutinagar), Zone VI (Western zone – Navsari) and Zone VII (Southern zone – Aduthurai, Coimbatore, Mandya, Gangavathi, Rajendranagar). The treatment details may be referred from the AICRPR Plant Pathology Technical Programme, 2025. The trial was conducted by the Scientists from different disciplines viz., Entomology, Pathology and Weed science. With respect to diseases, disease severity was recorded at regular intervals starting from 15 days after transplanting (DAT) onwards till the maturity of the crops both in the IPM and Farmers practices (FP) adopted fields. Later, Area Under the Disease Progress Curve (AUDPC) was calculated based on the weekly observation on disease severity to know the influence of the various management practices on the disease development. The results of the trail conducted at various locations are presented as below.

Zone – II: (Northern zone – Kaul)

Under Northern zone, the trial was conducted only at Kaul under DSR Conditions with the variety Sawa 7301. IPM practices and Farmers practices were adopted and compared for the management of leaf blast, sheath blight, brown spot, bacterial blight and false smut. The fungicides viz., copper oxychloride + streptocycline was sprayed for the management of bacterial blight; and propiconazole sprayed once for leaf blast, false smut and brown spot, upon symptoms seen, Whereas, in the farmer's field, fungicides viz., azoxystrobin + difenaconazole, copper oxychloride + streptocycline, hexaconazole were sprayed more than once, eraticallay, as and when the farmers decided to spary based on their observation. The adoption of IPM practices were found to reduce the disease progression *viz*., leaf blast (IPM – 7.00; FP-11.34), bacterial blight (IPM – 20.58; FP-39.48), sheath blight (IPM – 14.35; FP-17.85) and brown spot (IPM – 27.44; FP-35.84). In the IPM field, the disease incidence of false smut was 4.29% as compared to 8.75% in the Farmers field. In addition, the number of smut balls/Hill was 12 in number, as against 36 in the Farmers Practice adopted field (Table 13.1).

Table 13.1: AUDPC values based on disease severity (%) of rice diseases recorded at different dates at Kaul -*Kharif* '2025

Location	Treatment	Kaul				
		AUDPC Values				DI (%)
		LB	BB	SHB	BS	FS
L1	IPM	7.00	20.58	14.35	27.44	4.29
	FP	11.34	39.48	17.85	35.84	8.75

(L- Location; IPM – Integrated Pest Management Practices; FP- Farmer Practices; LB- Leaf Blast; BB- Bacterial blight; SHB-Sheath Blight; BS- Brown spot; FS- False smut; DI- Disease Incidence)

Zone IV – North Eastern (Arundhutinagar)

At Arundhatinagar, the IPM practices were evaluated against sheath blight, bacterial blight and brown spot. The data was recorded as disease severity at 30 days after transplanting. In general, the disease severity of bacterial blight and brown spot was very low, varied from

1% to 5%. The trial was conducted at four locations and in the IPM practices adopted fields sheath blight mean disease severity across the locations was recorded as 19.25% and in the farmer's practices, the disease severity was recorded as 22.75% (Table 13.2).

Table 13.2: Disease severity (%) of rice diseases recorded at different dates at Arundhati Nagar- *Kharif* '2025

Location	Treatment	Disease severity (%)		
		SHB	BB	BS
L1	IPM	20	3	1
	FP	25	4	2
L2	IPM	20	2	1
	FP	22	3	3
L2	IPM	20	3	1
	FP	24	5	3
L4	IPM	17	2	5
	FP	20	3	7
Mean	IPM	19.25	2.5	2
	FP	22.75	3.75	3.75

Zone VI (Western zone – Navsari)

Under this zone, the trial was conducted at Navsari on diseases viz., sheath blight and sheath rot. In the IPM field, spraying of propiconazole 25 EC @ 1ml/lit and trifloxystrobin 25 + tebuconazole 50 WG @ 0.4 g/l effectively reduced the disease progress (AUDPC value) of the sheath blight (IPM - 470.05; FP - 972.93) and sheath rot (IPM -736.82; FP - 1106.49) (Table 13.3).

Table 13.3: AUDPC values based on disease severity (%) of rice diseases recorded at different dates at Navsari -*Kharif* '2025

Location	Treatment	Navsari	
		AUDPC Values	
		Sheath blight	Sheath Rot
L1	IPM	470.05	736.82
	FP	972.93	1106.49

Zone VII (Southern zone – Aduthurai, Gangavathi, Mandya and Rajendranagar)

Aduthurai: At Aduthurai, the trial was conducted for the management of leaf and neck blast, bacterial blight and false smut diseases. Leaf and neck blast management practices were evaluated in two locations. The mean results of the two locations revealed that the leaf disease progress was 69.20 in terms of AUDPC value in the IPM practices adopted field and the value was 89.25 in the farmer practice adopted fields. Similarly, the mean disease progress of neck blast was reduced to 49.95 (IPM Field) from 77.00 (Farmers Practice). The diseases viz., false smut and bacterial blight were evaluated at three locations. The mean results revealed that the AUDPC value for false smut disease progress was 34.27 in the IPM field, whereas it increased to 47.60 under farmer practices. With respect to bacterial blight, adoption of IPM practices which included application of recommended dose of fertilizers and spraying of copper oxy chloride reduced the disease progress from 153.30 (Farmers Practice) to 88.33 (IPM Field) (Table 13.4).

Table 13.4: AUDPC values based on disease severity (%) of rice diseases recorded at different dates at Aduthurai - *Kharif* '2025

Location	Treatment	AUDPC Values			
		LB	NB	FS	BB
L1	IPM	86.1	39.9	11.2	62.3
	FP	95.9	81.2	16.8	203.7
L2	IPM	52.3	60.0	58.0	110.3
	FP	82.6	72.8	61.6	128.8
L3	IPM	-	-	33.6	92.4
	FP	-	-	64.4	127.4
Mean	**IPM**	**69.20**	**49.95**	**34.27**	**88.33**
	FP	**89.25**	**77.00**	**47.60**	**153.30**

Rajendranagar: The trial was carried out at three locations in Rajendranagar. Diseases *viz*., brown spot, neck blast, sheath rot, false smut and grain discolouration were recorded at 55 and 110 days after transplanting (DAT). Overall, the disease severity was very low except neck blast where the disease severity up to 10.8% was recorded. Application of single spray of broad-spectrum fungicide propiconazole @ 200 ml/acre was recommended in the IPM practices. However, in the farmer practices, even though low percentage of diseases were noticed, high-cost combination fungicide i.e., tebuconazole + trifloxystrobin was applied @ 80g/acre, which might have increased the protection costs. In addition, instead of single spray of fungicide, 2 to 3 sprays of fungicides were sprayed in the farmer's practices and hence there was nil or very low incidence of brown spot, neck blast, sheath rot, and false smut in the farmers practice adopted fields (Table 13.5).

Table 13.5: Disease severity (%) of rice diseases recorded at different dates at Rajendranagar- *Kharif* '2025

Location	Treatment	Disease Severity (%)				
		55 DAT	110 DAT			
		BS	NB	SHR	FS	GD
L1	IPM	3.60	-	0.18	2.00	5.40
	FP	1.60	-	0.00	3.00	1.74
L2	IPM	5.40	0.0	0.40	3.40	7.80
	FP	1.00	6.20	3.00	0.0	2.80
L3	IPM	-	10.80	-	-	5.50
	FP	-	7.00	1.00	-	3.00

Location	Treatment	Disease Severity (%)				
		55 DAT	110 DAT			
		BS	NB	SHR	FS	GD
Mean	**IPM**	**4.5**	**5.4**	**0.19**	**1.80**	**4.40**
	FP	**1.3**	**6.6**	**1.33**	**1.50**	**2.51**

(L- Location; IPM – Integrated Pest Management Practices; FP- Farmer Practices; NB- Neck Blast; BS- Brown spot; FS- False smut; GD- Grain Discolouration)

Gangavathi: At Gangavathi, the diseases *viz*., leaf and neck blast, sheath blight, brown spot, bacterial blight and false smut were observed. Fungicides *viz*., carbendazim+mancozeb, hexaconazole, streptocyclin + COC and propiconazole were sprayed once at the respective stages (total number of sprays were four). Adoption of IPM practices and application of fungicides at the specific stages reduced the disease progress of leaf blast (IPM-42, FP-58), neck blast (IPM-60, FP-147) and bacterial blight (IPM – 884, FP- 1052). However, with respect to sheath blight and brown spot the AUDPC value and for false smut disease the disease incidence, were high in the IPM field as compared to the farmer's field (SHB- IPM-1100, FP-936; BS - IPM-1283, FP-1054; FS IPM - 16.12%; FP-12.30 %). In the farmers practices a total of seven sprays of fungicides (hexaconazole, streptocyclin + COC, thifluzamide 24% SC, propiconazole, tricyclazole 75% WP, trifloxystrobin + tebuconozole) were applied in excess (Table 13.6).

Mandya: At Mandya, the IPM practices were evaluated against leaf and neck blast, sheath blight and false smut. IPM practices *viz*., application of recommended dose of fertilizers, adoption of seed treatment with carbendazim @ 4gm/kg seed, incorporation of zinc sulphate @ 8kg/acre at time of puddling operation and spraying of disease specific fungicides were recommended. In the IPM practices adopted plots, the disease progress of leaf and neck blast and sheath blight were reduced significantly as compared to farmer practices in all the diseases recorded (LB - IPM-224.7, FP-389.2; NB- IPM – 11.4; FP-32.4; SHB - IPM-245, FP-477.4) In addition, the disease incidence of false smut was reduced in the IPM practices adopted field as compared to the farmer's practices (IPM - 2.80; FP - 9.50). The number of smut balls per hill were recorded as 1-2 in the IPM practice field, whereas in the farmer's practices adopted field, the number of smut balls were recorded in the range of 11 to 22 per hill (Table 13.6).

Table 13.6: AUDPC values based on disease severity (%) of rice diseases recorded at different dates at Gangavathi and Mandya -*Kharif* '2025

Location	Treatment	Gangavathi						Mandya			
		AUDPC Values					DI (%)	AUDPC Values			DI (%)
		LB	NB	SHB	BS	BB	FS	LB	NB	SHB	FS
L1	IPM	42	60	1100	1283	884	16.12	224.7	11.4	245	2.80
	FP	58	147	936	1054	1052	12.30	389.2	32.4	477.4	9.50

(L- Location; IPM – Integrated Pest Management Practices; FP- Farmer Practices; LB- Leaf Blast; NB- Neck Blast; BB- Bacterial blight; SHB- Sheath Blight; BS- Brown spot; FS- False smut; DI- Disease Incidence)

Conclusion:

In Northern zone (Kaul), the adoption of IPM practices were found effective against leaf blast, bacterial blight, sheath blight, brown spot and false smut. In North Eastern zone (Arundhutinagar) IPM practices effective against sheath blight. In the Western zone (Navsari), IPM practices are highly effective against the sheath blight and sheath rot. In Southern zone (Aduthurai, Gangavathi, Mandya and Rajendranagar), the IPM practices reduced the disease progress of leaf and neck blast, sheath blight, bacterial blight and false smut (Table 13.7).

Table 13.7: AUDPC/ Disease severity (%)/Disease Incidence of diseases at various Zones, *Kharif* – 2025

Zone	Treatment	LB	NB	SHB	BB	BS	SHR	FS
Zone II	IPM	7.00		14.35	20.58	27.44		4.29$
	FP	11.34		17.85	39.48	35.84		8.75$
Zone IV	IPM			19.25*	2.5*	2*		
	FP			22.75*	3.75*	3.75*		
Zone VI	IPM			470			736	
	FP			972			1106	
Zone VII	IPM	112	40	245	884			2.80$
	FP	179	85	477	1052			9.50$

(LB- Leaf Blast; NB- Neck Blast; BB- Bacterial blight; SHB- Sheath Blight; BS- Brown spot; SHR- Sheath Rot; FS- False smut)

TRIAL NO.14: SPECIAL TRIAL ON YIELD LOSS ASSESSMENT DUE TO BROWN SPOT DISEASE OF RICE

A special trial on yield loss was conducted to assess the impact of brown spot disease on the grain yield of rice during *Kharif* 2025. The trial included four treatments; which were imposed with varying levels of inoculum to create graded levels of disease infection, and fungicide application. T1 received three inoculum sprays without fungicide, T2 received two inoculum sprays along with mancozeb @ 2 g/l, T3 received one inoculum spray with mancozeb @ 2 g/l, and T4 had no inoculum spray but was treated with mancozeb @ 2 g/l. Each treatment was replicated five times in a randomized block design (RBD). The pathogen *Bipolaris oryzae* was artificially inoculated using a standard inoculation method, and disease observations were recorded as percent disease index following the IRRI, SES scale. The trial was conducted at six hotspot locations, Gangavathi, Jagdalpur, Ludhiana, Moncompu, Rewa and Pusa, with data collected from all six locations. Trial details for each location are provided in Table 14.1. Brown spot-susceptible varieties, *viz*., GNV-10-89 (at Gangavathi), Swarna (Jagdalpur), Uma (Moncompu), PR 114 (Ludhiana), PS4 (Rewa) and Sugandha (Pusa), were used for yield loss assessment at different locations.

It was apparent from the table 14.2 that, consistent declining trend in disease severity was observed with a reduction in the number of inoculations, wherein the mean PDI decreased from 54.38% under T1 (thrice inoculation) to 20.20% under T4 (no inoculation). This reduction in disease pressure was correspondingly reflected in yield loss, which declined from 22.4% in T1 to negligible levels in T4, highlighting the strong influence of inoculum frequency on disease development and consequent yield reduction. The highest percent disease index (PDI) of brown spot was recorded at Ludhiana (86.07%), followed by Jagdalpur (73.70%), Moncompu (75.71%), and Pusa (56.80%) under thrice inoculum spray (T1 treatment). This resulted in a yield reduction of 49.8% at Jagdalpur, followed by 32.3% at Moncompu, 24.7% at Ludhiana, and 23.1% at Pusa. In contrast, Gangavathi and Rewa locations recorded lower disease severity under T1, with PDI values of 19.60% and 14.37%, respectively, showing minimal or negative yield reduction. Among all locations, Gangavathi and Rewa showed relatively lower disease pressure across treatments compared to other locations. At Gangavathi, the PDI ranged from 2.50% (T4) to 19.60% (T1), while at Rewa it ranged from 9.23% (T4) to 14.37% (T1), indicating limited variation in disease severity and negligible yield loss. At Jagdalpur, when the inoculum was sprayed twice (T2), the PDI was 51.85% with a yield reduction of 21.2%. Under single inoculation (T3), the PDI decreased to 39.63% with a yield reduction of 15.7%. Similarly, at Ludhiana, T2 and T3 treatments recorded disease severity of 76.30% and 46.96%, resulting in yield reductions of 17.6% and 12.6%, respectively. At Moncompu, the T2 and T3 treatments recorded per cent disease index of 71.96% and 65.60%, with corresponding yield reductions of 8.7% and 9.8%. At Pusa, the PDI values under T2 and T3 were 36.80% and 24.20%, causing yield reductions of 13.6% and 8.4%, respectively. At Rewa, comparatively lower PDIs were observed across treatments, with marginal or negative yield reductions. The control treatment (T4) consistently showed the lowest disease severity across all locations. (Table 14.2). The mean values across all locations revealed that:

- A PDI of 54.38% resulted in a 22.4% yield reduction (T1)
- A PDI of 43.28% caused a 10.5% yield reduction (T2)
- A PDI of 32.12% lead to a 7.7% yield reduction (T3)

These results indicate the strong correlation between increasing disease severity and declining rice yield at majority of the locations.

