PLANT PATHOLOGY

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3. PATHOLOGY

SUMMARY

The All India Coordinated Rice Pathology Program of the ICAR-Indian Rice Research Institute (formerly as Directorate of Rice Research) 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 2022, a total of 16 trials were conducted at 51 locations on host plant resistance, field monitoring of virulence of major pathogens and disease management methods.** The details on screening nurseries and disease management trials proposed and conducted at various test locations are given in Table 1. The summary of observations is given below. Detailed data on extensive screening of diverse genotypes are furnished in a separate report entitled 'National Screening Nurseries, 2022'.

1. HOST PLANT RESISTANCE (NSN-1, NSN-2, NSN-H, NHSN and DSN)

❖ LEAF BLAST

The entries for leaf blast resistance were evaluated under NSN-1, NSN-2, NSN-Hills, NHSN and DSN at 26, 19, 12, 24 and 24 centres respectively. None of the centres showed very high (LSI>7) across all nursery; few centres recorded high (LSI 6- 7) disease pressure. The disease pressure was moderate in most of the locations; however, at few centres it was low. Across all the nurseries, Patna, Maruteru and Wangbal showed low disease pressure (LSI<3). The entries that exhibited low over all disease score and high promising index were IET# 30022, 30000, 30051, 29411, 30020, 28959, 30037, 28128, 29409, 30003, 28997, 30004, 29396, 30233, 29446 and 30013 under NSN-1; IET # 30683, 30659, 30833, 30897, 31063, 31004, 30943, 30748, 31051, 30720, 31046, 31079, 31048, 31076, 31050, 30764 and 31011under NSN-2. None of the entries recorded resistant reaction across the locations under NSN-H; however, a few entries *viz*., IET # 30486, 30483, 28895, 28882, 30503, 29654, 29636, 30514, 30531, 30507 and 29635 were found promising. The promising entries under NHSN included IET #30577, 30594, 30585, 30567, 30568, 29722, 30593, 30572, 30569, 30560, 30582, 30573, 30631, 30578 and 30579. The donors *viz*., RNR 37909, MS-ISM-DIG-8, RP-Bio Patho-4, CB 18532, CGR 19-68, RNR 37998, AE 939, CB MSP9 007, UB 1066, CB MSP9 003, CB MSP9 006, RP Patho- 11, MS-ISM-DIG-10, RP-Bio Patho-3, RP-Bio Patho-9, VP-R111-SHB, CB 18536, CB MSP9 005, CB 19127 and RNR 37993were reported promising under DSN.

❖ NECK BLAST

The entries were evaluated under NSN-1, NSN-2, NSN-Hills, NHSN and DSN at 7, 4, 5, 8 and 8 centers respectively. In most of the centres the screening was carried out under natural infection condition except at Rajendranagar and Nellore, where artificial method of inoculation was followed. In majority of the locations the disease pressure was moderate to high, which was good enough for selection of the best entries. The entries that exhibited low over all disease score and high promising index were IET# 29576, 30037, 29430, 30200, 28959, 29743, 29825, 29891, 30207, 29361, 29826, 30021, 29405, 29446, 28950, 30083,

30072, 29004, 29000, 29943, 28965 and 30233 under NSN-1; IET# 30684, 30692, 30831, 29990, 30881, 31051, 30763, 30674, 30748, 30856, 31050, 31054, 30707, 30752, 31141, 31141, 30660, 30673, 30676, 30833, 30844, 30861, 30889, 31077, 30768, 30772, 30786, 29952, 30750, 30753, 31152, 30650 and 30667 under NSN-2. The entries with IET No. 30512, 30507, 30530, 30485, 30515, 30488, 30493, 30525, 30529, 30511, 28880, 30502, 29636, 30531, 30509, 29639, 28915 and 28914 under NSN-H; IET # 30558, 30555, 30569, 30587, 30576, 29722, 30620, 30556 and 30578 under NHSN were found to be promising against neck blast disease with low diseases score across the locations. Under DSN, donors *viz*., RP-Bio Patho-3, MS-68-3, VP-R262-SHB, MS-68-3-7, VP-R243-SHB, VP-D9-SHB, AE 939, Pusa 1824-17-4-3, Pusa 1824-17-4-8, KNM 14282, RNR 37909, VP-R45-SHB, VP-R104-SHB, VP-R260-SHB, CL-442, OYT ADW-259, VP-R294-SHB, KNM 12346, VP-WP-SHB, RP-Bio Patho-5, VP-R126-SHB, RP Bio Patho-7, VP-R36-SHB, BE 683, MTU 1265 and RP Bio Patho-8 were found to be promising for neck blast disease.

❖ **SHEATH BLIGHT**

The entries were evaluated under NSN-1, NSN-2, NSN-Hills, NHSN, and DSN at 22, 20, 3, 22 and 21 locations, respectively. In the majority of the locations, the disease pressure was moderate to high. None of the entries were found resistant (SI≤3) against sheath blight in all the nurseries during *Kharif*-2022. The promising entries to sheath blight were IET Nos., 30078, 29351, 29891, 29935, 30093, 30106, and 29549 in NSN-1-2022; IET Nos., 30805, 31087, 31114, 30867, 30945, 30783, 30844, 30973, 30977, 30881, 30976, 30891 and 29805 in NSN-2-2022; IET Nos., 28896, 30499 and 29654 in NSN-H-2022; IET Nos., 29616, 30575, 30621, 30617, 30602, 30605, 30603, 30625, 30609, 29758 and 30623 in NHSN-2022; and designated entries *viz*., VP-R36, 19082, MS-ISM-DIG-1, VP-D5, VP-R298, VP-D9, VP-R294, UB 1066, VP-R297, VP-R262, VP-R109, VP-R158, VP-R134, CB17135, MS-ISM-DIG-4, RP-Bio Patho-5, CO52, KNM 12346, 19273, CB18586 and CB17533 in DSN-2022.

❖ **BROWN SPOT**

The entries were evaluated under NSN-1, NSN-2, NSN-Hills, NHSN and DSN at 17, 11, 5, 14 and 14 centers respectively against brown spot disease across India. In most of the centres the screening was carried out under natural infection condition except at Bankura, Chinsurah, IIRR, Gangavathi, Ludhiana and Pusa; where screening was carried out artificially by spraying spore suspension. In majority of the centres the brown spot pressure was moderate to high; and at Gangavathi centre it was very high (LSI >7) across all the nurseries. None of entries found resistant to brown spot (SI<4) across all nurseries. However, the promising entries with moderate resistance (4-6) included IET # 30233, 29539, 30824, 30261, 30695, 28821, 28544, 30097, 30230, 28128, 30830, 30697, 28353, 30823, 28960 and 30703 under NSN-1; IET # 30767, 30848, 31044, 31056, 30801, 31021, 31068, 31075, 30752, 30852, 31153, 30753, 30772, 31059, 30856, 31076, 30799, 30831, 31014, 31079 and 30774 under NSN-2. The entries with IET No. 30530, 28887, 30527, 30515, 30513, 30507, 30524, 30526, 30487, 30512, 30525 and 30528 under NSN-H; IET#30571, 30620, 30562, 30619, 30590, 30591, 30613, 30586, 30616, 30561, 30566 and 30567 under NHSN and KNM 12346, CB MSP9 004, CB 17634, CB MSP9 007, VP-R40-SHB, CB MSP9 006, VP-R297-SHB, CB MSP9 003, KNM 14382, AM 773, CB 19107, CB 16710, CB 17135, VP-R243-SHB, 19198, CB MSP9 009, RP

Bio Patho-4, NLR-95, NLR 3415, KNM 14445 and CL-442 under DSN were found promising against brown spot disease.

❖ **SHEATH ROT**

The entries under NSN-1(338), NSN-2(571), NSN-Hills (2), NHSN (112) and DSN (229) were screened against sheath rot at 14, 8, 2, 14 and 12 locations, respectively. Screening for sheath rot was conducted under natural infection conditions at most of the locations except at Chinsurah, Coimbattore, Navasari, Pusa, Raipur, Titabar and Rajendranagar; where pathogen was artificially inoculated to screen the entries. The disease pressure was moderate to high at most of the locations across the nurseries. Some of the highly promising entries scored less than 3 were IET # 31032 in NSN-2; 19208 in DSN and none found in NSN1, NHSN.

❖ **GLUME DISCOLOURATION**

Glume discolouration (GD) was observed at four locations *viz*., Chatha, Lonavala, Navasari and Nawagam during *kharif* 2022. Some of the promising entries were: IET nos 30008, 29246, 29212, 29360 and 29943 in NSN 1; 30878, 31031, 31032, 31035, 31038 and 31079 in NSN2; 30615, 30558, 30624, 30563, 30565, 30580, 30585, 30587 and 30631 in NHSN and Pusa 2070-10-2, CB16806, CB16807, MS-68-3, MS-68-3-7, KNM 12346, ARC5791, CB18586, RP-Patho-10, CB17135, CB18527, CB18536, CB17533, CB17529, CB MSP9 007, IET19273, RP-Patho-5, RP-Bio Patho-9, 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. The promising entries identified in different nurseries were: IET 30020, IET 29411, IET 29410, IET 29256, IET 30201, IET 29947, in NSN-1; IET Nos 30850, 30851, 30866, 31017, 31042, 31082, 30902, 30999, 30922, in NSN 2; IET Nos IET 30498, IET 30499, IET 30529, IET 30531, IET 30510, IET 30511, VL Dhan 65, Vivekdhan 86 and Shalimar Rice-3 in NSNH and IET nos 30606, 30562, 30566, 30601, 30603, 30611, 30613, 30614, in NHSN and CB18532, IET19273, VP-R35-SHB, VP-D4-SHB, MTU 1297, CGR-18-65 and CGR-18-65 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 28, 21, 4, 23 and 25 locations, respectively. The number of entries including checks in different nurseries was 338 in NSN1, 571 in NSN-2, 114 in NSN-Hills, 112 in NHSN and 229 in DSN. Some of the promising entries against bacterial blight in different nursery were IET # 29861, 29748, 30827, 30037, 29214, 29000, 30241, 29576, 29574, 29935, 30827, 30830, 28997, 29878, 29549, 29714, 30240, 30828, 28524, 29539, 30822 and 30116 in NSN1; IET # 30835, 30971, 30984, 30755, 31140, 30819, 30881, 30831, 30886, 30740, 30880 30772, 30983, 30753, 30945, 30756, 31110, 30878, 30817 and 30968 in NSN2; IET # 30519, 28206 (R), 30502, 28896, 28907, 28217, 30518, 28884, 29640 and 30508 in NSN Hills; IET # 30603, 30620, 30605, 30582, 30577, 30585, 30593, 30594, 30578, 30602, 30615, 30575 and 30610 in NHSN and VP-R40-SHB, MS-ISM-DIG-3, VP-R297-SHB, VP-R12-SHB, MS-ISM-DIG-1, VP-R260-SHB, RP-Bio Patho-3, MS-ISM-DIG-4, RP-Bio Patho-5, VP-R256-SHB, VP-R44-SHB, VP-R157-SHB,

VP-R35-SHB, VP-R36-SHB, VP-D6-SHB, VP-R158-SHB, VP-R145-SHB, MTU 1217 and RP-Bio Patho-7 in DSN.

❖ MULTIPLE DISEASE RESISTANT LINES

Among the entries tested across the locations, total of 91 entries found moderately resistant to minimum of two and maximum of four diseases. A total of 13, 14, 14, 20 and 30 entries were identified with multiple disease resistance (for 2 or more diseases) in NSN 1, NSN2, NSN-H, NHSN and DSN screening nurseries respectively. The entries IET# 29411 (MR to LB, SHR & RTD), 30020 (MR to LB, SHR & RTD) and 30233 (MR to LB, NB & BS) showed moderate reaction for three diseases in NSN-1. IET# 30722 showed high resistance reaction to NB, MR to BS and SHR in NSN-2. IET# 30531 (Resistant to RTD & MR to LB, NB&SHB) showed resistant or moderate resistant reaction to four diseases and 30507 (Resistant to NB & MR to LB&BS) was showed resistant or moderate resistant reaction to three diseases in NSN-H. Two entries IET# 30578 (MR to LB, NB&SHR) and 30603 (MR to SHB, SHR &RTD) found MR to three different diseases in NHSN. In DSN, five donors exhibited resistant or moderate reaction to three diseases and that includes 19273 (MR to SHB, SHR&RTD), CB MSP9 006 (MR to LB, BS&SHR), KNM 12346 (Resistant to NB and MR to SHB&BS), UB 1066 (MR to LB, SHB&SHR) and VP-R36-SHB (Resistant to NB and MR to SHB&SHR).

II. FIELD MONITORING OF VIRULENCE

1. *Pyricularia oryzae*

The nursery included 39 cultivars consisting of near isogenic lines, international differentials, donors and commercial cultivars. The experiment was conducted at 24 locations during the crop season to monitor the blast reaction on different genotypes. Disease pressure was high at Cuttack (LSI 6.5) and Gudalur (LSI 6.3). It was moderate (LSI 5.8 to 5.1) at Gagharghat, Lonavala, Navasari, Jagtial, Khudwani and Karjat. Among all the genotypes, Tetep, RP Bio Path-3, Tadukan and Raminad str-3, were resistant across the locations with SI 3.1, 3.3, 3.4 and 3.4 respectively. However, RP Bio Patho 3 possessing *Pi*2, showed susceptible reaction at 7 locations; Tadukan showed susceptible reaction at 8 locations and Raminad str-3 showed susceptible reaction at 5 locations as against 2 locations during 2021. RP Bio Patho-4 showed susceptible reaction at 10 locations. The susceptible checks like HR-12 and Co-39 are showing susceptible reaction at most of the locations. However, HR-12 recorded resistant reaction at 5 locations. Similarly, Co-39 also recorded low disease score at Karjat, Mugad and Maruteru. The resistant check Rasi was highly susceptible at Cuttack, Gagharghat, Navasari, Jarjat, Almora and Jagdalpur. Similarly, IR 64 was showing susceptible reaction at Cuttack, Gagharghat and New Delhi. The reaction pattern of genotypes at all the locations was grouped into eight major groups at 30% dissimilarity coefficient. The reaction pattern at Cuttack, Gudalur, Lonovala, Ghaghraghat, Navasari and Karjat are distinct form the other isolates. The isolate from Jagityal and Khudhwani are grouped in same cluster. The other 16 isolates formed a major cluster showing same kind of virulence pattern.

2. *Xanthomonas oryzae* pv. *oryzae*

Trial on monitoring virulence of bacterial blight (BB) pathogen, *Xanthomonas oryzae pv. oryzae* (*Xoo*) was conducted at 25 locations. 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 variety, TN1 and resistant check variety Improved Samba Mahsuri was also included in the trial. Most of the differentials possessing single bacterial blight resistance genes like Xa1, Xa3, Xa4, xa5, 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 11 locations. Based on their virulence, the isolates were grouped into high, moderate and low virulence groups. The isolate from Maruteru formed a distinct cluster. Other highly virulent category isolates viz., IIRR, Chinsurah, Chiplima, Raipur and Pattambi grouped together or nearby. Low virulent isolate viz., Karjat, Moncompu, Rajendranagar and Warangal grouped together. Most of the isolates from moderately virulent category grouped together.

III. DISEASE OBSERVATION NURSERY

The trial of disease observation nursery (DON) was proposed to be conducted in 11 locations, but actually conducted at 10 locations with different sowing dates *viz*., early, normal and late with respect to the respective locations with an aim to estimate the effect of such varied sowing/planting dates on the occurrence and severity of the disease in the respective endemic regions. Disease development is generally known to depend on the availability of susceptible host, virulent pathogen and prevalence of favorable weather condition. The trial was proposed at 11 locations Bankura, Chinsurah, Gangavathi, Kaul, Malan, Mandya, Maruteru, Moncompu, Nawagam, Nellore, Pusa and Raipur. The data however was received from only 10 centres and Nellore centre did not send the data and Gangavathi send the data even though not proposed this trial for this centre. The incidence of leaf blast was found to be relatively less in this year when compared to the previous year. Further the incidence was also more in the late sown crops than when compared to the early and normal sown crops except for Raipur centre. The centre Maruteru has reported the highest incidence of BLB in the normal and late sown crops (67.35% and 52.07 % DS respectively) when compared to the early sown crops (24.71% DS). In general, the incidence of sheath blight was found to be more in the early sown crops when compared to the normal and late sown crops. Maruteru centre had the highest percent disease severity of sheath blight (67.41% DS at 110DAT) in the early sown crop among all the other centres and all the sowing periods. In Mocompu center, the severity of sheath blight was more in late sown crop (49.73% DS) compared to early (30.56% DS) and normal (37.50% DS) sown crops. Kaul centre has reported the incidence of Bakane, in the early sown crop and the variety PB1121 was found to be more susceptible than CSR-30. In Nawagam, sheath rot incidence was more in late sown crops. In Malan, the blast incidence was more in late sown crop (33.75% PDI) when compared to normal (21.45% PDI) and early sown crop.

IV. DISEASE MANAGEMENT TRIALS

1. EVALUATION OF FUNGICIDES AGAINST LOCATION SPECIFIC DISEASES

A trial was conducted with the objective to identify an effective fungicidal molecule against rice diseases. The trail constituted with fungicidal molecules *viz.*, difenoconazole 25% EC, isoprothiolane 40% EC, kasugamycin 3% SL, kitazin 48% EC, propineb 70% WP, tebuconazole 25.9% EC and thifluzamide 24% SC. The fungicides were evaluated against leaf blast (ten locations), neck blast (ten locations), sheath blight (fourteen locations), sheath rot (six locations), brown spot (seven locations), grain discoloration (one location) and stem rot (one location).

Commercial products kitazin 48% EC (1.0 ml/L) and Tebuconazole 25.9% EC (1.5 ml/L) were found effective in minimizing the leaf blast at 51.4% and 43%, respectively, and increased the yield up to 32% and 40%, respectively. Isoprothiolane 40% EC (1.5 ml/L) was also found effective in minimising the leaf blast at 41% and increased the yield 38%. Isoprothiolane 40% EC (1.5 ml/L) was also found effective in minimising the neck blast at 51% and increased the yield31%. Difenoconazole 25% EC (0.5 ml/L) (DS:33.8%) and Tebuconazole 25.9% EC (1.5 ml/L) (36.9%) were found effective in reducing sheath blight at 53% and 49%, respectively and increased the yield at 40% and 41%, respectively. Tebuconazole 25.9% EC (1.5 ml/L) and Difenoconazole 25% EC (0.5 ml/L) were found effective in reducing the sheath rot severity at 45% and 41%, and reducing the sheath rot incidence at 42% and 42%. Difenoconazole 25% EC (0.5 ml/L) was identified as the best molecule to reduce brown spot (60%) diseases and increased yield at 14%. Difenoconazole 25% EC (0.5 ml/L) showed broad spectrum activity against sheath blight, sheath rot, and brown spot. Tebuconazole 25.9% EC (1.5 ml/L) showed broad spectrum activity against sheath blight, sheath rot, brown spot and blast.

2. EVALUATION OF BIO-CONTROL FORMULATIONS AGAINST FUNGAL DISEASES

Among the different formulations tested viz., the liquid formulation was found to be better than the solid formulation. Similarly, the combination of bioagent formulation and fungicides were providing higher percent disease control and increased plant yield than when compared to the fungicide treatment alone. Among the different treatments overall for the management of the sheath blight disease, Moncompu reported the highest percentage control over the disease (DC) viz., 91.05% followed by IIRR (90.73) when applied with the liquid formulation of the bioagent as seed treatment followed by seedling dip @ 5g/l followed by Hexaconazole @ 2ml/l at tillering stage (T6). Regarding the plant yield, Maruteru centre reported the highest percent increase in grain yield over control (60.86%) when the plants were applied with bioagent as seed treatment followed by seedling dip @ 5g/l with liquid formulation followed by Hexaconazole @ 2ml/l at tillering stage (T6) followed by the treatment of bioagent as seed treatment followed by seedling dip @ 5g/l with solid formulation followed by Hexaconazole @ 2ml/l at tillering stage (T5). In the study of IDM against falsesmut disease using the bioagent *T. asperellum* Strain TAIK1, Karaikal centre reported the highest percent decrease in disease severity over control (91.80%) when the plant were treated with bioagent as seed treatment followed by seedling dip @ 5g/l with liquid formulation (T4) followed by the treatment bioagent as seed treatment followed by seedling dip @ 5g/l with solid formulation (T3).

3. INTEGRATED PEST MANAGEMENT (SPECIAL - IPM TRIAL)

The trial was conducted at four different zones *viz*., Northern zone (Pantnagar, Kaul); Eastern zone (Chiplima, Masodha); Western zone (Nawagam) and Southern zone (Aduthurai, Mandya). Disease severity of various diseases, recorded at weekly intervals was converted in to AUDPC values and compared. AUDPC of leaf blast and neck blast diseases indicated that the disease progress was significantly lower in the experimental plots where IPM practices were followed when compared to the farmer's practices. IPM practices against leaf blast were effective at Mandya, Masodha, Chiplima, Kaul and Jagdalpur compared to farmer's practices. In neck blast, IPM practices were effective at Masoda and Jagdalpur. At Jagdalpur, Pantnagar and Kaul IPM practices performed well compared to farmer practices against Sheath blight.,

IPM was effective against bacterial blight at Masodha and Jagdalpur. In case of brown spot, grain discoloration, sheath rot and false smut diseases, IPM practices performed well at each one location.

4. SPECIAL TRIAL ON YIELD LOSS ASSESSMENT DUE TO MAJOR RICE DISEASES

In *Kharif* 2022, trial on yield losses due to major rice diseases such as leaf blast (4 locations), sheath blight (6 locations) and bacterial blight (5 locations) was conducted. Leaf blast percent disease index of 52.34%, 38.36% and 19.66% 17.4% caused a yield reduction of 52.34, 38.36 and 19.66%. Sheath blight percent disease index of 68.53%, 46.93%, 36.51% and 5.2% caused a yield reduction of 46.18%, 31.57%, 14.80% from 100% inoculated (T1); 50% inoculated (T2) and 33% inoculated treatments respectively. Similarly, the BB percent disease index of 76.45, 56.64 and 20.69% caused a yield reduction of 23.26%, 16.36% and 15.94% from 100% inoculated (T1); 50% inoculated (T2) and 33% inoculated treatments, respectively. Results from the present study revealed that leaf blast, sheath blight and bacterial blight severity significantly reduced the rice grain yield.

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 2022, **a total of 16 trials were conducted at 51 locations on host plant resistance, field monitoring of virulence in major pathogens and disease management.** Five national screening nurseries comprising of 1,364 entries of advanced breeding lines and new rice hybrids were evaluated for their reactions to major rice diseases at 49 locations.

The composition of the nurseries is as follows:

- ❖ National Screening Nursery 1 (NSN-1) - 338 entries drawn from Advanced Variety Trials.
- ❖ National Screening Nursery 2 (NSN-2) - 571 entries from Initial Variety Trials.
- ❖ National Screening Nursery-Hills (NSN-H) - 114 entries from Advanced and Initial Varietal Trials.
- ❖ National Hybrid Screening Nursery (NHSN) - 112 entries from Initial National Hybrid Rice Trials (HRT'S).
- ❖ Donor Screening Nursery (DSN) - 229 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 18 centres (16 states) to identify the production constraints in different rice growing ecosystems.

The weather conditions and location details are given in Annexure I to Annexure III. Out of 633 experiments proposed, data were received from 584 experiments of 16 trials indicating the good response with 93.15 % data receipt from the centres.

Table 1: Scientists involved in Pathology Coordinated Programme, *Kharif* 2022. 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	Funded/ Voluntary	Experiments	
				Proposed	Conducted
1	Aduthurai	Dr. K. Rajappan	Funded	14	14
2	Almora	Dr. Gaurav Verma	Voluntary	7	7
3	Arundhatinagar	Dr. Srikanta Nath	Funded	8	2
4	Bankura	Drs. C K Bunia & Partha Pratim Ghosh	Funded	22	16
5	Chatha	Dr. Vijay Bahadur Singh	Funded	11	15
6	Chinsurah	Drs. Dilip Kumar Patra & P. Bandyopadhyay	Funded	14	12
7	Chiplima	Dr. Rini Pal	Funded	9	9
8	Coimbatore	Dr. C. Gopalakrishnan	Funded	21	21
9	Cuttack	Drs. Arup K Mukherjee, Srikanta Lenka & Manas Kumar Bag	Voluntary	30	24
10	Gangavati	Dr. Pramesh Devana	Funded	20	21
11	Gerua	Dr. Kanchan Saikia	Voluntary	7	-
12	Ghaghraghat	Dr. Amrit Lal Upadhaya	Funded	11	10
13	Gorakhpur	Prof. B. N. Singh	Voluntary	-	-
14	Gudalur	Dr. C. Gopalakrishnan	Voluntary	4	04
15	Hazaribagh	Dr. Someshwar Bhagat	Voluntary	12	-
16	ICAR-IIRR	Drs. M. S. Prasad, G. S. Laha, D. Krishnaveni, C. Kannan, D. Ladhalakshmi, V. Prakasam, K. Basavaraj and G. S. Jasudasu	HQ	32	32
17	Imphal	Dr. A. Ratankumar Singh	Voluntary	8	06
18	Jagdalpur	Dr. R. S. Netam	Funded	16	15
19	Jagtial	Dr. N. Balram	Voluntary	4	04
20	Karaikal	Dr. C. Jeyalakshmi	Voluntary	2	02
21	Karjat	Dr. Pushpa D Patil	Funded	15	14
22	Kaul	Dr. Mahaveer Singh	Funded	9	06
23	Khudwani	Dr. Fayaz Ahmad Mohiddin	Funded	10	07
24	Lonavala	Dr. K. S. Raghuwanshi	Voluntary	18	22
25	Ludhiana	Dr. Jagjeet Singh Lore	Funded	16	16
26	Malan	Dr. Sachin Upmanyu	Funded	13	08
27	Mandya	Dr. V. B. Sanath Kumar	Funded	17	28
28	Maruteru	Dr. V. Bhuvaneswari	Funded	23	18
29	Masodha (Faizabad)	Dr. Vindeshwari Prasad	Funded	12	12
30	Moncompu	Dr. M. Surendran	Funded	13	13
31	Mugad	Dr. Gurupada Balol	Voluntary	14	04
32	Navsari	Dr. Vijay A. Patil	Funded	16	21
33	Nawagam	Dr. Rakesh Kumar Gangwar	Funded	19	24
34	Nellore	Dr. P. Madhusudhan	Voluntary	10	06
35	New Delhi	Drs. K. K. Mondal, B. Bishnu Maya & G. Prakash	Voluntary	9	09
36	Pantnagar	Dr. Bijendra Kumar	Funded	14	14
37	Patna	Dr. Md. Reyaz Ahmad	Voluntary	10	18
38	Pattambi	Dr. Puzhakkal Raji	Funded	16	16
39	Ponnampet	Dr. G. N. Hosagoudar	Funded	13	13
40	Pusa	Dr. Rajesh Kumar Ranjan	Funded	10	10
41	Raipur	Dr. Pradeep Kumar Tiwari	Funded	15	15
42	Rajendranagar	Dr. Talluri Kiran Babu	Funded	14	13
43	Ranchi	Dr. M. K. Barnwal	Voluntary	10	05
44	Rewa	Dr. S. K. Tripathi	Funded	10	10
45	Sabour	Dr. Amarendra Kumar	Voluntary	7	08
46	Titabar	Dr. Popy Bora	Funded	13	12
47	Umiam (Barapani)	Dr. Pankaj Baiswar	Voluntary	3	07
48	Upper Shillong	Dr. Victor Tariang	Funded	8	05
49	Varanasi	Dr. R. K. Singh	Funded	10	09
50	Wangbal	Dr. Kh. Ngamreishang	Funded	6	06
51	Warangal	Dr. G. Padmaja	Voluntary	3	02
Total Experiments (93.15%)				**628**	**585**

1. HOST PLANT RESISTANCE

TRIAL No.1: SCREENING FOR LEAF BLAST RESISTANCE

❖ LEAF BLAST

➢ **National Screening Nursery-1 (NSN-1)**

The National Screening Nursery (NSN-1) comprised of 338 entries that included national regional and pathology checks. The nursery was evaluated at 26 locations across India under different-agro ecological Zones. The frequency distribution of disease scores and the representative location severity index (LSI) are presented in the Table 1.1A. The screening against leaf blast was carried out under artificial inoculation condition at most the locations except at Jagdalpur, Karjat, Lonavala, Maruteru, Navasari, Patna, Ponnampet, Ranchi, Umiam and Wangbal, where natural method of infection was followed. None of the locations showed a very high (LSI =>7.0) disease pressure under NSN-1. The highest disease pressures (LSI) of 6.2 was recorded at Coimbatore and Gudalur while lowest (LSI-1.8) at Patna. The disease pressure was high (LSI 6-7) at Coimbatore (6.2), Gudalur (6.2) and Gagharghat (6.1). The disease pressure was moderate (LSI 3-6) at most of the locations evaluated and that included Karjat (5.9), Cuttack (5.7), Jagtial (5.6), Lonavala (5.5), Ranchi (5.3), Nawagam (5.2), New Delhi (5.0), Navasari (4.9), Khudwani (4.9), IIRR (4.9), Gangavathi (4.7), Mandya (4.6), Nellore (4.5), Rewa (4.5), Umiam (4.5), Jagdalapur (4.4), Bankura (4.2), Ponnampet (3.9), Pattambi (3.9) and Rajendranagar (3.1). The data from locations (Patna, Maruteru and Wangbal) where disease pressure was very low (<3.0) was not considered for the selection of promising entries.

None of the entries performed better than resistant check Tetep (SI 3.6) under NSN-1 however, the entries that scored SI≤4.1 with high PI were considered as promising and presented in Table 3. **The promising entries were, IET Nos. 30022, 30000, 30051, 29411, 30020, 28959, 30037, 28128, 29409, 30003, 28997, 30004, 29396, 30233, 29446 and 30013** (Table 1.1B).

➢ **National Screening Nursery-2 (NSN-2)**

The nursery consists of 571 lines drawn from initial variety trials (IVTs). These were evaluated at 19 centres under various ecological zones. The screening was carried out under artificial inoculation conditions at most of the locations. The highest disease pressure was recorded at Coimbatore (LSI 6.9) and the lowest at Wangbal (LSI 2.2). None of the locations showed a very high disease (LSI >7.0) in NSN-2, however two locations *viz*., Coimbatore (6.9) and Gagharghat (6.3), showed high disease pressure (LSI 6-7). The disease pressure was moderate (LSI 3.0-6.0) at most of the locations and that included Cuttack (5.9), Umiam (5.7), Ranchi (5.6), Nawagam (5.4), Mandya (5.3), Rewa (5.1), IIRR (5.0), Nellore (5.0), Navasari (4.9), Gangavathi (4.8), Jagdalpur (4.5), Ponnampet (4.4) and Pattambi (3.5). The Performance of entries at locations *viz*., Maruteru (2.7), Rajendranagar (2.5), Patna (2.4), and Wangbal (2.2) was not considered for the selection of best entries, where disease pressure was very low (<3.0) (Table 1.2A).

None of the entries were recorded SI less than 3.0, but a few promising entries with **low susceptibility index (≤4.4) and high PI included IET # 30683, 30659, 30833, 30897, 31063, 31004, 30943, 30748, 31051, 30720, 31046, 31079, 31048, 31076, 31050, 30764 and 31011** (Table 1.2B).

Table 1.1A: Location severity index (LSI) and frequency distribution of leaf blast scores of NSN-1, *Kharif* 2022

Score	Location/Frequency of scores (0-9)																								
	BNK	**CBT**	**CTK**	**GNV**	**GGT**	**GDL**	**IIRR**	**JDP**	**JGL**	**KJT**	**KHD**	**LNV**	**MND**	**MTU**	**NLR**	**NVS**	**NWG**	**NDL**	**PTN**	**PTB**	**PNP**	**RNR**	**RCI**	**REW**	**UMM**	**WBL**
0	0	0	0	0	0	0	0	16	0	0	1	0	0	0	0	0	0	0	108	0	0	0	0	0	0	14
1	0	0	0	0	0	1	1	24	3	0	0	0	10	1	1	0	0	21	97	0	8	127	7	3	14	31
2	0	4	0	1	0	3	2	39	0	2	39	0	38	154	80	10	0	22	0	31	22	0	9	38	48	99
3	158	10	23	0	8	10	29	43	39	52	40	6	83	103	37	46	18	75	89	85	120	61	23	43	51	108
4	0	32	0	161	0	32	129	42	0	6	28	42	30	39	65	63	68	11	0	134	54	0	60	78	59	62
5	152	55	194	132	151	61	73	47	169	77	133	128	71	7	55	106	120	102	40	70	122	138	90	78	57	17
6	0	101	0	34	7	87	37	41	0	12	26	121	25	8	33	75	83	0	0	11	2	0	70	68	51	7
7	28	60	99	4	156	64	62	73	88	165	54	24	52	7	21	32	43	50	4	5	6	5	60	27	23	0
8	0	49	0	1	1	54	1	10	0	0	13	14	22	0	22	5	4	0	0	1	1	0	18	2	19	0
9	0	26	22	2	15	25	1	1	27	22	4	0	5	0	22	1	0	50	0	0	1	0	1	0	12	0
Total	**338**	**337**	**338**	**335**	**338**	**337**	**335**	**336**	**326**	**336**	**338**	**335**	**336**	**319**	**336**	**338**	**336**	**331**	**338**	**337**	**336**	**331**	**338**	**337**	**334**	**338**
LSI	**4.2**	**6.2**	**5.7**	**4.7**	**6.1**	**6.2**	**4.9**	**4.4**	**5.6**	**5.9**	**4.9**	**5.5**	**4.6**	**2.8**	**4.5**	**4.9**	**5.2**	**5.0**	**1.8**	**3.9**	**3.9**	**3.1**	**5.3**	**4.5**	**4.5**	**2.7**
Screening	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**N**	**A**	**N**	**N/A**	**N**	**A**	**N**	**A**	**N**	**A**	**A**	**N**	**A**	**N**	**A**	**N**	**A**	**N**	**N**

(LSI-Location severity Index; N-Natural; A-Artificial)

Table 1.1B: Promising entries with low susceptibility index (<=4.1) and high PI in NSN-1 to leaf blast, *Kharif* 2022

P. No.	Br. No.	IET No.	Location/Frequency of scores (0-9)																							SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
			BNK	CBT	CTK	GNV	GGT	GDL	IIRR	JDP	JGL	KJT	KHD	LNV	MND	NLR	NVS	NWG	NDL	PTB	PNP	RNR	RCI	REW	UMM						
9	4609	30022	3	4	5	4	5	3	4	1	3	5	7	6	4	2	6	6	3	5	2	1	1	2	2	**3.7**	**23**	**11**	**48**	**19**	**83**
10	4610	30000	3	4	5	4	3	4	3	3	3	7	7	4	4	5	5	4	1	4	1	1	4	2	3	**3.7**	**23**	**10**	**43**	**21**	**91**
21	4621	30051	3	2	7	-	7	1	4	1	5	5	5	6	1	6	4	3	3	2	3	1	4	3	6	**3.7**	**22**	**11**	**50**	**17**	**77**
31	4501	29411	3	4	5	5	5	4	4	0	5	5	4	6	3	3	7	4	1	3	5	1	4	3	3	**3.8**	**23**	**9**	**39**	**21**	**91**
8	4608	30020	5	2	5	5	5	2	4	0	-	7	5	5	6	5	5	5	3	2	3	3	3	3	2	**3.9**	**22**	**10**	**45**	**20**	**91**
126	3412	28959	3	8	5	4	5	7	4	0	5	3	4	3	4	2	4	4	3	4	3	5	4	3	3	**3.9**	**23**	**9**	**39**	**21**	**91**
22	4622	30037	5	4	5	5	3	4	5	0	5	5	5	7	1	4	5	3	3	3	4	3	4	2	6	**4.0**	**23**	**8**	**35**	**21**	**91**
101	3712	28128	3	5	5	5	3	5	3	2	5	3	3	5	1	4	5	4	3	4	3	5	5	5	6	**4.0**	**23**	**9**	**39**	**22**	**96**
36	4506	29409	3	4	5	5	7	4	3	3	5	5	4	5	2	2	7	6	3	4	3	1	3	4	4	**4.0**	**23**	**9**	**39**	**20**	**87**
1	4601	30003	3	3	7	5	3	2	3	3	5	7	5	5	3	2	5	5	5	4	3	3	3	3	6	**4.0**	**23**	**12**	**52**	**20**	**87**
86	4015	28997	5	4	5	4	3	3	3	1	3	7	5	5	2	2	5	7	3	2	5	5	7	5	2	**4.0**	**23**	**10**	**43**	**20**	**87**
3	4603	30004	3	5	5	5	5	6	3	4	3	3	4	4	9	3	4	5	5	3	1	1	4	4	5	**4.1**	**23**	**8**	**35**	**21**	**91**
33	4503	29396	5	5	5	6	5	6	2	0	5	3	5	5	2	4	3	6	7	3	1	1	5	4	6	**4.1**	**23**	**8**	**35**	**18**	**78**
233	5802	30233	5	4	5	4	7	4	4	0	5	5	2	5	4	5	6	4	2	3	3	3	5	7	2	**4.1**	**23**	**7**	**30**	**20**	**87**
45	4515	29446	3	6	5	5	7	5	4	0	5	3	5	6	2	3	7	3	5	3	3	3	6	4	2	**4.1**	**23**	**10**	**43**	**18**	**78**
2	4602	30013	5	4	5	4	5	4	4	5	5	5	5	5	4	2	5	6	3	4	4	3	3	2	3	**4.1**	**23**	**6**	**26**	**22**	**96**
338	Tetep		5	4	5	2	7	4	1	1	3	3	3	3	3	2	2	4	2	2	7	5	1	4	9	**3.6**	**23**	**13**	**57**	**20**	**87**
327	HR-12		5	8	9	9	7	9	9	9	5	5	6	6	8	9	8	8	9	7	7	1	7	7	8	**7.2**	**23**	**1**	**4**	**4**	**17**
LSI			**4.2**	**6.2**	**5.7**	**4.7**	**6.1**	**6.2**	**4.9**	**4.4**	**5.6**	**5.9**	**4.9**	**5.5**	**4.6**	**4.5**	**4.9**	**5.2**	**5.0**	**3.9**	**3.9**	**3.1**	**5.3**	**4.5**	**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)

Table 1.2A: Location severity index(LSI) and frequency distribution of leaf blast scores of NSN-2, *Kharif* 2022

Score	Location/Frequency of scores (0-9)																		
	CBT	**CTK**	**GNV**	**GGT**	**IIRR**	**JDP**	**MND**	**MTU**	**NLR**	**NVS**	**NWG**	**PTN**	**PTB**	**PNP**	**RNR**	**RCI**	**REW**	**UMM**	**WBL**
0	0	0	0	0	0	13	0	0	0	0	0	97	0	0	0	0	0	0	2
1	0	0	0	0	1	48	2	7	8	3	0	171	0	4	277	6	1	0	160
2	0	0	2	0	0	50	16	239	78	5	0	0	103	30	0	15	24	11	198
3	2	35	1	6	38	78	110	200	37	26	13	145	165	139	81	25	52	19	154
4	29	0	189	0	186	71	34	58	85	201	89	0	207	98	0	52	92	54	52
5	76	314	286	225	167	78	178	7	76	195	218	136	83	219	131	157	137	170	3
6	109	0	77	2	78	87	21	4	64	83	154	0	10	33	0	164	182	127	2
7	138	162	9	293	88	104	128	1	46	57	73	4	2	35	9	105	77	126	0
8	144	0	1	1	0	24	71	1	50	1	10	0	0	2	0	47	6	47	0
9	73	60	0	44	0	0	0	0	33	0	1	0	0	3	1	0	0	4	0
Total	**571**	**571**	**565**	**571**	**558**	**553**	**560**	**517**	**477**	**571**	**558**	**553**	**570**	**563**	**499**	**571**	**571**	**558**	**571**
LSI	**6.9**	**5.9**	**4.8**	**6.3**	**5.0**	**4.5**	**5.3**	**2.7**	**5.0**	**4.9**	**5.4**	**2.4**	**3.5**	**4.4**	**2.5**	**5.6**	**5.1**	**5.7**	**2.2**
Screening	**A**	**A**	**A**	**A**	**A**	**N**	**A**	**N**	**A**	**N**	**A**	**N**	**A**	**N**	**A**	**N**	**A**	**N**	**N**

(LSI-Location severity Index; N-Natural; A-Artificial)

Table 1.2B: Promising entries with low susceptibility index (<=4.4) and high PI in NSN-2 to leaf blast, Kharif 2022

P. No.	Br. No.	IET No.	CBT	CTK	GNV	GGT	IIRR	JDP	MND	NLR	NVS	NWG	PTB	PNP	RCI	REW	UMM	SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
546	3652	30683	7	3	5	5	4	0	4	2	3	6	2	3	4	5	3	**3.7**	**15**	**7**	**47**	**13**	**87**
521	3627	30659	4	5	4	5	4	1	4	2	3	4	2	3	4	5	6	**3.7**	**15**	**5**	**33**	**14**	**93**
3	4403	30833	4	5	4	7	4	1	3	-	5	4	3	6	5	2	4	**4.1**	**14**	**4**	**29**	**12**	**86**
169	4709	30897	7	7	4	7	3	1	2	3	5	5	2	3	5	5	4	**4.2**	**15**	**6**	**40**	**12**	**80**
138	5607	31063	6	5	5	5	5	5	3	1	7	5	2	2	4	6	2	**4.2**	**15**	**5**	**33**	**12**	**80**
65	5103	31004	4	5	4	5	5	3	5	-	5	4	3	4	2	5	5	**4.2**	**14**	**3**	**21**	**14**	**100**
221	4762	30943	5	5	4	9	4	0	1	-	4	6	4	5	5	4	4	**4.3**	**14**	**2**	**14**	**12**	**86**
466	3955	30748	8	5	5	7	4	1	3	-	2	-	4	5	3	4	5	**4.3**	**13**	**4**	**31**	**11**	**85**
122	5414	31051	4	7	5	5	5	2	2	2	5	6	2	3	5	6	6	**4.3**	**15**	**5**	**33**	**11**	**73**
433	3921	30720	5	5	5	5	5	3	4	4	4	5	5	3	4	3	5	**4.3**	**15**	**3**	**20**	**15**	**100**
66	5104	29484 (R)	4	5	5	5	4	2	3	3	4	4	4	4	5	6	7	**4.3**	**15**	**3**	**20**	**13**	**87**
116	5408	31046	6	3	4	5	4	3	3	4	5	4	4	4	6	4	6	**4.3**	**15**	**3**	**20**	**12**	**80**
156	5625	31079	6	5	4	5	3	4	4	2	4	5	4	4	7	6	2	**4.3**	**15**	**3**	**20**	**12**	**80**
119	5411	31048	5	5	4	7	5	5	3	2	4	7	3	4	7	3	2	**4.4**	**15**	**5**	**33**	**12**	**80**
153	5622	31076	5	5	5	5	6	4	3	2	4	5	2	4	5	4	7	**4.4**	**15**	**3**	**20**	**13**	**87**
121	5413	31050	6	7	5	5	4	3	3	-	5	5	2	2	5	5	5	**4.4**	**14**	**4**	**29**	**12**	**86**
337	4204	30764	5	5	6	5	5	1	3	2	5	7	4	2	6	6	-	**4.4**	**14**	**4**	**29**	**10**	**71**
74	5112	31011	5	5	5	5	5	1	3	-	5	6	3	5	5	4	5	**4.4**	**14**	**3**	**21**	**13**	**93**
569	Tetep		4	5	2	7	1	1	2	4	1	4	2	3	1	5	6	**3.2**	**15**	**8**	**53**	**13**	**87**
558	HR-12		9	9	8	7	7	8	8	8	7	8	6	5	8	7	5	**7.3**	**15**	**0**	**0**	**2**	**13**
LSI			**6.9**	**5.9**	**4.8**	**6.3**	**5.0**	**4.5**	**5.3**	**5.0**	**4.9**	**5.4**	**3.5**	**4.4**	**5.6**	**5.1**	**5.7**						

(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)

- **National Screening-Hills (NSN-H)**

The National Screening Nursery - Hills (NSN-H) comprised of 114 entries, were evaluated at 12 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 Cuttack and IIRR, where entries were screened under artificial method of inoculation. In Khudwani and Malan, natural infection was supplemented by spread of diseased leaves. The frequency distribution of disease scores and location severity indices are presented in Table 1.3A. The disease pressure was very high (LSI <7) at Umiam (7.6) and it was high at Karjat (6.9) and Lonavala (6.2). The disease pressure was moderate at (LSI 3-6) at Cuttack (6.0), Khudwani (5.5), Almora (5.4), Imphal (4.6), IIRR (4.4), Ponnampet (4.1) and Malan (3.7). The low disease pressure (LSI<3) was recorded at Uppershillong (2.3) and Wangbal (1.9), hence data from these centres were not considered for selection of best entries. The selection of best entries was done from the locations where LSI was more than 3 and presented in table 7. None of the entries found resistant (SI≤3) and none scored less than resistant check (Tetep-3.4), however, **the entries with SI ≤4.8 with high PI were considered promising and that included IET# 30486, 30483, 28895, 28882, 30503, 29654, 29636, 30514, 30531, 30507 and 29635** (Table 1.3B).

- **National Hybrid Screening Nursery (NHSN)**

The National Hybrid Screening Nursery (NHSN) consisted of 112 entries including different checks. The entries were evaluated at 24 locations across the country. The entries were evaluated under artificial inoculation and natural infection conditions at different locations. The frequency distribution of the disease scores and location severity indices are presented in Table 1.4A. None of the locations showed very high disease pressure (LSI >7), however Coimbatore (6.6), Gagharghat (6.3) and Cuttack (6.2) showed high disease pressure (LSI 6-7). The disease pressure was moderate (LSI 3-6) at Karjat (5.5), Nellore (5.2), Nawagam (5.2), Gangavathi (5.1), Khudwani (5.1), Bankura (5.0), Imphal (5.0), Rewa (5.0), Ranchi (4.9), Lonavala (4.9), IIRR (4.7), Jagdalpur (4.7), Umiam (4.5), Pattambi (4.2) and Mandya (4.0).

Selection of best entries was made from the locations where the disease pressure was ≥3.0, accordingly centres such as Ponnampet (2.9), Maruteru (2.6), Uppershillong (2.2), Patna (1.9), Wangbal (1.9) and Rajendranagar (1.1) were not considered, as the disease pressure was very low (LSI-<3.0). None of the hybrids under NHSN were found resistant, however, **entries with SI ≤4.5 with high PI were considered promising and that included IET # 30577, 30594, 30585, 30567, 30568, 29722, 30593, 30572, 30569, 30560, 30582, 30573, 30631, 30578 and 30579** (Table 1.4B).

Table 1.3A: Location severity index(LSI) and frequency distribution of leaf blast scores of NSN-H, *Kharif* 2022

Score	Location/Frequency of scores (0-9)											
	ALM	**CTK**	**IIRR**	**IMP**	**KJT**	**KHD**	**LNV**	**MLN**	**PNP**	**UMM**	**USG**	**WBL**
0	0	0	0	0	0	0	0	0	0	0	6	0
1	0	0	1	0	0	0	0	36	0	0	33	35
2	6	0	0	0	2	1	1	1	13	0	32	58
3	8	6	22	44	2	13	0	27	34	0	27	21
4	23	0	53	3	2	14	2	15	15	1	5	0
5	27	57	24	42	18	28	23	12	40	2	4	0
6	14	0	1	9	0	24	48	3	8	5	0	0
7	25	41	12	12	66	26	28	2	4	42	1	0
8	8	0	0	3	0	8	8	0	0	43	1	0
9	3	10	1	1	22	0	4	15	0	21	3	0
Total	**114**	**114**	**114**	**114**	**112**	**114**	**114**	**111**	**114**	**114**	**112**	**114**
LSI	**5.4**	**6.0**	**4.4**	**4.6**	**6.9**	**5.5**	**6.2**	**3.7**	**4.1**	**7.6**	**2.3**	**1.9**
Screening	**N**	**A**	**A**	**N**	**N**	**N/A**	**N**	**N/A**	**N**	**N**	**N**	**N**

(LSI-Location severity Index; N-Natural; A-Artificial)

Table 1.3B: Promising entries with low susceptibility index (<=4.8) and high PI in NSN-H to leaf blast, *Kharif* 2022

P. No.	Br. No	IET No.	Location/Frequency of scores (0-9)										SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
			ALM	CTK	IIRR	IMP	KJT	KHD	LNV	MLN	PNP	UMM						
36	2506	30486	4	5	3	3	5	6	6	1	3	8	4.4	10	4	40	7	70
32	2502	30483	2	5	4	4	5	8	5	1	3	7	4.4	10	3	30	8	80
13	2306	28895	2	5	4	3	7	7	5	1	3	8	4.5	10	4	40	7	70
15	2308	28882	2	5	5	3	7	6	6	3	3	5	4.5	10	4	40	7	70
96	2711	30503	7	5	3	3	3	6	5	4	2	7	4.5	10	4	40	7	70
89	2703	29654	2	5	4	3	7	3	6	3	5	8	4.6	10	4	40	7	70
18	2402	29636	4	5	4	5	7	4	6	1	3	7	4.6	10	2	20	7	70
80	2812	30514	3	3	5	3	9	5	6	3	3	7	4.7	10	5	50	7	70
68	2915	30531	4	5	4	3	7	3	6	3	3	9	4.7	10	4	40	7	70
71	2803	30507	3	3	4	5	7	3	7	3	6	7	4.8	10	4	40	6	60
20	2404	29635	3	5	4	6	7	4	6	1	5	7	4.8	10	2	20	6	60
114	Tetep		4	5	1	5	4	3	2	1	2	7	3.4	10	5	50	9	90
101	HR-12		8	9	9	9	7	7	6	9	5	8	7.7	10	0	0	1	10
LSI			**5.4**	**6.0**	**4.4**	**4.6**	**6.9**	**5.5**	**6.3**	**3.7**	**4.1**	**7.6**						

(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 1.4A: Location severity index(LSI) and frequency distribution of leaf blast scores of NHSN, *Kharif* 2022

Score	Location/Frequency of scores (0-9)																							
	BNK	**CBT**	**CTK**	**GNV**	**GGT**	**IIRR**	**IMP**	**JDP**	**KJT**	**KHD**	**LNV**	**MND**	**MTU**	**NLR**	**NWG**	**PTN**	**PTB**	**PNP**	**RNR**	**RCI**	**REW**	**UMM**	**USG**	**WBL**
0	0	0	0	0	0	0	0	1	0	7	0	0	0	0	0	38	0	0	0	0	0	0	2	0
1	0	0	0	0	0	1	0	1	0	0	0	0	2	0	0	24	0	4	105	7	0	4	55	27
2	0	0	0	0	0	0	0	5	0	4	0	24	60	14	0	0	6	25	0	3	1	9	23	71
3	32	2	5	1	0	18	22	35	26	6	11	39	26	2	4	32	20	65	0	8	9	25	11	14
4	0	9	0	29	0	45	14	25	1	10	33	2	12	29	28	0	48	16	0	25	22	20	9	0
5	51	19	46	46	41	22	40	14	37	43	33	30	2	18	38	16	25	2	2	35	44	24	5	0
6	0	23	0	26	0	5	16	4	0	12	30	2	2	21	30	0	12	0	0	13	33	5	1	0
7	25	22	51	4	67	20	15	8	42	24	5	11	1	13	10	2	1	0	0	15	3	20	0	0
8	0	22	0	2	0	0	4	9	0	6	0	4	0	6	1	0	0	0	0	4	0	5	0	0
9	4	15	10	0	4	1	1	10	6	0	0	0	0	9	1	0	0	0	0	2	0	0	5	0
Total	**112**	**112**	**112**	**108**	**112**	**112**	**112**	**112**	**112**	**112**	**112**	**112**	**105**	112	**112**	**112**	**112**	**112**	**107**	**112**	**112**	**112**	**111**	**112**
LSI	**5.0**	**6.6**	**6.2**	**5.1**	**6.3**	**4.7**	**5.0**	**4.7**	**5.5**	**5.1**	**4.9**	**4.0**	**2.6**	**5.2**	**5.2**	**1.9**	**4.2**	**2.9**	**1.1**	**4.9**	**5.0**	**4.5**	**2.2**	**1.9**
Screening	**A**	**A**	**A**	**A**	**A**	**A**	**N**	**N**	**N**	**N/A**	**N**	**A**	**N**	**A**	**A**	**N**	**A**	**N**	**A**	**N**	**A**	**N**	**N**	**N**

(LSI-Location severity Index; N-Natural; A-Artificial)

Table 1.4B: Promising entries with low susceptibility index (<=4.5) and high PI in NHSN to leaf blast, *Kharif* 2022

S. No.	Br. No.	IET No.	Location/Frequency of scores (0-9)																	SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
			BNK	CBT	CTK	GNV	GGT	IIRR	IMP	JDP	KJT	KHD	LNV	MND	NLR	NWG	PTB	RCI	REW	UMM						
73	3106	30577	3	7	5	5	5	3	3	3	5	2	4	3	4	5	4	4	5	4	4.1	18	6	33	17	94
92	3125	30594	3	7	5	4	5	4	5	3	7	3	5	3	4	3	4	3	3	4	4.2	18	7	39	16	89
82	3115	30585	5	6	5	5	5	4	7	3	7	0	4	3	2	6	4	1	5	3	4.2	18	6	33	14	78
60	3018	30567	5	6	5	5	7	6	3	3	3	0	4	2	7	5	4	1	6	4	4.2	18	6	33	13	72
61	3019	30568	3	5	5	4	7	3	4	3	3	5	4	3	7	5	2	5	5	4	4.3	18	6	33	16	89
55	3013	29722	5	4	7	5	5	4	5	3	5	2	4	2	5	4	4	5	5	3	4.3	18	4	22	17	94
91	3124	30593	3	5	5	6	7	3	3	3	7	4	4	3	2	4	5	5	4	5	4.3	18	6	33	15	83
67	3025	30572	7	9	5	4	5	3	5	2	3	0	4	2	6	4	5	4	5	5	4.3	18	5	28	15	83
62	3020	30569	5	9	7	5	5	4	4	2	3	5	3	2	6	5	4	4	5	1	4.4	18	5	28	15	83
51	3009	30560	5	5	7	6	7	5	5	3	3	6	4	3	2	6	2	3	3	5	4.4	18	7	39	13	72
79	3112	30582	3	6	7	6	5	3	3	3	5	5	4	3	6	5	4	5	6	1	4.4	18	6	33	13	72
68	3101	30573	7	5	5	5	5	4	5	3	5	5	3	2	2	6	3	5	5	5	4.4	18	5	28	16	89
41	3315	30631	5	8	5	5	7	6	3	3	3	5	5	3	4	4	4	5	3	3	4.5	18	6	33	15	83
74	3107	30578	3	9	5	6	7	3	3	2	7	5	4	2	4	5	4	3	4	5	4.5	18	6	33	14	78
75	3108	30579	5	7	5	5	7	3	5	2	5	5	3	2	2	6	5	5	5	4	4.5	18	5	28	15	83
112	Tetep		3	5	5	3	7	1	4	0	5	4	3	3	4	4	3	1	5	8	3.8	18	8	44	16	89
99	HR-12		5	7	9	8	7	9	5	9	7	7	5	8	9	8	6	8	7	8	7.3	18	0	0	3	17
LSI			**5.0**	**6.6**	**6.2**	**5.1**	**6.3**	**4.7**	**5.0**	**4.8**	**5.5**	**5.1**	**4.9**	**4.0**	**5.2**	**5.2**	**4.2**	**4.9**	**5.0**	**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)

- **Donor Screening Nursery (DSN)**

The Donor Screening Nursery (DSN) consisted of 229 entries including different checks. The entries were evaluated at 24 locations across the country. The entries were evaluated under artificial inoculation and natural infection conditions at different locations. The frequency distribution of the disease scores and location severity indices are presented in Table 1.5A. None of the locations showed very high (LSI>7) disease pressure. The disease pressure was high at Coimbatore and Gaagharghat (LSI 6.3), while it was low at Rajendranagar (1.4). The disease pressure was high (LSI 6-7) at Coimbatore (6.3), Gagharghat (6.3), Cuttack (6.0) and Almora (6.0). Most of the locations showed moderate disease pressure (LSI 3-6) and that included Jagdalpur (5.7), Umium (5.4), Lonavala (5.4), Ranchi (5.3), Nawagam (5.2), Gangavathi (5.1), Mandya (4.6), IIRR (4.6), Nellore (4.4), Rewa (4.2), Karjat (4.1), Imphal (4.0), Pattambi (3.7), Malan (3.2) and Uppershillong (3.1).

For selection of promising entries, the data of those locations were considered where the disease pressure was more than 3. Accordingly, the data of Maruteru (2.8), Ponnampet (2.3), Wangbal (2.2), Patna (1.5) and Rajendranagar (1.4) were not considered for selection of promising entries. **The promising donors with SI ≤4.1 with high PI was presented in** Table 1.5B **and that included RNR 37909, MS-ISM-DIG-8, RP-Bio Patho-4, CB 18532, CGR 19-68, RNR 37998, AE 939, CB MSP9 007, UB 1066, CB MSP9 003, CB MSP9 006, RP Patho- 11, MS-ISM-DIG-10, RP-Bio Patho-3, RP-Bio Patho-9, VP-R111-SHB, CB 18536, CB MSP9 005, CB 19127 and RNR 37993**.

Table 1.5A: Location severity index(LSI) and frequency distribution of leaf blast scores of DSN, *Kharif* 2022

Score		Location/Frequency of scores (0-9)																						
	ALM	**CBT**	**CTK**	**GNV**	**GGT**	**IIRR**	**IMP**	**JDP**	**KJT**	**LNV**	**MLN**	**MND**	**MTU**	**NLR**	**NWG**	**PTN**	**PTB**	**PNP**	**RNR**	**RCI**	**REW**	**UMM**	**USG**	**WBL**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	86	0	0	0	0	0	0	12	0
1	0	0	0	0	0	2	5	1	2	0	97	0	15	1	0	72	0	51	192	1	1	0	74	45
2	0	0	0	0	0	4	0	18	16	0	6	25	86	16	3	0	29	85	0	15	24	6	43	112
3	12	4	8	1	0	38	124	34	111	12	23	71	63	23	10	42	52	60	5	6	33	15	25	58
4	28	23	0	64	0	97	0	31	2	46	22	11	37	91	53	0	109	22	0	38	62	38	17	14
5	77	44	125	81	79	30	82	30	59	64	24	53	6	55	70	29	25	6	20	79	80	65	15	0
6	18	46	0	76	1	15	1	28	0	69	21	5	5	32	60	0	8	2	0	38	28	54	10	0
7	30	54	72	3	149	41	15	17	35	31	18	46	1	7	27	0	0	0	1	38	1	34	6	0
8	48	46	0	1	0	0	0	17	0	5	1	17	0	2	6	0	0	0	0	12	0	14	9	0
9	16	12	24	0	0	2	2	52	3	1	6	0	0	2	0	0	0	0	0	2	0	3	17	0
Total	**229**	**229**	**229**	**226**	**229**	**229**	**229**	**228**	**228**	**228**	**218**	**228**	**213**	229	**229**	**229**	**223**	**226**	**218**	**229**	**229**	**229**	**228**	**229**
LSI	**6.0**	**6.3**	**6.0**	**5.1**	**6.3**	**4.6**	**4.0**	**5.7**	**4.1**	**5.4**	**3.2**	**4.6**	**2.8**	**4.4**	**5.2**	**1.5**	**3.7**	**2.3**	**1.4**	**5.3**	**4.2**	**5.4**	**3.1**	**2.2**
Screening	**N**	**A**	**A**	**A**	**A**	**A**	**N**	**N**	**N**	**N**	**N/A**	**A**	**N**	**A**	**A**	**N**	**A**	**N**	**A**	**N**	**A**	**N**	**N**	**N**

(LSI-Location severity Index; N-Natural; A-Artificial)

Table 1.5B: Promising donors with low susceptibility index (<=4.1) and high PI in DSN to leaf blast, *Kharif* 2022

P. No.	Design	Location/Frequency of scores (0-9)																			SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
		ALM	CBT	CTK	GNV	GGT	IIRR	IMP	JDP	KJT	LNV	MLN	MND	NLR	NWG	PTB	RCI	REW	UMM	USG						
105	RNR 37909	3	5	5	5	7	4	3	5	3	5	1	2	5	2	3	1	5	5	0	**3.6**	**19**	**9**	**47**	**18**	**95**
54	MS-ISM-DIG-8	3	3	5	5	7	4	3	2	3	3	3	2	4	4	3	4	5	5	3	**3.7**	**19**	**10**	**53**	**18**	**95**
75	RP-Bio Patho-4	3	4	7	6	7	5	1	1	3	4	1	2	6	4	3	5	2	5	2	**3.7**	**19**	**9**	**47**	**15**	**79**
19	CB18532	5	4	5	6	5	4	3	3	3	5	2	2	4	6	2	5	4	3	1	**3.8**	**19**	**8**	**42**	**17**	**89**
214	CGR-19-68	4	4	3	6	7	5	5	3	2	4	1	3	2	5	3	4	5	4	2	**3.8**	**19**	**8**	**42**	**17**	**89**
107	RNR 37998	4	6	5	4	5	4	3	3	3	5	1	3	4	5	4	4	3	5	1	**3.8**	**19**	**7**	**37**	**18**	**95**
189	AE 939	5	4	5	4	7	4	3	3	3	7	3	3	3	6	3	2	2	6	0	**3.8**	**19**	**10**	**53**	**15**	**79**
35	CB MSP9 007	4	6	5	6	5	4	3	2	3	5	1	2	3	6	2	5	5	5	1	**3.8**	**19**	**8**	**42**	**16**	**84**
59	UB 1066	5	3	5	6	7	3	3	2	3	4	3	3	4	6	2	5	3	6	1	**3.9**	**19**	**10**	**53**	**15**	**79**
31	CB MSP9 003	5	4	5	4	7	4	3	3	7	5	1	3	4	3	2	4	3	6	1	**3.9**	**19**	**8**	**42**	**16**	**84**
34	CB MSP9 006	3	4	5	4	7	3	3	2	3	5	1	3	4	6	4	8	3	6	1	**3.9**	**19**	**9**	**47**	**15**	**79**
70	RP-Patho-11	4	4	5	5	7	4	3	4	4	3	1	5	3	6	4	2	5	3	3	**3.9**	**19**	**7**	**37**	**17**	**89**
55	MS-ISM-DIG-10	4	9	7	4	5	4	3	2	3	3	6	3	4	3	2	4	4	4	2	**4.0**	**19**	**8**	**42**	**16**	**84**
74	RP-Bio Patho-3	3	8	5	5	7	4	1	5	3	5	1	2	4	5	4	5	3	4	2	**4.0**	**19**	**7**	**37**	**17**	**89**
80	RP-Bio Patho-9	3	4	7	6	5	4	1	4	5	5	1	3	5	7	-	2	2	4	4	**4.0**	**18**	**6**	**33**	**15**	**83**
136	VP-R111-SHB	6	5	5	5	5	3	5	4	3	5	1	3	4	4	4	5	2	6	1	**4.0**	**19**	**6**	**32**	**17**	**89**
20	CB18536	3	7	5	4	5	5	3	4	3	7	2	5	1	4	2	6	4	6	1	**4.1**	**19**	**7**	**37**	**15**	**79**
33	CB MSP9 005	4	6	5	5	7	4	5	2	2	5	1	3	3	3	4	7	4	6	1	**4.1**	**19**	**7**	**37**	**15**	**79**
3	CB19127	5	4	7	4	7	2	3	6	7	5	1	3	2	6	4	2	2	7	1	**4.1**	**19**	**8**	**42**	**13**	**68**
106	RNR 37993	7	4	5	6	5	3	5	3	3	5	1	2	4	5	4	6	4	6	0	**4.1**	**19**	**6**	**32**	**15**	**79**
88	Tetep	5	8	5	4	5	1	3	4	5	3	5	2	3	4	4	6	5	5	3	**4.2**	**19**	**6**	**32**	**17**	**89**
216	HR-12	8	6	9	8	5	7	5	7	3	3	6	7	7	5	4	7	4	5	9	**6.1**	**19**	**2**	**11**	**8**	**42**
LSI		**6.0**	**6.4**	**6.0**	**5.1**	**6.3**	**4.6**	**4.0**	**5.7**	**4.1**	**5.4**	**3.2**	**4.7**	**4.4**	**5.2**	**3.7**	**5.3**	**4.2**	**5.4**	**3.1**						

(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.2: SCREENING FOR NECK BLAST RESISTANCE

➢ NSN-1

The National Screening Nursery-1 (NSN-1) for neck blast disease was evaluated at seven locations across India with 338 entries during *Kharif* 2022. The entries were screened under natural conditions in all the centres except at Nellore and Rajendranagar, where artificial method of screening was followed with spray of spore suspension. The frequency distribution of disease scores and location severity indices are presented in Table 2.1A. The highest and lowest disease pressure was observed at Nellore (5.7) and Lonavala (2.1) respectively. None of the locations showed very high disease pressure (LSI >7). The disease pressure was high (LSI 6-7) at Nellore (5.7), Rajendranagar (5.7), Jagdalpur (5.1), Nawagam (4.5), Ponnampet (4.4), and Mandya (3.6). The data from Lonavala was not considered for selection of best entries.