Table 14.1: Experimental details of Yield loss trial, *Kharif*-2025

S. No	Location	Test Variety	Screening	Date of activities					
				Sowing/ Transplanting	Dates of Inoculation (1st, 2nd and 3rd)	Initial symptom	Fungicide Spraying Date	Observation	Harvesting
1	**Gangavathi**	GNV-10-89	Artificial	19.7.2025 20.8.2025	10-10-2025, 16-10-2025, 22-10-2025	19.10.25	30.10.25	18.11.25	26.12.25
2	**Jagdalpur**	Swarna	Artificial	25.06.2025 17.07.2025	05.09.2025, 15.09.2025, 20.09.2025	-	08.10.25	15.10.24	20.12.25
3	**Ludhiana**	PR 114	Artificial	17.06.25 18.07.25	05/09/2025, 10/09/2025; 15/09/2025	-	1.09.25 25.09.25	06.10.25	30.10.25
4	**Moncompu**	UMA (MO 16)	Artificial	30.06.2025 25.07.2027	06.09.2025, 11.09.2025 16.09.2025	-	19.09.25	11.08.25	24.11.25
5	**Pusa**	Sugandha	Artificial	16.06.2025 25.07.2025	18.09.2025, 24.09.2025 30.09.2025	16.09.25	18.09.25 30.09.25	-	-
6	**Rewa**	PS4	Artificial	28.06.2025 18.07.2025	20.08.25	15.09.25	10.09.25 24.09.26		20.11.25

Treatment details:

Treatment	No. of Inoculum Spray	No. of Fungicide Spray (if required to maintain the graded disease level)	Level of Disease Pressure
T1	Three times inoculum spray	No fungicide spray	High disease pressure
T2	Two times inoculum spray	Spray of mancozeb @ 2 g/lt	Medium disease pressure
T3	One time inoculum spray	Spray of mancozeb @ 2 g/lt	Low disease pressure
T4	No inoculum spray	Spray of mancozeb @ 2 g/lt	No disease

Table 14.2: Effect of gradients of brown spot disease severity on rice grain yield, *Kharif*-2025

Treatment	GNV			JDP			LDN			Mean		
	PDI (%)	**Yield (Kg/ha)**	**% yield reduction over control**	**PDI (%)**	**Yield (Kg/ha)**	**% yield reduction over control**	**PDI (%)**	**Yield (Kg/ha)**	**% yield reduction over control**	**PDI (%)**	**Yield (Kg/ha)**	**% yield reduction over control**
T1	19.60 (26.26)	5193	**1.0**	73.70 (59.13)	2649	49.8	86.07 (68.19)	4490	24.7	54.38 (47.50)	3850	22.4
T2	10.44 (18.79)	5104	2.7	51.85 (46.04)	4159	21.2	76.30 (60.86)	4918	17.6	43.28 (41.11)	4436	10.5
T3	6.31 (14.47)	5281	-0.7	39.63 (38.99)	4447	15.7	46.96 (43.24)	5216	12.6	32.12 (34.5)	4576	7.7
T4	2.50 (8.91)	5244		21.85 (27.81)	5277		27.70 (31.73)	5965		20.20 (26.70)	4958	
C.V (%)	**2.5**	**117.1**		**2.1**	**251.3**		**3.8**	**507.3**				
LSD @ 5% (P= 0.05)	**10.5**	**1.6**		**3.5**	**4.4**		**3.7**	**4.8**				
Transformation	A			A			A					

Treatment	MNC			PSA			REW			Mean		
	PDI (%)	**Yield (Kg/ha)**	**% yield reduction over control**	**PDI (%)**	**Yield (Kg/ha)**	**% yield reduction over control**	**PDI (%)**	**Yield (Kg/ha)**	**% yield reduction over control**	**PDI (%)**	**Yield (Kg/ha)**	**% yield reduction over control**
T1	75.71 (60.75)	3131	32.3	56.80 (48.90)	3554	23.1	14.37 (22.26)	4082	-1.5	54.38 (47.50)	3850	22.4
T2	71.96 (58.23)	4224	8.7	36.80 (37.30)	3990	13.6	12.35 (20.55)	4222	-5.0	43.28 (41.11)	4436	10.5
T3	65.60 (54.13)	4171	9.8	24.20 (29.42)	4230	8.4	10.04 (18.45)	4109	-2.2	32.12 (34.5)	4576	7.7
T4	46.53 (42.97)	4624		13.40 (21.36)	4620		9.23 (17.67)	4021		20.20 (26.70)	4958	
C.V (%)	**7.4**	**940.4**		**3.7**	**671.4**		**0.3**	**58.2**				
LSD @ 5%	**9.9**	**16.7**		**7.8**	**11.8**		**0.7**	**0.7**				
Transformation	A			A			A					

(PDI- Percent disease index; Figures in the parenthesis indicates Arc sine transformed means)

TRIAL NO.15: Special Screening Trial on False Smut Screening – *Kharif* 2025

Rice false smut disease caused by the fungus *Ustilaginoidea virens* reduces both the yield and grain quality of rice. Identifying promising donor lines with tolerance to false smut is therefore crucial for developing resistant genotypes. To address this, a trial was designed to screen selected rice entries under artificial inoculation at IIRR, Hyderabad, and artificial/natural incidence at hotspot locations. The trial was proposed at seven Plant Pathology AICRPR locations *viz*., Gangavathi (GNV), Gudalur (GDL), IIRR, Ludhiana (LDN), Masodha (MSD), Pantnagar (PNT) and Radhanagari (RDN).

Data was received from all the locations including Karaikal, however, at Gudalur and Pantnagar, disease incidence was recorded as nil and atKaraikal, the disease incidence was very low. During *Kharif* 2025, selected sixty-seven (67) entries along with susceptible check were screened artificially at IIRR and naturally screened at Gangavathi, Ludhiana, Masodha and Radhanagari (RDN) during 2025. The susceptible check CO51 was included and the observations were recorded as number of infected panicle per plant and number of smut balls per panicle. For the purpose of evaluating the disease tolerance of a line, the smut ball per panicle was considered uniformly across the locations.

IIRR, Hyderabad: The entries were sown on 16th June, 2025 and transplanted on 16th July, 2025. The pathogen conidial suspension was prepared and injection method of inoculation was adopted. For each entry, minimum of five panicles were inoculated and observations were recorded during maturity stage. The field was provided with green shade and sprinkler system to create conducive conditions for false smut disease. The entries were screened during Rabi 2024-25 and the number of smut balls were recorded per panicle. For each entry, both the Kharif and Rabi data was pooled and maximum number of smut balls was considered. Number of smut balls varied from 0 to 60 per panicle. Among the 68 entries screened, 66 entries disease reaction and the smut balls varied between 0 to 60 smut balls per panicle (Table 15.1).

Gangavathi: The entries were screened naturally at three different sowing dates. The different dates *viz*., 03.07.2025, 14.07.2025, 24.07.2025 and transplanted on 05.08.2025, 13.08.2025, 24.08.2025. Disease incidence was recorded as 25.37%, 34.32%, 31.34% in the first, second and third date of transplanting and maximum of 66.66% of panicle infection and maximum of 9 smut ball per panicle was recorded in the third date of sowing. Overall, in all the three transplanting dates, twenty-two entries infected by *U. virens* (Table 15.1).

Ludhiana: The entries were sown on three different dates *viz*., 26.05.2025, 04.06.2025, 12.06.2025 and transplanted on 02.07.2025, 10.07.2025, 18.07.2025. Disease incidence was 32.35%, 33.83%, 30.88 % in the first, second and third date of transplanting and maximum of 100% of panicle infection and maximum of 15 smut ball per panicle was recorded in the first date of sowing. Across, all the three transplanting dates, twenty-six entries infected by *U. virens* (Table 15.1).

Faizabad: The entries were sown on three different dates *viz*., 10.06.2025, 20.06.2025 and 30.06.2025 and transplanted on 08.07.2025, 15.07.2025 and 22.07.2025. The disease incidence was 61.19%, 70.14% and 79.10%, however the number of smut balls per panicle was observed between 1 to 5 in all the transplanting dates. Overall, across the three different planting dates, 54 entries were infected with false smut (Table 15.1).

Karaikal: At this location, sowing was taken on 22.08.2025, 01.09.2025 and 11.09.2025 and transplanted on 15.09.2025, 24.09.2025 and 06.10.2025. In all the sowing dates disease incidence was very low with the disease incidence of 16.17% Overall, in all the three transplanting dates, only eleven genotypes infected by false smut and among the tested entries, the entry FS-39, FS-61 showed susceptibility with smut balls ranged from 5-14 per panicle (Table 15.1).

Radhanagari: At this location, the entries were sown 19.06.2025 and transplanted on 18.07.2025. The disease infection percentage was 32.35% and twenty-two genotypes were infected by false smut disease and the number of smut balls are varied between 1-5 per panicle (Table 15.1).

Table 15.1: Details about the false smut trial taken up at the different locations – *Kharif* 2025

Location	IIRR	GGV	LDN	MSD	RDN	KRK
Nature of screening	Artificial	Natural	Natural	Natural/ Artificial	Natural	Natural
First Date of Sowing/Transplanting	15.06.25/ 16.07.25	03.07.2025/ 05.08.2025	26.05.2025/ 02.07.2025	10.06.2025/ 22.07.2025	19.06.2025/ 18.07.2025	22.08.2025/ 15.09.2025
Second Date of Sowing/Transplanting	-	14.07.2025/ 13.08.2025	04.06.2025/ 10.07.2025	20.06.2025/ 15.07.2025	-	01.09.2025/ 11.09.2025
Third Date of Sowing/Transplanting	-	24.07.2025/ 24.08.2025	12.06.2025 /18.07.2025	30.06.2025/ 22.07.2025	-	24.09.2025/ 06.10.2025
Percentage of Disease incidence	80.59%	25.37%, 34.32%, 31.34%	32.35%, 33.83%, 30.88 %	61.19%, 70.14% 79.10%,	32.35%	Very Low
Number of False smut infected entries	54	22	26	60	22	-
Overall infection percentage across the sowing dates	80.59%	32.35%	41.18%	89.70%	32.35%	16.17%
Range of smut balls observed per panicle	1-60	1-12	1-14	1-5	1-5	-

Conclusion: Among the 68 selected entries screened against false smut both by artificial inoculation (at ICAR-IIRR) and natural incidence (at hot spot locations), across the locations and across the three different sowing date of transplanting, twenty- one entries viz., RPL-32, DL-28, RPL-9, RPL-29, RPL-30, RPL-58, DL-33, IRRI-G-104, IRRI-G-117, IRRI-G-200, IRRI-G-219, IRRI-G-247, RPL-20, RPL-25, RPL-34, DL-7, DL-13, DL-26, RPL-5,RPL-11 and RPL-35 recorded 1 to 4 smut balls and showed moderate tolerance to false smut disease (Table 15.2).

Table 15.2: False smut Disease Reaction of Selected genotypes screened at Multi-locations *Kharif* 2025

Pathology Entry No.	Codes	Details of the Entry	Maximum No. of smut balls/panicle					
			GGV	PAU	MSD	RND	IIRR	Pooled Data
FS-46	RPL-32	Jeerige Sanna 609	0	0	1	0	0	1
FS-8	DL-28	RL-1516	0	2	-	0	2	2
FS-36	RPL-9	Baasamati 640	2	0	2	2	2	2
FS-43	RPL-29	Jeerige Samba	0	0	0	0	2	2
FS-44	RPL-30	Jugal Batta 611	0	0	2	0	1	2
FS-58	RPL-58	Selam Sanna 656	0	0	2	0	0	2
FS-11	DL-33	NPS -13	0	0	1	0	3	3
FS-17	IRRI-G-104	CHI GU::IRGC 71988-1	1	0	2	1	3	3
FS-20	IRRI-G-117	E 4197::IRGC 68004-1	0	3	3	0	3	3
FS-26	IRRI-G-200	AI NAN TSAO 39:: IRGC 28461-2	0	0	3	0	3	3
FS-27	IRRI-G-219	DUDHSAR::IRGC26609-2	0	0	3	0	3	3
FS-28	IRRI-G-247	DILVAKSH::IRGC 74738-1	0	0	3	0	1	3
FS-40	RPL-20	Gowri Sanna 605	0	0	3	0	2	3
FS-41	RPL-25	Hasara 658	0	0	3	0	3	3
FS-49	RPL-34	Kari Gajali 603	0	0	3	0	2	3
FS-59	UB-1	Landrace	0	0	1	0	3	3
FS-60	UB-7	Landrace	0	0	3	0	2	3
FS-63	UB-17	Landrace	0	0	3	0	0	3
FS-2	DL-7	IET 29536 (R)	4	1	2	4	4	4
FS-3	DL-13	IET 29549	3	0	1	3	4	4
FS-6	DL-26	RL-348	4	0	3	4	4	4
FS-32	RPL-5	Andanuru Sanna 620	4	0	3	4	1	4
FS-38	RPL-11	Udda jyothi	1	0	4	1	0	4
FS-50	RPL-35	Kempu Batta 608	0	0	3	0	4	4
FS-29	IRRI-G-254	KHAO' SIM:: IRGC 24094-1	1	0	5	1	0	5
FS-30	IRRI-G-270	ARC 15505:: IRGC 42066-1	-	0	5	-	5	5
FS-33	RPL-6	Aanandi 614	3	0	5	3	3	5
FS-48	RPL-33	Kaagi Saale 626	0	0	5	0	1	5
FS-53	RPL-38	Madras Sanna 635	5	0	3	5	4	5
FS-9	DL-31	RL-4609	0	0	-	0	6	6