The selection of promising entries were done based on data from six locations and presented in Table 12. Eleven entries viz., **IET# 29576, 30037, 29430, 30200, 28959, 29743, 29825, 29891, 30207, 29361 and 29826 were found to be resistant with SI ≤3.0. Other promising entries which performed better across all locations included IET # 30021, 29405, 29446, 28950, 30083, 30072, 29004, 29000, 29943, 28965 and 30233** (Table 2.1B).

Table 2.1A: Location severity index (LSI) and frequency distribution of neck blast scores of NSN-1, *Kharif* 2022

Score	Location/Frequency of scores (0-9)						
	JDP	**LNV**	**MND**	**NLR**	**NWG**	**PNP**	**RNR**
0	15	17	5	0	0	0	1
1	0	157	125	0	9	52	22
2	0	1	0	0	0	0	0
3	81	129	82	30	121	111	17
4	0	0	0	0	1	0	0
5	133	31	53	160	156	85	125
6	0	0	0	0	0	0	0
7	75	0	34	136	48	56	166
8	0	0	0	0	0	0	0
9	32	0	35	7	1	30	7
Total	**336**	**335**	**334**	**333**	**336**	**334**	**338**
LSI	**5.1**	**2.1**	**3.6**	**5.7**	**4.5**	**4.4**	**5.7**
Screening	**N**	**N**	**N**	**A**	**N**	**N**	**A**

(LSI-Location severity Index; N-Natural; A-Artificial)

Table 2.1B: Promising entries with low susceptibility index (<=3.5) and high PI in NSN-1 to neck blast, *Kharif* 2022

P. No.	Br. No.	IET No.	Location/Frequency of scores (0-9)						SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
			JDP	MND	NLR	NWG	PNP	RNR						
258	6006	29576	3	1	3	3	3	1	**2.3**	**6**	**6**	**100**	**6**	**100**
22	4622	30037	0	0	5	3	1	7	**2.7**	**6**	**4**	**67**	**5**	**83**
42	4512	29430	0	1	3	3	5	5	**2.8**	**6**	**4**	**67**	**6**	**100**
129	5503	30200	3	0	5	3	1	5	**2.8**	**6**	**4**	**67**	**6**	**100**
126	3412	28959	0	1	5	3	1	7	**2.8**	**6**	**4**	**67**	**5**	**83**
196	4128	29743	3	1	3	3	3	5	**3.0**	**6**	**5**	**83**	**6**	**100**
185	4116	29825	3	1	5	3	1	5	**3.0**	**6**	**4**	**67**	**6**	**100**
211	4308	29891	5	1	3	3	5	1	**3.0**	**6**	**4**	**67**	**6**	**100**
128	5502	30207	5	1	7	3	1	1	**3.0**	**6**	**4**	**67**	**5**	**83**
144	5210	29361	3	1	-	5	1	5	**3.0**	**5**	**3**	**60**	**5**	**100**
170	4101	29826	5	1	5	5	1	1	**3.0**	**6**	**3**	**50**	**6**	**100**
17	4617	30021	0	3	5	3	1	7	**3.2**	**6**	**4**	**67**	**5**	**83**
32	4502	29405	0	1	5	3	3	7	**3.2**	**6**	**4**	**67**	**5**	**83**
45	4515	29446	0	1	5	3	3	7	**3.2**	**6**	**4**	**67**	**5**	**83**
123	3409	28950	0	1	7	3	1	7	**3.2**	**6**	**4**	**67**	**4**	**67**
51	4902	30083	3	1	5	5	3	3	**3.3**	**6**	**4**	**67**	**6**	**100**
50	4901	30072	7	5	3	3	1	1	**3.3**	**6**	**4**	**67**	**5**	**83**
85	4014	29004	3	1	5	5	1	5	**3.3**	**6**	**3**	**50**	**6**	**100**
89	4018	29000	5	1	3	5	1	5	**3.3**	**6**	**3**	**50**	**6**	**100**
147	3501	29943	5	1	5	3	1	5	**3.3**	**6**	**3**	**50**	**6**	**100**
162	3517	28965	5	0	5	1	3	7	**3.5**	**6**	**3**	**50**	**5**	**83**
233	5802	30233	0	1	5	3	7	5	**3.5**	**6**	**3**	**50**	**5**	**83**
338	Tetep		3	-	5	1	1	5	**3.0**	**5**	**3**	**60**	**5**	**100**
327	HR-12		9	7	7	5	9	7	**7.3**	**6**	**0**	**0**	**1**	**17**
LSI			**5.1**	**3.6**	**5.7**	**4.5**	**4.4**	**5.7**						

(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)

- **NSN-2**

A total of 571 entries were evaluated under NSN-2 at four different locations during *kharif* 2022. The screening was done under natural infection condition at all the locations. The location severity index and frequency distribution of scores presented in the Table 2.2A indicated that, the disease pressure was moderate (LSI 3-6) at all the locations *viz*., Jagdalpur (5.2), Ponnampet (5.2), Nawagam (4.6) and Mandya (3.4), and hence the data from these four centres were considered for selection of best entries.

A total of 33 entries were found resistant against neck blast under NSN-2 (Table 2.2B). **Two entries *viz*. IET 30684 and IET 30692 performed on par with resistant check Tetep (SI 2.8). Other promising entry with resistant reaction was presented in table 2.2B which includes IET# 30831, 29990, 30881, 31051, 30763, 30674, 30748, 30856, 31050, 31054, 30707, 30752, 31141, 31141, 30660, 30673, 30676, 30833, 30844, 30861, 30889, 31077, 30768, 30772, 30786, 29952, 30750, 30753, 31152, 30650 and 30667**.

Table 2.2A: Location severity index (LSI) and frequency distribution of neck blast scores of NSN-2, *Kharif* 2022

Score	Location/Frequency of score (0-9)			
	JDP	**MND**	**NWG**	**PNP**
0	11	13	0	0
1	2	234	6	40
2	0	0	0	0
3	150	134	188	163
4	1	0	1	0
5	199	61	281	142
6	0	0	5	0
7	142	57	72	148
8	0	0	0	0
9	48	59	4	70
Total	**553**	**558**	**557**	**563**
LSI	**5.2**	**3.4**	**4.6**	**5.2**
Screening method	**N**	**N**	**N**	**N**

(LSI-Location severity Index; N-Natural; A-Artificial)

- **NSN-H**

A total of 114 entries were evaluated under NSN-hills nursery at five 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 3-6) at Malan (5.2), Ponnampet (5.1), Almora (4.9) and Imphal (3.4). The disease pressure was low at Lonavala (1.5) and hence not considered for selection of promising entries. **The entries which performed better than resistant check Tetep (SI 3.7) are listed in Table 2.3B and they are IET# 30512, 30507, 30530, 30485, 30515, 30488, 30493, 30525, 30529, 30511, 28880, 30502, 29636, 30531, 30509, 29639, 28915 and 28914**.

Table 2.2B: Promising entries with low susceptibility index (<=2.5) and high PI in NSN-2 to neck blast, *Kharif* 2022

P. No.	Br. No.	IET No.	Location/Frequency of score (0-9)				SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
			JDP	MND	NWG	PNP						
547	3653	30684	0	1	3	3	**1.8**	**4**	**4**	**100**	**4**	**100**
555	3661	30692	0	1	3	3	**1.8**	**4**	**4**	**100**	**4**	**100**
1	4401	30831	3	1	3	1	**2.0**	**4**	**4**	**100**	**4**	**100**
454	3943	29990	3	0	3	3	**2.3**	**4**	**4**	**100**	**4**	**100**
53	4454	30881	5	0	3	1	**2.3**	**4**	**3**	**75**	**4**	**100**
122	5414	31051	3	0	5	1	**2.3**	**4**	**3**	**75**	**4**	**100**
336	4203	30763	0	1	5	3	**2.3**	**4**	**3**	**75**	**4**	**100**
536	3642	30674	0	1	5	3	**2.3**	**4**	**3**	**75**	**4**	**100**
466	3955	30748	3	1	-	3	**2.3**	**3**	**3**	**100**	**3**	**100**
26	4426	30856	3	1	3	3	**2.5**	**4**	**4**	**100**	**4**	**100**
121	5413	31050	3	1	3	3	**2.5**	**4**	**4**	**100**	**4**	**100**
126	5418	31054	3	1	3	3	**2.5**	**4**	**4**	**100**	**4**	**100**
418	3906	30707	3	1	3	3	**2.5**	**4**	**4**	**100**	**4**	**100**
470	3959	30752	3	3	3	1	**2.5**	**4**	**4**	**100**	**4**	**100**
481	6207	31141	3	1	3	3	**2.5**	**4**	**4**	**100**	**4**	**100**
483	6209	31143	3	1	3	3	**2.5**	**4**	**4**	**100**	**4**	**100**
522	3628	30660	3	1	3	3	**2.5**	**4**	**4**	**100**	**4**	**100**
535	3641	30673	3	3	3	1	**2.5**	**4**	**4**	**100**	**4**	**100**
539	3645	30676	3	1	3	3	**2.5**	**4**	**4**	**100**	**4**	**100**
3	4403	30833	3	1	5	1	**2.5**	**4**	**3**	**75**	**4**	**100**
14	4414	30844	5	1	3	1	**2.5**	**4**	**3**	**75**	**4**	**100**
32	4432	30861	5	1	3	1	**2.5**	**4**	**3**	**75**	**4**	**100**
62	4463	30889	5	1	3	1	**2.5**	**4**	**3**	**75**	**4**	**100**
154	5623	31077	5	1	3	1	**2.5**	**4**	**3**	**75**	**4**	**100**
341	4208	30768	5	1	3	1	**2.5**	**4**	**3**	**75**	**4**	**100**
345	4212	30772	3	1	5	1	**2.5**	**4**	**3**	**75**	**4**	**100**
360	4227	30786	1	1	5	3	**2.5**	**4**	**3**	**75**	**4**	**100**
417	3905	29952	3	1	5	1	**2.5**	**4**	**3**	**75**	**4**	**100**
468	3957	30750	3	1	5	1	**2.5**	**4**	**3**	**75**	**4**	**100**
471	3960	30753	5	1	3	1	**2.5**	**4**	**3**	**75**	**4**	**100**
492	6218	31152	5	1	3	1	**2.5**	**4**	**3**	**75**	**4**	**100**
511	3617	30650	3	1	5	1	**2.5**	**4**	**3**	**75**	**4**	**100**
529	3635	30667	5	1	3	1	**2.5**	**4**	**3**	**75**	**4**	**100**
569	Tetep		3	0	3	1	**1.8**	**4**	**4**	**100**	**4**	**100**
558	HR-12		9	9	9	9	**9.0**	**4**	**0**	**0**	**0**	**0**
LSI			**5.2**	**3.4**	**4.6**	**5.2**						

(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 2.3A: Location severity index(LSI) and frequency distribution of neck blast scores of NSN-H, *Kharif* 2022

Score	Location/Frequency of score (0-9)				
	ALM	IMP	LNV	MLN	PNP
0	0	0	14	0	0
1	1	18	64	13	13
2	0	1	1	0	0
3	31	58	35	17	26
4	0	4	0	0	0
5	51	26	0	20	31
6	0	4	0	0	0
7	24	3	0	23	32
8	0	0	0	0	0
9	3	0	0	15	12
Total	**110**	**114**	**114**	**88**	**114**
LSI	**4.9**	**3.4**	**1.5**	**5.2**	**5.1**
Screening	**N**	**N**	**N**	**N**	**N**

(LSI-Location severity Index; N-Natural; A-Artificial)

Table 2.3B: Promising entries with low susceptibility index (<=3.5) and high PI in NSN-H to neck blast, *Kharif* 2022

P. No.	Br. No	IET No	Location/Frequency of score (0-9)				SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
			ALM	IMP	MLN	PNP						
78	2810	30512	3	3	1	1	**2.0**	**4**	**4**	**100**	**4**	**100**
71	2803	30507	5	1	1	1	**2.0**	**4**	**3**	**75**	**4**	**100**
67	2914	30530	5	1	-	1	**2.3**	**3**	**2**	**67**	**3**	**100**
34	2504	30485	3	3	-	3	**3.0**	**3**	**3**	**100**	**3**	**100**
81	2813	30515	3	3	-	3	**3.0**	**3**	**3**	**100**	**3**	**100**
38	2508	30488	3	3	1	5	**3.0**	**4**	**3**	**75**	**4**	**100**
44	2514	30493	3	3	1	5	**3.0**	**4**	**3**	**75**	**4**	**100**
60	2907	30525	5	3	3	1	**3.0**	**4**	**3**	**75**	**4**	**100**
66	2913	30529	5	1	-	3	**3.0**	**3**	**2**	**67**	**3**	**100**
76	2808	30511	5	3	-	1	**3.0**	**3**	**2**	**67**	**3**	**100**
19	2403	28880	5	3	3	3	**3.5**	**4**	**3**	**75**	**4**	**100**
53	2523	30502	3	3	5	3	**3.5**	**4**	**3**	**75**	**4**	**100**
18	2402	29636	7	3	1	3	**3.5**	**4**	**3**	**75**	**3**	**75**
68	2915	30531	3	1	3	7	**3.5**	**4**	**3**	**75**	**3**	**75**
73	2805	30509	3	1	7	3	**3.5**	**4**	**3**	**75**	**3**	**75**
29	2413	29639	5	3	5	1	**3.5**	**4**	**2**	**50**	**4**	**100**
88	2702	28915	5	3	1	5	**3.5**	**4**	**2**	**50**	**4**	**100**
94	2708	28914	5	3	1	5	**3.5**	**4**	**2**	**50**	**4**	**100**
114	Tetep		3	5	-	3	**3.7**	**3**	**2**	**67**	**3**	**100**
101	HR-12		-	7	-	7	**7.0**	**2**	**0**	**0**	**0**	**0**
LSI			**5.0**	**3.4**	**5.3**	**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**

Total of 112 entries in National Hybrid Screening Nursery (NHSN) were evaluated for neck blast reaction at eight locations. The entries were screened under natural infection conditions in all the locations except at Rajendranagar; where artificial method of screening was followed. The disease pressure was highest at Malan (6.5) and lowest at Lonavala (2.1). The disease pressure was moderate at Malan (6.5), Rajendranagar (5.5), Nawagam (5.2), Jagdalpur (5.1), Umium (4.4), Imphal (3.8) and Mandya (3.0). The data from Lonavala centre was not considered for selection of best entries (Table 2.4A). The entries which showed low disease score across the locations with high PI were considered as promising against neck blast and listed in Table Table 2.4B. **The resistant entries included IET#30558, 30555, 30569, 30587, 30576, 29722, 30620, 30556 and 30578**.

- **DSN**

A total of 229 entries were evaluated under Donor screening nursery at eight locations during *Kharif*, 2022. The entries were screened under natural infection conditions in all the locations. The location severity index and frequency distribution of scores were presented in the Table 2.5A. The disease pressure was high at Almora (LSI 6.2); while it was lowest at Lonavala (1.9). The disease pressure was moderate (LSI 3-6) at Jagdalpur (5.9), Umium (4.5), Nawagam (4.3), Rajendranagar (3.6), Mandya (3.3) and Imphal (3.1). The data from Lonavala was not considered for selection of best entries under DSN. **The promising entries with low disease pressure across the locations were presented in Table 2.5B and that included RP-Bio Patho-3, MS-68-3, VP-R262-SHB, MS-68-3-7, VP-R243-SHB, VP-D9-SHB, AE 939, Pusa 1824-17-4-3, Pusa 1824-17-4-8, KNM 14282, RNR 37909, VP-R45-SHB, VP-R104-SHB, VP-R260-SHB, CL-442, OYT ADW-259, VP-R294-SHB, KNM 12346, VP-WP-SHB, RP-Bio Patho-5, VP-R126-SHB, RP Bio Patho-7, VP-R36-SHB, BE 683, MTU 1265 and RP Bio Patho-8**.

Table 2.4A: Location severity index(LSI) and frequency distribution of neck blast scores of NHSN, *Kharif* 2022

Score	Location/Frequency of score (0-9)							
	IMP	**JDP**	**LNV**	**MLN**	**MND**	**NWG**	**RNR**	**UMM**
0	0	0	0	0	1	0	0	3
1	7	2	53	1	48	1	6	0
2	1	0	0	0	0	0	0	8
3	57	29	59	2	37	19	7	35
4	4	1	0	0	0	0	0	13
5	35	50	0	11	13	62	55	16
6	1	0	0	0	0	0	0	26
7	6	23	0	21	5	29	40	5
8	1	0	0	0	0	0	0	5
9	0	7	0	8	8	1	4	1
Total	**112**	**112**	**112**	**43**	**112**	**112**	**112**	**112**
LSI	**3.8**	**5.1**	**2.1**	**6.5**	**3.0**	**5.2**	**5.5**	**4.4**
Screening	**N**	**N**	**N**	**N/A**	**N**	**N**	**A**	**N**

(LSI-Location severity Index; N-Natural; A-Artificial)

Table 2.4B: Promising entries with low susceptibility index (<=3.5) and high PI in NHSN to neck blast, *Kharif* 2022

P.No.	Br. No.	IET No.	Location/Frequency of score (0-9)							SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
			IMP	JDP	MLN	MND	NWG	RNR	UMM						
49	3007	30558	1	5	-	1	3	5	3	**3.0**	**6**	**4**	**67**	**6**	**100**
45	3003	30555	3	3	-	1	5	5	3	**3.3**	**6**	**4**	**67**	**6**	**100**
62	3020	30569	3	5	-	1	5	3	3	**3.3**	**6**	**4**	**67**	**6**	**100**
84	3117	30587	1	5	-	1	5	5	3	**3.3**	**6**	**3**	**50**	**6**	**100**
72	3105	30576	3	5	-	3	3	5	2	**3.5**	**6**	**4**	**67**	**6**	**100**
55	3013	29722	3	3	-	1	5	7	2	**3.5**	**6**	**4**	**67**	**5**	**83**
26	3226	30620	3	3	-	1	5	5	4	**3.5**	**6**	**3**	**50**	**6**	**100**
46	3004	30556	5	3	-	3	5	5	0	**3.5**	**6**	**3**	**50**	**6**	**100**
74	3107	30578	1	5	-	1	5	3	6	**3.5**	**6**	**3**	**50**	**5**	**83**
112	Tetep		5	1	-	0	3	7	8	**4.0**	**6**	**3**	**50**	**4**	**67**
99	HR-12		3	7	-	9	7	7	8	**6.8**	**6**	**1**	**17**	**1**	**17**
LSI			**3.8**	**5.1**	**6.5**	**3.0**	**5.2**	**5.5**	**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 2.5A: Location severity index(LSI) and frequency distribution of neck blast scores of DSN, *Kharif* 2022

Score	Location/Frequency of score (0-9)							
	ALM	IMP	JDP	LNV	MND	NWG	RNR	UMM
0	0	2	0	5	4	0	54	0
1	0	17	0	123	94	5	33	0
2	0	0	0	0	0	0	0	10
3	1	175	49	99	57	103	23	43
4	0	0	0	0	0	0	0	67
5	34	35	59	0	33	83	60	56
6	0	0	0	0	0	0	0	35
7	27	0	87	0	15	38	54	15
8	0	0	0	0	0	0	0	3
9	9	0	33	0	25	0	5	0
Total	**71**	**229**	**228**	**227**	**228**	**229**	**229**	**229**
LSI	**6.2**	**3.1**	**5.9**	**1.9**	**3.3**	**4.3**	**3.6**	**4.5**
Screening	**N**	**N**	**N**	**N**	**N**	**N**	**A**	**N**

(LSI-Location severity Index; N-Natural; A-Artificial)

Table 2.5B: Promising donors with low susceptibility index (<=3.0) and high PI in DSN to neck blast, *Kharif* 2022

P.No.	Dsgn.	Location/Frequency of score (0-9)							SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
		ALM	IMP	JDP	MND	NWG	RNR	UMM						
10	ADT 54	-	3	3	1	1	1	4	**2.2**	**6**	**5**	**83**	**6**	**100**
74	RP-Bio Patho-3	-	1	5	1	3	0	3	**2.2**	**6**	**5**	**83**	**6**	**100**
56	MS-68-3	-	3	3	1	5	1	2	**2.5**	**6**	**5**	**83**	**6**	**100**
156	VP-R262-SHB	-	3	3	1	5	0	3	**2.5**	**6**	**5**	**83**	**6**	**100**
57	MS-68-3-7	-	3	3	1	5	1	3	**2.7**	**6**	**5**	**83**	**6**	**100**
152	VP-R243-SHB	-	3	5	1	3	0	4	**2.7**	**6**	**4**	**67**	**6**	**100**
172	VP-D9-SHB	-	3	3	3	5	0	3	**2.8**	**6**	**5**	**83**	**6**	**100**
189	AE 939	-	3	3	1	3	1	6	**2.8**	**6**	**5**	**83**	**5**	**83**
202	Pusa 1824-17-4-3	-	3	3	0	3	1	7	**2.8**	**6**	**5**	**83**	**5**	**83**
204	Pusa 1824-17-4-8	-	3	3	1	3	0	7	**2.8**	**6**	**5**	**83**	**5**	**83**
97	KNM 14282	-	5	3	1	3	0	5	**2.8**	**6**	**4**	**67**	**6**	**100**
105	RNR 37909	-	3	5	1	1	5	2	**2.8**	**6**	**4**	**67**	**6**	**100**
128	VP-R45-SHB	-	3	5	1	5	0	3	**2.8**	**6**	**4**	**67**	**6**	**100**
133	VP-R104-SHB	-	3	5	1	5	0	3	**2.8**	**6**	**4**	**67**	**6**	**100**
154	VP-R260-SHB	-	3	5	1	5	0	3	**2.8**	**6**	**4**	**67**	**6**	**100**
196	CL-442	-	3	5	1	3	0	5	**2.8**	**6**	**4**	**67**	**6**	**100**
197	OYT ADW - 259	-	3	5	1	3	0	5	**2.8**	**6**	**4**	**67**	**6**	**100**
160	VP-R294-SHB	-	1	5	1	7	0	3	**2.8**	**6**	**4**	**67**	**5**	**83**
98	KNM 12346	-	3	3	1	5	3	3	**3.0**	**6**	**5**	**83**	**6**	**100**
116	VP-WP-SHB	-	1	7	1	3	3	3	**3.0**	**6**	**5**	**83**	**5**	**83**
76	RP-Bio Patho-5	-	3	5	1	3	1	5	**3.0**	**6**	**4**	**67**	**6**	**100**
141	VP-R126-SHB	-	5	5	1	3	1	3	**3.0**	**6**	**4**	**67**	**6**	**100**
78	RP-Bio Patho-7	-	1	3	1	5	0	8	**3.0**	**6**	**4**	**67**	**5**	**83**
123	VP-R36-SHB	-	1	7	1	3	1	5	**3.0**	**6**	**4**	**67**	**5**	**83**
184	BE 683	-	3	3	1	5	0	6	**3.0**	**6**	**4**	**67**	**5**	**83**
187	MTU 1265	-	5	5	1	3	0	4	**3.0**	**6**	**3**	**50**	**6**	**100**
79	RP-Bio Patho-8	-	1	5	1	5	0	6	**3.0**	**6**	**3**	**50**	**5**	**83**
227	Tetep	-	5	3	0	3	1	6	**3.0**	**6**	**4**	**67**	**5**	**83**
216	HR-12	7	3	7	9	7	7	5	**6.4**	**7**	**1**	**14**	**2**	**29**
LSI		**6.2**	**3.1**	**5.9**	**3.3**	**4.4**	**3.6**	**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)

TRIAL No.3: SCREENING FOR BROWN SPOT RESISTANCE

- **NSN-1**

The National Screening Nursery (NSN-1) comprised of 338 entries evaluated at 17 locations across India under different-agro ecological Zones. The entries were screened under natural infection conditions at most of the centres except at Bankura, Gangavathi, IIRR, Ludhiana and Pusa; where screening was conducted under artificial inoculation with spore suspension. The frequency distribution of disease scores and the representative location severity index (LSI) are presented in Table 3.1A. The disease pressure was highest at Gangavathi (7.4), while it was lowest at Upper shilling (0.1). The disease pressure was high (LSI 6-7) at IIRR (7.0), Ludhiana (6.6) and Khudwani (6.5); moderate (LSI 3-6) at Gagharghat (5.6), Chatha (5.4), Rewa (5.2), Sabour (5.1), Ponnampet (4.9), Jagdalpur (4.7), Masodha (3.9), Bankura (3.8), Mugad (3.2) and Lonavala (3.1). The selection of promising entries was done based on the data of those locations where LSI was more than 3. The disease pressure was low at centres *viz*., Mandya (2.3) and Uppershillong (0.1); hence data from these centres were not considered for the selection of best entries. None of the entry was shown a resistance reaction against brown spot disease under NSN-1; however, **a few promising entries with low SI (<4.5) across the centres were observed and they are IET# 30233, 29539, 30824, 30261, 30695, 28821, 28544, 30097, 30230, 28128, 30830, 30697, 28353, 30823, 28960 and 30703** (Table 3.1B).

- **NSN-2**

A total of 571 entries were screened under NSN- 2 at 11 locations across the India for brown spot disease. The entries were screened under artificial inoculation conditions at Bankura, Gangavathi, Ludhiana and Pusa; while it was under natural infection condition at Chatha, Jagdalpur, Mandya, Ponnampet, Rewa and Sabour. The frequency distribution of disease scores and the representative location severity index (LSI) are presented in the Table 3.2A. The disease pressure was highest and lowest at Gangavathi (7.5) and Mandya (2.5) respectively. The disease pressure was high (LSI 6-7) at Pusa (6.4); moderate at Ponnampet (5.9), Ludhiana (5.7), Gagharghat (5.7), Bankura (5.2), Chatha (5.1), Jagdalpur (5.1), Rewa (5.1) and Sabour (5.0). The disease pressure was very low at Mandya (2.) and; hence data from this centre was not considered for selection of best entries (Table 3.2A).

The promising entries with low disease pressure across the locations presented in Table 3.2B. **Some of the promising entries included IET# 30767, 30848, 31044, 31056, 30801, 31021, 31068, 31075, 30752, 30852, 31153, 30753, 30772, 31059, 30856, 31076, 30799, 30831, 31014, 31079 and 30774**.

Table 3.1A: Location severity index(LSI) and frequency distribution of brown spot scores of NSN-1, *Kharif* 2022

Score	Location/Frequency of score (0-9)																
	BNK	**CHT**	**GNV**	**GGT**	**IIRR**	**JDP**	**KHD**	**LNV**	**LDN**	**MND**	**MSD**	**MGD**	**PNP**	**PSA**	**REW**	**SBR**	**USG**
0	0	0	0	0	0	9	1	45	0	20	0	0	0	0	0	0	323
1	5	2	0	0	0	7	0	0	0	138	11	8	0	0	0	13	13
2	0	0	0	0	0	15	2	52	0	7	69	0	13	0	9	0	2
3	207	72	0	8	0	38	33	114	11	100	96	287	58	2	10	111	0
4	0	0	1	0	11	69	1	56	0	45	14	0	74	7	20	0	0
5	112	126	3	177	54	82	67	43	77	14	89	37	89	59	175	100	0
6	0	0	37	121	55	64	1	23	0	6	5	0	25	133	120	0	0
7	13	124	177	3	59	52	166	1	216	4	45	6	57	116	2	82	0
8	0	0	52	29	94	0	19	0	0	0	2	0	7	10	0	0	0
9	0	13	65	0	53	0	48	0	33	0	1	0	11	0	0	32	0
Total	**337**	**337**	**335**	**338**	**326**	**336**	**338**	**334**	**337**	**334**	**332**	**338**	**334**	**327**	**336**	**338**	**338**
LSI	**3.8**	**5.4**	**7.4**	**5.6**	**7.0**	**4.7**	**6.5**	**3.1**	**6.6**	**2.3**	**3.9**	**3.2**	**4.9**	**6.2**	**5.2**	**5.1**	**0.1**
Screening	**A**	**N**	**A**	**N/A**	**A**	**N**	**N/A**	**N**	**A**	**N**	**N**	**N**	**N**	**A**	**N**	**N**	**N**

(LSI-Location severity Index; N-Natural; A-Artificial)

Table 3.1B: Promising entries with low susceptibility index (<=4.5) and high PI in NSN-1 to brown spot, Kharif 2022

P. No.	Br. No	IET No.	Location/Frequency of score (0-9)														SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
			BNK	CHT	GNV	GGT	IIRR	JDP	KHD	LNV	LDN	MSD	MGD	PNP	PSA	REW	SBR						
233	5802	30233	3	3	7	5	7	3	3	3	3	5	3	4	3	5	3	**4.0**	**15**	**9**	**60**	**13**	**87**
109	4804	29539	3	3	7	5	5	3	3	4	3	5	3	4	5	5	3	**4.1**	**15**	**7**	**47**	**14**	**93**
287	4313	30824	3	3	7	5	6	3	3	0	5	5	3	6	6	5	3	**4.2**	**15**	**7**	**47**	**11**	**73**
264	6012	30261	5	5	7	5	7	3	3	2	5	3	3	3	5	5	3	**4.3**	**15**	**7**	**47**	**13**	**87**
310	3823	30695	3	3	9	6	6	4	8	0	5	1	3	3	5	6	3	**4.3**	**15**	**7**	**47**	**10**	**67**
232	5801	28821	3	7	7	5	7	4	0	0	5	3	3	3	5	6	7	**4.3**	**15**	**6**	**40**	**10**	**67**
206	4303	28544 (R)	3	3	7	6	6	3	7	0	7	3	3	2	7	6	3	**4.4**	**15**	**8**	**53**	**8**	**53**
60	4911	30097	5	3	7	5	4	3	7	3	7	2	3	4	5	5	3	**4.4**	**15**	**6**	**40**	**12**	**80**
234	5803	30230	5	3	7	5	5	5	7	3	5	2	3	4	4	5	3	**4.4**	**15**	**5**	**33**	**13**	**87**
101	3712	28128	3	3	7	3	5	2	5	3	7	5	3	5	6	5	5	**4.5**	**15**	**6**	**40**	**12**	**80**
283	5315	30830	3	5	6	8	6	6	7	0	5	3	3	2	6	4	3	**4.5**	**15**	**6**	**40**	**9**	**60**
312	3825	30697	3	5	7	6	5	4	7	0	3	2	3	4	5	6	7	**4.5**	**15**	**5**	**33**	**10**	**67**
93	3704	28353	3	5	6	5	5	6	5	0	7	2	3	4	6	5	5	**4.5**	**15**	**4**	**27**	**11**	**73**
286	4312	30823	3	5	-	5	5	4	9	0	5	2	3	3	6	6	7	**4.5**	**14**	**5**	**36**	**10**	**71**
124	3410	28960	3	3	7	3	5	4	2	3	9	5	3	4	7	5	5	**4.5**	**15**	**6**	**40**	**12**	**80**
320	3833	30703	3	3	9	5	5	4	7	0	5	3	3	5	6	3	7	**4.5**	**15**	**6**	**40**	**11**	**73**
338	Tetep		5	7	4	5	4	5	5	3	7	5	1	3	-	5	7	**4.7**	**14**	**3**	**21**	**11**	**79**
LSI			**3.8**	**5.5**	**7.4**	**5.6**	**7.0**	**4.7**	**6.5**	**3.1**	**6.6**	**3.9**	**3.2**	**4.9**	**6.2**	**5.2**	**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)

Table 3.2A: Location severity index(LSI) and frequency distribution of brown spot scores of NSN-2, *Kharif* 2022

Score	Location/Frequency of score (0-9)										
	BNK	**CHT**	**GNV**	**GGT**	**JDP**	**LDN**	**MND**	**PNP**	**PSA**	**REW**	**SBR**
0	0	0	0	0	0	0	35	0	0	0	0
1	0	3	0	0	5	0	218	1	0	1	9
2	0	0	0	0	7	0	0	12	0	7	0
3	116	149	0	6	55	9	171	46	0	25	196
4	0	0	1	0	116	0	96	72	0	64	0
5	288	225	2	318	142	343	19	144	58	300	193
6	0	0	41	158	136	0	16	60	229	154	0
7	167	170	231	16	90	205	3	89	218	18	130
8	0	0	245	73	2	0	0	74	36	0	0
9	0	13	43	0	0	6	0	65	0	1	40
Total	**571**	**560**	**563**	**571**	**553**	**563**	**558**	**563**	**541**	**570**	**568**
LSI	**5.2**	**5.1**	**7.5**	**5.7**	**5.1**	**5.7**	**2.4**	**5.9**	**6.4**	**5.1**	**5.0**
Screening	**A**	**N**	**A**	**N/A**	**N**	**A**	**N**	**N**	**A**	**N**	**N**

(LSI-Location severity Index; N-Natural; A-Artificial)

- **NSN-H**

The National Screening Nursery - Hills (NSN-H) was evaluated for their resistance to brown spot at five locations *viz*., Almora, IIRR, Khudwani, Lonavala and Ponnampet. These entries were screened through natural method in all the locations except at IIRR. The frequency distribution of disease scores and location severity indices are presented in Table 3.3A. The disease pressure was very high (LSI >7) at IIRR (7.4) while it was high at Ponnampet (6.4.). Moderate disease pressure was recorded at Almora (5.5) and Khudwani (5.8). The disease pressure was very low (LSI <3) at Lonavala (2.0), hence this centre data was not considered for selection of best entries. None of the entries found resistant against brown spot; however, **few entries with low SI (≤5.3) considered promising and they are IET# 30530, 28887, 30527, 30515, 30513, 30507, 30524, 30526, 30487, 30512, 30525 and 30528** (Table 3.3B).

- **NHSN**

One hundred and twelve hybrids including checks were evaluated at 14 locations against brown spot disease under NHSN. The highest and lowest disease pressure was recorded at Gangavathi (7.6) and Lonavala (2.8) respectively. The disease pressure was high (LSI 6-7) at Pusa (6.8) and IIRR (6.8). Most of the centres showed moderate disease pressure *viz.*, Khudwani (5.8), Chatha (5.8), Gagharghat (5.5), Rewa (5.3), Ludhiana (4.8), Jagdalpur (4.6), Chinsurah (4.3) and Bankura (3.5) (Table 38). The Performance of entries at Mugad, Mandya and Lonavala was not considered for identifying promising entries, as the disease pressure was low at these centres (< 3.0) (Table 3.4A).

None of the entries recorded resistance reaction consistently across the locations however **a few promising entries that included IET # 30571, 30620, 30562, 30619, 30590, 30591, 30613, 30586, 30616, 30561, 30566 and 30567**(Table 3.4B).

Table 3.2B: Promising entries with low susceptibility index (<=4.8) and high PI in NSN-2 to brown spot, *Kharif* 2022

P.No.	Br.No	IET No.	Location/Frequency of score (0-9)										SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
			BNK	CHT	GNV	GGT	JDP	LDN	PNP	PSA	REW	SBR						
340	4207	30767	3	5	6	5	4	5	3	5	5	1	**4.2**	**10**	**3**	**30**	**9**	**90**
18	4418	30848	3	5	6	5	4	5	5	5	5	3	**4.6**	**10**	**2**	**20**	**9**	**90**
114	5406	31044	3	3	8	8	4	5	2	6	5	3	**4.7**	**10**	**4**	**40**	**7**	**70**
128	5420	31056	3	3	8	5	3	5	6	5	6	3	**4.7**	**10**	**4**	**40**	**7**	**70**
375	4243	30801	5	3	7	5	3	5	4	7	5	3	**4.7**	**10**	**3**	**30**	**8**	**80**
86	5124	31021	5	3	7	7	4	5	2	6	5	3	**4.7**	**10**	**3**	**30**	**7**	**70**
143	5612	31068	3	3	6	5	4	5	7	5	6	3	**4.7**	**10**	**3**	**30**	**7**	**70**
152	5621	31075	3	3	7	5	6	5	5	6	4	3	**4.7**	**10**	**3**	**30**	**7**	**70**
470	3959	30752	3	3	7	5	4	7	3	6	4	5	**4.7**	**10**	**3**	**30**	**7**	**70**
22	4422	30852	5	5	6	6	3	5	3	-	5	5	**4.8**	**9**	**2**	**22**	**7**	**78**
494	6220	31153	5	3	7	6	5	5	4	-	5	3	**4.8**	**9**	**2**	**22**	**7**	**78**
471	3960	30753	3	3	8	5	3	7	4	7	5	3	**4.8**	**10**	**4**	**40**	**7**	**70**
345	4212	30772	7	3	9	6	4	5	3	6	2	3	**4.8**	**10**	**4**	**40**	**6**	**60**
133	5602	31059	7	3	8	5	3	5	4	5	5	3	**4.8**	**10**	**3**	**30**	**8**	**80**
26	4426	30856	3	7	7	5	5	5	2	6	5	3	**4.8**	**10**	**3**	**30**	**7**	**70**
153	5622	31076	7	3	7	5	4	5	3	6	3	5	**4.8**	**10**	**3**	**30**	**7**	**70**
373	4241	30799	3	5	8	8	4	5	3	6	5	1	**4.8**	**10**	**3**	**30**	**7**	**70**
1	4401	30831	5	5	6	5	5	3	5	6	5	3	**4.8**	**10**	**2**	**20**	**8**	**80**
78	5116	31014	3	3	6	5	6	5	5	5	5	5	**4.8**	**10**	**2**	**20**	**8**	**80**
156	5625	31079	5	3	7	5	4	5	6	5	5	3	**4.8**	**10**	**2**	**20**	**8**	**80**
347	4214	30774	5	5	7	5	6	5	5	5	2	3	**4.8**	**10**	**2**	**20**	**8**	**80**
569	Tetep		7	5	4	5	2	5	5	7	4	3	**4.7**	**10**	**2**	**20**	**8**	**80**
246	5924	**Rasi**	7	3	-	5	-	-	-	-	5	3	**4.6**	**5**	**2**	**40**	**4**	**80**
		LSI	**5.2**	**5.1**	**7.5**	**5.7**	**5.1**	**5.7**	**5.9**	**6.4**	**5.1**	**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)

Table 3.3A: Location severity index(LSI) and frequency distribution of brown spot scores of NSN-H, *Kharif* 2022

Score	Location/Frequency of scores (0-9)				
	ALM	IIRR	KHD	LNV	PNP
0	0	0	1	17	0
1	0	0	0	20	0
2	0	0	0	40	0
3	7	0	7	19	13
4	25	2	1	16	7
5	30	7	39	2	24
6	14	18	24	0	10
7	32	18	38	0	19
8	6	39	4	0	23
9	0	27	0	0	18
Total	**114**	**111**	**114**	**114**	**114**
LSI	**5.5**	**7.4**	**5.8**	**2.0**	**6.4**
Screening	**N**	**A**	**N/A**	**N**	**N**

(LSI-Location severity Index; N-Natural; A-Artificial)

Table 3.3B: Promising entries with low susceptibility index (<=5.3) and high PI in NSN-H to brown spot, *Kharif* 2022

P. No.	Br. No	Location/Frequency of scores (0-9)					SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
		IET No	ALM	IIRR	KHD	PNP						
67	2914	30530	4	8	3	3	**4.5**	**4**	**2**	**50**	**3**	**75**
30	2414	28887	3	6	6	3	**4.5**	**4**	**2**	**50**	**2**	**50**
63	2910	30527	3	8	5	3	**4.8**	**4**	**2**	**50**	**3**	**75**
81	2813	30515	6	8	0	5	**4.8**	**4**	**1**	**25**	**2**	**50**
79	2811	30513	5	8	3	4	**5.0**	**4**	**1**	**25**	**3**	**75**
71	2803	30507	7	8	3	3	**5.3**	**4**	**2**	**50**	**2**	**50**
59	2906	30524	3	8	5	5	**5.3**	**4**	**1**	**25**	**3**	**75**
62	2909	30526	5	8	5	3	**5.3**	**4**	**1**	**25**	**3**	**75**
37	2507	30487	5	6	7	3	**5.3**	**4**	**1**	**25**	**2**	**50**
78	2810	30512	5	6	7	3	**5.3**	**4**	**1**	**25**	**2**	**50**
60	2907	30525	4	8	5	4	**5.3**	**4**	**0**	**0**	**3**	**75**
64	2911	30528	4	7	5	5	**5.3**	**4**	**0**	**0**	**3**	**75**
107	CH-45		6	5	3	6	**5.0**	**4**	**1**	**25**	**2**	**50**
113	Rasi		8	4	3	6	**5.3**	**4**	**1**	**25**	**2**	**50**
112	RP-Bio-226		8	7	7	7	**7.3**	**4**	**0**	**0**	**0**	**0**
LSI			**5.5**	**7.5**	**5.8**	**6.4**						

(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 3.4A: Location severity index(LSI) and frequency distribution of brown spot scores of NHSN, *Kharif* 2022

Score	Location/Frequency of score (0-9)													
	BNK	**CHT**	**CHN**	**GNV**	**GGT**	**IIRR**	**JDP**	**KHD**	**LNV**	**LDN**	**MND**	**MGD**	**PSA**	**REW**
0	0	0	0	0	0	0	0	0	22	0	7	0	0	0
1	0	0	0	0	0	0	0	0	0	0	28	22	0	0
2	0	0	3	0	0	0	0	0	0	0	0	0	0	0
3	88	18	30	0	0	0	31	3	64	15	44	59	0	5
4	0	0	34	0	0	3	33	4	9	0	29	0	0	13
5	22	44	33	0	78	15	27	60	17	93	4	18	3	47
6	0	0	2	10	24	20	10	2	0	0	0	0	26	44
7	2	35	8	43	2	40	1	34	0	1	0	0	73	2
8	0	0	2	41	8	29	4	6	0	0	0	0	9	0
9	0	15	0	15	0	4	6	3	0	1	0	0	0	1
Total	**112**	**112**	**112**	**109**	**112**	**111**	**112**	**112**	**112**	**110**	**112**	**99**	**111**	**112**
LSI	**3.5**	**5.8**	**4.3**	**7.6**	**5.5**	**6.8**	**4.6**	**5.8**	**2.8**	**4.8**	**2.6**	**2.9**	**6.8**	**5.3**
Screening	**A**	**N**	**A**	**A**	**N/A**	**A**	**N**	**N/A**	**N**	**A**	**N**	**N**	**A**	**N**

(LSI-Location severity Index; N-Natural; A-Artificial)

Table 3.4B: Promising entries with low susceptibility index (<=5.0) and high PI in NHSN to brown spot, *Kharif* 2022

P. No.	Br. No	IET No.	Location/Frequency of score (0-9)											SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
			BNK	CHT	CHN	GNV	GGT	IIRR	JDP	KHD	LDN	PSA	REW						
65	3023	30571	3	5	3	6	5	6	5	5	3	-	5	**4.6**	**10**	**3**	**30**	**8**	**80**
26	3226	30620	3	5	2	9	5	5	3	5	5	6	5	**4.8**	**11**	**3**	**27**	**9**	**82**
53	3011	30562	3	3	2	6	5	7	3	7	5	7	6	**4.9**	**11**	**4**	**36**	**6**	**55**
25	3225	30619	3	5	3	8	5	5	3	5	5	7	5	**4.9**	**11**	**3**	**27**	**9**	**82**
88	3121	30590	3	5	4	7	5	5	5	5	3	7	5	**4.9**	**11**	**2**	**18**	**9**	**82**
89	3122	30591	3	5	5	7	5	8	3	3	3	8	5	**5.0**	**11**	**4**	**36**	**8**	**73**
17	3217	30613	3	3	4	7	5	7	3	5	5	7	6	**5.0**	**11**	**3**	**27**	**7**	**64**
83	3116	30586	3	7	5	-	5	6	3	4	5	6	6	**5.0**	**10**	**2**	**20**	**6**	**60**
21	3221	30616	3	3	5	7	5	7	4	5	5	6	5	**5.0**	**11**	**2**	**18**	**8**	**73**
52	3010	30561	3	5	3	7	5	6	4	5	5	7	5	**5.0**	**11**	**2**	**18**	**8**	**73**
59	3017	30566	3	3	5	7	5	6	4	5	5	8	4	**5.0**	**11**	**2**	**18**	**8**	**73**
60	3018	30567	3	5	4	7	5	6	4	3	5	7	6	**5.0**	**11**	**2**	**18**	**7**	**64**
112	Tetep		3	3	8	8	5	4	3	5	3	7	5	**4.9**	**11**	**4**	**36**	**8**	**73**
111	Rasi		5	3	5	8	5	5	3	7	3	7	4	**5.0**	**11**	**3**	**27**	**8**	**73**
108	Swarnadhan		3	7	7	9	5	8	4	5	5	8	6	**6.1**	**11**	**1**	**9**	**5**	**45**
LSI			**3.5**	**5.8**	**4.3**	**7.6**	**5.5**	**6.8**	**4.6**	**5.8**	**4.8**	**6.8**	**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)

- **DSN**

The entries under donor screening nursery (DSN) were evaluated for their resistance to brown spot at 14 locations with 229 entries across the country. The brown spot resistance screening was done under natural infection conditions in most of the centres except at Bankura, Gangavati, Ludhiana, IIRR and Pusa; where artificial method of screening was followed. The frequency distribution of disease scores and location severity index (LSI) are presented in Table 3.5A. The highest and lowest disease pressure was recorded at Gangavathi (7.6) and Mandya (2.7) respectively. The disease Pressure was high (LSI 6-7) at IIRR (7.0), Almora (6.2), Pusa (6.2); moderate disease pressure (LSI 3-6) at Chatha (5.8), Gagharghat (5.3), Ludhiana (4.9), Bankura (4.8), Jagdalpur (4.6), Rewa (4.4), Sabour (4.1), Lonavala (3.4) and Mugad (3.3). The data from Mandya was not considered for selection of promising entries. **The promising donor lines with low disease reaction across the locations were presented in** Table 3.5B **and that included KNM 12346, CB MSP9 004, CB 17634, CB MSP9 007, VP-R40-SHB, CB MSP9 006, VP-R297-SHB, CB MSP9 003, KNM 14382, AM 773, CB 19107, CB 16710, CB 17135, VP-R243-SHB, 19198, CB MSP9 009, RP Bio Patho-4, NLR-95, NLR 3415, KNM 14445 and CL-442**.

Table 9: Location severity index (LSI) and frequency distribution of brown spot scores of DSN, *Kharif* 2022

Score	Location/Frequency of score (0-9)													
	ALM	**BNK**	**CHT**	**GNV**	**GGT**	**IIRR**	**JDP**	**LNV**	**LDN**	**MND**	**MGD**	**PSA**	**REW**	**SBR**
0	0	0	0	0	0	0	0	32	0	22	0	0	0	0
1	0	0	0	0	0	0	0	0	0	53	13	0	0	25
2	0	0	0	0	0	0	3	0	0	0	0	0	15	0
3	7	65	41	0	0	0	44	93	59	80	173	0	19	106
4	20	0	0	0	0	9	64	28	0	56	0	1	71	0
5	50	121	69	0	168	22	59	66	123	12	42	24	116	59
6	38	0	0	16	52	43	44	1	0	5	0	117	7	0
7	68	43	107	88	0	62	14	6	47	0	1	58	1	28
8	39	0	0	93	9	69	0	0	0	0	0	3	0	0
9	7	0	11	26	0	20	0	0	0	0	0	0	0	11
Total	**229**	**229**	**228**	**223**	**229**	**225**	**228**	**226**	**229**	**228**	**229**	**203**	**229**	**229**
LSI	**6.2**	**4.8**	**5.8**	**7.6**	**5.3**	**7.0**	**4.6**	**3.4**	**4.9**	**2.7**	**3.3**	**6.2**	**4.4**	**4.1**
Screening	**N**	**A**	**N**	**A**	**N/A**	**A**	**N**	**N**	**A**	**N**	**N**	**A**	**N**	**N**

(LSI-Location Severity Index; N-Natural; A-Artificial)

Table 10: Promising entries with low susceptibility index (<=4.5) and high PI in DSN to brown spot, *Kharif* 2022

P. No.	Designation	Location/Frequency of score (0-9)													SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
		ALM	BNK	CHT	GNV	GGT	IIRR	JDP	LNV	LDN	MGD	PSA	REW	SBR						
98	KNM 12346	7	3	3	9	6	5	3	0	3	3	-	5	1	**4.0**	**12**	**7**	**58**	**9**	**75**
32	CB MSP9 004	4	3	3	8	5	6	4	0	3	3	4	5	5	**4.1**	**13**	**5**	**38**	**11**	**85**
23	CB17634	4	5	5	7	6	5	4	0	3	3	5	4	3	**4.2**	**13**	**4**	**31**	**11**	**85**
35	CB MSP9 007	4	5	5	7	5	4	4	0	3	3	6	5	3	**4.2**	**13**	**4**	**31**	**11**	**85**
10	ADT 54	3	5	3	9	6	-	4	3	3	1	6	5	3	**4.3**	**12**	**6**	**50**	**9**	**75**
125	VP-R40-SHB	3	3	7	7	5	4	3	3	5	3	6	5	3	**4.4**	**13**	**6**	**46**	**10**	**77**
34	CB MSP9 006	5	3	3	8	5	4	5	4	3	3	6	5	3	**4.4**	**13**	**5**	**38**	**11**	**85**
162	VP-R297-SHB	3	3	3	7	5	7	4	5	5	3	6	5	1	**4.4**	**13**	**5**	**38**	**10**	**77**
31	CB MSP9 003	6	3	7	6	5	5	5	0	3	3	6	5	3	**4.4**	**13**	**5**	**38**	**9**	**69**
99	KNM 14382	8	3	3	8	5	5	4	3	3	3	6	4	3	**4.5**	**13**	**6**	**46**	**10**	**77**
193	AM 773	6	3	3	7	6	7	2	3	5	3	6	4	3	**4.5**	**13**	**6**	**46**	**8**	**62**
2	CB19107	5	5	7	7	5	4	4	3	3	3	5	4	3	**4.5**	**13**	**4**	**31**	**11**	**85**
22	CB16710	4	5	3	8	5	5	5	3	3	5	6	5	1	**4.5**	**13**	**4**	**31**	**11**	**85**
1	CB17135	4	7	5	7	8	4	4	0	3	3	5	3	5	**4.5**	**13**	**4**	**31**	**10**	**77**
152	VP-R243-SHB	4	5	3	6	5	7	4	3	5	3	6	4	3	**4.5**	**13**	**4**	**31**	**10**	**77**
42	19198	5	7	3	7	5	5	6	0	3	5	-	5	3	**4.5**	**12**	**4**	**33**	**9**	**75**
37	CB MSP9 009	5	5	3	8	5	5	5	3	3	3	6	5	3	**4.5**	**13**	**5**	**38**	**11**	**85**
75	RP-Bio Patho-4	7	5	5	7	5	5	3	3	3	3	6	4	3	**4.5**	**13**	**5**	**38**	**10**	**77**
180	NLR-95	4	3	5	8	5	6	3	3	5	3	6	5	3	**4.5**	**13**	**5**	**38**	**10**	**77**
183	NLR 3415	4	3	3	8	5	6	3	5	5	3	6	5	3	**4.5**	**13**	**5**	**38**	**10**	**77**
100	KNM 14445	7	5	3	8	5	7	4	3	3	3	6	4	1	**4.5**	**13**	**5**	**38**	**9**	**69**
196	CL-442	6	5	7	7	5	7	4	0	5	1	6	5	1	**4.5**	**13**	**3**	**23**	**8**	**62**
88	Tetep	7	5	3	7	6	6	3	4	3	3	-	2	5	**4.5**	**12**	**5**	**42**	**8**	**67**
221	IR-64	6	3	5	7	6	6	3	3	5	1	5	5	1	**4.3**	**13**	**5**	**38**	**9**	**69**
LSI		**6.2**	**4.8**	**5.8**	**7.6**	**5.3**	**7.0**	**4.6**	**3.4**	**4.9**	**3.3**	**6.2**	**4.4**	**4.1**						

(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 Patna where the entries were evaluated under natural condition. The highest disease pressure was recorded at Kaul (7.8) and lowest at Patna (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 Kaul (7.8), Gangavati (7.6) and Titabar (7.4) and Cuttack (7.1); high (LSI 6 - 7) Ludhiana (6.9), IIRR (6.8), Maruteru (6.6), Pattambi (6.8), New Delhi (6.7), Chinsurah (6.2), Raipur (6.2), Masodha (6.1), Navasari (6.0); moderate (LSI 3-6) at Chiplima (5.9), Mandya (5.7), Moncompu (5.6), Coimbatore (5.6), Pant Nagar (5.3), Aduthurai (5.2), Bankura (5.2), Varanasi (4.9); and less (LSI <3) at Patna (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 ≤ 5.1 are presented in the Table 4.1B. None of the entries were found resistant (SI≤3.0) against sheath blight disease. **Promising entries (SI≤5.0) were viz., IET Nos. 30078, 29351, 29891, 29935, 30093, 30106, and 29549. Some of the other promising entries were selected based on low susceptibility index than Swarnadhan (tolerant check) are 29833, 30207, 27908, 30085, 29564, 29860, 29301 and 29284**.

- **NSN-2**

The National Screening Nursery-2 (NSN-2) was evaluated for its resistance to sheath blight at 20 locations. The entries were screened by artificial inoculation at most of the centres except Patna where the entries were evaluated under natural conditions and observed moderate level of (LSI <1.4) disease severity. 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 Gangavati (7.6), Kaul (7.5), Cuttack (7.4), and Ludhiana (7.1); high (LSI 6 - 7) at IIRR (6.8), Maruteru (6.6), Titabar (6.6), Masodha (6.5), Pattambi (6.5), Aduthurai (6.0) and Bankura (6.0) and moderate (LSI 3-6) at Navasari (5.8), Raipur (5.7), Pant Nagar (5.6), Chiplima (5.4), Varanasi (5.1), Mandya (4.9), Moncompu (4.2) and Coimbatore (4.0); and low (LSI <3) at Patna (1.4) and 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 are IETs 30805, 31087, 31114, 30867, 30945, 30783, 30844, 30973, 30977, 30881, 30976, 30891 and 29805 were found better than tolerant check Swarnadhan (5.2)** (Table 4.2B).

- **NSN-H**

The National Screening Nursery - Hills (NSN-H) was evaluated for their resistance to sheath blight at NRRI, IIRR and Pant Nagar. These entries were screened through artificial inoculation at all the locations. The frequency distribution of disease scores and location severity indices are presented in Table 4.3A. The disease pressure was high (LSI 6-7) at Cuttack (6.9), IIRR (6.4); moderate (3-6) at Pantnagar (5.0). The selection of best entries was done based on the reaction at these two locations. None of the entries were resistant (SI≤3.0) against sheath blight. **Some of the highly promising entries *viz.*, IETs 28896, 30499 and 29654 were found better than tolerant checks (Tetep and Swarnadhan) and other few entries viz., IETs 30518, 30531, 28887, 30526, 30514 and 30504 were on par with checks** (Table 4.3B).

Table 4.1A: Location severity index and frequency distribution of sheath blight disease score for NSN1 entries, *Kharif*-2022

Score/Location	Location/Frequency of scores (0-9)																					
	ADT	**BNK**	**CHN**	**CHP**	**CBT**	**CTK**	**GNV**	**IIRR**	**KUL**	**LDN**	**MND**	**MTU**	**MSD**	**MNC**	**NVS**	**NDL**	**PNT**	**PTN**	**PTB**	**RPR**	**TTB**	**VRN**
0	17	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	137	0	0	0	0
1	46	0	0	0	0	5	0	0	0	0	4	0	0	25	0	0	0	105	0	0	2	8
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	55	91	35	52	54	23	0	0	5	1	58	0	19	36	25	0	29	71	16	3	10	72
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	78	123	120	117	149	40	11	75	23	39	134	76	151	76	142	68	235	19	83	158	58	190
6	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	20	115	133	125	113	144	213	225	137	278	88	242	119	154	146	208	69	6	145	154	60	47
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	101	9	50	37	18	119	112	35	156	17	49	6	43	33	25	21	2	0	89	23	146	11
Total	**317**	**338**	**338**	**331**	**336**	**331**	**336**	**335**	**321**	**335**	**333**	**324**	**332**	**338**	**338**	**297**	**335**	**338**	**333**	**338**	**276**	**328**
LSI	**5.2**	**5.2**	**6.2**	**5.9**	**5.6**	**7.1**	**7.6**	**6.8**	**7.8**	**6.9**	**5.7**	**6.6**	**6.1**	**5.6**	**6.0**	**6.7**	**5.3**	**1.3**	**6.8**	**6.2**	**7.4**	**4.9**
Screening	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**N**	**A**	**A**	**A**	**A**

(N- Natural; A- Artificial; LSI- Location Severity Index)

Table 4.1B: Promising entries with low susceptibility index (SI≤5.1) and high promising index in NSN1 to sheath blight, *Kharif*-2022

P.No.	IET No.	Location/Frequency of scores (0-9)																										
		ADT	BNK	CHN	CHP	CBT	CTK	GNV	IIRR	KUL	LDN	MND	MTU	MSD	MNC	NVS	NDL	PNT	PTB	RPR	TTB	VRN	SI	Total	<=3	PI (<=3)	<=5	PI (<=5)
84	ZC	1	3	3	5	3	7	7	7	5	5	3	5	5	1	5	7	5	3	5	7	3	**4.5**	**21**	**8**	**38**	**16**	**76**
66	30078	0	5	3	5	3	3	7	7	5	7	5	5	7	1	3	5	5	5	7	5	3	**4.6**	**21**	**7**	**33**	**16**	**76**
204	29351	1	5	3	3	3	9	7	7	7	5	5	5	5	0	5	7	3	5	5	5	1	**4.6**	**21**	**7**	**33**	**16**	**76**
338	Tetep	3	5	5	5	3	5	5	5	5	5	-	7	5	0	5	7	5	3	3	9	-	**4.7**	**19**	**5**	**26**	**16**	**84**
211	29891	3	3	5	5	7	3	7	9	5	7	3	5	3	0	7	-	5	5	5	5	3	**4.8**	**20**	**7**	**35**	**15**	**75**
208	29935	1	5	5	5	5	9	7	7	7	7	5	5	3	0	7	-	5	5	5	1	1	**4.8**	**20**	**5**	**25**	**14**	**70**
59	30093	3	5	3	3	5	7	7	7	7	7	9	7	3	1	5	7	3	3	5	5	1	**4.9**	**21**	**8**	**38**	**13**	**62**
55	30106	0	7	5	3	3	9	7	7	5	7	7	5	5	0	5	7	5	5	5	3	3	**4.9**	**21**	**6**	**29**	**14**	**67**
237	29549	3	5	7	5	5	7	7	7	3	5	5	5	5	1	7	-	5	5	5	5	3	**5.0**	**20**	**4**	**20**	**15**	**75**
171	29833	0	9	3	7	7	3	7	7	5	5	5	7	3	1	7	-	3	5	7	5	5	**5.1**	**20**	**6**	**30**	**12**	**60**
128	30207	0	5	3	5	7	9	7	7	5	5	3	7	3	3	7	-	5	5	5	5	5	**5.1**	**20**	**5**	**25**	**14**	**70**
82	27908	1	5	5	7	3	7	7	5	5	5	3	7	5	0	5	7	5	5	7	-	7	**5.1**	**20**	**4**	**20**	**13**	**65**
67	30085	5	3	3	3	5	9	9	5	7	7	7	5	5	1	5	5	3	7	5	3	5	**5.1**	**21**	**6**	**29**	**15**	**71**
253	29564	5	3	5	3	5	7	7	5	7	7	3	7	7	1	7	7	3	3	5	5	5	**5.1**	**21**	**6**	**29**	**13**	**62**
177	29860	9	5	3	5	5	7	7	5	7	7	5	5	3	1	5	7	3	3	5	5	5	**5.1**	**21**	**5**	**24**	**15**	**71**
74	29301	1	7	5	7	3	1	7	7	3	7	7	5	5	3	5	7	5	5	7	5	5	**5.1**	**21**	**5**	**24**	**13**	**62**
79	29284	5	9	3	3	3	5	7	7	7	7	5	-	5	1	5	5	5	5	5	5	5	**5.1**	**20**	**4**	**20**	**15**	**75**
334	Swarnadhan	5	7	5	5	7	5	7	5	7	7	7	5	5	5	5	7	5	5	5	5	5	**5.7**	**21**	**0**	**0**	**14**	**67**
328	TN1	-	7	7	5	7	7	9	9	9	7	5	7	7	7	7	7	7	9	7	9	5	**7.2**	**20**	**0**	**0**	**3**	**15**
331	IR-50	9	5	9	7	7	5	7	9	9	9	7	7	7	7	7	7	7	7	7	-	5	**7.2**	**20**	**0**	**0**	**3**	**15**
LSI		**5.2**	**5.2**	**6.2**	**5.9**	**5.6**	**7.1**	**7.6**	**6.8**	**7.8**	**6.9**	**5.7**	**6.6**	**6.1**	**5.6**	**6.0**	**6.7**	**5.3**	**6.8**	**6.2**	**7.4**	**4.9**	-	-	-	-	-	-

(SI- Susceptibility Index; Promising Index (PI) based on percentage of locations the entry has scored ≤3* and ≤5**)

Table 4.2A: Location severity index and frequency distribution of sheath blight disease score for NSN-2 entries, *Kharif*-2022