Pathology Entry No.	Codes	Details of the Entry	Maximum No. of smut balls/panicle					
			GGV	PAU	MSD	RND	IIRR	Pooled Data
FS-16	IRRI-G-98	BU ZHI MING ::IRGC 71971-1	4	6	3	4	3	6
FS-21	IRRI-G-120	E ZI110::IRGC 70201-1	2	6	4	2	0	6
FS-34	RPL-7	Aasanaliya 610	5	3	3	5	6	6
FS-37	RPL-10	Bangara Sanna 604	1	5	2	1	6	6
FS-52	RPL-37	Kagga Selection 655	0	4	2	0	6	6
FS-22	IRRI-G-127	IH PEN SHIM MING::IRGC 26067-1	0	1	3	0	9	9
FS-5	DL-24	RL 4	1	2	2	1	10	10
FS-7	DL-27	RL-479	1	0	3	1	10	10
FS-25	IRRI-G-158	NCS 331::IRGC 62247-1	0	0	0	0	10	10
FS-23	IRRI-G-128	IR19058-107-1::IRGC 72997-1	5	3	2	5	12	12
FS-42	RPL-28	Jasmin Black 629	0	6	3	0	12	12
FS-45	RPL-31	Joolige 654	2	12	3	2	7	12
FS-10	DL-32	PAU 1044	0	0	2	0	13	13
FS-62	UB-10	Landrace	-	13	4	-	1	13
FS-39	RPL-12	Barma Black 625	0	0	3	0	3	3
FS-55	RPL-49	Raama Dari 641	0	15	1	0	6	15
FS-24	IRRI-G-143	LIU HE XI HE::IRGC 76661-1	0	2	4	0	17	17
FS-13	IRRI-G-32	GUIHUAZAO::IRGC 68060-1	0	4	3	0	20	20
FS-1	DL-5	IET 29939	5	8	3	4	22	22
FS-4	DL-14	Rasi	3	6	2	3	22	22
FS-12	IRRI-G-30	FACAGRO64::IRGC 82059-1	0	1	3	0	22	22
FS-54	RPL-42	Mulagudi Sanna 616	3	0	4	3	29	29
FS-14	IRRI-G-84	AN FU ZHAN ::IRGC 72576-1	0	0	2	0	30	30
FS-18	IRRI-G-115	DONGREM::IRGC 6688-1	0	4	2	0	40	40
FS-35	RPL-8	Antara Saali 659	0	0	3	0	50	50
FS-57	RPL-56	Selam Sanna 627	0	0	3	0	59	59
FS-19	IRRI-G-116	DU GEN CHUAN::IRGC 70083-1	4	3	2	4	60	60
Check	**CO51**		5	8	4	4	40	40
	GSR (PAU)			14			25	

TRIAL NO. 16: EVALUATION OF DRONES FOR SPRAYING OF AGROCHEMICALS (HERBICIDES, INSECTICIDES, AND FUNGICIDES) IN RICE PEST MANAGEMENT (EDAPM)

(Collaborative trial –Agronomy, Entomology and Pathology)

The trial is proposed to study the efficiency of DRONE spraying in rice cultivation

Objectives:

- ❖ To evaluate the efficacy of drone based spraying of herbicides, insecticides and fungicides for the management of weeds, major insect pests and diseases of rice.

- ❖ To compute the labour saving, economics and feasibility of drone application in rice cultivation

The trial was conducted for the management of leaf blast, neck blast, sheath blight and grain discolouration and details of treatments are as per the AICRPR Plant Pathology Technical Program 2025. In brief the treatments details are: T1 treatment - drone is used to spray the tank mix of both fungicide and insecticide at maximum tillering stage (tebuconazole 50% + trifloxystrobin 25% WG (Nativo) @ 80 g/acre + isocycloseram 18.1% W/W SC (Insipio) @ 120 ml/acre) and at booting stage (Picoxystrobin 7.05% + propiconazole 11.7% SC (Galilieo way) + chlorantraniliprole 18.50 % SC @60ml/acre@400 ml/acre. In T2, the same chemicals were sprayed using Battery operated Knapsack sprayer at maximum tillering, booting stage and T3 is the control. Data was recorded at maximum tillering stage and booting stage as Per cent Disease Index (PDI).

The trial was proposed at 10 locations viz., Coimbatore, Gangavathi, IIRR, Ludhiana, Mandya, Navasari, Nawagam, Pantnagar, Raipur and Rajendranagar and the data was received from 8 locations except Coimbatore and Raipur. At Rajendranagar, the trial was conducted for the management of neck blast, sheath rot, grain discolouration, however the since the disease severity in the control treatment for neck blast and sheath rot was low and these data are not considered. Similarly, the data for leaf blast at Gangavathi and Mandya was also not considered due to low disease severity in control plots. The data from other locations are compiled and presented below.

Leaf Blast: The trial was conducted at Gangavathi, Mandya, Moncompu and Nawagam. At Gangavathi, Percent disease index (PDI) of leaf blast was recorded as low both at maximum tillering and booting stage and the percentage varied between 9.42% to 11.97%. Similarly, at Mandya also the disease severity was low (2.10%) and hence the data from Gangavathi and Mandya was not considered. At Moncompu, the PDI of leaf blast was recorded as 64.03% at maximum tillering stage and 69.60% at booting stage in the untreated control. Treatment T1 significantly reduced the PDI compared to treatment T2, in which disease severity was reduced by up to 53.68% at the maximum tillering stage and 50.00% at the booting stage, where a combination of fungicide and insecticide was sprayed using a drone. At Nawagam, the PDI in the control treatment (T3) was recorded as 28.28% at maximum tillering stage and 41.62% at booting stage. The treatments T1 and T2 i.e., spraying combination of fungicide and insecticide using drone and battery operated sprayer performed on par in reducing the disease severity of leaf blast. At the maximum tillering stage, the PDI was 46.21% in T1 and 42.75% in T2, while at the booting stage, it was 47.52% in T1 and 45.77% in T2. Across the two locations, leaf blast severity was reduced by up to 49.94% with drone spraying and by 37.29% with the battery-operated knapsack sprayer (Table 16.1).

Neck Blast: The trial was conducted at Mandya to evaluate the treatments against neck blast and the PDI was recorded as 30.80% in the untreated treatment (T3). Among the two treatments, the PDI was recorded as 15.20% in T1 treatment with 50.65% disease reduction, and in T2 treatment, the PDI was recorded as 18.30% with 40.58% disease reduction (T3) at booting stage of the crop (Table 16.1).

Sheath blight: The trial was conducted at Gangavathi, Ludhiana, Mandya Moncompu and Navsari. Across the locations, the PDI of sheath blight was recorded in between 21.14% to 49.05% at maximum tillering stage and 34.25% to 66.57% at booting stage of the crop in the control treatment (T3). At all the locations studied, application of fungicides in combination with insecticides either by using drone or by knapsack sprayer reduced the PDI of the disease. When the percentage of reduction was compared between the treatments T1 and T2, the results revealed that there was no much difference between the two treatments irrespective to the stage of the crop (MTS – T1 – 13.87%; T2 – 11.43%; BS – T1 – 17.02%, T2 – 15.49%) at Gangavathi and Navsari (MTS – T1 – 39.22%; T2 – 31.39%; BS – T1 – 33.73%, T2 – 28.39%). At Ludhiana, the percentage of disease reduction was high in the T2 treatment compared to T1 treatment, wherein the knapsack sprayer is used for the spray (MTS – T1 – 64.91%; T2 – 74.34%; BS – T1 – 67.32%, T2 – 74.02%). At Mandya, significant difference between T1 and T2 was observed only at the booting stage of the crop and not in the maximum tillering stage (MTS – T1 – 21.59%; T2 – 20.70%; BS –– T1 – 32.88%; T2 – 22.83%). At Moncompu, during the maximum tillering stage, the treatment T1 significantly reduced the PDI from 49.05% to 31.00% with 36.80% disease reduction and at booting stage, the disease was reduced up to 31.76% from 66.57% with 52.29% disease reduction (Table 16.2).

Further across the locations, treatment T1 reduced the mean PDI from 30.42% to 16.90% with 44.44% disease reduction at maximum tillering stage and reduced the mean PDI from 43.45% to 22.62% with 47. 94% disease reduction at booting stage. Similarly, the treatment T2 reduced the mean PDI from 30.42% to 19.64% with 35.43% disease reduction at maximum tillering stage and reduced the mean PDI from 43.45% to 27.37% with 37.00% disease reduction at booting stage (Table 16.2).

Grain discolouration: The trial was conducted at Rajendranagar and the management practices were adopted only at maturity stage. In the control, the PDI was 23.84% and the treatment T1 recorded lowest PDI (7.20%) with highest percentage of disease reduction (69.78%) and the treatment T2 recorded the PDI of 11.66% with 51.08% disease reduction (Table 16.3).

Table 16.1: Evaluation of Drone spray of chemicals for the management of Leaf Blast

Treatment Details/ Disease/ Location	Leaf Blast											
	GNV				MND				MNC			
	PDI (%)		% of disease reduction		PDI (%)		% of disease reduction		PDI (%)		% of disease reduction	
	MTS	BS	MTS	BS	MTS	BS	MTS	BS	MTS	BS	MTS	BS
T1- Drone	3.96 (1.97)	5.15 (2.26)	57.98	56.99	1.70 (1.26)	2.20 (1.45)	19.05	0.00	29.66 (32.86)	34.80 (36.04)	53.68	50.00
T2- Battery operated Knapsack sprayer	5.36 (2.31)	7.45 (2.72)	43.06	37.72	1.40 (1.15)	2.10 (1.41)	33.33	4.55	49.53 (44.69)	49.54 (44.69)	22.64	28.82
T3 - Untreated Control	9.42 (3.06)	11.97 (3.45)	-	-	2.10 (1.41)	2.2 (1.44)	-	-	64.03 (53.25)	69.60 (56.58)	-	-
C. V.	6.51	5.24			25.60	22.74			12.94	12.43		
LSD @ 5% *(P= 0.05)*	0.15	0.14			0.31	0.31			5.30	5.35		
Transformation	ST	ST			ST	ST			AT	AT		

(MTS- Maximum Tillering Stage; BS- Booting Stage; PDI – Percent Disease Index; Figures in the parenthesis indicates transformed means; AT- Arcsine transformation; ST – Square root Transformation)

(Conti..) Table 16.1: Evaluation of Drone spraying of chemicals for the management of Leaf Blast, and Neck Blast

Treatment Details/ Disease/ Location	Leaf Blast								Neck Blast	
	NWG				Overall Mean across the Locations PDI (%)		Mean percentage (%) of disease reduction across the Locations		MND	
	PDI (%)		% of disease reduction						PDI (%)	
	MTS	BS	MTS	BS	MTS	BS	MTS	BS	Booting Stage	% of disease reduction
T1- Drone	15.21 (22.72)	21.84 (27.67)	46.21	47.52	22.43	28.32	49.94	48.76	15.20 (22.82)	50.65
T2- Battery operated Knapsack sprayer	16.19 (23.41)	22.57 (28.15)	42.75	45.77	32.86	36.05	32.69	37.29	18.30 (25.05)	40.58
T3 - Untreated Control	28.28 (32.01)	41.62 (40.12)	-	-	25.96	31.35	-	-	30.80 (33.64)	-
C. V.	14.45	11.51							11.29	
LSD @ 5% *(P= 0.05)*	3.54	3.46							2.88	
Transformation	AT	AT							AT	

(MTS- Maximum Tillering Stage; BS- Booting Stage; PDI – Percent Disease Index; Figures in the parenthesis indicates transformed means; AT- Arcsine transformation; ST – Square root Transformation)

Table 16.2: Evaluation of Drone spraying of chemicals for the management of leaf blast, sheath blight and grain discolouration

Treatment Details/ Disease/ Location	Sheath Blight											
	GNV				LUD				MND			
	PDI (%)		% of disease reduction		PDI (%)		% of disease reduction		PDI (%)		% of disease reduction	
	MTS	BS	MTS	BS	MTS	BS	MTS	BS	MTS	BS	MTS	BS
T1- Drone	7.28 (2.67)	17.23 (24.49)	13.87	17.02	10.33 (18.45)	13.00 (20.90)	64.91	67.32	17.80 (24.77)	24.70 (29.56)	21.59	32.88
T2- Battery operated Knapsack sprayer	9.71 (3.10)	18.76 (25.64)	11.43	15.49	7.56 (15.69)	10.33 (18.36)	74.34	74.02	18.00 (24.95)	28.40 (32.03)	20.70	22.83
T3 - Untreated Control	21.14 (4.60)	34.25 (35.79)	-	-	29.44 (32.79)	39.78 (39.06)	-	-	22.70 (28.24)	36.80 (37.20)		
C. V.	7.52	5.63			14.15	12.89			11.57	17.57		
LSD @ 5% *(P= 0.05)*	0.24	1.52			2.97	3.16			2.83	5.44		
Transformation	ST	AT			AT	AT			AT	AT		

(MTS- Maximum Tillering Stage; BS- Booting Stage; PDI – Percent Disease Index; Figures in the parenthesis indicates transformed means; AT- Arcsine transformation; ST – Square root Transformation)

(Conti…) Table 16.2: Evaluation of Drone spray of chemicals for the management of leaf blast, sheath blight and grain discolouration

Treatment Details/ Disease/ Location	Sheath Blight											
	MNC				NSV				Overall Mean across the Locations PDI (%)		Mean percentage (%) of disease reduction across the Locations	
	PDI (%)		% of disease reduction		PDI (%)		% of disease reduction					
	MTS	BS	MTS	BS	MTS	BS	MTS	BS	MTS	BS	MTS	BS
T1- Drone	31.00 (33.30)	31.76 (34.10)	36.80	52.29	18.09 (25.07)	26.41 (30.89)	39.22	33.73	16.90	22.62	44.44	47.94
T2- Battery operated Knapsack sprayer	42.53 (40.62)	50.81 (45.44)	13.28	23.68	20.42 (26.79)	28.54 (32.26)	31.39	28.39	19.64	27.37	35.43	37.00
T3 - Untreated Control	49.05 (44.36)	66.57 (54.84)	-	-	29.76 (33.03)	39.86 (39.13)			30.42	43.45		
C. V.	15.37	12.79			5.53	4.91						
LSD @ 5% *(P= 0.05)*	5.69	5.38			1.47	1.57						
Transformation	AT	AT			AT	AT						

(MTS- Maximum Tillering Stage; BS- Booting Stage; PDI – Percent Disease Index; Figures in the parenthesis indicates transformed means; AT- Arcsine transformation; ST – Square root Transformation)

Table 16.2: Evaluation of Drone spray of chemicals for the management grain discolouration at Rajendranagar

Treatment Details/ Disease/ Location	PDI (%)			
	Neck Blast	Sheath Rot	Grain Discoloration	
	Maturity Stage	Maturity Stage	Maturity Stage	% of disease reduction
T1- Drone	0.28 (0.23)	1.37 (0.96)	7.20 (7.21)	69.78
T2- Battery operated Knapsack sprayer	0.91 (0.58)	4.29 (1.93)	11.66 (11.66)	51.08
T3 - Untreated Control	3.25 (1.73)	3.34 (1.52)	23.84 (23.84)	0.00
C. V.	70.12	64.80	28.71	
LSD @ 5% *(P= 0.05)*	0.56	0.89	3.84	
Transformation	ST	ST	AT	

(PDI- Percent disease index; Figures in the parenthesis indicates transformed means; AT- Arcsine transformation; ST – Square root Transformation)

Conclusion: The trial was proposed at 10 locations viz., Coimbatore, Gangavathi, IIRR, Ludhiana, Mandya, Navasari, Nawagam, Pantnagar, Raipur and Rajendranagar and the data was received from 8 locations except Coimbatore and Raipur. At maximum tillering stage, the leaf blast severity was reduced by up to 49.94% with drone spraying and by 37.29% with the battery-operated knapsack sprayer as compared to the control treatment. With respect to neck blast, the T1 treatment recorded 50.65% disease reduction, and T2 treatment recorded 40.58% disease reduction at booting stage of the crop. In case of sheath blight, across the locations, the treatment T1 reduced the mean PDI from 30.42% to 16.90% with 44.44% disease reduction at maximum tillering stage and reduced the mean PDI from 43.45% to 22.62% with 47. 94% disease reduction at booting stage. Similarly, the treatment T2 reduced the mean PDI from 30.42% to 19.64% with 35.43% disease reduction at maximum tillering stage and reduced the mean PDI from 43.45% to 27.37% with 37.00% disease reduction at booting stage. In grain discoloration management trial, the treatment T1 recorded lowest PDI (7.20%) with highest percentage of disease reduction (69.78%) and the treatment T2 recorded the PDI of 11.66% with 51.08% disease reduction.

TRIAL No. 17: OBSERVATION ON INCIDENCE AND SEVERITY OF RICE DISEASES IN ORGANIC RICE CULTIVATION AND NATURAL FARMING (COLLABORATIVE TRIAL WITH SOIL SCIENCE)

The trial was formulated by the Soil Science Division, ICAR-IIRR with different treatment combinations, organic and natural framing practices, to know its impact on soil health and grain yield. Since, rice diseases cause considerable economic yield loss in rice crop, the chemical management practices are inevitably a part of management practices to reduce the economic yield loss. Adoption of eco-friendly management practices against plant diseases are playing crucial role in maintaining the ecosystem by reducing the pollution and enhancing the biodiversity. Hence, to know the incidence of diseases in different organic and natural farming practices, co-operators of Plant Pathology recorded the prevalent diseases in the eight locations *viz.*, Chinsurah, Karaikal, Khudwani, Mandya, Moncompu, Pantnagar, Pusa and Titabar. However, the data was received from only five locations viz., Chiplima, Karaikal, Mandya, Pantnagar and Pusa. The trial results are presented below.

Chiplima: Diseases *viz.*, sheath blight and brown spot were recorded at Chiplima in terms of Percent Disease Index. The PDI of sheath blight and brown spot was recorded as high 46.95% and 50.55% respectively when there are no management practices adopted during the crop growth period. Adoption of treatment applications reduced the disease intensity and the lowest PDI of sheath blight (23.90 %) and brown spot (22.78%) was recorded in the treatment T5, in which integrated crop management practices were adopted along with application of need-based fungicides. The highest Percent reduction over control on sheath blight was recorded in T5 treatment (49.09%) followed by T4 treatment (40.26%) where, crop management practices were adopted along with application of botanicals and biocontrol agents. The lowest percentage of disease reduction was recorded in the T6 (27.80%), wherein only the recommended doses of fertilizers were applied. With respect to brown spot disease, highest percentage of reduction was observed in the treatment (T5 - 54.95%) wherein the need-based fungicides were sprayed along with the application of organic and inorganic fertilizers. In addition, the application of recommended dose of fertilizers (T6 treatment) reduced the PDI and reduced the disease up to 40.65% (Table 17.1).

Mandya: In this location, disease observations were recorded for Sheath blight and Neck blast. Among the different treatments, the maximum PDI was recorded in T1 (Sheath blight - 38.89%; Neck blast – 42.73%), wherein no management practices were adopted. Application of crop management practices significantly reduced the PDI of sheath blight and neck blast. Application of location specific management practices (T3 treatment) effectively reduced the PDI of sheath blight disease from 38.89% to 20.61% with 47.00% disease reduction and PDI of neck blast from 42.73% to 23.53% with 44.93% disease reduction. With respect to sheath blight, the treatments T2, T4, T5 were on par in reducing the disease. However, in case of neck blast, treatment T5 reduced the disease up to 26.53% from 42.73% (Table 17.1).

Table 17.1: Percent Disease Index of the diseases recorded under organic rice cultivation and natural farming at Chiplima and Mandya, *Kharif* - 2025

T.No	CHIPLIMA				MANDYA			
	Sheath blight		Brown Spot		Sheath blight		Neck blast	
	PDI	% reduction over control	PDI	% reduction over control	PDI	% reduction over control	PDI	% reduction over control
T1	46.95 (43.23)	0.00	50.55 (45.30)	0.00	38.89 (38.51)	0.00	42.73 (40.78)	0.00
T2	30.55 (33.51)	34.93	39.18 (38.73)	22.50	22.72 (28.44)	41.58	29.99 (33.13)	29.82
T3	34.15 (35.73)	27.26	37.78 (37.90)	25.27	20.61 (26.84)	47.00	23.53 (28.97)	44.93
T4	28.05 (31.94)	40.26	26.68 (31.04)	47.23	23.22 (28.73)	40.29	27.56 (31.60)	35.52
T5	23.90 (29.19)	49.09	22.78 (28.44)	54.95	23.11 (28.69)	40.57	26.53 (30.98)	37.93
T6	33.90 (35.55)	27.80	30.00 (33.17)	40.65	23.83 (29.16)	38.72	30.93 (33.75)	27.63
C.V (%)	**6.54**		**5.47**		**7.73**		**8.27**	
LSD @ 5% (P= 0.05)	**3.44**		**2.95**		**3.50**		**4.14**	
Transformation	AT		AT		AT		AT	

(PDI- Percent disease index; Figures in the parenthesis indicates transformed means; AT- Arcsine transformation)

Karaikal: The diseases *viz*., Leaf blast, Brown spot, Sheath rot and Grain discoloration were recorded. Among all the treatments, treatment T1, where there was no addition of inputs and management practices, the percent disease index was high for all the recorded diseases. The maximum PDI of leaf blast was recorded as 28.82% in T1 and it was significantly reduced to 12.14% with 57.88% reduction over control by the application of integrated management practices along with botanicals and biocontrol agents (T4 treatment). The same treatment (T4) also significantly reduced the PDI of brown spot (from 41.95% - T1 to 20.81% - T4), sheath rot (from 39.32% - T1 to 19.08 % - T4) and grain discolouration (from 43.09% - T1 to 16.23 % T4). The percent disease reduction was recorded as 50.39%, 51.48% and 62.33% for brown spot, sheath rot and grain discolouration diseases respectively. Followed by the treatment T4, treatment T3 wherein the state specific management practices were followed performed well in reducing the PDI of the diseases viz., leaf blast, brown spot, sheath rot and grain discolouration as compared to other treatments and the percentage of reduction was 51.44%, 42.66%, 41.31% and 58.10% respectively (Table 17.2).

Table 17.2: Percent Disease Index of the diseases recorded under organic rice cultivation and natural farming at Karaikal, *Kharif* - 2025

T.No	KARAIKAL							
	Leaf Blast		Brown Spot		Sheath Rot		Grain Discoloration	
	PDI	% reduction over control	PDI	% reduction over control	PDI	% reduction over control	PDI	% reduction over control
T1	28.82 (5.37)	0.00	41.95 (40.35)	0.00	39.32 (38.81)	0.00	43.09 (41.01)	0.00
T2	22.95 (4.79)	20.39	32.70 (34.86)	22.06	34.71 (35.82)	11.73	19.08 (25.88)	55.72
T3	14.00 (3.74)	51.44	24.05 (29.35)	42.66	23.08 (28.68)	41.31	18.06 (25.13)	58.10
T4	12.14 (3.48)	57.88	20.81 (27.12)	50.39	19.08 (25.88)	51.48	16.23 (23.74)	62.33
T5	20.40 (4.51)	29.23	30.31 (33.39)	27.75	31.31 (34.01)	20.39	22.83 (28.53)	47.01
T6	18.56 (4.31)	35.61	25.82 (30.52)	38.46	28.33 (32.14)	27.96	20.99 (27.25)	51.29
C.V (%)	**3.65**		**3.25**		**3.67**		**3.05**	
LSD @ 5% (P= 0.05)	**0.24**		**1.60**		**1.80**		**1.32**	
Transformation	SR		AT		AT		AT	

(PDI- Percent disease index; Figures in the parenthesis indicates transformed means; AT- Arcsine transformation; ST- Square root transformation)

Pantnagar: Brown spot and sheath blight was recorded in terms of PDI. When the crop management practices were not applied, the intensity of sheath blight and brown spot incidence were recorded as very high in the T1 treatment (sheath blight – 69.92%; brown spot - 48.44%). Among the other treatments, treatment T5 with integrated management practices along with need-based fungicides application significantly reduced the PDI of sheath blight from 69.92% to 23.24% with 66.76% disease reduction and in brown spot disease the percent of disease reduction was 43.83% (T1 - 48.44%; T5 - 27.21%). Similarly, the treatment T4 wherein, the crop management practices included application of organic and inorganic sources of nutrients, seed treatment with biocontrol agents and spraying of botanicals also effectively reduced the sheath blight PDI from 69.92% to 26.18% with 62.56% disease reduction and brown spot PDI from 48.44% to 28.89% with 40.36% disease reduction (Table 17.3).

PUSA: In this location, PDI of the brown spot was recorded as 14.75% and the intensity of the disease was recorded as moderate. Treatment T5 included with integrated management practices along with need-based fungicides application significantly reduced the PDI of 14.75% to 6.00% with 59.32% disease reduction. Treatment T4 with integrated management practices along with biocontrol agents reduced the PDI from 14.75% to 7.25% with 50.85% per cent disease reduction (Table 17.3).

Table 17.3: Percent Disease Index of the diseases recorded under organic rice cultivation and natural farming at Pantnagar and Pusa, *Kharif* - 2025

T.No	PANTNAGAR				PUSA	
	Brown spot		Sheath blight		Brown spot	
	PDI	% reduction over control	PDI	% reduction over control	PDI	% reduction over control
T1	48.44 (44.09)	0.00	69.92 (56.73)	0.00	14.75 (3.83)	0.00
T2	31.11 (35.11)	35.78	29.59 (32.94)	57.68	8.50 (2.90)	42.37
T3	34.94 (36.22)	27.87	32.16 (34.53)	54.00	10.00 (3.15)	32.20
T4	28.89 (32.49)	40.36	26.18 (30.76)	62.56	7.25 (2.67)	50.85
T5	27.21 (31.42)	43.83	23.24 (28.81)	66.76	6.00 (2.43)	59.32
T6	35.56 (36.58)	26.59	35.78 (36.72)	48.83	12.25 (3.49)	16.95
C.V (%)	3.91		2.26		8.71	
LSD @ 5% (P= 0.05)	2.12		1.25		0.40	
Transformation	AT		AT		ST	

(PDI- Percent disease index; Figures in the parenthesis indicates transformed means; AT- Arcsine transformation; ST- Square root transformation)

Conclusion: In all the centres it was observed that the integrated disease management strategy was found to be very effective in reducing the disease incidence. At Chiplima, the adoption of integrated crop management practices (T5 treatment) along with application of need-based fungicides recorded nearly 50% disease reduction in sheath blight and brown spot diseases. The treatment (T4) in which, crop management practices were adopted along with application of botanicals and biocontrol agents reduced the disease up to 40%. At Mandya, application of state wise management practices (T3 treatment) effectively reduced the PDI of sheath blight with 47.00% disease reduction and neck blast with 44.93% disease reduction. At Karaikal, the application of integrated management practices along with application of botanicals and biocontrol agents (T4 treatment) recorded the percent disease reduction of 51.44%, 50.39%, 51.48% and 62.33% for leaf blast, brown spot, sheath rot and grain discolouration diseases respectively. In Pantnagar, the treatment T5 with integrated management practices along with need-based fungicides application (T5 treatment) significantly reduced the PDI of sheath blight with 66.76% disease reduction and brown spot with 66.76% disease reduction. At Pusa, the treatment T5 included with integrated management practices along with need-based fungicides application significantly reduced the PDI of 14.75% to 6.00% with 59.32% disease reduction.

TRIAL 18: SPECIAL TRIAL ON MANAGEMENT OF BAKANAE DISEASE IN BASMATI RICE GROWING AREAS

The trial was conducted with an objective to manage Bakanae disease in rice. During *Kharif* 2025 by using Randomised Block Design (RBD) as a statistical method with four or three replications in each centre. Four different fungicides which included Sprint 75WS (Carbendazim 25% + Mancozeb 50%), Bavistin 50 WP (Carbendazim 50 WP), Evergol Stend (Penflufen 13.28% w/w + Trifloxystrobin 13.28% w/w FS) and Vibrance Integral (Sedaxane 12.61% w/w + Azoxystrobin 3.15% w/w + Thiamethoxam 22.06% w/w) were evaluated along with inoculated control and healthy seeds. Experiment was conducted in the fields of three locations i.e.ICAR-IARI, PAU, Ludhiana and Kaul, Haryana station. The seeds of susceptible cultivar Pusa Basmati 1121 (PAU and Kaul) and Pusa Basmati 1692 (IARI) were first surface sterilized with 1% (v/v) sodium hypochlorite solution followed by washing with sterile distilled water and soaked in *F. fujikuroi* inoculum suspension (10^6 spores ml^{-1}) for 24 h at room temperature (25^0C). Percent bakanae affected plants were recorded along with the yield (Kg/ha). Significant differences were observed in fungicides treatments for bakanae disease incidence compared to inoculated control.