Score/Location	Location/Frequency of scores (0-9)																			
	ADT	**BNK**	**CHP**	**CBT**	**CTK**	**GNV**	**IIRR**	**KUL**	**LDN**	**MND**	**MTU**	**MSD**	**MNC**	**NVS**	**PNT**	**PTN**	**PTB**	**RPR**	**TTB**	**VRN**
0	26	0	0	0	0	0	0	0	0	1	0	0	91	0	0	181	0	0	0	0
1	37	0	3	70	7	0	0	0	0	22	0	0	46	0	0	209	0	0	3	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	76	41	95	228	29	1	2	7	0	188	0	18	78	57	33	136	39	7	16	102
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	102	253	252	197	56	14	112	43	21	198	93	205	131	242	343	20	166	361	168	314
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	68	223	177	76	227	367	393	289	482	104	393	223	153	263	165	7	249	198	255	95
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	204	54	18	0	244	177	62	203	56	45	0	113	24	8	14	0	102	5	111	19
Total	**513**	**571**	**545**	**571**	**563**	**559**	**569**	**542**	**559**	**558**	**486**	**559**	**523**	**570**	**555**	**553**	**556**	**571**	**553**	**530**
LSI	**6.0**	**6.0**	**5.4**	**4.0**	**7.4**	**7.6**	**6.8**	**7.5**	**7.1**	**4.9**	**6.6**	**6.5**	**4.2**	**5.8**	**5.6**	**1.4**	**6.5**	**5.7**	**6.6**	**5.1**
Screening	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**N**	**A**	**A**	**A**	**A**

(N- Natural; A- Artificial; LSI- Location Severity Index)

Table 4.2B: Promising entries with low susceptibility index (SI≤5.0) and high promising index in NSN-2 to sheath blight, *Kharif*-2022

P.No.	IET No.	Location/Frequency of scores (0-9)																								
		ADT	BNK	CHP	CBT	CTK	GNV	IIRR	KUL	LDN	MND	MTU	MSD	MNC	NVS	PNT	PTB	RPR	TTB	VRN	SI	Total	<=3	PI (<=3)	<=5	PI (<=5)
379	30805	5	7	5	3	5	7	3	5	7	3	5	5	0	7	5	3	5	5	3	**4.6**	**19**	**6**	**32**	**15**	**79**
569	Tetep	-	5	5	3	5	3	5	7	5	1	7	5	-	5	5	3	5	5	5	**4.6**	**17**	**4**	**24**	**15**	**88**
401	31087	5	3	7	5	9	7	7	5	7	3	5	5	1	3	3	5	7	1	3	**4.8**	**19**	**7**	**37**	**13**	**68**
243	31114	0	5	5	1	9	7	7	7	7	3	7	3	0	5	7	3	5	5	5	**4.8**	**19**	**6**	**32**	**12**	**63**
38	30867	3	3	5	3	7	7	5	5	7	3	7	7	0	5	5	3	7	5	-	**4.8**	**18**	**6**	**33**	**12**	**67**
248	30945	0	5	9	3	9	7	7	5	7	3	7	3	1	5	5	3	7	1	5	**4.8**	**19**	**7**	**37**	**12**	**63**
357	30783	5	5	7	1	3	7	7	5	7	7	5	7	0	3	5	5	5	5	3	**4.8**	**19**	**5**	**26**	**13**	**68**
14	30844	0	9	5	7	7	7	7	7	5	3	7	3	0	5	3	5	5	5	3	**4.9**	**19**	**6**	**32**	**12**	**63**
279	30973	-	3	3	5	3	7	7	9	7	3	7	7	0	7	3	3	5	5	5	**4.9**	**18**	**7**	**39**	**11**	**61**
283	30977	1	5	3	5	5	7	7	7	7	5	7	7	0	7	5	3	5	5	3	**4.9**	**19**	**5**	**26**	**12**	**63**
53	30881	0	9	3	7	7	7	7	7	5	1	7	5	0	7	3	3	7	5	-	**5.0**	**18**	**6**	**33**	**9**	**50**
282	30976	1	3	5	3	7	7	7	5	7	3	7	7	1	5	5	7	5	5	5	**5.0**	**19**	**5**	**26**	**12**	**63**
162	30891	3	5	7	1	7	7	7	7	7	1	7	5	1	7	5	3	5	5	5	**5.0**	**19**	**5**	**26**	**11**	**58**
394	29805	5	5	5	5	7	7	5	5	7	3	7	5	1	3	5	5	5	5	5	**5.0**	**19**	**3**	**16**	**15**	**79**
565	Swarnadhan	3	7	5	3	5	7	5	7	7	5	5	5	-	5	5	5	5	5	5	**5.2**	**18**	**2**	**11**	**14**	**78**
559	TN1	9	5	5	7	7	9	9	7	7	7	-	7	-	7	7	7	7	9	7	**7.2**	**17**	**0**	**0**	**2**	**12**
562	IR-50	9	5	5	7	7	9	9	9	9	7	7	7	-	7	7	7	7	9	5	**7.3**	**18**	**0**	**0**	**3**	**17**
LSI		**6.0**	**6.0**	**5.4**	**4.0**	**7.4**	**7.6**	**6.8**	**7.5**	**7.1**	**4.9**	**6.6**	**6.5**	**4.2**	**5.8**	**5.6**	**6.5**	**5.7**	**6.6**	**5.1**	**-**	**-**	**-**	**-**	**-**	**-**

(SI- Susceptibility Index; Promising Index (PI) based on percentage of locations the entry has scored ≤3* and ≤5**)

Table 4.3A: Location severity index and frequency distribution of sheath blight disease score for NSN-H entries, *Kharif*-2022

Score/Location	Location/Frequency of scores (0-9)		
	CTK	IIRR	PNT
0	0	0	0
1	2	0	0
2	0	0	0
3	8	0	23
4	0	0	0
5	22	41	71
6	0	0	0
7	42	65	19
8	0	0	0
9	38	8	1
Total	**114**	**114**	**114**
LSI	**6.9**	**6.4**	**5.0**
Screening	**A**	**A**	**A**

(N- Natural; A- Artificial; LSI- Location Severity Index)

Table 4.3B: Promising entries with low susceptibility index (SI≤5.0) and high promising index in NSN-H to sheath blight, *Kharif*-2022

P.No.	IET No.	Location/Frequency of scores (0-9)								
		CTK	IIRR	PNT	SI	Total	<=3	PI (<=3)	<=5	PI (<=5)
24	28896	3	5	3	3.7	**3**	**2**	**67**	**3**	**100**
3	Vivekdhan 62 (NC)	5	5	3	4.3	**3**	**1**	**33**	**3**	**100**
7	ZC	3	5	5	4.3	**3**	**1**	**33**	**3**	**100**
50	30499	5	5	3	4.3	**3**	**1**	**33**	**3**	**100**
89	29654	3	5	5	4.3	**3**	**1**	**33**	**3**	**100**
106	IR-64	3	5	5	4.3	**3**	**1**	**33**	**3**	**100**
85	30518	7	5	3	5.0	**3**	**1**	**33**	**2**	**67**
68	30531	1	7	7	5.0	**3**	**1**	**33**	**1**	**33**
30	28887	5	5	5	5.0	**3**	**0**	**0**	**3**	**100**
62	30526	-	5	5	5.0	**2**	**0**	**0**	**2**	**100**
80	30514	5	5	5	5.0	**3**	**0**	**0**	**3**	**100**
97	30504	5	5	5	5.0	**3**	**0**	**0**	**3**	**100**
110	Swarnadhan	5	5	5	5.0	**3**	**0**	**0**	**3**	**100**
114	Tetep	5	5	5	5.0	**3**	**0**	**0**	**3**	**100**
102	TN1	7	9	5	7.0	**3**	**0**	**0**	**1**	**33**
105	IR-50	5	9	5	6.3	**3**	**0**	**0**	**2**	**67**
LSI		**6.9**	**6.4**	**5.0**	**-**	**-**	**-**	**-**	**-**	**-**

(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 22 varied locations. The entries were screened by artificial inoculation at most of the centres except Arundhatinagar and Patna 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 Titabar (7.6), Ludhiana (7.5), Gangavathi (7.4), NRRI (7.2) and Aduthurai (7.1); High (LSI 6-7) at IIRR (6.9), Pattambi (6.8), Maruteru (6.7), Masodha (6.6), Kaul (6.6) Bankura (6.4), Chinsurah (6.4), New Delhi (6.3), Raipur (6.0); moderate (LSI 3-6) at Navasari (5.9), Moncompu (5.8), Pantnagar (5.1), Varanasi (5.2), Coimbatore (5.4), Mandya (3.9) and Arundhatinagar (3.7), and low at (LSI <3) at Patna (2.0). Therefore, the data from those centres having LSI ≤3.0 was not considered for selecting the promising entries. None of the entries were showed resistant against sheath blight based on the 0-9 disease screening scale (Table 4.4B). IET No 29616 showed high level of tolerance compared to Tetep. **Some of the selected promising entries are namely, IET 30575, 30621, 30617, 30602, 30605, 30603, 30625, 30609, 29758 and 30623**.

- **DSN**

The Donor Screening Nursery (DSN) was evaluated for resistance to sheath blight at 21 disease hot spot locations in India. The entries were screened by artificial inoculation at all the centers except Patna, 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 (7.6), Titabar (7.3), and Ludhiana (7.1); high (LSI 6-7) at Cuttack (6.9), New Delhi (6.6), Kaul (6.5), Maruteru (6.4), IIRR (6.3), Masodha (6.3), Aduthurai (6.0), and Bankura (6.0); moderate (LSI 3-6) at Raipur (5.9), Pattambi (5.7), Chiplima (5.6), Navasari (5.5), Pantnagar (5.3), Varanasi (5.2), Coimbatore (4.6), Moncompu (4.4), and Mandya (4.0); and low (LSI >3) at Patna (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 to be better than Tetep and promising (≤5) namely, VP-R36, 19082, MS-ISM-DIG-1, VP-D5, VP-R298, VP-D9, VP-R294, UB 1066, VP-R297, VP-R262, VP-R109, VP-R158, VP-R134, CB17135, MS-ISM-DIG-4, RP-Bio Patho-5, CO52, KNM 12346, 19273, CB18586 and CB17533** (Table 4.5B).

Table 4.4A: Location severity index and frequency distribution of sheath blight disease score for NHSN entries, *Kharif*-2022

Score/Location	Location/Frequency of scores (0-9)																					
	ADT	**ARD**	**BNK**	**CHN**	**CBT**	**CTK**	**GNV**	**IIRR**	**KUL**	**LDN**	**MND**	**MTU**	**MSD**	**MNC**	**NVS**	**NDL**	**PNT**	**PTN**	**PTB**	**RPR**	**TTB**	**VRN**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	35	0	0	0	0
1	1	8	0	0	0	2	0	0	0	0	12	0	0	3	0	0	0	32	0	0	0	2
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	7	46	5	9	18	5	0	0	2	0	63	0	8	6	5	1	19	22	3	1	0	21
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	28	35	42	36	56	15	6	20	30	4	20	18	39	26	55	36	68	18	27	55	17	58
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	19	3	47	44	35	46	75	76	67	77	9	75	30	56	50	71	23	5	61	56	46	22
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	51	0	18	23	3	42	31	16	13	29	8	3	35	12	2	2	2	0	21	0	49	8
Total	**106**	**92**	**112**	**112**	**112**	**110**	**112**	**112**	**112**	**110**	**112**	**96**	**112**	**112**	**112**	**110**	**112**	**112**	**112**	**112**	**112**	**111**
LSI	**7.1**	**3.7**	**6.4**	**6.4**	**5.4**	**7.2**	**7.4**	**6.9**	**6.6**	**7.5**	**3.9**	**6.7**	**6.6**	**5.8**	**5.9**	**6.3**	**5.1**	**2.0**	**6.8**	**6.0**	**7.6**	**5.2**
Screening	**A**	**N**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**N**	**A**	**A**	**A**	**A**	**A**	**A**	**N**	**A**	**A**	**A**	**A**

(N- Natural; A- Artificial; LSI- Location Severity Index)

Table 4.4B: Promising entries with low susceptibility index (SI≤5.6) and high promising index in NHSN to sheath blight, *Kharif*-2022

P. No	IET No.	Location/Frequency of scores (0-9)																										
		ADT	**ARD**	**BNK**	**CHN**	**CBT**	**CTK**	**GNV**	**IIRR**	**KUL**	**LDN**	**MND**	**MTU**	**MSD**	**MNC**	**NVS**	**NDL**	**PNT**	**PTB**	**RPR**	**TTB**	**VRN**	**SI**	**Total**	**<=3**	**PI (<=3)**	**<=5**	**PI (<=5)**
108	Swarnadhan	1	5	7	7	5	5	9	5	3	7	3	5	5	0	5	7	5	3	5	5	3	**4.8**	**21**	**6**	**29**	**16**	**76**
109	Ajaya	5	3	5	7	3	3	7	7	7	7	3	-	5	0	5	7	5	5	5	5	5	**5.0**	**20**	**5**	**25**	**14**	**70**
1	29616	9	1	5	3	5	5	7	5	5	7	3	7	3	7	5	5	3	7	5	7	1	**5.0**	**21**	**6**	**29**	**14**	**67**
112	Tetep	-	3	5	5	3	5	7	5	7	7	1	7	5	0	5	7	5	5	7	9	5	**5.2**	**20**	**4**	**20**	**13**	**65**
70	30575	5	3	5	7	3	9	7	7	7	7	3	5	9	1	5	5	5	5	5	5	1	**5.2**	**21**	**5**	**24**	**14**	**67**
27	30621	3	5	5	3	7	9	7	7	5	7	5	7	5	7	5	5	3	3	5	5	3	**5.3**	**21**	**5**	**24**	**14**	**67**
22	30617	9	5	5	5	5	7	7	5	5	7	1	7	5	3	5	7	5	3	5	5	5	**5.3**	**21**	**3**	**14**	**15**	**71**
5	30602	5	3	5	5	5	9	9	7	7	5	3	7	3	3	5	7	5	7	5	7	3	**5.5**	**21**	**5**	**24**	**13**	**62**
8	30605	3	1	7	5	7	1	9	7	7	7	1	7	3	5	5	7	5	5	7	7	9	**5.5**	**21**	**5**	**24**	**10**	**48**
6	30603	5	3	7	3	7	7	7	7	5	5	1	7	5	3	5	7	5	5	5	7	9	**5.5**	**21**	**4**	**19**	**12**	**57**
33	30625	9	3	9	5	7	3	7	5	9	7	3	-	3	0	5	5	5	7	7	7	5	**5.6**	**20**	**5**	**25**	**11**	**55**
13	30609	3	3	5	7	5	7	7	5	7	7	3	-	5	3	5	7	5	7	5	9	7	**5.6**	**20**	**4**	**20**	**11**	**55**
42	29758	5	-	7	5	5	5	7	7	5	7	3	7	5	5	7	5	3	5	7	7	5	**5.6**	**20**	**2**	**10**	**12**	**60**
29	30623	5	3	7	5	7	5	7	7	7	7	3	5	5	0	7	5	5	9	7	7	5	**5.6**	**21**	**3**	**14**	**11**	**52**
100	TN1	9	7	7	9	9	7	7	9	7	7	9	9	7	7	7	7	9	5	7	9	7	**7.7**	**21**	**0**	**0**	**1**	**5**
103	IR-50	9	7	7	9	7	9	7	9	7	-	7	9	7	7	5	7	7	7	7	9	7	**7.5**	**20**	**0**	**0**	**1**	**5**
LSI		**7.1**	**3.7**	**6.4**	**6.4**	**5.4**	**7.2**	**7.4**	**6.9**	**6.6**	**7.5**	**3.9**	**6.7**	**6.6**	**5.8**	**5.9**	**6.3**	**5.1**	**6.8**	**6.0**	**7.6**	**5.2**	-	-	-	-	-	-

(SI- Susceptibility Index; Promising Index (PI) based on percentage of locations the entry has scored ≤3* and ≤5**)

Table 4.5A: Location severity index and frequency distribution of sheath blight disease score for DSN entries, *Kharif*-2022

Score/ Location	Location/Frequency of scores (0-9)																				
	ADT	**BNK**	**CHP**	**CBT**	**CTK**	**GNV**	**IIRR**	**KUL**	**LDN**	**MND**	**MTU**	**MSD**	**MNC**	**NVS**	**NDL**	**PNT**	**PTN**	**PTB**	**RPR**	**TTB**	**VRN**
0	14	0	0	0	0	0	0	0	0	0	0	0	29	0	0	0	131	0	0	0	0
1	10	0	16	2	3	0	0	0	0	34	0	0	27	0	0	0	67	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	34	9	42	76	15	1	22	11	1	110	0	13	36	27	0	33	15	37	5	9	39
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	40	112	65	121	57	15	50	66	24	41	69	97	53	118	48	138	16	83	123	19	121
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	20	87	57	28	68	129	140	112	163	19	143	75	64	84	143	47	0	92	92	34	38
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	88	21	44	2	82	84	17	32	41	24	6	43	16	0	9	11	0	13	9	53	11
Total	**206**	**229**	**224**	**229**	**225**	**229**	**229**	**221**	**229**	**228**	**218**	**228**	**225**	**229**	**200**	**229**	**229**	**225**	**229**	**115**	**209**
LSI	**6.0**	**6.0**	**5.6**	**4.6**	**6.9**	**7.6**	**6.3**	**6.5**	**7.1**	**4.0**	**6.4**	**6.3**	**4.4**	**5.5**	**6.6**	**5.3**	**0.8**	**5.7**	**5.9**	**7.3**	**5.2**
Screening	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**N**	**A**	**A**	**A**	**A**

(N- Natural; A- Artificial; LSI- Location Severity Index)

Table 4.5B: Promising entries with low susceptibility index (SI≤5.0 and high promising index in DSN to sheath blight, *Kharif*-2022

P.No.	Designation	Location/Frequency of scores (0-9)																									
		ADT	BNK	CHP	CBT	CTK	GNV	IIRR	KUL	LDN	MND	MTU	MSD	MNC	NVS	NDL	PNT	PTB	RPR	TTB	VRN	SI	Total	<=3	PI (<=3)	<=5	PI (<=5)
123	VP-R36-SHB	0	5	3	5	7	5	3	5	7	3	7	7	0	3	7	5	3	5	-	-	**4.4**	**18**	**7**	**39**	**13**	**72**
48	19082	0	5	1	5	9	7	5	5	5	1	7	5	1	3	5	5	5	7	5	5	**4.6**	**20**	**5**	**25**	**16**	**80**
51	MS-ISM-DIG-1	-	7	-	5	5	7	5	-	5	3	-	3	1	5	5	5	-	7	3	3	**4.6**	**15**	**5**	**33**	**12**	**80**
169	VP-D5-SHB	3	5	5	5	5	5	3	7	7	3	7	5	1	3	5	3	7	5	-	-	**4.7**	**18**	**6**	**33**	**14**	**78**
163	VP-R298-SHB	3	5	3	3	7	5	3	5	7	5	5	7	3	5	7	3	5	5	-	3	**4.7**	**19**	**7**	**37**	**15**	**79**
172	VP-D9-SHB	0	9	5	3	5	9	3	7	7	3	-	3	1	5	7	3	5	5	-	5	**4.7**	**18**	**7**	**39**	**13**	**72**
160	VP-R294-SHB	3	7	5	3	5	5	3	5	7	1	5	7	0	3	9	5	7	5	-	-	**4.7**	**18**	**6**	**33**	**13**	**72**
59	UB 1066	-	5	3	5	9	3	7	5	7	1	5	5	0	5	7	3	5	5	5	-	**4.7**	**18**	**5**	**28**	**14**	**78**
162	VP-R297-SHB	0	7	7	3	5	7	3	9	7	1	7	3	1	5	7	5	3	5	-	5	**4.7**	**19**	**7**	**37**	**12**	**63**
156	VP-R262-SHB	-	7	3	3	5	7	3	7	7	3	7	5	3	5	7	5	3	3	-	3	**4.8**	**18**	**8**	**44**	**12**	**67**
135	VP-R109-SHB	3	7	5	3	5	5	3	5	7	1	7	7	3	5	5	3	7	5	-	-	**4.8**	**18**	**6**	**33**	**13**	**72**
149	VP-R158-SHB	1	5	5	3	5	5	3	5	7	7	5	7	1	5	7	5	5	5	-	-	**4.8**	**18**	**4**	**22**	**14**	**78**
144	VP-R134-SHB	3	7	1	3	5	7	3	7	7	7	5	7	1	5	7	5	3	5	-	3	**4.8**	**19**	**7**	**37**	**12**	**63**
1	CB17135	5	7	7	1	7	7	5	5	7	7	5	3	0	5	5	5	3	5	5	3	**4.9**	**20**	**5**	**25**	**14**	**70**
53	MS-ISM-DIG-4	-	3	7	5	1	7	7	-	7	3	-	5	1	5	7	5	5	5	5	5	**4.9**	**17**	**4**	**24**	**12**	**71**
76	RP-Bio Patho-5	5	7	3	5	-	5	5	7	5	1	-	5	5	5	5	5	5	5	5	5	**4.9**	**18**	**2**	**11**	**16**	**89**
6	CO52	0	5	7	3	9	7	7	5	7	9	7	5	1	3	7	3	3	5	3	3	**5.0**	**20**	**8**	**40**	**12**	**60**
98	KNM 12346	3	5	3	3	7	7	7	5	5	1	7	5	0	7	7	5	5	7	5	5	**5.0**	**20**	**5**	**25**	**13**	**65**
47	19273	-	5	1	3	3	7	7	7	5	3	5	5	3	3	7	5	7	7	7	-	**5.0**	**18**	**6**	**33**	**11**	**61**
11	CB18586	3	5	5	3	7	7	7	3	5	3	7	5	3	5	7	5	3	7	5	5	**5.0**	**20**	**6**	**30**	**14**	**70**
26	CB17533	3	5	3	1	3	9	7	7	7	5	5	7	5	3	5	5	7	5	5	3	**5.0**	**20**	**6**	**30**	**14**	**70**
227	Tetep	1	7	7	5	5	7	5	7	7	1	7	7	0	5	7	5	3	5	-	5	**5.1**	**19**	**4**	**21**	**11**	**58**
223	Swarnadhan	5	7	7	5	9	9	5	7	7	3	7	7	0	5	7	5	3	5	-	5	**5.7**	**19**	**3**	**16**	**10**	**53**
217	TN1	9	5	7	9	5	7	9	9	7	7	9	9	9	7	7	9	9	7	-	7	**7.7**	**19**	**0**	**0**	**2**	**11**
220	IR-50	9	5	9	9	9	9	9	9	9	5	9	9	9	5	7	9	9	7	-	5	**7.9**	**19**	**0**	**0**	**4**	**21**
LSI		**6.0**	**6.0**	**5.6**	**4.6**	**6.9**	**7.6**	**6.3**	**6.5**	**7.1**	**4.0**	**6.4**	**6.3**	**4.4**	**5.5**	**6.6**	**5.3**	**5.7**	**5.9**	**7.3**	**5.2**	**-**	**-**	**-**	**-**	**-**	**-**

(SI- Susceptibility Index; Promising Index (PI) based on percentage of locations the entry has scored ≤3* and ≤5**)

TRIAL No.5: SCREENING FOR SHEATH ROT RESISTANCE

- **NSN 1**

The National Screening Nursery 1 consisting of 338 entries were evaluated against sheath rot disease at 14 locations across the country. Screening was done artificially in some centers viz., Chinsurah, Coimbatore, Navasari, Pusa, Rajendranagar, 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, Bankura, Cuttack, Karjat, Lonavala, Mandya and Nawagam.

High disease pressure was recorded at Chinsurah (6.7) and Raipur (6.2); moderate disease pressure at Navasari (5.9), Cuttack (5.5), Nawagam (5.4), Bnakura (5.0), Coimbatore (4.9), Aduthurai (4.3), Mandya (3.7) and Rajendranagar (3.4). The disease pressure was very low (LSI$\leq$ 3) at Pusa, Lonavala, Bankura and Titabar and hence the data from these centres were not considered for selecting the resistant entries for sheath rot. The frequency distribution of sheath rot scores are 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*-2022

Score	Location/Frequency of scores (0-9)													
	ADT	**BNK**	**CHN**	**CBT**	**CTK**	**KJT**	**LNV**	**MND**	**NVS**	**NWG**	**PSA**	**RPR**	**RNR**	**TTB**
0	113	232	5	0	47	0	8	5	0	0	22	0	131	0
1	12	29	5	7	0	262	147	81	0	0	95	0	1	213
2	0	0	0	0	0	0	3	8	0	0	0	0	0	0
3	36	66	22	73	8	4	139	121	18	49	156	2	46	65
4	0	0	0	0	0	0	0	5	0	0	0	0	0	0
5	24	10	88	194	104	33	37	59	169	179	51	159	71	20
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	30	0	111	61	64	19	0	22	131	107	3	150	78	5
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	102	0	107	1	69	16	0	33	20	1	0	27	11	0
Total	**317**	**337**	**338**	**336**	**292**	**334**	**334**	**334**	**338**	**336**	**327**	**338**	**338**	**303**
LSI	**4.3**	**0.8**	**6.7**	**4.9**	**5.5**	**2.1**	**2.3**	**3.7**	**5.9**	**5.4**	**2.6**	**6.2**	**3.4**	**1.8**
Screening method	**N**	**N**	**A**	**A**	**N**	**N**	**N**	**N**	**A**	**N**	**A**	**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# 30035, 29564, 29268, 30008, 29578,30020, 30252, 30247, 29349, 30022, 29741, 29549, 29409, 29411 and 30032**.

Table 5.1B: Promising entries with low susceptibility index (≤ 4.0) and high PI in NSN-1 to Sheath rot, *Kharif*-2022

S.No.	Entry no.	IET No.	Location/Frequency of scores (0-9)									SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
			ADT	CHN	CBT	CTK	MND	NVS	NWG	RPR	RNR						
14	4614	30035	1	3	3	-	4	5	3	7	0	**3.3**	**8**	**5**	**63**	**7**	**88**
253	6001	29564	0	0	3	-	3	5	5	7	3	**3.3**	**8**	**5**	**63**	**7**	**88**
77	4006	29268	-	7	3	0	1	5	5	5	0	**3.3**	**8**	**4**	**50**	**7**	**88**
4	4604	30008	0	0	5	7	1	7	5	5	0	**3.3**	**9**	**4**	**44**	**7**	**78**
255	6003	29578	0	1	5	0	5	7	7	5	0	**3.3**	**9**	**4**	**44**	**7**	**78**
8	4608	30020	0	3	7	-	1	7	5	5	0	**3.5**	**8**	**4**	**50**	**6**	**75**
241	5810	30252	0	1	5	-	1	9	7	5	0	**3.5**	**8**	**4**	**50**	**6**	**75**
242	5811	30247	0	5	1	-	1	7	5	9	0	**3.5**	**8**	**4**	**50**	**6**	**75**
205	4302	29349	0	7	5	0	3	9	3	5	0	**3.6**	**9**	**5**	**56**	**7**	**78**
9	4609	30022	3	5	5	5	2	3	3	7	0	**3.7**	**9**	**5**	**56**	**8**	**89**
200	4132	29741	0	7	5	5	1	5	3	7	0	**3.7**	**9**	**4**	**44**	**7**	**78**
237	5806	29549	0	5	3	5	1	7	5	7	0	**3.7**	**9**	**4**	**44**	**7**	**78**
36	4506	29409	0	5	5	7	1	5	5	5	0	**3.7**	**9**	**3**	**33**	**8**	**89**
31	4501	29411	0	3	3	5	1	7	5	5	5	**3.8**	**9**	**4**	**44**	**8**	**89**
20	4620	30032	0	5	5	7	2	7	3	5	0	**3.8**	**9**	**4**	**44**	**7**	**78**
328	**TN1**		-	7	5	9	5	7	7	7	7	**6.8**	**8**	**0**	**0**	**2**	**25**
LSI			**4.3**	**6.7**	**4.9**	**5.5**	**3.7**	**5.9**	**5.4**	**6.2**	**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 ≤5)

- **NSN-2**

The NSN -2 nursery consisting of 571 entries was evaluated only at 8 locations and screening was done under natural conditions at Aduthurai, Bankura, Mandya and Nawagam. Artificial screening was done at Coimbatore, Navasari, Pusa and Raipur. High disease pressure was recorded at Raipur (6.3), Aduthurai (6.2), Navasari (5.8) and Nawagam (5.7); moderate disease pressure at Coimabtore (4.1) and Mandya (4.2) and very low disease pressure at Pusa and Bankura and hence the data from these centres were 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# 30791, 31106, 31118, 30984, 30832, 31047 and 31032**.

Table 5.2A: Promising entries with low susceptibility index (≤ 4.0) and high PI in NSN-2 to Sheath rot disease, *Kharif*-2022

Score	Location/Frequency of scores (0-9)							
	ADT	**BNK**	**CBT**	**MND**	**NVS**	**NWG**	**PSA**	**RPR**
0	68	463	0	15	0	0	14	0
1	22	0	56	117	0	0	176	0
2	0	0	0	3	0	0	0	0
3	70	56	216	169	42	38	279	8
4	0	0	0	1	0	0	0	0
5	49	52	223	113	281	296	69	239
6	0	0	0	0	0	0	0	0
7	24	0	75	53	232	218	3	269
8	0	0	0	0	0	0	0	0
9	280	0	0	87	15	6	0	55
Total	**513**	**571**	**570**	**558**	**570**	**558**	**541**	**571**
LSI	**6.2**	**0.7**	**4.1**	**4.2**	**5.8**	**5.7**	**2.5**	**6.3**
Screening method	**N**	**N**	**A**	**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*-2022

P.No.	Entry No.	IET No.	Location/Frequency of scores (0-9)						SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
			ADT	CBT	MND	NVS	NWG	RPR						
99	5137	31032	1	3	0	7	3	3	**2.8**	**6**	**5**	**83**	**5**	**83**
117	5409	31047	3	3	1	5	3	5	**3.3**	**6**	**4**	**67**	**6**	**100**
2	4402	30832	0	3	3	5	5	5	**3.5**	**6**	**3**	**50**	**6**	**100**
291	5044	30984	0	3	3	5	5	5	**3.5**	**6**	**3**	**50**	**6**	**100**
311	6102	31118	0	3	1	5	7	5	**3.5**	**6**	**3**	**50**	**5**	**83**
234	5912	31106	0	5	1	5	5	5	**3.5**	**6**	**2**	**33**	**6**	**100**
365	4232	30791	0	5	1	5	5	5	**3.5**	**6**	**2**	**33**	**6**	**100**
134	5603	31060	3	3	3	3	5	5	**3.7**	**6**	**4**	**67**	**6**	**100**
343	4210	30770	3	3	1	5	5	5	**3.7**	**6**	**3**	**50**	**6**	**100**
158	5627	31080	3	1	1	7	5	5	**3.7**	**6**	**3**	**50**	**5**	**83**
385	4253	30811	1	3	1	5	7	5	**3.7**	**6**	**3**	**50**	**5**	**83**
245	5923	31115	9	1	1	3	-	5	**3.8**	**5**	**3**	**60**	**4**	**80**
523	3629	30661	-	3	1	3	7	5	**3.8**	**5**	**3**	**60**	**4**	**80**
314	6105	31121	1	5	1	5	-	7	**3.8**	**5**	**2**	**40**	**4**	**80**
159	5628	31081	0	5	1	5	3	9	**3.8**	**6**	**3**	**50**	**5**	**83**
422	3910	30711	0	3	3	7	5	5	**3.8**	**6**	**3**	**50**	**5**	**83**
127	5419	31055	0	1	3	7	5	7	**3.8**	**6**	**3**	**50**	**4**	**67**
142	5611	31067	0	3	1	7	7	5	**3.8**	**6**	**3**	**50**	**4**	**67**
313	6104	31120	0	3	1	7	5	7	**3.8**	**6**	**3**	**50**	**4**	**67**

P.No.	Entry No.	IET No.	Location/Frequency of scores (0-9)						SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
			ADT	CBT	MND	NVS	NWG	RPR						
88	5126	31023	0	5	3	5	5	5	**3.8**	**6**	**2**	**33**	**6**	**100**
32	4432	30861	0	1	5	7	5	5	**3.8**	**6**	**2**	**33**	**5**	**83**
42	4443	30871	0	5	1	5	5	7	**3.8**	**6**	**2**	**33**	**5**	**83**
258	5011	30954	0	7	1	5	5	5	**3.8**	**6**	**2**	**33**	**5**	**83**
345	4212	30772	0	5	1	7	5	5	**3.8**	**6**	**2**	**33**	**5**	**83**
368	4235	30794	0	1	5	5	5	7	**3.8**	**6**	**2**	**33**	**5**	**83**
559	**TN1**		9	5	5	7	7	7	**6.7**	**6**	**0**	**0**	**2**	**33**
558	**HR-12**		9	3	9	7	7	9	**7.3**	**6**	**1**	**17**	**1**	**17**
LSI			**6.2**	**4.1**	**4.2**	**5.8**	**5.7**	**6.3**						

(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)

- **NSN -H**

Screening for sheath rot under NSN- hills was conducted at only at Karjat and Lonavala under natural infection condition. The location severity index at Karjat was 4.7 and at in Lonavala 1.6. The frequency distribution of scores at Karjat centre indicated that, 26 entries showed 1 score, 21 entries showed score of 7 and 11 entries scored 9 and in Lonavala, all entries showed very less score of below 5 (Table 5.3A).