Table 18.1: Effect of fungicide treatment on Bakanae disease incidence

Treatment	Fungicides	Disease incidence (%)				
		Doses	IARI	PAU	Kaul	Mean
T0	Inoculated control (seed)	-	21.47 (27.41)	38.7 (53.68)	20.11 (26.62)	26.77
T1	Sprint 75WS (Carbendazim 25% + Mancozeb 50%)	3 g/ kg seed	6.17 (14.28)	4.7 (10.61)	9.12 (17.55)	6.65
T2	Bavistin 50 WP (Carbendazim 50 WP)	2g/ L of water	5.57 (12.87)	2.7 (7.29)	8.07	5.45
T3	Evergol Stend (Penflufen 13.28% w/w + Trifloxystrobin 13.28% w/w FS)	12 – 14 ml/kg seed	2.73 (9.46)	*	4.35 (16.44)	3.53
T4	Vibrance Integral (Sedaxane 12.61% w/w + Azoxystrobin 3.15% w/w + Thiamethoxam 22.06% w/w)	8-10 ml/kg seed	0.85 (5.08)	7.4 (21.50)	2.03 (8.14)	3.42
T5	Healthy control	-	1.2 (6.10)	11.2 (23.61)	12.24 (20.45)	8.22
General mean			6.33	12.94	9.32	-
LSD @ 5% *(P=0.05)*			4.974	0.745	2.358	-
SE(m)			1.558	1.053	0.775	-
SE(d)			2.204	5.525	1.097	-
Transformation			AT	AT	AT	-

(Figures in the parenthesis indicate transformed means; AT- Arc sine transformation) * Fungicide not available

Table 18.2: Effect of fungicide treatment on Yield (Kg/ha)

Treatment	Fungicides	Yield (Kg/ha)				
		Doses	IARI	PAU	Kaul	Mean
T0	Inoculated control (seed)	-	2527.78	1506.9	3890	2641.56
T1	Sprint 75WS (Carbendazim 25% + Mancozeb 50%)	3 g/ kg seed	2700.00	2806.9	4255	3253.97
T2	Bavistin 50 WP (Carbendazim 50 WP)	2g/ L of water	3000.00	3257.9	4370	3542.63
T3	Evergol Stend (Penflufen 13.28% w/w + Trifloxystrobin 13.28% w/w FS)	12 – 14 ml/kg seed	2988.89	*	5075	2687.96
T4	Vibrance Integral (Sedaxane 12.61% w/w + Azoxystrobin 3.15% w/w + Thiamethoxam 22.06% w/w)	8-10 ml/kg seed	3166.67	2501.1	5240	3635.92
T5	Healthy control	-	3916.67	2303.50	4110	3443.39
General mean			3050.00	2475.26	4490	-
LSD @ 5% *(P=0.05)*			392.724	207.50	285.99	-
SE(m)			123.042	62.66	94.02	-
SE(d)			174.008	88.61	132.97	-
C.V.			6.987	4.38	4.19	-

* Fungicide not available

V. AICRPR - RAINFED TRIALS – HOST PLANT RESISTANCE - *Kharif* 2025

Seed for AICRP of rainfed ecology were sent to 18 centres which are Bankura, Ghaghraghat, Maruteru, Mugad, Titabar, Gerua, Ponnampet, Masodha, Sabour, Chinsurah, Rewa (JNKVV), IGKV(Raipur), Coimbatore, Jagdalpur, Hazaribag, Pusa (Samastipur), Birsa Agril. Univ.(Kanke) and Cuttack. Out of all these 18 centre 5 centres (Ghaghraghat, Gerua-merged with IARI, JNKVV-Rewa, IGKV-Raipur and BAU-Kanke) did not send the report. The trials were segregated on the basis of different ecologies like: Rainfed Direct Seeded Late, Rainfed Direct Seeded Medium, Early direct seeded, Rainfed Shallow Lowland, Deep Water, Direct Seeded, Rainfed Shallow Lowland, and Semi Deep Water. The promising index less than 5 were considered for brown spot, sheath rot and sheath blight, and bacterial blight however, less than 3 was considered for blast. Location severity index less than 3.5 and more than 8 were not considered. The details of NSN-1 and NSN-2 reports are given below:

❖ **NSN-1:**

I. RAINFED DIRECT SEEDED LATE

- **Brown Spot**: Only four centres (Pusa, Sabour, Chinsura, Jagdalpur) submitted the report Twenty-five entries (IET-33248, 33257, 34271, 34273, 34274, 34275, 34279, 34280, 34281, 34282(2.5), 34283, 34284, 34285, 34286, 34287, 34288, 34290, 34291, 34297, 34299, 34300, 34301, 34302, 34303, 34304) were promising.
- **Blast:** 5 centres namely Ponnampet, Comibatore, Mugad, Jagdalpur, Hazaribag submitted the data and none were promising.
- **Bacterial Blight:** Data were sent by 5 centres namely- Masodha, Cuttack, Chinsura, Tittabar and Sabour. The data from Sabour were not accepted as the LSI was too low. Ten entries (IET-33248,34275,34277,34278,34282,34283,34288,34295,34296,34301) were promising.
- **Sheath Blight:** Masodha, Chinsura and Titabar sent the data. Altogether 12 lines (34275,34276,34277,34278, 34279,34280,34284,34288, 34290,34296,34298, 34300) were promising.
- **Sheath Rot:** Three centres namely Chinsura, Titabar and Pusa sent the data. However, the data from Pusa was rejected due to too low LSI. No decision could be taken on the basis of two locations data.

II. RAINFED DIRECT SEEDED MEDIUM

Brown Spot: Only four centres (Pusa, Sabour, Chinsura, Jagdalpur) submitted the report Twenty-seven entries (33202, 33204, 33217, 33218, 34222, 34225, 34226, 34233, 34234, 34235, 34238, 34239, 34240, 34242, 34243, 34244, 34250, 34251, 34252, 34254, 34256, 34258, 34260, 34262, 34264, 34265, 34267) were promising.

Blast: 5 centres namely Ponnampet, Comibatore, Mugad (low LSI), Jagdalpur, Hazaribag submitted the data. The data of Mugad was not considered as LSI was too low. None were promising.

Bacterial Blight: Data were sent by 5 centres namely- 5 centres- Masodha, Cuttack, Chinsura, Titabar and Sabour. The data from Sabour were not accepted as the LSI was too low. Fifteen entries (IET- 33202,33204,34219,34221,34224,34243,34245,34250,34253,34256,34262,34263,34266,34267, 34269) were promising.

ShB: 3 centres- Masodha, Chinsura, Titabar sent the data. Altogether 16 lines (33204,34220,34222,34225,34229,34230,34239,34244,34247,34249,34251,34252,34253,34255,34257,34260) were promising.

Sheath Rot: Three centres namely Chinsura, Titabar and Pusa sent the data. However, the data from Pusa was rejected due to too low LSI. No decision could be taken on the basis of two locations data.

III. EARLY DIRECT SEEDED

- **Brown Spot:** Only 4 centres submitted data they are Pusa, Chinsurah, Sabour and Jagdalpur. However, the data from Sabour and, Jagdalpur were not accepted due to low LSI. As only two cenres data were valid so, promising index was not calculated.
- **Blast:** Ponnampet, Comibatore, Mugad(low LSI), Jagdalpur and Hazaribag centres sent the data but the data from Mugad was rejected due to low LSI and none was recorded to be promising.
- **Bacterial blight**: Data received from 5 centres namely Bankura, Tittabar, Sabour (low LSI), Tittabar, Chinsura, Cuttack. Sabour data showed very low LSI so not accepted and none was recorded to be promising.
- **Sheath blight**: Only 3 centres (Masodha, Chinsura, Tittabar) sent the data and IET-32100, 33112, 33119, 33100 were recorded to be promising.
- **Sheath rot:** 3 centres namely Tittabar, Chinsura and Pusa sent the data but Pussa not accepted. Valid data from only 2 centres so, the promising lines was not indicated.

IV. RAINFED SHALLOW LOWLAND

- **Brown Spot:** Only 4 centres submitted data they are Pusa, Sabour, Chinsura, Jagdalpur. Except 33129 rest all are showing less than 5 score.
- **Blast:** Ponnampet, Comibatore, Mugad(low LSI), Jagdalpur and Hazaribag centres sent the data but the data from Mugad was rejected due to low LSI and none was recorded to be promising.
- **Bacterial Blight**: Data received from 5 centres namely Masodha, Cuttack, Chinsura, Tittabar, Sabour. Sabour data showed very low LSI so not accepted and 33123, 33125, 32134, 33264, 34117 were recorded to be promising.
- **Sheath Blight**: Only 3 centres (Masodha, Chinsura, Tittabar) sent the data and IET-32175, 33123, 33125, 32134, 32150, 34117 were recorded to be promising.
- **Sheath Rot:** 3 centres namely Tittabar, Chinsura and Pusa sent the data but Pussa not accepted. Valid data from only 2 centres so, the promising lines was not indicated.

- **NSN-2**

I. DEEP WATER:

- **Brown Spot:** Only 3 centres (Pusa, Sabour, Jagdalpur) submitted the report. Only 34211 promising.
- **Blast:** 5 centres namely Ponnampet, Comibatore, Mugad, Jagdalpur, Hazaribag submitted the data and none were promising.
- **Bacterial Blight:** Data were sent by 4 centres namely- 4 centres- Masodha, Cuttack, Titabar and Sabour). Sabour was not accepted due to low LSI. Only 34212 was promising.

- **Sheath Blight:** Data received from 2 centres (Masodha and Titabar) so the promising lines was not indicated.
- **Sheath Rot:** 2 centres (Titabar and Pusa) sent the data but Pussa not accepted. 1 centre data so the promising lines was not indicated.

II. DIRECT SEEDED:

- **Brown Spot:** 34062, 34064, 34065, 34066, 34069, 34071, 34072, 34073, 34074, 34075, 34076, 34077, 34079, 34080, 34082, 34083, 34084, 34085, 34086, 34087, 34088, 34091, 34096, 34099, 34100, 34102, 34103, 34104, 34106, 34107, 34108, 34109, 34110, 34111, 34113, 34115 are promising as per the data received from 3 centres (Pusa, Sabar, Jagdalpur).
- **Blast:** 5 centres namely Ponnampet, Comibatore, Mugad, Jagdalpur, Hazaribag submitted the data. None were promising.
- **Bacterial Blight**: Data were sent by 4 centres namely Masodha, Cuttack, Titabar and Sabour. The data from Sabour were not accepted as the LSI was too low. 34062,34063,34064,34065,34066,34082,34083,34084,34085,34086,34087,34088,34091, 34103,34107,34113,34114,34115 are promising.
- **Sheath Blight:** 2 centres- Masodha, Titabar sent the data and as data received from only 2 centres so the promising lines was not indicated.
- **Sheath Rot**: Data received from Titabar and Pusa only. However, the data from Pusa was rejected due to too low LSI. No decision could be taken on the basis one location data.

III. RAINFED SHALLOW LOWLAND

- **Brown Spot:** Only 3 centres submitted data they are Pusa, Sabour and Jagdalpur. 34128,34129,34130,34132,34134,34135,34136,34137,34138,34140,34141,34145,34146, 34149,34151,34152,34153,34157,34159,34160,34167,34170 are promising.
- **Blast:** Ponnampet, Comibatore, Mugad, Jagdalpur and Hazaribag centres sent the data 34159 was recorded to be promising.
- **Bacterial Blight:** 34125,34127,34140,34146,34147,34149,34155,34159,34165 were recorded to be promising on the basis of 3 centres data they are Masodha, Cuttack, Titabar. Sabour data was rejected.
- **Sheath Blight:** Only 2 centres (Masodha, Titabar) sent the data so promising lines were not indicated.

- **Sheath Rot:** Data from Titabar was accepted but Pussa not accepted. 1 centre data so the promising lines was not indicated.

IV. SEMI DEEP WATER

- **Brown Spot:** Only 3 centres submitted data they are Pusa, Sabour and, Jagdalpur. IET-34182, 34183, 34184, 34185, 34191, 34196, 34202, 34203, 34204, 34205, 34207 lines were promising.
- **Blast:** Ponnampet, Comibatore, Mugad, Jagdalpur and Hazaribag centres sent the data but none was recorded to be promising.
- **Bacterial Blight:** 14 lines IET-34175, 34174, 34176, 34178, 34179, 34185, 34186, 34190, 34191, 34194, 34195, 34198, 34201, 34207 wer epromising as per the data received from Masodha, Cuttack and Titabar. Sabour data showed very low LSI so not accepted.
- **Sheath Blight:** Only 2 centres (Masodha, and Tittabar) sent the data 2 centres data so the promising lines was not indicated.
- **Sheath Rot: Data received from** 2 centres (Titabar and Pusa) but Pussa was not accepted. Valid data from 1 centre only so the promising lines was not indicated.

VI. Basmati programme: Host Plant Resistance trials

The All India Coordinated Rice Pathology Program on Basmati rice initiated with more focused programme on Basmati cultivars. During the year 2025, a total of 23 entries excluding local check were evaluated for host plant resistance trials. For sheath blight and bakanae all the trials were conducted under artificial inoculation conditions. The details on different disease screening nurseries are given in Table 1. For blast, bacterial blight, brown spot and sheath blight standard evaluation scale as mentioned for all the non-basmati trials were followed. Bakanae was evaluated using disease incidence (%).