Table 5.3A: Promising entries with low susceptibility index (≤ 4.0) and high PI in NSN-H to Sheath rot disease, *Kharif*-2022

Score	Location/Frequency of scores (0-9)	
	KJT	**LNV**
0	0	12
1	26	65
2	0	1
3	1	31
4	0	0
5	13	5
6	0	0
7	21	0
8	0	0
9	11	0
Total	**72**	**114**
LSI	**4.7**	**1.6**
Screening	**N**	**N**

(LSI-Location severity Index; N-Natural; A-Artificial)

- **NHSN**

The NHSN trial consisted of 112 entries including checks. The entries were evaluated at 14 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 (8.3); high at Raipur (6.8), Navasari (5.9), Nawagam (5.4) and Coimbatore (5.3); moderate disease pressure at Chinsurah (4.8), Mandya (4.7), Karjat (3.5) and Cuttack (3.3). The disease pressure was very low (LSI≤ 3) at Pusa, Rajendranagar, Titabar and Bankura, 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 4.5 are IET Nos.30306, 30578, 30604, 30601, 30630, 30606, 30577, 30602, 30608, 30611 and 30585** (Table 5.4B).

Table 5.4A: Location severity index (LSI) and frequency distribution of Sheath rot scores of NHSN, *Kharif*' 2022

Score	Location/Frequency of scores (0-9)													
	ADT	**BNK**	**CHN**	**CBT**	**CTK**	**KJT**	**LNV**	**MND**	**NVS**	**NWG**	**PSA**	**RPR**	**RNR**	**TTB**
0	1	78	5	0	38	0	7	0	0	0	1	0	41	0
1	2	13	12	0	0	55	36	4	0	0	33	0	1	74
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	3	20	18	19	1	6	63	38	5	5	57	0	41	27
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	5	1	41	59	28	9	6	51	51	79	20	36	23	4
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	4	0	28	31	13	4	0	10	55	26	0	53	4	1
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	91	0	8	3	5	21	0	9	1	2	0	23	2	0
Total	**106**	**112**	**112**	**112**	**85**	**95**	**112**	**112**	**112**	**112**	**111**	**112**	**112**	**106**
LSI	**8.3**	**0.7**	**4.8**	**5.3**	**3.3**	**3.5**	**2.3**	**4.7**	**5.9**	**5.4**	**2.7**	**6.8**	**2.5**	**1.7**
Screening method	**N**	**N**	**A**	**A**	**N**	**N**	**N**	**N**	**A**	**N**	**A**	**A**	**A**	**A**

(LSI-Location severity Index; N-Natural; A-Artificial)

Table 5.4B: Promising entries with low susceptibility index (≤ 4.0) and high PI in NSN-H to Sheath rot disease, *Kharif*-2022

S.No.	Entry No.	IET No.	Location/Frequency of scores (0-9)									SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
			ADT	CHN	CBT	CTK	KJT	MND	NVS	NWG	RPR						
6	3206	30603	9	3	3	0	1	1	3	5	7	**3.6**	**9**	**6**	**67**	**7**	**78**
74	3107	30578	5	1	3	0	1	5	9	3	7	**3.8**	**9**	**5**	**56**	**7**	**78**
7	3207	30604	9	1	5	0	1	3	5	5	7	**4.0**	**9**	**4**	**44**	**7**	**78**
3	3203	30601	3	0	5	7	1	3	5	7	7	**4.2**	**9**	**4**	**44**	**6**	**67**
40	3314	30630	9	5	3	0	1	5	5	5	5	**4.2**	**9**	**3**	**33**	**8**	**89**
9	3209	30606	5	3	5	0	1	5	7	7	5	**4.2**	**9**	**3**	**33**	**7**	**78**
73	3106	30577	9	1	5	-	1	3	5	5	5	**4.3**	**8**	**3**	**38**	**7**	**88**
5	3205	30602	1	3	3	5	5	3	5	5	9	**4.3**	**9**	**4**	**44**	**8**	**89**
12	3212	30608	3	5	5	3	1	5	5	5	7	**4.3**	**9**	**3**	**33**	**8**	**89**
15	3215	30611	9	3	7	0	1	5	5	5	5	**4.4**	**9**	**3**	**33**	**7**	**78**
82	3115	30585	9	5	3	0	1	5	5	5	7	**4.4**	**9**	**3**	**33**	**7**	**78**
100	**TN1**		9	7	7	0	5	7	7	7	9	**6.4**	**9**	**1**	**11**	**2**	**22**
107	**Co-39**		9	7	5	7	9	5	7	7	7	**7.0**	**9**	**0**	**0**	**2**	**22**
LSI			**8.3**	**4.8**	**5.3**	**3.3**	**3.6**	**4.7**	**6.0**	**5.5**	**6.8**						

(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)

- **DSN**

The DSN trial consisted of 229 entries including checks were screened at 12 locations across the country. The frequency distribution of disease scores and the LSI are presented in Table Table 5.5A. The nursery was screened under natural conditions at Aduthurai, Bankura, Cuttack, Karjat, Lonavala, Mnadya, Nawagam and artificially done in remaining locations viz., Coimbattore, Navasari, Pusa, Rajendranagar and Raipur. Very high disease pressure was at Aduthurai (7.3); high disease pressure was recorded at Raipur (6.1), Navasari (5.8), Nawagam (5.3). Moderate disease pressure was recorded at Mnadya (4.5), Rajendranagar (4.2), Coimbattore (4.0) and very low disease pressure was observed Pusa (2.6), Cuttack (2.5), Lonavala (2.3), Karjat (2.0) and Bankura (0.6) during the season.

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≤5 are presented in the** Table 5.5B**. Some of the promising lines were 19208, CB 18573, RP-Patho-7, 19198, CB MSP9010 and VP-R36-SHB**.

Table 5.5A: Location severity index (LSI) and frequency distribution of Sheath rot scores of DSN, *Kharif*' 2022

Score	Location/Frequency of scores (0-9)											
	ADT	BNK	CBT	CTK	KJT	LNV	MND	NVS	NWG	PSA	RPR	RNR
0	23	188	0	95	0	9	0	0	0	5	0	61
1	2	0	13	0	161	70	50	0	0	68	0	4
2	0	0	0	0	3	0	0	0	0	0	0	0
3	9	32	101	5	20	146	57	11	22	94	3	33
4	0	0	0	0	0	0	0	0	0	0	0	0
5	17	9	104	56	5	2	58	118	146	36	111	46
6	0	0	0	0	0	0	0	0	0	0	0	0
7	6	0	11	15	8	0	28	94	61	0	96	71
8	0	0	0	0	0	0	0	0	0	0	0	0
9	149	0	0	3	12	0	35	6	0	0	19	14
Total	**206**	**229**	**229**	**174**	**209**	**227**	**228**	**229**	**229**	**203**	**229**	**229**
LSI	**7.3**	**0.6**	**4.0**	**2.5**	**2.0**	**2.3**	**4.5**	**5.8**	**5.3**	**2.6**	**6.1**	**4.2**
Screening method	**N**	**N**	**A**	**N**	**N**	**N**	**N**	**A**	**N**	**A**	**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 disease, *Kharif*-2022

P. No.	Designation	Location/Frequency of scores (0-9)							SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
		ADT	CBT	MND	NVS	NWG	RPR	RNR						
46	19208	-	1	1	5	5	5	0	**2.8**	**6**	**3**	**50**	**6**	**100**
18	CB18573	5	1	1	5	3	9	0	**3.4**	**7**	**4**	**57**	**6**	**86**
66	RP-Patho-7	0	1	3	5	5	5	7	**3.7**	**7**	**3**	**43**	**6**	**86**
42	19198	-	5	1	5	5	7	0	**3.8**	**6**	**2**	**33**	**5**	**83**
38	CB MSP9 010	9	3	1	5	5	5	0	**4.0**	**7**	**3**	**43**	**6**	**86**
123	VP-R36-SHB	0	3	3	5	7	5	5	**4.0**	**7**	**3**	**43**	**6**	**86**
87	C101 A51	5	3	1	5	7	5	3	**4.1**	**7**	**3**	**43**	**6**	**86**
170	VP-D6-SHB	5	3	1	7	5	5	3	**4.1**	**7**	**3**	**43**	**6**	**86**
21	CB17537	-	3	3	5	7	7	0	**4.2**	**6**	**3**	**50**	**4**	**67**
41	CB 06 535	-	5	1	5	7	7	0	**4.2**	**6**	**2**	**33**	**4**	**67**
47	19273	-	5	1	7	5	7	0	**4.2**	**6**	**2**	**33**	**4**	**67**
168	VP-D4-SHB	9	3	1	5	3	9	0	**4.3**	**7**	**4**	**57**	**5**	**71**
34	CB MSP9 006	9	1	1	5	5	9	0	**4.3**	**7**	**3**	**43**	**5**	**71**
111	CRR 771-B-B-18	9	3	1	5	5	7	0	**4.3**	**7**	**3**	**43**	**5**	**71**

P. No.	Designation	Location/Frequency of scores (0-9)							SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
		ADT	CBT	MND	NVS	NWG	RPR	RNR						
167	VP-D1-SHB	9	3	1	7	5	5	0	**4.3**	**7**	**3**	**43**	**5**	**71**
212	CGR-16-54	9	3	1	5	5	7	0	**4.3**	**7**	**3**	**43**	**5**	**71**
48	19082	0	5	3	5	7	5	5	**4.3**	**7**	**2**	**29**	**6**	**86**
208	CGR-8	9	5	1	5	5	5	0	**4.3**	**7**	**2**	**29**	**6**	**86**
136	VP-R111-SHB	-	3	1	3	7	5	7	**4.3**	**6**	**3**	**50**	**4**	**67**
55	MS-ISM-DIG-10	-	5	5	5	3	3	5	**4.3**	**6**	**2**	**33**	**6**	**100**
59	UB 1066	-	5	3	3	5	5	5	**4.3**	**6**	**2**	**33**	**6**	**100**
44	19279	-	5	3	5	7	5	1	**4.3**	**6**	**2**	**33**	**5**	**83**
20	CB18536	9	3	1	5	3	7	3	**4.4**	**7**	**4**	**57**	**5**	**71**
95	KNM 13489	9	3	1	5	5	5	3	**4.4**	**7**	**3**	**43**	**6**	**86**
214	CGR-19-68	9	3	1	5	5	5	3	**4.4**	**7**	**3**	**43**	**6**	**86**
45	19081	-	5	5	5	7	5	0	**4.5**	**6**	**1**	**17**	**5**	**83**
218	**Vikramarya**	9	5	7	5	5	9	5	**6.4**	**7**	**0**	**0**	**4**	**57**
LSI		**7.3**	**4.0**	**4.5**	**5.8**	**5.3**	**6.1**	**4.2**						

(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.6: SCREENING FOR BACTERIAL BLIGHT RESISTANCE

- **NSN-1**

The National Screening Nursery-1 (NSN-1) consisted of 338 entries including 78 different checks. The entries were evaluated at 28 locations across the country. The entries were evaluated through artificial inoculation at all the locations except Mandya where the entries were screened under natural conditions. The frequency distribution of the disease scores and location severity indices are presented in Table 6.1A**.** The disease pressure was very highhigh (LSI> 8) at Maruteru (8.2); high (LSI-6-8) at Pattambi (7.4), Chinsurah (6.7), Titabar (6.6), Cuttack (6.6), New Delhi (6.5), Chiplima (6.4), Ludhiana (6.3), IIRR (6.3), Pantnagar (6.2), Jagtiyal (6.1) and Navsari (6.1); moderate (LSI-3-6) at Raipur (5.9), Gangavathi (5.8), Nawagam (5.7), Aduthurai (5.7), Karjat (5.6), Varanasi (5.2), Chatha (5.2), Mashodha (5.1), Nellore (5.1), Sabour (5.0), Coimbatore (4.2), Warangal (3.7) and Moncompu (3.4) and very low (LSI < 3) at Karaikal (2.6), Patna (1..6) and Mandya (0.3).

For selection of the promising entries, data of Karaikal, Patna and Mandya were not considered as the disease pressure was very low (LSI below 3). The promising entries which exhibited an SI of less than 5 and which showed a disease score of 5 at or more than 65% locations are presented in Table 6.1B. **Some of the promising entries which performed better than resistant check Improved Samba Mahsuri and scored an SI less than 4.8 and showed a disease score of 5 at more than 65% locations were IET # 29861, 29748, 30827, 30037, 29214, 29000, 30241, 29576, 29574, 29935, 30827, 30830, 28997, 29878 and 29549. Some other promising entries which scored an SI of less than or equal to 5 were IET # 29714, 30240, 30828, 28524, 29539, 30822 and 30116**.

- **NSN-2**

The National Screening Nursery-2 (NSN-2) consisted of 571 entries including 59 different checks. The entries were evaluated at 21 locations across the country. The entries were evaluated using artificial inoculation at all the centres except Mandya where the entries were screened under natural conditions. The frequency distribution of the disease scores and location severity indices are presented in Table 6.2A**.** The disease pressure was very high (LSI >8) at Maruteru (8.9); high (LSI- 6-8) at Pantnagar (7.3), Pattambi (7.3), Gangavathi (7.2), Raipur (6.6), IIRR (6.5), Navsari (6.2) and Mashodha (6.2); moderate (LSI- 3-6) at Ludhiana (5.8), Nawagam (5.8), Cuttack (5.8), Varanasi (5.8), Titabar (5.5), Chatha (5.3), Coimbatore (5.3), Chiplima (5.1), Aduthurai (5.0), Sabour (4.4) and Moncompu (3.1) and very low (LSI < 3) at Patna (2.5) and Mandya (0.2).

For selection of the promising entries, data of Patna and Mandya were not considered as the disease pressure was very low (LSI below 3). The promising entries with SI less than 5 and the entries which exhibited a score of 5 at or more than 70% of the locations are presented in Table 6.2B**. Some of the highly promising entries which performed better than resistant check Improved Samba Mahsuri and which exhibited an SI of less than 4.6 and showed a disease score of 5 at more than 70% test locations are IET # 30835, 30971, 30984, 30755, 31140, 30819, 30881, 30831, 30886, 30740 and 30880. Some other promising entries which score an SI of less than 5 were IET # 30772, 30983, 30753, 30945, 30756, 31110, 30878, 30817 and 30968**.

Table 6.1A: Location severity index (LSI) and frequency distribution of bacterial blight scores of NSN 1, *Kharif*' 2022

Score	Location/Frequency of scores (0-9)													
	ADT	**CHT**	**CHN**	**CHP**	**CBT**	**CTK**	**GNV**	**IIRR**	**JGL**	**KRK**	**KJT**	**LDN**	**MND**	**MTU**
0	18	0	0	0	0	0	0	0	0	23	0	0	292	0
1	30	4	0	5	23	0	1	28	8	117	1	0	13	0
2	0	0	0	0	1	0	0	0	0	0	0	0	13	0
3	52	92	48	15	114	31	16	24	24	119	100	82	13	2
4	0	0	0	0	0	0	0	0	0	0	1	0	0	0
5	57	127	55	117	165	118	182	1	96	63	65	38	3	15
6	0	0	0	0	0	0	0	0	1	0	0	0	0	0
7	56	100	129	133	34	66	116	271	179	13	142	130	0	87
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	104	14	106	61	0	119	21	14	22	1	27	87	0	204
Total	**317**	**337**	**338**	**331**	**337**	**334**	**336**	**338**	**330**	**336**	**336**	**337**	**334**	**308**
LSI	**5.7**	**5.2**	**6.7**	**6.4**	**4.2**	**6.6**	**5.8**	**6.3**	**6.1**	**2.6**	**5.6**	**6.3**	**0.3**	**8.2**
Screening	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**N**	**A**

(LSI-Location severity Index; N-Natural; A-Artificial)

(Conti.) Location severity index (LSI) and frequency distribution of bacterial blight scores of NSN 1, *Kharif*' 2022

Score	Location/Frequency of scores (0-9)													
	MSD	**MNC**	**NVS**	**NWG**	**NLR**	**NDL**	**PNT**	**PTN**	**PTB**	**RPR**	**SBR**	**TTB**	**VRN**	**WGL**
0	0	85	0	0	0	0	0	112	0	0	10	0	0	0
1	0	34	1	0	33	11	8	111	0	0	53	0	0	99
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	56	57	19	33	101	0	30	84	0	19	75	23	46	101
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	201	91	123	158	70	129	112	26	42	157	54	93	202	66
6	0	0	0	0	0	0	0	0	1	0	0	0	0	0
7	74	68	182	138	77	124	117	4	178	156	81	118	78	43
8	0	0	0	0	0	0	0	0	1	0	0	0	0	0
9	1	3	13	7	52	74	68	1	113	6	65	82	2	22
Total	**332**	**338**	**338**	**336**	**333**	**338**	**335**	**338**	**335**	**338**	**338**	**316**	**328**	**331**
LSI	**5.1**	**3.4**	**6.1**	**5.7**	**5.1**	**6.5**	**6.2**	**1.6**	**7.4**	**5.9**	**5.0**	**6.6**	**5.2**	**3.7**
Screening	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**

(LSI-Location severity Index; N-Natural; A-Artificial)

Table 6.1B: NSN 1 entries with low susceptibility index (SI <5) with score ≤5 to BB at more than 65% of the locations

P. No.	Br. No.	IET No.	Locations/Score (0-9)																										SI	PI (<-3)*	PI (<-5)*
			ADT	CHT	CHN	CHP	CBT	CTK	GNV	IIRR	JGL	KJT	LDN	MTU	MSD	MNC	NVS	NWG	NLR	NDL	PNT	PTB	RPR	SBR	TTB	VRN	WGL				
176	4107	29861	0	5	3	3	3	9	7	3	3	3	3	5	5	0	5	5	3	5	3	7	7	1	3	3	1	**3.8**	**60.0**	**84.0**
202	4134	29748	3	5	3	5	1	5	5	1	5	7	3	7	7	3	7	5	1	7	5	5	5	1	-	5	1	**4.3**	**37.5**	**79.2**
292	4318	30827	0	3	7	7	5	5	5	1	7	5	3	3	3	0	5	5	3	5	5	7	5	9	3	5	1	**4.3**	**40.0**	**80.0**
22	4622	30037	1	5	3	5	3	7	7	1	5	3	7	-	5	3	7	7	5	5	3	7	3	3	5	3	1	**4.3**	**45.8**	**75.0**
100	3711	29214	5	3	5	3	7	5	7	7	3	5	3	7	3	3	5	5	3	5	1	9	5	3	3	5	1	**4.4**	**44.0**	**80.0**
89	4018	29000	1	1	3	5	1	9	7	1	5	3	7	5	5	0	7	7	5	9	5	7	5	5	3	5	1	**4.5**	**36.0**	**72.0**
235	5804	30241	3	3	7	7	5	3	5	7	5	3	7	7	5	0	7	3	3	5	3	7	7	1	5	3	1	**4.5**	**44.0**	**68.0**
258	6006	29576	0	5	9	5	1	5	5	7	5	5	3	7	3	1	5	7	3	7	5	5	5	0	5	5	5	**4.5**	**28.0**	**80.0**
256	6004	29574	7	1	3	5	3	3	5	3	5	1	3	3	3	7	5	7	1	9	9	9	5	5	3	7	1	**4.5**	**48.0**	**72.0**
208	4305	29935	3	5	7	3	3	5	5	7	5	7	5	7	5	0	5	5	3	9	5	5	5	1	5	3	3	**4.6**	**32.0**	**80.0**
282	5314	30827	0	5	3	5	5	7	5	1	5	3	3	5	5	5	7	7	5	1	5	7	9	7	3	5	3	**4.6**	**32.0**	**76.0**
283	5315	30830	0	5	3	7	7	5	7	1	5	7	3	7	5	5	9	5	3	1	5	5	7	3	3	7	1	**4.6**	**36.0**	**68.0**
86	4015	28997	3	3	3	3	3	5	9	3	7	3	5	7	5	3	5	5	3	5	5	7	5	9	5	5	1	**4.7**	**40.0**	**80.0**
203	4135	29878	0	5	3	7	5	9	5	3	7	7	3	5	5	0	5	5	5	5	5	5	5	5	5	7	1	**4.7**	**24.0**	**80.0**
237	5806	29549	1	3	5	7	3	5	5	7	5	5	3	7	7	0	7	5	3	5	3	9	7	7	3	5	1	**4.7**	**36.0**	**68.0**
221	3811	29714	9	3	3	7	5	3	5	1	7	3	3	7	5	5	3	5	3	7	5	7	5	3	5	5	5	**4.8**	**36.0**	**76.0**
238	5807	30240	5	3	5	5	5	5	5	7	3	9	7	7	5	0	7	7	1	5	3	9	7	1	3	5	1	**4.8**	**32.0**	**68.0**
293	4319	30828	0	5	3	7	5	7	5	1	5	7	3	5	5	1	7	7	5	1	5	7	5	9	9	5	1	**4.8**	**28.0**	**68.0**
210	4307	28524	1	5	7	7	3	9	7	7	3	5	7	7	5	0	5	5	5	5	5	7	5	1	5	3	3	**4.9**	**28.0**	**68.0**
109	4804	29539	1	3	7	5	5	5	7	7	5	3	5	9	3	3	7	5	3	9	5	7	5	5	5	3	1	**4.9**	**32.0**	**72.0**
285	4311	30822	0	5	3	5	7	5	7	3	5	3	3	5	7	5	5	5	1	5	9	7	5	9	5	5	5	**5.0**	**24.0**	**76.0**
65	4916	30116	3	5	5	9	5	5	5	7	3	7	5	7	5	0	5	5	1	5	5	7	7	5	5	5	3	**5.0**	**20.0**	**76.0**
328	**TN1 (S Check)**		**-**	**7**	**9**	**9**	**7**	**9**	**9**	**7**	**7**	**9**	**9**	**-**	**9**	**5**	**9**	**9**	**7**	**7**	**9**	**9**	**9**	**5**	**7**	**7**	**9**	**8.0**	**0.0**	**8.7**
336	**RP Bio 226 (R Check)**		**9**	**5**	**3**	**1**	**3**	**3**	**3**	**1**	**3**	**7**	**3**	**9**	**3**	**5**	**1**	**5**	**7**	**5**	**3**	**9**	**5**	**7**	**7**	**5**	**7**	**4.8**	**44.0**	**68.0**

(SI-Susceptibility Index; *Promising index (PI): Percentage of locations based on no. of locations where the entry had scored ≤3 and ≤5)

Table 6.2A: Location severity index (LSI) and frequency distribution of bacterial blight scores of NSN 2, *Kharif*' 2022

Score	Location/Frequency of scores (0-9)										
	ADT	**CHT**	**CHP**	**CBT**	**CTK**	**GNV**	**IIRR**	**LDN**	**MND**	**MTU**	**MSD**
0	61	0	0	0	0	0	0	0	497	0	0
1	39	0	17	22	0	1	34	0	25	0	0
2	0	0	0	0	0	0	0	0	18	0	0
3	111	94	139	131	45	2	26	154	15	0	41
4	0	0	0	0	0	0	0	0	0	0	0
5	95	284	226	218	297	63	10	115	3	2	241
6	0	0	0	0	0	0	0	0	0	0	0
7	70	176	128	149	178	375	444	198	0	20	187
8	0	0	0	1	0	0	0	0	0	0	0
9	137	6	35	50	45	118	27	94	0	419	90
Total	**513**	**560**	**545**	**571**	**565**	**559**	**541**	**561**	**558**	**441**	**559**
LSI	**5.0**	**5.3**	**5.1**	**5.3**	**5.8**	**7.2**	**6.5**	**5.8**	**0.2**	**8.9**	**6.2**
Screening	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**N**	**A**	**A**

(LSI-Location severity Index; N-Natural; A-Artificial)

(Conti.) Location severity index (LSI) and frequency distribution of bacterial blight scores of NSN 2, *Kharif*' 2022

Score	Location/Frequency of scores (0-9)									
	MNC	**NVS**	**NWG**	**PNT**	**PTN**	**PTB**	**RPR**	**SBR**	**TTB**	**VRN**
0	155	0	0	0	59	1	0	89	0	0
1	70	0	0	17	187	0	0	33	1	0
2	0	0	0	0	0	0	0	0	0	0
3	79	27	26	68	166	8	27	109	97	22
4	0	0	0	0	0	0	0	0	0	0
5	118	194	292	68	132	98	151	140	266	304
6	0	0	0	0	0	0	0	0	0	0
7	91	331	226	58	8	263	298	153	157	185
8	1	0	0	0	0	0	0	0	0	0
9	9	18	14	344	1	192	95	44	37	19
Total	**523**	**570**	**558**	**555**	**553**	**562**	**571**	**568**	**558**	**530**
LSI	**3.1**	**6.2**	**5.8**	**7.3**	**2.5**	**7.3**	**6.6**	**4.4**	**5.5**	**5.8**
Screening	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**

(LSI-Location severity Index; N-Natural; A-Artificial)

Table 6.2B: NSN 2 entries with low susceptibility index (SI <5) with score ≤5 to BB at more than 70% of the locations

P. No.	Br. No.	IET No.	Locations/Score (0-9)																			SI	PI (<-3)*	PI (<-5)*
			ADT	CHT	CHP	CBT	CTK	GNV	IIRR	LDN	MTU	MSD	MNC	NVS	NWG	PNT	PTB	RPR	SBR	TTB	VRN			
5	4405	30835	1	5	3	3	5	7	5	3	9	7	0	7	5	1	5	5	0	3	3	**4.1**	**47.4**	**78.9**
277	5030	30971	0	7	3	5	5	7	1	3	-	7	0	5	7	1	9	5	0	3	5	**4.1**	**44.4**	**72.2**
291	5044	30984	3	7	3	1	7	7	3	3	9	3	3	5	5	1	7	3	0	3	5	**4.1**	**57.9**	**73.7**
473	3962	30755	3	3	5	1	7	7	7	3	9	5	1	5	5	1	5	5	0	5	3	**4.2**	**42.1**	**78.9**
479	6205	31140	3	-	3	3	3	7	3	3	-	5	1	7	7	5	7	5	0	5	5	**4.2**	**47.1**	**76.5**
393	4261	30819	3	3	5	5	7	7	7	3	-	5	0	5	5	5	5	3	0	5	5	**4.3**	**33.3**	**83.3**
53	4454	30881	0	5	5	5	5	7	7	3	7	5	0	5	5	7	5	5	0	3	-	**4.4**	**27.8**	**77.8**
1	4401	30831	0	5	5	5	3	7	7	5	9	5	0	7	5	3	5	7	0	3	3	**4.4**	**36.8**	**73.7**
59	4460	30886	3	3	3	5	5	5	7	7	-	5	0	3	7	3	3	9	5	3	5	**4.5**	**44.4**	**77.8**
458	3947	30740	0	3	7	5	7	7	9	5	-	3	0	7	5	5	5	5	0	5	3	**4.5**	**33.3**	**72.2**
52	4453	30880	5	3	5	3	3	5	3	3	7	5	0	5	5	7	5	9	5	3	5	**4.5**	**36.8**	**84.2**
345	4212	30772	1	5	5	3	7	9	7	5	-	5	1	5	5	1	7	3	3	5	5	**4.6**	**33.3**	**77.8**
290	5043	30983	3	7	3	5	9	9	1	3	5	5	0	5	5	3	7	5	0	7	5	**4.6**	**36.8**	**73.7**
471	3960	30753	7	5	3	3	5	5	7	5	9	3	0	7	5	3	5	7	0	5	3	**4.6**	**36.8**	**73.7**
248	5001	30945	0	5	5	5	5	7	7	5	9	5	0	7	5	5	3	5	0	3	7	**4.6**	**26.3**	**73.7**
474	3963	30756	3	-	3	3	5	7	7	3	9	5	0	7	5	1	5	5	5	5	7	**4.7**	**33.3**	**72.2**
239	5917	31110	5	5	7	3	3	7	7	5	-	5	0	5	5	9	5	7	0	3	-	**4.8**	**29.4**	**70.6**
50	4451	30878	3	5	5	3	5	7	7	7	-	5	0	3	5	9	5	7	1	5	5	**4.8**	**27.8**	**72.2**
391	4259	30817	3	3	5	5	5	7	7	3	-	5	5	5	5	5	5	5	5	5	5	**4.9**	**16.7**	**88.9**
274	5027	30968	0	3	3	5	5	5	7	5	9	5	0	7	5	3	9	5	5	5	7	**4.9**	**26.3**	**73.7**
559	**TN1 (S check)**		**9**	**7**	**9**	**7**	**9**	**9**	**7**	**9**	**9**	**9**	**-**	**9**	**9**	**9**	**7**	**9**	**5**	**5**	**5**	**7.9**	**0.0**	**16.7**
567	**RPBio 226 (R Check)**		**9**	**5**	**3**	**5**	**3**	**1**	**-**	**3**	**9**	**3**	**-**	**3**	**5**	**5**	**7**	**5**	**5**	**5**	**3**	**4.6**	**41.2**	**82.4**

(SI-Susceptibility Index; *Promising index (PI): Percentage of locations based on no. of locations where the entry had scored ≤3 and ≤5)

➢ **NSN-Hills**

The National Screening Nursery-Hills (NSN-Hills) consisted of 114 entries including 35 different checks. The entries were evaluated at 4 locations across the country. 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- 6-8) at Pantnagar (7.5), IIRR (7.0) and Karjat (6.1) and was moderate (LSI- 3-6) at Cuttack (5.8). For selection of best entries, the disease reactions from all the locations were considered. The promising entries which showed an SI of less or equal to 5.5 and which exhibited a disease score of 5 at or more than 50% locations are presented in Table 6.3B. None of the entries performed better than resistant check Improved Samba Mahsuri. **Some of the promising entries were IET # 30519, 28206 (R), 30502, 28896, 28907, 28217, 30518, 28884, 29640 and 30508**.