Table 1. Reaction to leaf Blast, Bacterial blight, Bakanae, Sheath blight and Brown spot diseases observed in different entries at different centers

S. NO.	Entry No.	IET No.	Blast	Bacterial blight					Bakanae (DI)		Sheath blight			Brown spot
					Ludhiana (BB Pathotypes)									
			NDL	NDL	PbXo-7	PbXo-8	PbXo-10	PNT	NDL (GH)	NDL (Field)	New Delhi	LDN	PNT	PNT
1	1801	33269	5	5	7	9	5	5	50	20	9	7	7	3
2	1802	33272	5	7	7	9	7	5	27	0	7	5	5	5
3	1803	33275	7	7	7	7	7	9	22	0	9	7	7	7
4	1804	33279	3	3	1	5	5	5	25	25	9	7	7	5
5	1805	PB1121	7	7	7	9	7	3	72	40	9	7	7	5
6	1806	33268	5	7	7	9	5	7	33	0	9	9	7	5
7	1807	33274	7	7	7	9	5	9	50	0	7	9	7	3
8	1808	33278	2	1	1	5	3	7	50	25	9	7	7	7
9	1809	PB6	7	9	9	9	9	7	62	30	9	7	7	3
10	1810	LC	5	5	#	#	#	9	25	0	#	#	7	#
11	1811	33270	3	3	7	9	3	5	52	40	9	7	7	7
12	1812	33276	5	7	7	9	5	9	26	0	9	7	9	5
13	1813	33281	3	3	7	9	7	5	28	20	9	7	7	5
14	1814	PB1509	7	9	7	9	7	9	70	35	9	7	9	5
15	1815	33271	3	5	7	9	5	5	40	0	9	5	7	7
16	1816	33273	7	7	7	9	7	7	30	25	7	5	7	7
17	1817	33280	3	3	7	9	7	7	40	0	7	7	9	7
18	1818	TB	7	7	7	9	7	9	33	0	9	3	7	7
19	1819	32297	2	3	7	9	5	5	16	0	7	7	7	7
20	1820	PB1	9	9	9	9	7	7	75	20	9	7	9	3
21	1821	33277	5	5	7	7	7	7	28	0	9	5	9	9
22	1822	31299	3	5	3	3	3	5	60	25	7	7	7	5
23	1823	PRH10	7	7	7	3	5	9	85	40	9	7	7	7

(DI- Disease Incidence; GH – Glass house; LC: local check (IARI it is Pusa Basmati 1692); #: missing)

Annexure I

Weather conditions at test locations where Plant Pathology Coordinated Trials were conducted, *Kharif*-2025

S. No	Location/ Details		Weather data from May-2025 to January-2026								
1	**Aduthurai**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		5	3	1	5	9	13	10	5	3
	Rainfall (mm)		133.6	109.4	16.2	121.4	253.8	279.6	293.2	43.8	62.4
	Temp. (^{0}C)	Maximum	34.9	34.9	35.6	34.0	33.8	33.1	31.1	29.6	28.7
		Minimum	24.7	25.0	25.3	23.9	23.7	23.2	22.2	19.8	18.7
	RH (%)	Morning	88.2	85.1	79.3	85.0	85.0	90.9	91.1	92.0	92.9
		Evening	64.8	63.3	55.1	63.0	64.5	71.3	75.5	75.6	76.5
2	**Almora**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		12	14	19	21	9	3	-	-	-
	Rainfall (mm)		75.6	66.5	161	329.75	145.5	36.5	-	-	-
	Temp. (^{0}C)	Maximum	30.5	31.1	29.9	29.6	30.9	29	-	-	-
		Minimum	13.3	16.1	18.6	20	20.1	12.5	-	-	-
	RH (%)	Morning	81.3	83.7	89.6	94.1	92.6	92.7	-	-	-
		Evening	58.7	64.6	71.2	76.2	65	49	-	-	-
3	**Arundhutinagar**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Weather data not available										
4	**Bankura**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		11	18	24	16	10	5	0	0	-
	Rainfall (mm)		10.18	12.68	7.64	6.25	10.12	13.22	0	0	-
	Temp. (^{0}C)	Maximum	37.16	35.7	33.83	34.45	32.22	32.4	24.3	22.6	-
		Minimum	24.7	24.01	26.61	25.41	24.22	25.3	17.36	15.25	-
	RH (%)		79.64	86.83	88.51	78.02	78.44	79.23	68.23	65.23	-
5	**Chatha**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		7	4	13	14	4	4	1	0	-
	Rainfall (mm)		87	60.6	275.8	880.6	131.4	73.4	3.4	0	-
	Temp. (^{0}C)	Maximum	37	37.4	33.6	32.2	33.5	31.3	26.5	21.3	-
		Minimum	22.4	25.1	26.1	24.7	24.3	16.6	8.6	6.6	-
	RH (%)	Morning	68	71	87	91	89	86	92	96	-
		Evening	39	45	70	73	64	56	47	55	-
6	**Chinsurah**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		-	18	26	22	15	11	1	-	-
	Rainfall (mm)		-	185.5	322.3	307.5	281.2	117.1	0.1	-	-
	Temp. (^{0}C)	Maximum	-	34.7	32.3	32.6	33.9	31.7	28.8	-	-
		Minimum	-	26.4	25	25.4	25.7	23.8	15.8	-	-
7	**Chiplima**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		8	11	17	12	10	8	0	0	-
	Rainfall (mm)		224.4	336.2	433.2	223	331	89.4	0	0	-
	Temp. (^{0}C)	Maximum	38.3	33.5	30.9	32.3	32.3	31.7	28.9	27.1	-
		Minimum	27	25	24.6	25	25.6	23	13.6	9.3	-
	RH (%)	Morning	83.1	87.5	93	89.5	90.9	90.8	89.4	91.9	-
		Evening	69.3	73	83.3	78.7	80.3	74.4	59.7	51	-
8	**Coimbatore**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		12	5	1	2	3	10	2	2	-
	Rainfall (mm)		193.8	41.6	14.4	79.3	48.6	128.4	32.2	22	-

S. No	Location/ Details		Weather data from May-2025 to January-2026								
	Temp. (^{0}C)	Maximum	32.70	31.18	31	30.73	31.71	31.03	30.44	29.53	-
		Minimum	23.49	22.91	22.81	22.16	22.29	22.1	20.19	18.73	-
	RH (%)	Morning	83.52	84.07	81.77	89.29	85.8	88.77	89	88.52	-
		Evening	56.3	58.07	57.03	62	56.67	62.5	62.3	49.74	-
9	**Cuttack**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		4	12	15	15	12	11	0	0	NA
	Rainfall (mm)		29.2	315.8	299.7	210.8	273	161.2	0	0	NA
	Temp. (^{0}C)	Maximum	34.8	33	31	31.4	31	31	29.6	26.5	NA
		Minimum	27.5	27.4	27	27.1	26.9	26.2	19.9	15.4	NA
	RH (%)	Morning	90.2	91.3	91.8	91.8	92.7	90.1	87	91.2	NA
		Evening	55.8	66.4	68	71.1	61.6	67.3	47.8	48.5	NA
10	**Faizabad (Masodha)**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		-	6	15	18	7	3	1	-	-
	Rainfall (mm)		-	90	279.4	452	16.6	42	2	-	-
	Temp. (^{0}C)	Maximum	-	36.8	34.3	32.7	32.5	3.4	27.7	-	-
		Minimum	-	26.8	26.1	25.8	25.9	20.5	12.7	-	-
	RH (%)	Morning	-	87.9	85.6	87.6	84.3	87	86	-	-
		Evening	-	52.3	62.4	66.4	69.9	65.4	57.1	-	-
11	**Gangavathi**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		10	4	5	12	11	6	0	0	-
	Rainfall (mm)		160.3	60.7	34.5	87.3	133.5	71.5	0	0	-
	Temp. (^{0}C)	Maximum	33.33	33.81	30.55	29.49	29.27	29.9	29.74	29.15	-
		Minimum	24.30	23.15	24.37	23.50	23.07	21.88	18.72	15.08	-
	RH (%)	Morning	81.23	81.27	90.48	95.94	96.63	95.87	91.83	87.55	-
		Evening	44.58	57.10	56.42	64.97	65.17	61.23	44.17	28.23	-
12	**Ghaghraghat**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
		Weather data not available									
13	**Gudalur**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		12	10	24	15	19	3	2	4	-
	Rainfall (mm)		324	147	580	235	408	61	76	33	-
	Temp. (^{0}C)	Maximum	26.6	22.5	22.4	21.7	25.2	25.8	26.9	25.1	-
		Minimum	19.2	17.1	16.4	16.3	17.2	16	15.4	14.1	-
	RH (%)	Morning	94.2	96.8	97.5	98.3	95.8	93.1	91.6	88.1	-
		Evening	75.1	86.9	93.2	91.6	90.3	86.1	71.3	63.4	-
14	**Hazaribag**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		13	16	25	23	19	9	2	NIL	-
	Rainfall (mm)		134.2	426.4	411.8	307.5	210.8	230.4	11.2	NIL	-
	Temp. (^{0}C)	Maximum	34	32	29.3	29.3	30.3	28.7	24.7	21.6	-
		Minimum	22	23.9	23.7	23.2	23.1	19.3	10.1	6.4	-
	RH (%)	Morning	71.2	80.7	90.3	87.6	88.1	82.5	77.9	86.1	-
		Evening	49.8	64.9	78.5	79	74.1	64.7	45.3	47.1	-
15	**IIRR, Hyderabad**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		9	3	14	15	9	10	1	0	0
	Rainfall (mm)		142.6	46.6	251.7	280.2	105.8	188.8	3.0	0.0	0.0
	Temp. (^{0}C)	Maximum	35.0	32.7	30.1	29.4	29.9	29.8	29.0	28.1	28.6

S. No	Location/ Details		Weather data from May-2025 to January-2026								
		Minimum	23.5	23.0	22.8	22.5	22.2	21.5	16.7	10.8	13.9
	RH (%)	Morning	49.9	55.8	67.0	71.6	67.4	65.6	44.2	31.8	33.6
		Evening	79.3	79.5	84.0	90.2	89.3	87.1	87.6	80.8	82.8
16	**Imphal**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		21	19	20	23	15	8	4	-	-
	Rainfall (mm)		248.2	237.8	268.7	239.6	234.6	143.4	16.3	-	-
	Temp. (^{0}C)	Maximum	28.8	30.1	30	29.3	30.2	29.9	26.7	-	-
		Minimum	20.3	22.6	23.1	22.4	22.2	19.9	13.7	-	-
	RH (%)	Morning	88.9	90.9	90.1	92.5	91.9	91.3	90.7	-	-
		Evening	64.8	68.9	70	69.6	66.5	62.9	52.4	-	-
17	**Jagdalpur**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		12	11	20	16	21	11	0	0	-
	Rainfall (mm)		248.4	137	550.7	501.1	287.3	141.4	0	0.6	-
	Temp. (^{0}C)	Maximum	33.6	31.4	28.5	29.8	30.7	30.4	29.5	27.8	-
		Minimum	21.8	22.6	22.1	22.3	22	19.8	12.6	7.2	-
	RH (%)	Morning	85.5	89.7	92.6	92.3	93.9	93.4	84.2	81.3	-
		Evening	58.2	67.7	78.5	75.9	74.3	65.6	38.8	28.3	-
18	**Jagtial**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		10	10	16	14	15	6	0	0	0
	Rainfall (mm)		246.1	169.5	201.9	285.3	299.4	80.6	0.5	0	0
	Temp. (^{0}C)	Maximum	37.6	34.8	30.9	31.2	31.6	31.5	30.9	29.8	30.1
		Minimum	24	24.2	23.6	23.3	22.6	21.9	14.8	10.8	13.9
	RH (%)	Morning	76.2	76.5	85.7	89	90.2	77.3	89.8	85.7	90.6
		Evening	47	56.3	74.6	75.6	72.2	68.5	47.8	30.7	49.8
19	**Karaikal**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		5	5	1	6	5	10	11	6	4
	Rainfall (mm)		76.4	56.7	5.4	215.6	113.9	338.9	574.5	150	154.3
	Temp. (^{0}C)	Maximum	37.3	37.6	37.6	35.3	35.5	33.9	32.1	29.9	29.2
		Minimum	26.2	26.1	26.7	25.5	25.6	25.2	24.4	21.8	21.2
	RH (%)	Morning	87	82	77	85	86	90	91	90	91
		Evening	64	57	53	63	62	70	75	75	76
20	**Karjat**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		7	22	30	26	22	12	3	-	-
	Rainfall (mm)		390.5	789.7	1125.5	1169.8	840.1	183.3	33.5	-	-
	Temp. (^{0}C)	Maximum	32.6	31.4	28.9	28.5	28.8	33.1	29.6	-	-
		Minimum	27.1	24.6	24.6	23.8	23.5	22.7	20.4	-	-
	RH (%)	Morning	80.4	89.5	91.4	91.0	87.4	89.0	81.2	-	-
		Evening	86.7	74.3	89.6	82.1	76.7	57.3	62.5	-	-
21	**Kaul**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		5.0	2.0	10.0	11.0	5.0	1.0	0.0	-	-
	Rainfall (mm)		195.3	26.5	260.6	308.1	163.4	16.7	1.5	-	-
	Temp. (^{0}C)	Maximum	36.7	36.5	33.7	32.3	33.0	32.1	28.9	-	-
		Minimum	23.6	26.0	27.0	26.1	24.8	18.6	11.2	-	-
	RH (%)	Morning	75.0	76.0	89.0	93.0	93.0	92.0	89.0	-	-
		Evening	50.0	50.0	72.0	78.0	67.0	49.0	44.0	-	-

S. No	Location/ Details		Weather data from May-2025 to January-2026								
22	**Khudwani**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		8	6	13	8	6	3	1	-	-
	Rainfall (mm)		64.6	38	82.8	118.4	75.2	35	7.4	-	-
	Temp. (^{0}C)	Maximum	27.4	31.1	30.9	29.7	28.8	23.5	16.5	-	-
		Minimum	11.6	16.2	18.9	17.2	13.1	4.9	-2.2	-	-
	RH (%)	Morning	80.8	82.6	84.1	89.9	91.2	93.2	91.4	-	-
		Evening	43.5	47.6	51.7	58.5	58	54.1	58.3	-	-
23	**Lonavala**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		15	25	31	18	24	5	2	0	0
	Rainfall (mm)		761.6	1600.7	2167.9	434.2	1114.2	49.3	20.4	0	0
	Temp. (^{0}C)	Maximum	36.3	31.1	35.5	30.5	31.0	31.1	31.8	29.9	31.2
		Minimum	19.4	17.0	16.3	17.4	18.1	18.4	16.3	14.0	14.0
	RH (%)	Morning	84.9	85.2	84.5	84.9	83.7	84.6	76.5	70.2	74.0
		Evening	49.2	89.9	82.9	83.0	84.9	84.2	73.9	69.6	72.2
24	**Ludhiana**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		5.0	5.0	10.0	11.0	6.0	3.0	0.0	-	-
	Rainfall (mm)		35.0	128.2	260.9	314.6	142.4	52.4	1.2	-	-
	Temp. (^{0}C)	Maximum	38.6	37.7	32.9	32.3	33.4	30.9	26.3	-	-
		Minimum	25.9	27.7	27.4	26.5	25.1	18.6	9.9	-	-
	RH (%)	Morning	55.5	64.3	82.0	84.3	86.7	88.2	89.1	-	-
		Evening	29.3	44.3	70.4	73.2	61.6	44.5	32.5	-	-
25	**Malan**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		-	-	-	-	-	-	-	-	-
	Rainfall (mm)		-	541	811.2	1050.2	766.6	100.6	-	-	-
	Temp. (^{0}C)	Maximum	-	31.3	27.4	23.8	24.2	23.2	-	-	-
		Minimum	-	19.6	17.1	15.7	16.7	16.1	-	-	-
	RH (%)	Morning	-	78.4	75.9	74.2	78.2	77.2	-	-	-
		Evening	-	73.3	67.9	66.3	69.6	69.6	-	-	-
26	**Mandya**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		9	7	4	4	6	7	2	0	-
	Rainfall (mm)		156	91	41	87.4	64	180	7	0	-
	Temp. (^{0}C)	Maximum	32.3	29.5	28.5	28.2	29.5	28.9	27.7	27.9	-
		Minimum	21.8	21.2	20.5	20.5	20.5	19.5	18.1	15.4	-
	RH (%)	Morning	82	84	83	83	83	85	82	82	-
		Evening	55	61	58	54	55	57	56	56	-
27	**Maruteru**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		8	8	9	10	8	10	1	2	-
	Rainfall (mm)		170.8	102.2	159	259	134.7	210.9	25.8	19.8	-
	Temp. (^{0}C)	Maximum	34	34.5	30.77	30.81	30.7	28.7	28.1	27.97	-
		Minimum	25.87	26.47	25.52	26.48	26.33	25	25.07	21.19	-
	RH (%)	Morning	86.32	87.03	84.74	85.87	85.67	82.3	84.3	87.35	-
		Evening	59.29	68.5	77.74	81.71	82.43	83.6	87.67	63.68	-
28	**Moncompu**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		18	24	24	16	14	13	5	0	-
	Rainfall (mm)		660.4	686.3	569.4	232.8	205.8	300.9	101	0	-

S. No	Location/ Details		Weather data from May-2025 to January-2026								
	Temp. (^{0}C)	Maximum	24.4	32.8	31.5	30.67	31.2	32.2	32.3	33	-
		Minimum	33.4	24.6	24.2	24.6	24.7	25.2	22.3	24.6	-
	RH (%)	Morning	75.3	78.6	81.4	82.5	84.2	77.3	78.5	80.7	-
		Evening	69.9	69.2	73.8	73.1	67.8	67.9	71.8	74.9	-
29	**Mugad**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		7	14	18	15	4	7	0	-	-
	Rainfall (mm)		212.8	171.8	122.2	141.0	132.5	119.0	3.0	-	-
	Temp. (^{0}C)	Maximum	32	28.3	26.8	27	27.4	29.9	29.1	-	-
		Minimum	20.7	20.7	20.3	19.7	19.2	20.3	16.1	-	-
	RH (%)	Morning	32.0	28.3	26.8	27.0	27.4	29.9	29.1	-	-
		Evening	20.7	20.7	20.3	19.7	19.2	20.3	16.1	-	-
30	**Navsari**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		7	16	21	18	14	6	1	0	-
	Rainfall (mm)		72	305	546	402	293	220	11	0	-
	Temp. (^{0}C)	Maximum	33.5	32	30.3	30.6	31.1	33.3	32	31.8	-
		Minimum	24.1	24.3	24	23.6	23.2	23.4	18.8	19.6	-
	RH (%)	Morning	88	91.5	94.9	92.4	94	90.6	93.3	91.3	-
		Evening	65.4	76.6	86	82.4	81	60.2	52.2	50.3	-
31	**Nawagam**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		6	11	12	9	9	4	3	0	-
	Rainfall (mm)		141.4	270.0	276.3	105.6	142.6	37.4	26.6	0.0	-
	Temp. (^{0}C)	Maximum	38.31	33.96	31.44	31.11	31.19	32	29.94	30.19	-
		Minimum	24.17	25.57	26.02	25.52	24.83	20.51	16.47	11.49	-
	RH (%)	Morning	83.58	84.72	90.55	91.35	97.03	80.94	83.33	78.29	-
		Evening	58.68	66.93	80.1	83.81	82.87	73.42	55.43	38.77	-
32	**Nellore**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		-	1	3	4	5	12	6	5	1
	Rainfall (mm)		-	20	38.6	95.7	148.4	440.2	83.4	228.6	2.8
	Temp. (^{0}C)	Maximum	36.6	36.4	34.8	33.4	32.86	31.63	29.2	27.56	17.46
		Minimum	23.4	25.3	24.6	23.5	22.4	23.48	20.54	19.08	28.74
	RH (%)	Morning	69.4	64.6	68.1	74	80.36	84.8	85.36	90.09	81.27
		Evening	53.6	47.2	52.7	62.4	60	69.09	73.9	78.38	69.28
33	**NewDelhi (IARI)**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainfall(mm)	129.7	113.6	326.0*	394.5	77.1	91.2	0	-	-	
34	**Pantnagar**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		6	9	12	20	5	2	0	-	-
	Rainfall (mm)		88.40	186.60	367.60	811.40	64.60	69.40	0.00	-	-
	Temp. (^{0}C)	Maximum	35.50	34.93	33.10	31.28	32.60	30.40	27.08	-	-
		Minimum	23.82	25.98	26.05	24.92	24.98	18.90	11.16	-	-
	RH (%)	Morning	67.14	76.33	78.58	90.36	89.10	86.65	93.36	-	-
		Evening	39.66	57.55	69.93	76.94	68.03	53.38	41.88	-	-
35	**Patna**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		5	14	21	12	13	11	13	2	-
	Rainfall (mm)		97.8	122.8	169.3	307.5	122.7	95.1	9.6	0	-
	Temp. (^{0}C)	Maximum	31.24	31.91	32.18	32.15	33.9	29.45	26.5	22.5	-

S. No	Location/ Details		Weather data from May-2025 to January-2026								
		Minimum	28.5	31.3	31.49	26.39	26.1	22.72	17.5	10.2	-
	RH (%)		55.48	70.98	92.16	96.37	96.93	92.46	80.82	76.47	-
36	**Pattambi**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		15	25	30	18	15	16	3	3	
	Rainfall (mm)		590	714.8	585.7	325.1	266.4	286.1	8	10	
	Temp. (^{0}C)	Maximum	32.22	29.24	29.1	29.55	31.2	31.59	31.9	32.12	32.85
		Minimum	21.28	20.6	19.81	23.17	23.62	23.92	22.72	20.82	21.14
	RH (%)	Morning	90.25	93.23	94.9	94.93	94.56	92.45	91.63	83.25	75.45
		Evening	67.29	74.76	80.77	77.77	66.73	65.9	57.86	50.09	40.93
37	**Ponnampet**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		17	20	26	12	18	12	0	1	0
	Rainfall (mm)		643.6	624.6	433.2	335.6	251.4	249.4	0	5	0
	Temp. (^{0}C)	Maximum	34.61	29.92	27.57	28.32	28.88	29.72	29.69	31.36	30.6
		Minimum	20.07	18.66	19.56	17.66	18.76	18.66	14.83	12.26	16.2
	RH (%)	Morning	85.3	93.46	94.3	94.8	92.6	93.16	85.9	73.82	82.5
		Evening	73.3.	81.46	82.2	82.06	80.4	81.24	73.6	61.42	40.4
38	**Pusa**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		6	9	12	16	14	7	1	-	-
	Rainfall (mm)		85.3	47.8	235.5	304	128.9	182.9	25	-	-
	Temp. (^{0}C)	Maximum	34.7	36.2	34.2	32.6	33.3	32	28.1	-	-
		Minimum	23.8	25.8	26	25.4	25.3	21	14.1	-	-
	RH (%)	Morning	86	85	91	95	92	95	94	-	-
		Evening	64	64	73	81	77	68	58	-	-
39	**Raipur**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		8	6	13	14	12	7	1	0	0
	Rainfall (mm)		95	130.8	489.8	186	218.6	139	8.2	0	0
	Temp. (^{0}C)	Maximum	38	35.3	29.2	31.5	31.4	30.8	29.2	27.7	29.5
		Minimum	25.7	26.3	25.2	25.5	25.2	23.4	14.6	8.7	11.9
	RH (%)	Morning	70	76	90	89	92	89	88	91	85
		Evening	42	52	77	70	71	64	34	29	30
40	**Rajendranagar**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		9	3	14	15	9	10	1	0	0
	Rainfall (mm)		142.6	46.6	251.7	280.2	105.8	188.8	3.0	0.0	0.0
	Temp. (^{0}C)	Maximum	35.0	32.7	30.1	29.4	29.9	29.8	29.0	28.1	28.6
		Minimum	23.5	23.0	22.8	22.5	22.2	21.5	16.7	10.8	13.9
	RH (%)	Morning	49.9	55.8	67.0	71.6	67.4	65.6	44.2	31.8	33.6
		Evening	79.3	79.5	84.0	90.2	89.3	87.1	87.6	80.8	82.8
41	**Ranchi**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		8	14	18	19	18	7	1	0	-
	Rainfall (mm)		76	982.6	563	360.1	400.6	61.6	4	0	-
	Temp. (^{0}C)	Maximum	40.3	40.4	33.4	32.5	33.3	30.2	27.3	24.6	-
		Minimum	20.5	12.5	12.4	18.3	17.5	10	5.2	3	-
	RH (%)	Morning	87	87	87	86	86	86	86	87	-
		Evening	70	71	71	70	70	70	70	70	-
42	**Rewa**		May	June	July	August	Sep	Oct	Nov	Dec	Jan

S. No	Location/ Details		Weather data from May-2025 to January-2026								
	Rainy days (No.)		-	10	14	14	9	8	0	0	1
	Rainfall (mm)		8.0	119.8	308.8	337.4	199.1	31.9	9.7	8.5	24.7
	Temp. (^{0}C)	Maximum	-	38.52	32.87	32.76	33.8	31.116	27.47	24.517	-
		Minimum	-	28.13	25.726	25.571	25.79	22.22	11.17	7.94	-
	RH (%)	Morning	-	-	-	-	-	-	-	-	-
		Evening	-	-	-	-	-	-	-	-	-
43	**Sabour**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		2	9	14	14	10	9	1	0	-
	Rainfall (mm)		35.4	132.8	351.7	186.8	55	174.3	76.4	0	-
	Temp. (^{0}C)	Maximum	34.3	34.3	31.8	32.5	33.2	31.2	27.8	21.5	-
		Minimum	23.9	26.3	26.4	26.3	26.3	22.7	14.5	12.1	-
	RH (%)	Morning	85.1	79.6	86.4	84	83	84.6	85.9	88.5	-
		Evening	67	63	80.2	78.4	76.1	77.8	73	79.1	-
44	**Titabar**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		10	12	15	12	8	9	0	0	-
	Rainfall (mm)		4.3	8.5	12.3	6.5	2.7	2.8	0	0	-
	Temp. (^{0}C)	Maximum	33	33.1	34	33	33.8	29	29	17	-
		Minimum	20.2	21.3	22.5	23.4	20.8	17	13.8	9.5	-
	RH (%)	Morning	90	92.2	91	92.8	92.5	95.5	92.7	68.2	-
		Evening	70	72.3	71.2	73.4	65	75.5	62.3	65.5	-
45	**Umiam (Barapani)**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		-	13	16	20	20	-	-	-	-
	Rainfall (mm)		-	188.1	343.2	325.6	385.2	-	-	-	-
	Temp. (^{0}C)	Maximum	-	28.6	28.9	28	28.5	-	-	-	-
		Minimum	-	20.7	21.2	20.9	20.3	-	-	-	-
	RH (%)	Morning	-	89.4	92.5	93.5	91.3	-	-	-	-
		Evening	-	83.8	81.9	86.3	82.3	-	-	-	-
46	**Upper Shillong**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		-	10	28	10	5	-	-	-	-
	Rainfall (mm)		-	57	134.6	84.4	17	-	-	-	-
	Temp. (^{0}C)	Maximum	-	24.19	25.73	24.29	-	-	-	-	-
		Minimum	-	18.25	17.28	17.18	-	-	-	-	-
	RH (%)	Morning	-	96.84	94.5	94.17	-	-	-	-	-
		Evening	-	78.41	77.57	75.42	-	-	-	-	
47	**Varanasi**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Rainy days (No.)		-	-	-	-	-	-	-	-	-
	Rainfall (mm)		0	191.8	275	470	49.3	249.8	0	-	-
	Temp. (^{0}C)	Maximum	38.8	40.9	33.7	33.3	33.7	30.6	28.7	-	-
		Minimum	25.4	26.3	26.6	26.4	26.7	18	11.6	-	-
	RH (%)	Morning	72	87	87	91	91	91	96	-	-
		Evening	46	41	67	69	69	58	37	-	-
48	**Wangbal**		May	June	July	August	Sep	Oct	Nov	Dec	Jan
	Weather data not available										

Note:(-) means data not received

Annexure II

Details on the locations where Coordinated Pathology Screening trials were conducted during, *Kharif* 2025-2026