Table 6.3A: Location severity index (LSI) and frequency distribution of bacterial blight scores of NSN Hills, *Kharif*' 2022

Score	Location/Frequency of scores (0-9)			
	CTK	IIRR	KJT	PNT
0	0	0	0	0
1	0	0	0	1
2	0	0	0	0
3	13	4	16	1
4	0	0	0	0
5	51	0	12	20
6	0	0	0	0
7	35	102	32	37
8	0	0	0	0
9	11	8	12	55
Total	**110**	**114**	**72**	**114**
LSI	**5.8**	**7.0**	**6.1**	**7.5**
Screening	**A**	**A**	**A**	**A**

(LSI-Location severity Index; N-Natural; A-Artificial)

Table 6.3B: NSN Hills entries with low susceptibility index (SI ≤5.5) with score ≤5 to BB at or more than 50% of the locations

P. No.	Br. No.	IET No.	Locations/Score (0-9)					PI (<-3)*	PI (<-5)*
			CTK	IIRR	KJT	PNT	SI		
86	2818	30519	3	7	3	5	4.5	50.0	75.0
9	2302	28206 (R)	3	7	-	5	5	33.3	66.7
53	2523	30502	3	7	-	5	5	33.3	66.7
24	2408	28896	3	7	3	7	5	50.0	50.0
1	2601	28907	5	7	7	1	5	25.0	50.0
2	2602	28217	5	3	9	5	5.5	25.0	75.0
85	2817	30518	5	7	5	5	5.5	0.0	75.0
8	2301	28884	5	7	3	7	5.5	25.0	50.0
27	2411	29640	7	3	7	5	5.5	25.0	50.0
72	2804	30508	5	7	3	7	5.5	25.0	50.0
102	TN1 (S Check)		9	7	7	9	8	0.0	0.0
112	RPBio 226 (R Check)		3	3	3	3	3	100.0	100.0

(SI-Susceptibility Index; *Promising index (PI): Percentage of locations based on no. of locations where the entry had scored ≤3 and ≤5)

➢ **NHSN**

The National Hybrid Screening Nursery (NHSN) consisted of 112 entries including 30 different checks. The entries were evaluated at 23 locations across the country. The entries were evaluated using artificial inoculation at all the centres except at Arundhatinagar and Mandya where the entries were screened under natural conditions. The frequency distribution of the disease scores and location severity indices are presented in Table 6.4A**.** The disease pressure was very high (LSI > 8) at Maruteru (8.9); high (LSI-6-8) at New Delhi (7.4), Gangavathi (7.3), Pantnagar (7.2), Pattambi (7.1), Raipur (6.7), Chinsurah (6.5), Aduthurai (6.3), Ludhiana (6.2), Nawagam (6.1) and Navsari (6.0); moderate (LSI-3-6) at Titabar (5.8), Chatha (5.7), Cuttack (5.7), Mashodha (5.5), Coimbatore (5.5), IIRR (5.3), Varanasi (5.3), Moncompu (4.6) and Karjat (4.3) and very low (LSI < 3) at Arundhatinagar (2.6), Patna (2.5) and Mandya (0.5). The promising entries with SI less than 5.5 and which exhibited a score of 5 at or more than 55% of the locations are presented in Table 6.4B. **Two entries viz., IET # 30603 and 30620 performed better than the resistant check Improved Samba Mahsuri and exhibited an SI of less than 4.7. Other promising entries were which showed an SI of less than 5.5 were IET # 30605, 30582, 30577, 30585, 30593, 30594, 30578, 30602, 30615, 30575 and 30610**.

Table 6.4A: Location severity index (LSI) and frequency distribution of bacterial blight scores of NHSN, *Kharif*' 2022

Score	Location/Frequency of scores (0-9)											
	ADT	**ARD**	**CHT**	**CHN**	**CBT**	**CTK**	**GNV**	**IIRR**	**KJT**	**LDN**	**MND**	**MTU**
0	0	0	0	1	0	0	0	0	0	0	85	0
1	4	11	0	0	0	0	0	26	0	0	12	0
2	0	0	0	0	0	0	0	0	0	0	5	0
3	19	22	11	24	19	15	3	8	61	21	6	0
4	0	0	0	0	0	0	0	0	0	0	0	0
5	16	4	54	16	52	52	9	1	17	31	4	0
6	0	0	0	0	0	0	0	0	0	0	0	0
7	36	0	45	29	34	37	66	70	13	30	0	6
8	0	0	0	0	0	0	0	0	0	0	0	0
9	31	0	2	42	7	8	34	4	7	28	0	89
Total	**106**	**37**	**112**	**112**	**112**	**112**	**112**	**109**	**98**	**110**	**112**	**95**
LSI	**6.3**	**2.6**	**5.7**	**6.5**	**5.5**	**5.7**	**7.3**	**5.3**	**4.3**	**6.2**	**0.5**	**8.9**
Screening	**A**	**N**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**N**	**A**

(LSI-Location severity Index; N-Natural; A-Artificial)

(Conti.) Location severity index (LSI) and frequency distribution of bacterial blight scores of NHSN, *Kharif*' 2022

Score	Location/Frequency of scores (0-9)										
	MSD	**MNC**	**NVS**	**NWG**	**NDL**	**PNT**	**PTN**	**PTB**	**RPR**	**TTB**	**VRN**
0	0	18	0	0	0	0	23	0	0	0	0
1	0	5	0	0	1	2	32	0	1	1	3
2	0	0	0	0	0	0	0	0	0	0	0
3	15	15	7	6	0	2	26	1	3	18	19
4	0	0	0	0	0	0	0	0	0	0	0
5	60	31	45	46	19	20	23	25	21	43	52
6	0	0	0	0	0	0	0	0	0	0	0
7	29	37	55	50	45	46	8	52	73	35	32
8	0	0	0	0	0	0	0	0	0	0	0
9	8	6	5	10	46	42	0	33	14	14	5
Total	**112**	**112**	**112**	**112**	**111**	**112**	**112**	**111**	**112**	**111**	**111**
LSI	**5.5**	**4.6**	**6.0**	**6.1**	**7.4**	**7.2**	**2.5**	**7.1**	**6.7**	**5.8**	**5.3**
Screening	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**

(LSI-Location severity Index; N-Natural; A-Artificial)

- **DSN**

The Donor Screening Nursery (DSN) consisted of 229 entries including 25 different checks. The entries were evaluated at 23 locations across the country. The entries were evaluated using artificial inoculation at all the centres except at Mandy where the entries were evaluated under natural conditions. The frequency distribution of the disease scores and location severity indices are presented in **Table 6.5A.** The disease pressure was very high (LSI > 8) at Maruteru (8.3); high (LSI- 6-8) at Pantnagar (7.7), Patambi (7.3), Ludhiana (7.2), Raipur (7.0), Titabar (6.5), New Delhi (6.1), Chiplima (6.1) and IIRR (6.0); moderate (LSI- 3-6) at Navsari (5.9), Mashodha (5.9), Gangavathi (5.8), Nawagam (5.7), Cuttack (5.3), Coimbatore (5.2), Chatha (5.0), Varanasi (4.7), Aduthurai (4.5), Karjat (4.4), Sabour (4.1) and Moncompu (3.0) and very low (LSI- < 3) at Patna (1.3) and Mandya (0.3).

For selection of the promising entries, data of those locations were considered where the disease pressure was moderate to very high. Accordingly, the data from Patna and Mandya were not considered for selection of promising entries in DSN. The promising entries with SI less than or equal to 5 and which exhibited a score of 5 at or more than 65% of the locations are presented in **Table 6.5B. Some of the entries which performed better than the resistant check Improved Samba Mahsuri were VP-R40-SHB, MS-ISM-DIG-3, VP-R297-SHB, VP-R12-SHB, MS-ISM-DIG-1, VP-R260-SHB, RP-Bio Patho-3, MS-ISM-DIG-4, RP-Bio Patho-5, VP-R256-SHB, VP-R44-SHB, VP-R157-SHB, VP-R35-SHB, VP-R36-SHB, VP-D6-SHB, VP-R158-SHB, VP-R145-SHB, MTU 1217 and RP-Bio Patho-7**.

Table6.4B: NHSN entries with low susceptibility index (SI ≤5.5) with score ≤5 to BB at or more than 55% of the locations

P. No.	Br. No.	IET No.	Locations/Score (0-9)																				SI	PI (<-3)*	PI (<-5)*
			ADT	CHT	CHN	CBT	CTK	GNV	IIRR	KJT	LDN	MTU	MSD	MNC	NVS	NWG	NDL	PNT	PTB	RPR	TTB	VRN			
6	3206	30603	3	5	3	7	5	7	3	3	3	9	3	0	5	5	7	5	5	7	3	1	**4.5**	**45.0**	**75.0**
26	3226	30620	3	5	3	3	3	7	1	3	3	7	7	0	7	7	9	5	5	5	3	5	**4.6**	**45.0**	**70.0**
8	3208	30605	1	7	3	5	3	7	1	3	3	-	5	3	7	5	7	7	9	5	3	7	**4.8**	**42.1**	**63.2**
79	3112	30582	3	7	3	7	5	3	1	3	5	7	5	1	7	7	9	7	5	5	5	5	**5.0**	**30.0**	**65.0**
73	3106	30577	3	7	0	5	5	9	1	3	7	9	5	7	5	5	9	5	7	1	3	5	**5.1**	**30.0**	**65.0**
82	3115	30585	3	7	3	5	7	9	1	3	3	9	5	3	5	7	9	5	5	5	3	5	**5.1**	**35.0**	**70.0**
91	3124	30593	1	5	3	5	3	9	1	3	3	9	5	7	7	7	5	7	7	5	5	5	**5.1**	**30.0**	**65.0**
92	3125	30594	9	5	3	3	5	7	1	3	5	9	3	7	5	5	5	7	7	3	5	7	**5.2**	**30.0**	**65.0**
74	3107	30578	7	7	3	7	5	7	1	3	7	9	3	0	7	5	5	7	9	5	5	3	**5.3**	**30.0**	**55.0**
5	3205	30602	9	5	3	5	5	7	3	3	3	-	7	0	7	5	7	9	7	7	5	3	**5.3**	**31.6**	**57.9**
20	3220	30615	3	5	9	5	7	7	7	-	5	-	5	0	5	3	5	7	5	7	5	5	**5.3**	**16.7**	**66.7**
70	3103	30575	3	7	5	5	5	7	7	3	9	-	5	0	5	5	5	7	7	7	5	5	**5.4**	**15.8**	**63.2**
14	3214	30610	3	7	5	3	5	7	1	3	5	9	7	5	7	7	7	5	7	7	5	3	**5.4**	**25.0**	**55.0**
100	**TN1 (S Check)**		**9**	**7**	**9**	**7**	**9**	**9**	**7**	**7**	**7**	**9**	**9**	**5**	**9**	**9**	**7**	**9**	**7**	**7**	**7**	**7**	**7.8**	**0.0**	**5.0**
110	**RPBio 226 (R Check)**		**9**	**5**	**3**	**3**	**3**	**3**	**1**	**3**	**9**	**-**	**3**	**5**	**3**	**3**	**7**	**3**	**7**	**7**	**5**	**7**	**4.7**	**52.6**	**68.4**

(SI-Susceptibility Index; *Promising index (PI): Percentage of locations based on no. of locations where the entry had scored ≤3 and ≤5)

Table 6.5A: Location severity index (LSI) and frequency distribution of bacterial blight scores of DSN, *Kharif*' 2022

Score	Location/Frequency of scores (0-9)											
	ADT	**CHT**	**CHP**	**CBT**	**CTK**	**GNV**	**IIRR**	**KJT**	**LDN**	**MND**	**MTU**	**MSD**
0	46	0	0	0	0	0	0	0	0	189	0	0
1	11	1	6	2	0	0	33	0	0	22	0	0
2	0	0	0	0	0	0	0	0	0	11	0	0
3	39	54	17	37	32	6	14	125	12	6	0	23
4	0	0	0	0	0	0	0	0	0	0	0	0
5	32	118	93	128	141	136	3	37	41	0	9	103
6	0	0	0	0	0	0	0	0	0	0	0	0
7	31	49	69	62	40	72	163	35	90	0	58	83
8	0	0	0	0	0	0	0	0	0	0	0	0
9	47	6	39	0	12	15	14	12	86	0	139	19
Total	**206**	**228**	**224**	**229**	**225**	**229**	**227**	**209**	**229**	**228**	**206**	**228**
LSI	**4.5**	**5.0**	**6.1**	**5.2**	**5.3**	**5.8**	**6.0**	**4.4**	**7.2**	**0.3**	**8.3**	**5.9**
Screening	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**N**	**A**	**A**

(LSI-Location severity Index; N-Natural; A-Artificial)

(Conti.) Location severity index (LSI) and frequency distribution of bacterial blight scores of DSN, *Kharif*' 2022

Score	Location/Frequency of scores (0-9)										
	MNC	**NVS**	**NWG**	**NDL**	**PNT**	**PTN**	**PTB**	**RPR**	**SBR**	**TTB**	**VRN**
0	57	0	0	0	0	92	1	0	43	0	0
1	41	0	0	7	1	73	0	0	16	0	2
2	0	0	0	0	0	0	0	0	0	0	0
3	41	10	14	0	16	47	0	4	58	14	55
4	0	0	0	0	0	0	0	0	0	0	0
5	45	111	123	109	29	17	38	35	40	39	125
6	0	0	0	0	0	0	0	0	0	0	0
7	40	102	87	84	38	0	118	143	51	21	27
8	0	0	0	0	0	0	0	0	0	0	0
9	1	6	5	29	145	0	71	47	21	40	0
Total	**225**	**229**	**229**	**229**	**229**	**229**	**228**	**229**	**229**	**114**	**209**
LSI	**3.0**	**5.9**	**5.7**	**6.1**	**7.7**	**1.3**	**7.3**	**7.0**	**4.1**	**6.5**	**4.7**
Screening	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**

(LSI-Location severity Index; N-Natural; A-Artificial)

Table 6.5B: DSN entries with low susceptibility index (SI ≤5) with score ≤5 to BB at or more than 65% of the locations

Path #	Designation	Locations/Score (0-9)																						SI	PI (<3)*	PI (<5)*
		ADT	CHT	CHP	CBT	CTK	GNV	IIRR	KJT	LDN	MTU	MSD	MNC	NVS	NWG	NDL	PNT	PTB	RPR	SBR	TTB	VRN				
125	VP-R40-SHB	0	3	5	3	3	5	1	7	5	7	3	1	7	3	7	5	5	3	3	-	-		**4.0**	**52.6**	**78.9**
52	MS-ISM-DIG-3	-	3	-	3	-	7	1	3	5	-	3	1	7	5	5	3	0	3	7	9	3		**4.0**	**58.8**	**76.5**
162	VP-R297-SHB	0	5	5	7	5	5	1	3	3	9	3	0	5	5	7	5	5	5	0	-	3		**4.1**	**40.0**	**85.0**
118	VP-R12-SHB	0	5	5	5	5	5	3	3	3	5	5	3	5	5	5	5	5	5	3	-	3		**4.2**	**35.0**	**100.0**
51	MS-ISM-DIG-1	-	5	-	5	5	5	1	5	5	-	3	0	5	5	5	3	7	5	9	3	3		**4.4**	**33.3**	**88.9**
154	VP-R260-SHB	0	3	5	7	5	9	3	3	7	5	3	1	5	7	5	3	7	5	0	-	5		**4.4**	**40.0**	**75.0**
74	RP-Bio Patho-3	0	3	3	7	5	5	1	3	9	7	3	0	7	5	5	3	5	7	9	3	3		**4.4**	**47.6**	**71.4**
53	MS-ISM-DIG-4	-	5	5	7	5	5	1	-	3	-	7	1	5	5	7	3	7	7	1	3	5		**4.6**	**33.3**	**72.2**
76	RP-Bio Patho-5	3	7	5	7	3	5	1	3	5	7	7	3	5	5	5	5	5	5	3	3	5		**4.6**	**33.3**	**81.0**
153	VP-R256-SHB	5	5	5	3	3	5	3	7	5	7	7	0	5	7	5	3	5	5	3	-	5		**4.7**	**30.0**	**80.0**
127	VP-R44-SHB	0	5	5	5	5	5	3	3	7	7	3	3	7	3	7	5	7	5	5	-	3		**4.7**	**35.0**	**75.0**
148	VP-R157-SHB	0	7	5	5	5	5	3	3	5	7	5	0	7	5	9	5	5	3	3	-	7		**4.7**	**30.0**	**75.0**
122	VP-R35-SHB	1	3	1	5	7	5	3	5	5	7	5	0	5	7	9	9	5	7	3	-	3		**4.8**	**35.0**	**70.0**
123	VP-R36-SHB	0	5	3	5	5	5	3	3	5	9	5	0	5	7	5	9	5	7	5	-	-		**4.8**	**26.3**	**78.9**
170	VP-D6-SHB	3	3	5	5	5	5	7	3	7	-	7	0	5	7	5	9	5	7	0	-	3		**4.8**	**31.6**	**68.4**
149	VP-R158-SHB	0	7	5	5	5	5	3	3	3	5	9	1	7	5	5	1	7	7	9	-	-		**4.8**	**31.6**	**68.4**
146	VP-R145-SHB	-	3	5	5	5	7	7	3	5	7	5	1	5	5	5	5	7	5	3	-	5		**4.9**	**21.1**	**78.9**
191	MTU 1217	3	5	7	5	5	5	7	3	7	9	5	1	3	5	5	9	5	5	0	-	5		**5.0**	**25.0**	**75.0**
78	RP-Bio Patho-7	1	5	5	7	5	5	1	5	3	-	7	5	5	5	7	5	7	5	7	5	-		**5.0**	**15.8**	**73.7**
217	**TN1 (S Check)**	**9**	**5**	**7**	**5**	**9**	**9**	**9**	**5**	**9**	**9**	**7**	**7**	**7**	**3**	**7**	**9**	**9**	**9**	**9**	**-**	**5**		**7.4**	**5**	**25**
225	**RPBio 226 (R Check)**	**7**	**7**	**5**	**5**	**7**	**3**	**7**	**5**	**7**	**7**	**7**	**0**	**3**	**5**	**5**	**9**	**9**	**7**	**1**	**-**	**5**		**5.5**	**20**	**50**

(SI-Susceptibility Index; *Promising index (PI): Percentage of locations based on no. of locations where the entry had scored ≤3 and ≤5)

❖ TRIAL No.7: SCREENING FOR RICE TUNGRO VIRUS DISEASE (RTD)

➢ NSN-1

The national screening nursery 1 (NSN-1) trial consisting of 338 entries including checks was proposed and conducted at 2 locations *viz*., Coimbatore and IIRR. At both the locations the nursery was evaluated by artificially with the aid of l insect vector (leafhopper) transmission in the glass house. The frequency distribution of disease scores and location severity indices are presented in Table.7.1A. The disease pressure was high at IIRR (LSI 6.3) and Coimbatore (LSI 6.1) **The entries performed better than the resistant check Vikramarya and showed resistance reaction to rice tungro disease are IET 30020, IET 29411, IET 29410, IET 29256, IET 30201, IET 29947, IET 29744, IET 29807 and IET 30284** (Table 7.1B).

Table 7.1A: Location severity index (LSI) and frequency distribution of Rice tungro disease scores of NSN-1, *Kharif* 2022

Score	Location/Frequency of scores (0-9)	
	CBT	IIRR
1	0	0
3	14	9
4	1	0
5	138	98
7	149	225
9	27	0
Total	**329**	**332**
LSI	**6.1**	**6.3**
Screening	**A**	**A**

(N- Natural; A- Artificial)

Table: Promising entries with low susceptibility index (<=4.0) and high PI in NSN-1 to Rice tungro disease, *Kharif* 2022

P. No.	Br. No.	IET No.	Location/ Frequency of scores (0-9)		SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
			CBT	IIRR						
8	4608	30020	5	3	4.0	2	1	50	2	100
31	4501	29411	5	3	4.0	2	1	50	2	100
40	4510	29410	5	3	4.0	2	1	50	2	100
47	4517	29436	3	5	4.0	2	1	50	2	100
72	4001	29256	5	3	4.0	2	1	50	2	100
131	5505	30201	3	5	4.0	2	1	50	2	100
148	3502	29947	3	5	4.0	2	1	50	2	100
194	4126	29744	3	5	4.0	2	1	50	2	100
215	3804	29807	3	5	4.0	2	1	50	2	100
324	3837	30284	3	5	4.0	2	1	50	2	100
329	Vikramarya		7	3	5.0	2	0	0	0	0
328	TN1		5	7	6.0	1	0	0	1	100
LSI			**6.1**	**6.3**						

(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)

- **NSN-2**

The National Screening Nursery 2 (NSN-2) trial consisting of 571 entries including checks was conducted only at IIRR and 15 lines did not germinate. The disease pressure recorded was high with LSI 6.1 (Table 7.1A)

Table 7.2A: Location severity index (LSI) and frequency distribution of Rice tungro disease scores of NSN-2, Kharif 2022

Score	Location/Frequency of scores (0-9)
	IIRR
1	0
3	20
5	202
7	341
9	1
Total	**564**
LSI	**6.1**
Screening	**A**

Out of 564 lines tested, only tested 20 lines showed score 3 and 202 showed 5 score against RTD. **Best performing lines are viz., IET Nos 30850, 30851, 30866, 31017, 31042, 31082, 30902, 30999, 30922, 31128, 30800, 30807, 30756, 30725, 30641 and 30685** (Table 7.1B).

Table 7.2B: NSN-2 entries with low susceptibility index (SI ≤ 3) against rice tungro disease, *Kharif*, 2022.

P. No.	Br. No.	IET No.	RTD score at IIRR
20	4420	30850	3
21	4421	30851	3
37	4438	30866	3
82	5120	31017	3
111	5403	31042	3
160	5629	31082	3
175	4715	30902	3
306	5060	30999	3
198	4739	30922	3
323	6114	31128	3
374	4242	30800	3
381	4249	30807	3
474	3963	30756	3
439	3927	30725	3
502	3608	30641	3
548	3654	30685	3
Vikramarya			3
Nidhi			3
Screening			**A**

(A- Artificial)

➢ **NSN-H**

One hundred fourteen entries were screened against rice tungro disease at IIRR under moderate disease pressure with LSI 5.8 (Table 7.3A).

Table 7.3A: Location severity index (LSI) and frequency distribution of rice tungro disease scores of NSN-H, Kharif 2022

Score	Location/Frequency of scores (0-9)
	IIRR
1	0
3	11
5	47
7	55
Total	**113**
LSI	**5.8**
Screening	**A**

Out of which, only **8 lines (IET 30498, IET 30499, IET 30529, IET 30531, IET 30510, IET 30511, VL Dhan 65, Vivekdhan 86 and Shalimar Rice-3) shown to be resistant for RTD** (Table 7.3B).

Table 7.3B: NSN-H entries with low susceptibility index (SI ≤ 3) against rice tungro disease, *Kharif*, 2022

P.No	Ent. No.	IET No.	RTD score (0-9) at IIRR
49	2519	30498	3
50	2520	30499	3
66	2913	30529	3
68	2915	30531	3
75	2807	30510	3
76	2808	30511	3
7	2607	VL Dhan 65	3
35	2505	Vivekdhan 86	3
43	2513	Shalimar Rice-3	3
103	Vikramarya		3
104	Nidhi		3
LSI			**5.8**

➢ **NHSN**

The National Hybrid Screening Nursery (NHSN) consisted of 112 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 67. The disease pressure was high at CBT (LSI 6.2) and Moderate at IIRR (LSI 5.9) (Table 7.4A).

Table7.4A: Location severity index (LSI) and frequency distribution of Rice tungro disease scores of NHSN, Kharif 2022

Score	Location/Frequency of scores (0-9)	
	CBT	IIRR
1	0	0
3	6	5
4	1	0
5	45	50
7	47	57
9	13	0
Total	**112**	**112**
LSI	**6.2**	**5.9**
Screening	**A**	**A**

(A- Artificial)

For the selection of promising entries both the locations were taken into consideration. The best entries which showed overall SI< 5.0 are listed in Table 7.4B. **The promising entries are 30606, 30562, 30566, 30601, 30603, 30611, 30613, 30614, 30619, 30621, 29758, 30555, 30565, 30574, 30588, 30593 and 30599.**

Table 7.4B: Promising entries with low susceptibility index (<=5.0) and high PI in NHSN to Rice tungro disease, *Kharif* 2022.

P. No.	Br. No.	IET No.	Location/ Frequency of scores (0-9)		SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
			CBT	IIRR						
9	3209	30606	3	5	4.0	2	1	50	2	100
53	3011	30562	3	5	4.0	2	1	50	2	100
59	3017	30566	3	5	4.0	2	1	50	2	100
3	3203	30601	5	5	5.0	2	0	0	2	100
6	3206	30603	5	5	5.0	2	0	0	2	100
15	3215	30611	5	5	5.0	2	0	0	2	100
17	3217	30613	5	5	5.0	2	0	0	2	100
19	3219	30614	5	5	5.0	2	0	0	2	100
25	3225	30619	5	5	5.0	2	0	0	2	100
27	3301	30621	5	5	5.0	2	0	0	2	100
42	3316	29758	5	5	5.0	2	0	0	2	100
45	3003	30555	5	5	5.0	2	0	0	2	100
58	3016	30565	5	5	5.0	2	0	0	2	100
69	3102	30574	5	5	5.0	2	0	0	2	100
86	3119	30588	5	5	5.0	2	0	0	2	100
91	3124	30593	5	5	5.0	2	0	0	2	100
98	3131	30599	5	5	5.0	2	0	0	2	100
101	Vikramarya		7	3	5.0	2	1	50	1	50
100	TN1		7	7	7.0	2	0	0	0	0
LSI			**6.2**	**5.9**						

(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)

- **DSN**

Donor screening nursery (DSN) comprising of 229 entries including checks were tested at Coimbatore and IIRR. The frequency distribution of disease scores and LSI are presented in Table 7.5A. The disease pressure was high at IIRR (LSI 6.4) and moderate at Coimbatore (LSI 6.0).

Table 7.5A: Location severity index (LSI) and frequency distribution of Rice tungro disease scores of DSN, *Kharif* 2022

Score	Location/Frequency of scores (0-9)	
	CBT	IIRR
1	0	0
3	10	8
5	107	55
7	94	162
9	18	0
Total	**229**	**225**
LSI	**6.0**	**6.4**
Screening	**A**	**A**

The DSN entries that showed a moderate level of resistance to rice tungro disease are listed in Table 7.5B. **The promising entries included are CB18532, IET19273, VP-R35-SHB, VP-D4-SHB, MTU 1297, CGR-18-65 and CGR-18-65**.

Table 7.5B: Promising entries with low susceptibility index (<=4.0) and high PI in DSN to rice tungro disease, *Kharif* 2022

P. No.	Designation	Location/Frequency of score (0-9)		SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
		CBT	IIRR						
19	CB18532	5	3	4.0	2	1	50	2	100
47	19273	3	5	4.0	2	1	50	2	100
122	VP-R35-SHB	5	3	4.0	2	1	50	2	100
168	VP-D4-SHB	3	5	4.0	2	1	50	2	100
186	MTU 1297	5	3	4.0	2	1	50	2	100
213	CGR-18-65	3	5	4.0	2	1	50	2	100
219	Nidhi	5	3	4.0	2	1	50	2	100
218	Vikramarya	7	3	5.0	2	1	50	1	50
217	TN1	5	7	6.0	2	0	0	1	50
LSI		**6.1**	**6.4**						

(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)

❖ GLUME DISCOLOURATION

Glume discolouration (GD) was observed at four locations *viz*., Chatha, Lonavala, Navasari and Nawagam during *kharif* 2022. Screening was done under natural conditions at all the four locations.

➢ NSN 1

In NSN1, 338 entries including checks were screened against glume discolouration under natural conditions. Moderate disease pressure was observed at Navasari (LSI 5.5), Nawagam (LSI 5.3), Chatha (LSI 5.1) and Lonavala (LSI 4.2). The frequency distribution of glume discolouration scores are presented below along with location severity indices.

Location severity index(LSI) and frequency distribution of glume discoloration scores of NSN-1, *Kharif* 2022

Score	Location/Frequency of scores (0-9)			
	CHT	**LNV**	**NVS**	**NWG**
1	7	0	0	0
2	0	2	0	0
3	74	153	61	42
5	144	153	124	206
7	89	26	153	86
9	8	1	0	2
Total	**322**	**335**	**338**	**336**
LSI	**5.1**	**4.2**	**5.5**	**5.3**
Screening	**N**	**N**	**N**	**N**

(LSI-Location severity Index; N-Natural; A-Artificial)

A few promising entries found in NSN 1 for glume discolouration are IET Nos. 30008, 29246, 29212, 29360, 29943, 29694 and 29749.

Promising entries with low susceptibility index (<=3.5) and high PI in NSN-1 to glume discoloration, *Kharif* 2022

P.No.	Br. No.	IET No.	Location/Frequency of scores (0-9)				SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
			CHT	LNV	NVS	NWG						
4	4604	30008	3	3	5	3	3.5	4	3	75	4	100
97	3708	29246	5	3	3	3	3.5	4	3	75	4	100
105	3716	29212	3	3	5	3	3.5	4	3	75	4	100
136	5202	29360	3	3	3	5	3.5	4	3	75	4	100
147	3501	29943	5	3	3	3	3.5	4	3	75	4	100
160	3515	29694	3	3	3	5	3.5	4	3	75	4	100
191	4123	29749	3	3	3	5	3.5	4	3	75	4	100
334	Swarnadhan		3	3	5	3	3.5	4	3	75	4	100
328	TN1		7	5	7	7	6.5	4	0	0	1	25
LSI			**5.1**	**4.2**	**5.5**	**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)

- **NSN-2**

The national screening nursery 2 (NSN-2) trial consisting of 571 entries including checks was conducted only at Chatha and Nawagam. The disease pressure recorded was high at Nawagam (LSI 5.7) and moderate at Chatha with LSI 5.0.

Location severity index (LSI) and frequency distribution of glume discoloration scores of NSN-2, *Kharif* 2022

Score	Location/Frequency of scores (0-9)	
	CHT	NWG
1	4	0
3	116	27
5	156	311
7	110	217
9	4	3
Total	**390**	**558**
LSI	**5.0**	**5.7**
Screening	N	N

(LSI-Location severity Index; N-Natural; A-Artificial)

Best performing lines against glume discolouration included IET nos 30878, 31031, 31032, 31035, 31038, 31079, 30907, 30920, 31110, 31121, 30792, 30712, 30857, 31067 and 31076.

Promising entries with low susceptibility index (<=3.0) and high PI in NSN-2 to glume discoloration, *Kharif* 2022

P. No.	Br. No.	IET No.	Location/Frequency of score (0-9)		SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
			CHT	NWG						
50	4451	30878	-	3	3.0	1	1	100	1	100
98	5136	31031	3	3	3.0	2	2	100	2	100
99	5137	31032	-	3	3.0	1	1	100	1	100
102	5140	31035	-	3	3.0	1	1	100	1	100
106	5144	31038	-	3	3.0	1	1	100	1	100
156	5625	31079	-	3	3.0	1	1	100	1	100
180	4721	30907	3	-	3.0	1	1	100	1	100
196	4737	30920	3	3	3.0	2	2	100	2	100
239	5917	31110	3	3	3.0	2	2	100	2	100
314	6105	31121	3	-	3.0	1	1	100	1	100
366	4233	30792	-	3	3.0	1	1	100	1	100
423	3911	30712	-	3	3.0	1	1	100	1	100
27	4427	30857	1	5	3.0	2	1	50	2	100
142	5611	31067	1	5	3.0	2	1	50	2	100
153	5622	31076	1	5	3.0	2	1	50	2	100
559	TN1		5	7	6.0	2	0	0	1	50
558	HR-12		7	7	7.0	2	0	0	0	0
LSI			**5.0**	**5.7**						

(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)

- **NHSN**

National Hybrid Screening Nursery (NHSN) consisted of 112 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 below. The disease pressure was moderate at all locations viz., Nawagam (LSI 5.5), Chatha (LSI 5.2), Navasari (LSI 5.1) and Lonavala (LSI 4.1).

Location severity index(LSI) and frequency distribution of glume discoloration scores of NHSN, Kharif 2022

Score	Location/Frequency of scores (0-9)			
	CHT	LNV	NVS	NWG
1	0	0	0	0
3	20	62	23	5
5	56	39	62	73
7	26	11	25	33
9	3	0	2	1
Total	**105**	**112**	**112**	**112**
LSI	**5.2**	**4.1**	**5.1**	**5.5**
Screening	**N**	**N**	**N**	**N**

(LSI-Location severity Index; N-Natural; A-Artificial)

Some of the promising entries selected from NHSN are IET Nos. 30615, 30558, 30624, 30563, 30565, 30580, 30585, 30587 and 30631.