S. No.	Location	Latitude (North)	Longitude (East)	Elevation (m. from MSL)	Ecosystem	Sowing (Year, 2025)	Fertilizer Basal - NPK (Kg/ha)	Fertilizer top dressing (Kg/ha)
1	**Aduthurai**	11° N	79° E	19.5 m	Irrigated	22-09-2025	37.5:50:25	112.5:0:25 (NPK)
2	**Almora**	29°36′N	79°40′E	1250 m	Upland	18-07-2025 LB	60:60:40 (Full dose of P, K and 1/3rd dose of N (i.e @20 kg N per ha))	N at two splits @ 20 Kg N per ha at early tillering stage (30 DAT) and at panicle initiation (60 DAT)
3	**Arundhutinagar**	23.80N	91.26E	18m	Rainfed lowland	18-07-2025	Urea - 1.173 kh., SSP - 4.500 kg., MOP - 1.080 kg.	Urea - o.586 kg., 2 (Two) times
4	**Bankura**	23°24′ N	87°05′E	84 m	Upland (Rainfed)	11-07-2025	60:30:30(Half of N and Full Dose P and K)	Rest Half of N
5	**Chatha**	32°40′N	74°18′E	293 m	Irrigated	24-06-2025	40+60+30Kg NPK/h	40+40kgN/h Ist & 2nd top dressing
6	**Chinsurah**	22°52′N	88°24′E	8.62 m	Irrigated	25-06-2025	60:50:30	60
7	**Chiplima**	20º21′N	80º55′E	178.8 m	Irrigated	18-07-2025	50:40:20	25:0:20 NPK (tillering stage) 25:0:0 NPK (PI stage)
8	**Coimbatore**	11° N	77°E	409 m	Irrigated	23.07.2025 for brown spot ; 02.12.2025 for blast	-	Urea 25 kg for entire uniform blast nursery bed; 10g/pot (RTD)
9	**Cuttack**	20º23′N	85° 17′E	36 m	Irrigated Shallow lowland	SHB-12.06.2025,BLB-04-07-2025	40 Kg N/ha(SHB)	20 Kg N/ha(SHB)
10	**Gangavathi**	15°43′N	76°53′E	1332 ft	Irrigated	12-09-2025(For Leaf Blast), 07-10-2025(For Brown Spot), 10-07-2025(For BLB & Sheath blight)	125:75:75 kg NPK/ha (For Sheath Blight, BLB and Leaf Blast), 25:75:75 kg/ha (for Brown spot)	125:0:0 kg NPK/ha (For Sheath Blight, BLB and Leaf Blast), 25:0:0 kg/ha(for Brown spot)
11	**Ghaghraghat**	27°50′N	81°20′E	112m	Irrigated	-	-	-
12	**Gudalur**	11°30′N	76°30′E	950 m	Upland	19-08-2025	100:50:50 kg/ha	Urea 15 kg for entire uniform blast nursery bed; for false smut 50 kg N/ha
13	**Hazaribag**	23° 95'91″ N	85° 37'20″ E	614 m	Upland	21-08-2025	75:60:30 (NPK)	75:0:0 (NPK)
14	**IIRR**	17°19′N	78°23′E	542m	Irrigated	13-06-2025	45:60:40	135N
15	**Imphal**	24°45' N	93°54' E	774 m	Rainfed lowland	25-07-2025(direct sowing)	80:60:40	40N
16	**Jagdalpur**	19°05' N	81°57'E	556 m	Upland / Rainfed	12-08-2025	60:60:60	30:30 (N: N)
17	**Jagtial**	18°831′N	78°96′E	264m	Irrigated	22-11-2025	120 Nitrogen 40	
18	**Karaikal**	10°55′ N	79°52′E	4	Irrigated	1-9-2025	75:50:50:25	75N
19	**Karjat**	18°55′ N	73°15′E	51.7 m	Rainfed lowland	02-07-2025	As per recommendation	N 70 kg/ha
20	**Kaul**	29°51′N	76°39′E	230.7 m	Irrigated	23-06-2025	150 kg N and 60 kg K20	100 kg N

S. No.	Location	Latitude (North)	Longitude (East)	Elevation (m. from MSL)	Ecosystem	Sowing (Year, 2025)	Fertilizer Basal - NPK (Kg/ha)	Fertilizer top dressing (Kg/ha)
21	**Khudwani**	33.73°N	75.15°E	1601 m	Irrigated	14-08-2025	60:60:30	60 N
22	**Lonavala**	18.75N	71.40E	622m	Rainfed lowland	30-06-2025	80:25:25	20:25:25
23	**Ludhiana**	30°90′N	75° 85′E	262 m	Irrigated	25-06-2025	Urea 37kg / Acre	Urea 74kg / Acre
24	**Malan**	32°1′N	76°2′E	950 m	Upland	06-07-2025	120:40:40 60:40:40	60 N
25	**Mandya**	12°36′N	76°15′E	694.65 m	Irrigated	Blast :25-10-2025 ; Sheath blight:20-08-2025 ; Neck blast :20-08-2025	200:50:50 100:50:50	50:0:0 (15 DAT) 50:0:0 (30 DAT)
26	**Maruteru**	16°38′N	81°44′E	5m	Irrigated	4-7-2025	150:40:40 50:40:20	50:0:0 (NPK) 50:0:20
27	**Faizabad (Masodha)**	26°47′N	82°12′E	113 m	Irrigated	22-07-2025	SHB- 60:60:60 BLB-75:60:60	ShB-60, BLB-75 N & 25 $ZnSo_4$
28	**Moncompu**	9°51′N	76 °5′E	Below MSL	Irrigated	20-07-2025	120:45:45 Kg/ha 1/2N,1/3P&K	15DAP-1/4N, 1/3P&K, 40DAP-1/4N, 1/3P&K
29	**Mugad**	50°26′N	74°54′E	697m	Rainfed drill sown lowland	18-07-2025	100:50:50 33:50:50	33 kg N/ha at 30 days after sowing and 33 kg N/ha at 60 days after sowing.
30	**Navsari**	20 °57′N	72°90′E	10 m	Irrigated	13-07-2025	150:50:0 75:50:0	Remaining 75 N given in two splits at 30 days intervals.
31	**Nawagam**	22°48′N	71°38′E	32.4 m	Irrigated	17-07-2025	120:30:0 60 N + 30 P_2O_5.	60 N + 20 $ZnSO_4$
32	**Nellore**	14°27′N	79°59′E	20 m	Upland	15-10-2025	150:60:40 75:60:20 20 kg/acre-Zn	37.5+ 37.5 0 20 (30DAT & 60DAT)
33	**New Delhi (IARI)**	28 ° 08′N	77°12′E	216 m	Irrigated	26-06-2025	Full dose of P, K and 1/3rd dose of N (i.e @20 kg N per ha)	-N at two splits @ 20 Kg N per ha at early tillering stage (30 DAT) and at panicle initiation (60 DAT)
34	**Pantnagar**	29°N	79°30′E	343.84 m	Irrigated	23-06-2025	60:60:40-25Kg (ZnSO4)	N-60kg, P2O5-0.00kg, K2O-0.00kg, ZnSO4-0.00kg
35	**Patna**	25°13N	84°14E	77m	Irrigated	29-08-2025	120:60:40 NPK kg/ha	-
36	**Pattambi**	10°48′N	76°12′E	25.35 m	Upland Rainfed lowland	Blast - 07.07.2025, SHBL - 08.07.2025 and BLB - 08.07.2025	120:30:30 80:30:15	40:0:15
37	**Ponnampet**	12°29′N	75°56′E	856 m	Rainfed lowland	29/08/2025 in UBN Pattern Nursery and 28-07-2025 in Field Nursery	75:75:90 37.5:75:45	37.5:0:45
38	**Pusa**	25°98′N	85 °67′E	51.8 m	Irrigated	31-06-2025	N-80kg,P2O5-40kg, K2O-20kg	Split: 40 kg N/ha
39	**Raipur**	21° 16′N	81°36′E	681 m	Irrigated	25-06-2025	60 kg/ha	60kg/ha as a

S. No.	Location	Latitude (North)	Longitude (East)	Elevation (m. from MSL)	Ecosystem	Sowing (Year, 2025)	Fertilizer Basal - NPK (Kg/ha)	Fertilizer top dressing (Kg/ha)
								spray in two split doses
40	**Rajendranagar**	17° 19′N	78°23′E	542 m	Irrigated	Leaf Blast: 12-10-2025; Neck Blast:14-07-2025; Bacterial Leaf Blight:02-07-2025	180-60 NP (Kg/ha)	125% RDN was applied in 3-4 split doses
41	**Ranchi**	23° 17′N	85° 19′E	625m	Upland	09-08-2025	20	30+30
42	**Rewa**	24°30′N	81°15′E	360 m	Upland Irrigated	18-07-2025	N40 Kg/Ha	N40 Kg/Ha
43	**Sabour**	25°23′N	87°07′E	37.19 m	Rainfed lowland	04-07-2025	40:40:20	20+20 N
44	**Titabar**	26°60′N	94°20′ E	99 m	Rainfed lowland	30-06-2025	60:20:40 30:20:40	15+15 N(First top- 15 kg N, Second top-15 Kg N per ha)
45	**Umiam (Barapani)**	25°30′ N	91°51′ E	1000m	Upland	26-06-2025	60:60	60
46	**Upper Shillong**	25° 54′24″ N	91° 83′ 96″ E	1814 m	Rainfed	18-07-2025	50:40:40 25:40:40	25
47	**Varanasi**	25°20′ N	23°03′E°	75.7 m	Irrigated	10-07-2025	180:60:60 120:60:60	15+15 N(Top 30 Kg N split doses)
48	**Wangbal**	24°8′N	94′E	781 m	Rainfed lowland	-	-	-

Note: (-) data not received

Annexure – III (Abbreviations)

Name of the centre	Code	Details	Code
Aduthurai	ADT	(-)	Data not available
Almora	ALM	A	Artificial Inoculation
Arundhatinagar	ARD	AVTs	Advanced variety trails
Bankura	BAN	BB	Bacterial blight
Chatha	CHT	BS	Brown spot
Chinsurah	CHN	CV	Co-efficient of variation
Chiplima	CHP	DSN	Donor Screening Nursery
Coimbatore	CBT	FS	False Smut
Cuttack (NRRI)	CTK	GD	Glume discoloration
Gangavathi	GNV	IET No.	Initial Evaluation Trail Number
Ghaghraghat	GGT	IVTs	Initial variety trails
Gudalur	GDL	LB	Leaf blast
Hazaribagh	HZB	LSD	Least significant difference
Imphal	IMP	LSI	Location Severity Index
Indian Institute of Rice Research	IIRR	MSL	Mean sea level
Jagadalpur	JDP	N	Natural Infection
Karjat	KJT	NB	Neck blast
Kaul	KUL	NHSN	National Hybrid Screening Nursery
Kudhwani	KHD	NSN-1	National Screening Nursery 1
Lonavala	LNV	NSN -2	National Screening Nursery 2
Ludhiana	LDN	NSN-H	National Screening Nursery- Hills
Malan	MLN	PI	Promising index
Mandya	MND	RTD	Rice Tungro Disease
Maruteru	MTU	RTV	Rice Tungro Virus
Masodha (Faizabad)	MSD	SE	Standard error
Moncompu	MNC	ShB	Sheath blight
Mugad	MGD	ShR	Sheath rot
Navsari	NVS	SI	Susceptibility Index
Nawagam	NWG		
Nellore	NLR		
New Delhi (IARI)	NDL		
Pantnagar	PNT		
Patna	PTN		
Pattambi	PTB		
Ponnampet	PNP		
Pusa	PSA		
Raipur	RPR		
Rajendranagar	RNR		
Ranchi	RCI		
Rewa	REW		
Sabour	SBR		
Titabar	TTB		
Umiam (Barapani)	UMM		
Upper Shillong	USG		
Varanasi	VRN		
Wangbal	WBL		

Progress Report-2025 report was compiled by the following scientists of Department of Plant Pathology, ICAR-IIRR, Hyderabad.

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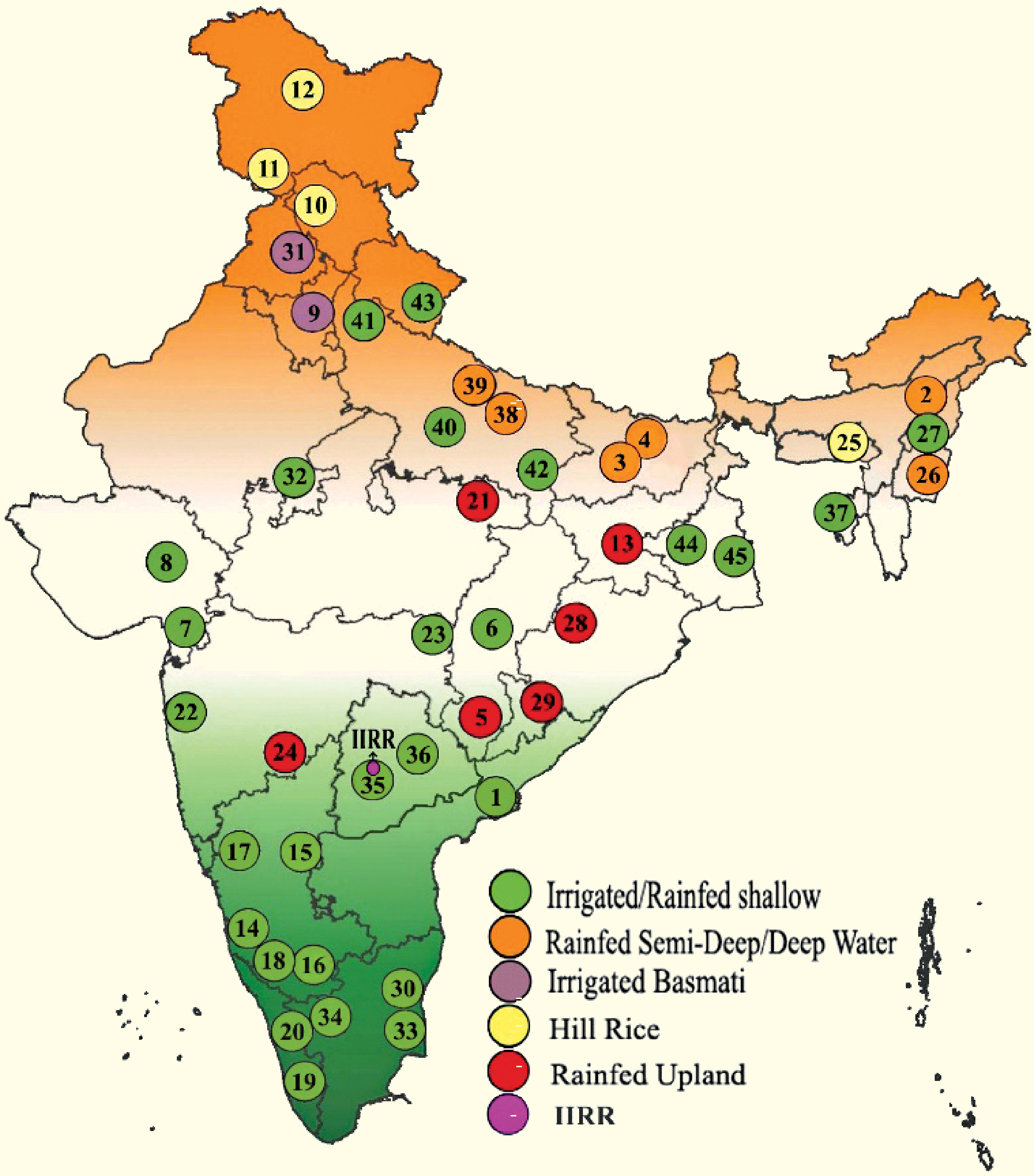

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