Promising entries with low susceptibility index (<=4.0) and high PI in NHSN to glume discoloration, *Kharif* 2022

P. No.	Br. No.	IET No.	Location/Frequency of scores (0-9)				SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
			CHT	LNV	NVS	NWG						
20	3220	30615	3	3	3	5	3.5	4	4	100	4	100
49	3007	30558	3	3	3	5	3.5	4	4	100	4	100
31	3305	30624	5	3	3	5	4.0	4	4	100	4	100
54	3012	30563	5	3	3	5	4.0	4	4	100	4	100
58	3016	30565	3	3	5	5	4.0	4	4	100	4	100
76	3109	30580	3	3	5	5	4.0	4	4	100	4	100
82	3115	30585	5	3	5	3	4.0	4	4	100	4	100
84	3117	30587	3	3	5	5	4.0	4	4	100	4	100
41	3315	30631	3	3	3	7	4.0	4	4	100	3	75
109	Ajaya		-	3	3	5	3.7	3	3	100	3	100
100	TN1		7	7	7	7	7.0	4	4	100	0	0
LSI			**5.3**	**4.1**	**5.1**	**5.5**						

(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**

Donor screening nursery (DSN) comprising of 229 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 below. The disease pressure was moderate at Nawagam (LSI 5.4), Chatha (5.2), Navasari (LSI 5.1) and Lonavala (LSI 4.3)

Location severity index(LSI) and frequency distribution of glume discoloration scores of DSN, *Kharif* 2022

Score	Location/Frequency of scores (0-9)			
	CHT	LNV	NVS	NWG
1	1	0	0	0
3	53	104	55	22
5	70	101	109	139
7	66	15	65	67
9	3	7	0	1
Total	**193**	**227**	**229**	**229**
LSI	**5.2**	**4.3**	**5.1**	**5.4**
Screening method	**N**	**N**	**N**	**N**

(LSI-Location severity Index; N-Natural; A-Artificial)

Some of the entries that are found to be promising are: Pusa 2070-10-2, CB16806, CB16807, MS-68-3, MS-68-3-7, KNM 12346 and ARC5791.

Promising donors with low susceptibility index (<=3.7) and high PI in DSN to glume discoloration, *Kharif* 2022

P. No.	Designation	Location/Frequency of scores (0-9)				SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
		CHT	LNV	NVS	NWG						
199	Pusa 2070-10-2	3	3	3	3	3.0	4	4	100	4	100
24	CB16806	3	3	5	3	3.5	4	3	75	4	100
25	CB16807	3	3	5	3	3.5	4	3	75	4	100
56	MS-68-3	3	3	3	5	3.5	4	3	75	4	100
57	MS-68-3-7	-	5	3	3	3.7	3	2	67	3	100
98	KNM 12346	-	5	3	3	3.7	3	2	67	3	100
109	ARC5791	-	3	3	5	3.7	3	2	67	3	100
LSI		**5.2**	**4.3**	**5.1**	**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)

- **False smut**

The NSN-1 entries were screened for false smut disease at Cuttack, Masodha and Patna under natural conditions. However, most of the entries recorded 0 and 1 and the LSI of the entries was very low (CTK- 0.42; Masodha – 0.37; Patna - 0.5). Hence these data were not considered for the selection of the entries. Similarly, NSN-2 entries were screened naturally at one location i.e. Patna and LSI was very low (0.87). NHSN entries naturally screened at Chatha, Cuttack, Ludhiana and Patna. The LSI of locations varied from 0.4 to 5.69; the details are presented below.

Location severity index(LSI) and frequency distribution of false smut scores of NHSN, *Kharif* 2022

Score	Location/Frequency of scores (0-9)			
	CHT	**CTK**	**LDN**	**PTN**
0	0	69	0	71
1	1	9	5	27
2	0	0	0	0
3	31	5	12	10
4	0	0	0	0
5	49	2	31	4
6	0	0	0	0
7	23	0	28	0
8	0	0	0	0
9	0	0	10	0
Total	**104**	**85**	**86**	**112**
LSI	**4.8**	**0.4**	**5.6**	**0.7**
Screening	**N**	**N**	**N**	**N**

Among the four locations, LSI was 4.81 at Chatha and 5.6 at Ludhiana. The IET #30555, 30564, 30600, 30603, 30615, 30617, 30621, 30623, 30631, 30554 and 29686 are showed tolerance against false smut disease at these locations. However, the identified entries have to be confirmed for one more season because of variations in the flowering period.

Promising entries with low susceptibility index (<=3.0) and high PI in NHSN to false smut, *Kharif* 2022

P.No.	Br. No.	IET No.	Location/Frequency of scores (0-9)		SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
			CHT	LDN						
45	3003	30555	3	1	2.0	2	2	100	2	100
56	3014	30564	3	1	2.0	2	2	100	2	100
2	3202	30600	3	-	3.0	1	1	100	1	100
6	3206	30603	3	3	3.0	2	2	100	2	100
20	3220	30615	3	-	3.0	1	1	100	1	100
22	3222	30617	3	-	3.0	1	1	100	1	100
27	3301	30621	3	-	3.0	1	1	100	1	100

P.No.	Br. No.	IET No.	Location/Frequency of scores (0-9)		SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
			CHT	LDN						
29	3303	30623	3	-	3.0	1	1	100	1	100
41	3315	30631	3	3	3.0	2	2	100	2	100
43	3001	30554	3	-	3.0	1	1	100	1	100
44	3002	29686	5	1	3.0	2	1	50	2	100
100	TN1		7	7	7.0	2	0	0	0	0
LSI			**4.8**	**5.6**						

The DSN entries were screened naturally at Cuttack and Patna and the respective LSI was 0.43 and 0.55 and hence these locations were not considered for the selection of the entries.

➢ MULTIPLE DISEASE RESISTANCE

In NSN-1, a total of 13 entries had shown resistant/moderately resistant reaction to two or three diseases. All the entries showed moderate or resistant reaction against any of two diseases except **IET# 29411 (MR to LB, SHR & RTD), 30020 (MR to LB, SHR & RTD) 30233 (MR to LB, NB & BS) and 30037 (MR to LB, BB & Resistant to NB) which showed moderate reaction for three diseases**. Other entries under NSN-1 which showed different reaction was listed below. Entries *viz*., IET # 28128 (MR to LB & BS), 28959 (MR to LB & Resistant to NB), 29409 (MR to LB&SHR), 29446 (MR to LB&NB), 29549(MR to SHB &SHR), 29564 (MR to SHB&SHR), 29891(Resistant to NB &MR to SHB), 30022 (MR to LB&SHR) and 30207 (Resistant to NB & MR to SHB)

Multiple disease resistant lines in NSN-1, *Kharif* -2022

Sl. No.	IET No.	Disease susceptible/resistance reaction						
		LB	NB	ShB	BS	BB	ShR	RTD
1	28128	4	-	-	4.5	-	-	-
2	28959	3.9	2.8	-	-	-	-	-
3	29409	4	-	-	-	-	3.7	-
4	29411	3.8	-	-	-	-	3.8	4
5	29446	4.1	3.2	-	-	-	-	-
6	29549	-	-	5	-	-	3.7	-
7	29564	-	-	5.1	-	-	3.3	-
8	29891	-	3	4.8	-	-	-	-
9	30020	3.9	-	-	-	-	3.5	4
10	30022	3.7	-	-	-	-	3.7	-
11	30037	4	2.7	-	-	4.3	-	-
12	30207	-	3	5.1	-	-	-	-
13	30233	4.1	3.5	-	4	-	-	-

(LB-Leaf Blast; NB-Neck blast; ShB-Sheath Blight; BS-Brown spot; BB- Bacterial blight; RTD – Rice tungro virus)

In NSN-2, a total of fourteen entries showed resistance or moderate resistance reaction to two or three diseases. **The entry *viz*., IET # 30722 showed high resistance reaction to NB, MR to BS, SHR and 30772 resistance to NB and MR to BS, SHR, BB). IET # 30753 (Resistant to NB; MR to BS& BB), 30831 (Resistant to NB; MR to BS, BB) and 30881 (Resistant to NB & MR to SHB, BB) showed resistance to three diseases**. Remaining entries showed resistance or MR to two diseases and that included IET# 30748, 30833, 31050 and 31051 (MR to LB & Resistant to NB); IET# 30752 and 30856 (Resistant to NB; MR to BS), IET# 31050 and 31051 (MR to LB; Reistant to NB); IET# 31076 and 31079 (MR to LB&BS); IET# 30844 (Resistant to NB & MR to SHB), 30861 (Resistant to NB & MR to SHR) and.

Multiple disease resistance in NSN-2, *Kharif* – 2022

Sl. No.	IET No.	Disease susceptible/resistance reaction					
		LB	NB	ShB	BS	BB	ShR
1	30748	4.3	2.3	-	-	-	-
2	30752	-	2.5	-	4.7	-	-
3	30753	-	2.5	-	4.8	4.6	-
4	30772	-	2.5	-	4.8	4.6	3.8
5	30831	-	2	-	4.8	4.4	-
6	30833	4.1	2.5	-	-	-	-
7	30844	-	2.5	4.9	-	-	-
8	30856	-	2.5	-	4.8	-	-
9	30861	-	2.5	-	-	-	3.8
10	30881	-	2.3	5	-	4.4	-
11	31050	4.4	2.5	-	-	-	-
12	31051	4.3	2.3	-	-	-	-
13	31076	4.4	-	-	4.8	-	-
14	31079	4.3	-	-	4.8	-	-

(LB-Leaf Blast; NB-Neck blast; ShB-Sheath Blight; BB- Bacterial Blight; BS-Brown spot)

In NSN-H, a total of fourteen entries showed moderate or resistant reaction to two or more than two diseases. **Entry *viz*., IET# 30531 (Resistant to RTD & MR to LB, NB &SHB) showed resistant or moderate reistant reaction to four diseases and 30507 (Resistant to NB & MR to LB&BS) was showed resistant or moderate resistant reaction to three diseases.** Remaining all entries viz., IET# 28887 (MR to SHB&BS), 29636 (MR to LB&NB), 29654 (MR to LB&SHB), 30499 (Resistant to RTD& MR to SHB), 30511(Resistant to NB&RTD), 30512 (Resistant to NB& MR to BS), 30514 (MR to LB&SHB), 30515 (Resistant to NB & MR to BS), 30525 (Resistant to NB & MR to BS), 30526 (MR to SHB&BS), 30529 (Resistant to NB &RTD) and 30530 (Resistant to NB & MR to BS).

Multiple disease resistance in NSN-H, *Kharif* – 2022

Sl. No.	IET No.	Disease susceptible/resistance reaction				
		LB	NB	ShB	BS	RTD
1	28887			5	4.5	
2	29636	4.6	3.5			
3	29654	4.6		4.3		
4	30499			4.3		3
5	30507	4.8	2		5.3	
6	30511		3			3
7	30512		2		5.3	
8	30514	4.7		5		
9	30515		3		4.8	
10	30525		3		5.3	
11	30526			5	5.3	
12	30529		3			3
13	30530		2.3		4.5	
14	30531	4.7	3.5	5		3

(LB-Leaf Blast; NB-Neck blast; ShB-Sheath Blight; BS-Brown spot; RTD – Rice tungro virus)

In NHSN, a total of 20 entries found resistant or moderately resistant to two or more diseases. IET # **30603 (MR to SHB, SHR, RTD & BB) and 30620 (MR to NB, BS & BB) showed resistance to three diseases.** Other **entries for two diseases included IET# 29722 and 30569 (MR to LB &NB), 30562, 30566, 30613 and 30619 (MR to BS&RTD), 30577 and 30585 (MR to LN &SHR), 30601, 30606 and 30611 (MR to SHR&RTD), 29758 (MR to SHB&RTD), 30567 (MR to LB &BS), 30593 (MR to LB&RTD), 30602 (MR to SHB& SHR).**

Multiple disease resistance in NHSN, *Kharif* – 2022

Sl. No.	IET No.	Disease susceptible/resistance reaction						
		LB	NB	ShB	BS	BB	ShR	RTD
1	29722	4.3	3.5					
2	29758			5.6				5
3	30555		3.3					5
4	30562				4.9			4
5	30566				5			4
6	30567	4.2			5			
7	30569	4.4	3.3					
8	30577	4.1					4.3	
9	30578	4.5	3.5				3.8	
10	30585	4.2					4.4	
11	30593	4.3						5
12	30601						4.2	5
13	30602			5.5			4.3	
14	30603			5.5		4.5	3.6	5
15	30606						4.2	4
16	30611						4.4	5
17	30613				5			5
18	30619				4.9			5
19	30620		3.5		4.8	4.6		
20	30621			5.3				5

(LB-Leaf Blast; NB-Neck blast; ShB-Sheath Blight; BS-Brown spot; BB-Bacterial blight; RTD – Rice tungro virus)

In DSN, a total of 30 donors were found resistant or moderate reaction to two or more diseases. **Five donors exhibited resistant or moderate reaction to three diseases and that includes 19273 (MR to SHB, SHR&RTD), CB MSP9 006 (MR to LB, BS&SHR), KNM 12346 (Resistant to NB and MR to SHB&BS), UB 1066 (MR to LB, SHB&SHR) and VP-R36-SHB (Resistant to NB and MR to SHB&SHR) and RP-Bio Patho-3 (R to NB, MR-LB, BB).** Other donors showing resistant or moderate reaction to two diseases was listed below.

Multiple disease resistance in DSN *Kharif* – 2022

Sl. No.	IET No.	Disease susceptible/resistance reaction						
		LB	NB	ShB	BS	BB	ShR	RTD
1	19082			4.6			4.3	
2	19198				4.5		3.8	
3	19273			5			4.2	4
4	ADT 54		2.2		4.3			
5	AE 939	3.8	2.8					
6	CB MSP9 003	3.9			4.4			
7	CB MSP9 006	3.9			4.4		4.3	
8	CB MSP9 007	3.8			4.2			

Sl. No.	IET No.	Disease susceptible/resistance reaction						
		LB	**NB**	**ShB**	**BS**	**BB**	**ShR**	**RTD**
9	CB17135			4.9	4.5			
10	CB18532	3.8						4
11	CB18536	4.1					4.4	
12	CGR-19-68	3.8					4.4	
13	CL-442		2.8		4.5			
14	KNM 12346		3	5	4			
15	MS-ISM-DIG-10	4					4.3	
16	RNR 37909	3.6	2.8					
17	RP-Bio Patho-3	4	2.2			4.4		
18	RP-Bio Patho-4	3.7			4.5			
19	RP-Bio Patho-5		3	4.9				
20	Tetep	4.2	3	5.1	4.5			
21	TN1			7.7				6
22	UB 1066	3.9		4.7			4.3	
23	VP-D4-SHB						4.3	4
24	VP-D9-SHB		2.8	4.7				
25	VP-R111-SHB	4					4.3	
26	VP-R243-SHB		2.7		4.5			
27	VP-R262-SHB		2.5	4.8				
28	VP-R294-SHB		2.8	4.7				
29	VP-R297-SHB			4.7	4.4			
30	VP-R36-SHB		3	4.4			4	

(LB-Leaf Blast; NB-Neck blast; ShB-Sheath Blight; BS-Brown spot; BLB-Bacterial leaf blight; RTD – Rice tungro virus)

II. FIELD MONITORING OF VIRULENCE

TRIAL No.8: FIELD MONITORING OF VIRULENCE: *Pyricularia oryzae*

The experiment was conducted at 24 locations across India against *Pyricularia oryzae* during *Kharif* 2022. The aim of this experiment was to monitor virulence pattern in the population of rice blast pathogen. The nursery included 39 cultivars consisting of near isogenic lines, international differentials, donors and commercial cultivars possessing different genes for blast resistance. The reaction of 39 differentials at twenty-four locations during the crop season to monitor the blast reaction on different host genotypes and is presented in Table 8.1A. The disease pressure was high at Cuttack (LSI 6.5) and Gudalur (LSI 6.3). It was moderate (LSI 5.8 to 5.1) Gagharghat, Lonavala, Navasari, Jagtial, Khudwani and Karjat. The low disease pressure was recorded (LSI 4.7 to 1.0) at Almora, Nawagam, New Delhi, Patna, Ponnampet, Jagdalpur, Gangavathi, Uppershillong, Mandya, Malan, Pattambi, Mugad, Maruteru, IIRR, Wangbal and Rajendranagar. The data from these locations are presented in Table 8.1 and Figure 8.1A. The disease reaction at Rajendranagar centre did not showed variation among the differentials, all the entries scored resistant reaction with score of 1; and hence data from this location not included in interpretation of virulence pattern of isolates.

Tetep, RP Bio Path-3, Tadukan and Raminad str-3, were resistant across the locations with SI 3.1, 3.3, 3.4 and 3.4 respectively. Tetep was highly resistant across 17 locations indicating its potentiality as the best donors for resistance against blast disease. Tetep was susceptible at Cuttack, Gagharghat; moderately susceptible New Delhi, Patna, Khudwani, Maruteru and Karjat. Differential line-RP Bio Patho 3 possessing *Pi*2, showed resistance reaction at 14 locations, susceptible reaction at 7 locations. Tadukan showed susceptible reaction at Gudalur and Gagharghat; moderate susceptible reaction at Cuttack, Jagtial, Khudwani, New Delhi, Patna and Gangavathi; while it exhibited resistance reaction at 13 locations. Raminad str-3 showed susceptible reaction at Karjat, Khudwani, Jagtial, Cuttack and Lonavala while it was susceptible only at Coimbatore and Cuttack during 2021. It was moderately susceptible at Lonavala, Gagharghat, Ponnampet and Navasari. RP Bio Patho-4 showed susceptible reaction at only Gudalur and Navasari; while it was moderately susceptible at Cuttack, Lonavala, Khudwani, Karjat, Nawagam, New Delhi, Patna and Mugad.

Zenith was highly susceptible at Gudalur and Karjat; while it showed moderate reaction at Cuttack, Gagharghat, Lonavala, Jagtial, Khudwani, Nawagam, Patna, and Ponnampet. The susceptible checks like HR-12 and Co-39 are showing susceptible reaction at most of the locations but HR-12 recorded resistant reaction at Mugad, Wangbal and Rajendranagar; where it may be due to low disease pressure; it was moderately resistant reaction at Lonavala and Karjat. Similarly, Co-39 also recorded moderate disease reaction at Karjat, Mugad and Maruteru. The resistant check Rasi was highly susceptible at Cuttack, Gagharghat, Navasari, Jarjat, Almora and Jagdalpur. IR 64 was showing susceptible reaction at Cuttack, Gagharghat and New Delhi.

The difference in disease reaction score of susceptible and resistant checks reveals that shift in the pathogen population. Cluster analysis of *Pyricularia oryzae* reaction on 36 different genotypes at 24 locations was done and is presented in Figure 8.1B. The reaction pattern of genotypes at all the locations was grouped into eight major groups at 30% dissimilarity coefficient. The reaction pattern at Cuttack, Gudalur, Lonovala, Ghaghraghat, Navasari and Karjat are distinct form the other isolates. The isolate from Jagityal and Khudhwani are grouped in same cluster. The other 16 isolates formed a major cluster showing same kind of virulence pattern.

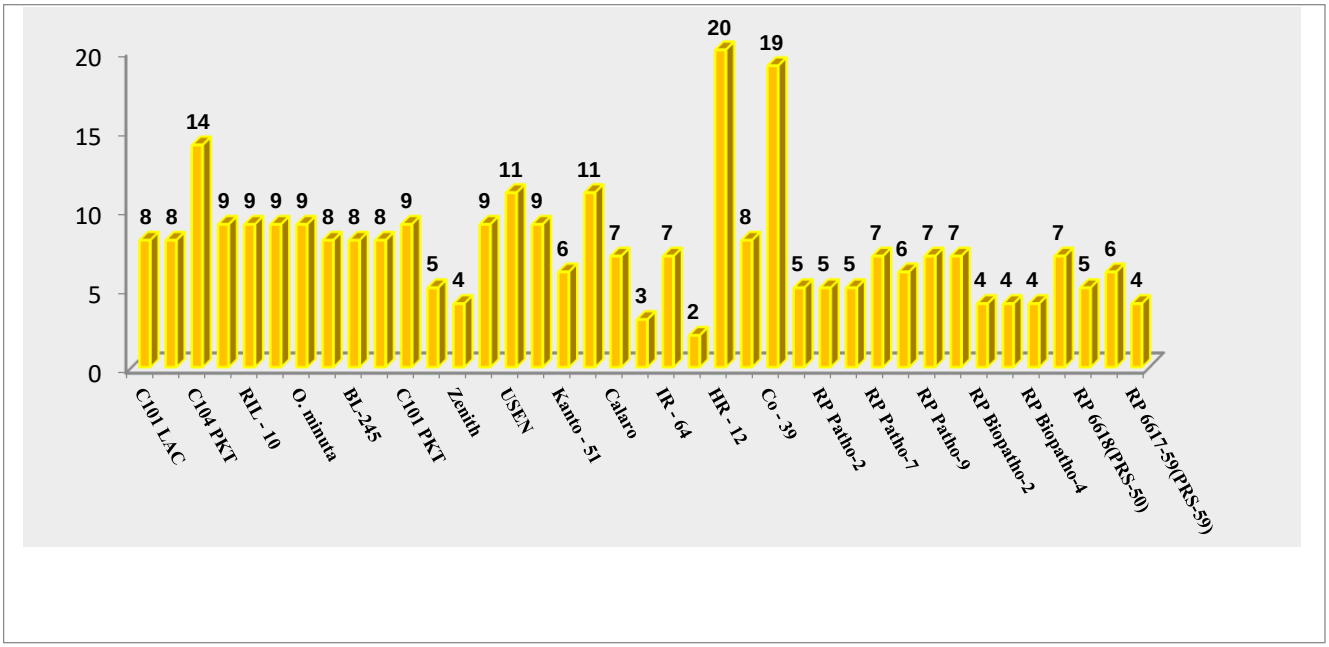

Figure 8.1A: Differential reaction of hosts to rice blast pathogen (*Pyricularia oryzae)* at different locations - *Kharif* 2022

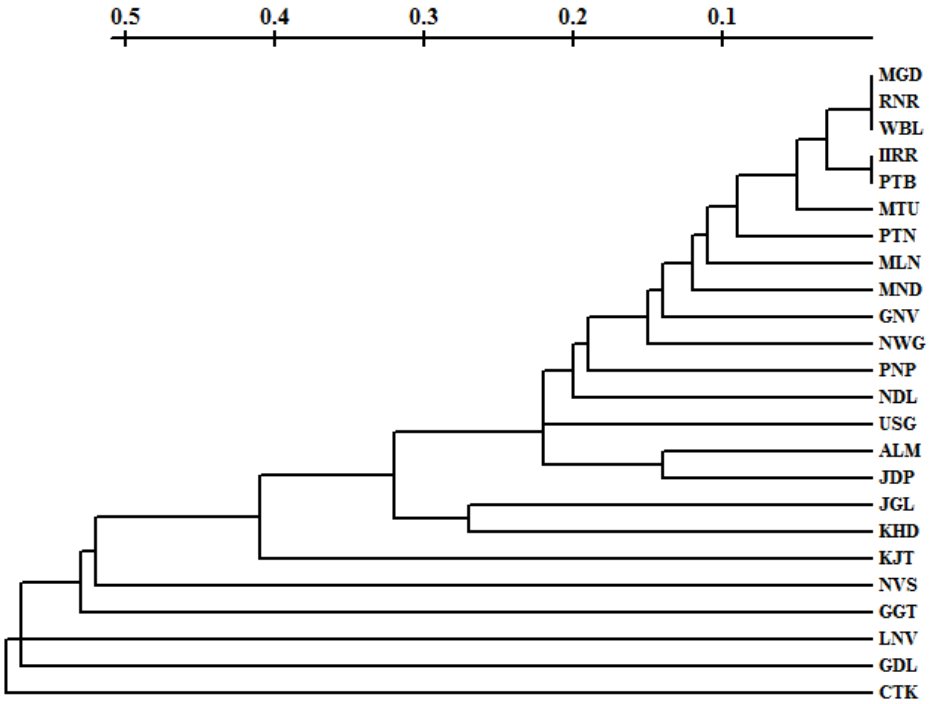

Figure 8.1B: Dendrogram showing relatedness of different reactions of *P. oryzae* at different locations during *Kharif* -2022

Table 8.1: Reaction of rice differentials to *Pyricularia oryzae* at across the locations in India during *Kharif* -2022

P. No	Differentials	Locations	ALM	CTK	GNV	GGT	GDL	IIRR	JDP	JGL	KJT	KHD	LNV	MLN	SI	<=3*	<=5*	Total	PI 5	PI 3
		Genes/Screening	N	A	A	-	N	A	N	A	N	A	A	A						
22	Tetep	*Pi-kh+*	2.5	7.0	2.0	7.0	4.0	1.0	0.0	3.0	4.5	4.0	3.0	2.0	**3.1**	**15**	**22**	**24**	**92**	**63**
34	RP Biopatho-3	*Pi2*	2.5	7.0	3.5	5.0	7.0	3.0	3.0	3.0	5.5	5.0	5.0	1.0	**3.3**	**14**	**20**	**24**	**83**	**58**
20	Tadukan	*Pi-ta*	3.0	5.0	5.5	7.0	6.0	1.0	1.5	5.0	4.0	5.0	4.5	1.0	**3.4**	**13**	**21**	**24**	**88**	**54**
12	Raminad -STR -3	-	1.0	7.0	3.0	5.0	3.0	1.0	2.5	7.0	7.5	7.0	6.5	2.0	**3.4**	**15**	**19**	**24**	**79**	**63**
35	RP Biopatho-4	*Pi54*	2.0	5.0	3.0	3.0	7.0	3.0	2.5	3.0	5.5	5.0	5.0	1.0	**3.7**	**12**	**20**	**24**	**83**	**50**
13	Zenith	*Pi-z + Pi-a + Pi-i*	3.0	5.0	3.5	5.0	6.0	4.0	0.5	5.0	7.0	5.0	5.5	2.0	**3.8**	**9**	**20**	**24**	**83**	**38**
27	RP Patho-2	*Pi2*	3.0	7.0	3.0	6.0	2.0	2.0	2.5	5.0	4.0	5.0	6.0	2.0	**3.8**	**11**	**19**	**24**	**79**	**46**
36	PRS-17	*(Pi9+Pi54)*	2.0	7.0	5.5	3.0	8.0	2.0	4.5	5.0	7.0	5.0	6.0	1.0	**3.8**	**12**	**17**	**24**	**71**	**50**
38	PRS-58	*Pi9*	3.0	7.0	5.0	6.0	9.0	3.0	4.0	3.0	7.0	5.0	5.5	2.0	**3.9**	**12**	**18**	**24**	**75**	**50**
39	PRS-59	*Pi9*	5.0	9.0	6.5	5.0	8.0	2.0	3.5	3.0	6.0	4.0	4.5	4.0	**3.9**	**9**	**20**	**24**	**83**	**38**
37	PRS-50	*Pi54*	5.0	7.0	6.0	5.0	8.0	2.0	3.5	3.0	5.5	4.0	6.5	3.5	**3.9**	**10**	**19**	**24**	**79**	**42**
28	RP Patho-3	*Pi54*	4.0	7.0	3.5	6.0	8.0	3.0	3.0	5.0	3.5	6.0	6.5	4.0	**3.9**	**10**	**19**	**24**	**79**	**42**
33	RP Biopatho-2	*Pi54*	4.0	7.0	3.5	5.0	8.0	3.0	3.5	5.0	5.0	5.0	4.5	2.0	**4.0**	**9**	**20**	**24**	**83**	**38**
21	IR - 64	Resistant	4.0	7.0	4.0	7.0	6.0	3.0	3.0	6.0	3.5	3.0	6.0	1.0	**4.0**	**9**	**17**	**24**	**71**	**38**
26	RP Patho-1	*Pi1*	5.5	5.0	3.0	5.0	2.0	3.0	1.5	8.0	3.0	3.0	6.5	5.0	**4.1**	**10**	**19**	**24**	**79**	**42**
30	RP Patho-8	*Pi2*	2.5	9.0	3.0	7.0	7.0	3.0	3.0	5.0	5.0	5.0	6.5	2.0	**4.1**	**11**	**18**	**24**	**75**	**46**
29	RP Patho-7	*Pi1*	4.0	7.0	4.0	6.0	5.0	3.0	3.0	6.0	3.5	6.0	5.5	2.0	**4.3**	**8**	**17**	**24**	**71**	**33**
17	Kanto - 51	*Pi-k*	5.0	7.0	4.5	6.0	5.0	3.0	3.0	-	3.5	7.0	5.0	4.0	**4.3**	**8**	**17**	**23**	**74**	**35**
14	NP - 125	-	7.0	5.0	5.5	6.0	6.0	3.0	1.5	-	7.0	5.0	5.5	2.0	**4.3**	**8**	**14**	**23**	**61**	**35**
16	Dular	*Pi-ka+*	7.0	5.0	4.0	6.0	8.0	1.0	3.0	5.0	7.0	5.0	5.5	7.0	**4.3**	**8**	**15**	**24**	**63**	**33**
31	RP Patho-9	*Pi54*	5.0	5.0	3.0	7.0	4.0	3.0	6.0	7.0	4.5	6.0	4.5	1.0	**4.3**	**7**	**17**	**24**	**71**	**29**
7	O. minuta	*Pi-9*	6.0	5.0	5.5	6.0	7.0	3.0	2.5	-	3.5	5.0	5.5	4.0	**4.3**	**7**	**14**	**23**	**61**	**30**
32	RP Biopatho-1	*Pi2*	5.0	5.0	3.5	7.0	4.0	3.0	7.5	5.0	6.0	6.0	5.5	1.5	**4.4**	**7**	**17**	**24**	**71**	**29**
2	C101 A51	*Pi-2*	6.0	7.0	3.5	7.0	8.0	3.0	5.0	3.0	6.0	5.0	5.5	4.0	**4.4**	**7**	**16**	**24**	**67**	**29**
1	C101 LAC	*Pi-1*	6.0	7.0	4.0	7.0	4.0	3.0	5.5	3.0	6.0	7.0	6.0	4.5	**4.5**	**7**	**16**	**24**	**67**	**29**
19	Calaro	*Pi-ks*	8.0	5.0	5.5	3.0	4.0	3.0	6.0	-	3.5	8.0	6.5	2.0	**4.5**	**6**	**15**	**22**	**68**	**27**
8	BL-122	*Pi-1 + Pi-2*	5.0	7.0	3.0	5.0	9.0	4.0	5.0	-	5.5	6.0	7.0	6.0	**4.7**	**6**	**15**	**23**	**65**	**26**
4	C101 TTP	*Pi-4b*	6.0	5.0	4.0	6.0	5.0	3.0	6.0	9.0	5.0	6.0	5.5	6.0	**4.8**	**6**	**15**	**24**	**63**	**25**
11	C101 PKT	*Pi-3*	4.5	5.0	4.0	6.0	7.0	3.0	2.5	7.0	7.0	6.0	7.0	2.0	**4.8**	**6**	**15**	**24**	**63**	**25**
5	RIL - 10	*Pi-12*	8.0	7.0	4.0	6.0	6.0	3.0	8.5	-	4.5	6.0	5.0	6.5	**4.8**	**6**	**13**	**22**	**59**	**27**
24	Rasi	Resistant	8.0	7.0	4.0	7.0	5.0	4.0	7.5	-	7.0	5.0	5.5	2.0	**4.8**	**6**	**15**	**23**	**65**	**26**
9	BL-245	*Pi-2 + Pi-4*	3.0	7.0	4.0	6.0	8.0	5.0	3.5	9.0	5.5	6.0	6.5	4.0	**4.8**	**6**	**16**	**24**	**67**	**25**
6	RIL - 29	*Pi-7*	7.0	7.0	5.0	6.0	7.0	3.0	6.5	8.0	3.5	5.0	4.5	4.5	**4.9**	**4**	**15**	**24**	**63**	**17**
10	A 57	*Pi-1 + Pi-2 + Pi-4*	3.0	7.0	3.5	7.0	8.0	3.0	3.0	9.0	4.5	5.0	7.0	5.0	**5.0**	**7**	**16**	**24**	**67**	**29**
15	USEN	*Pi-a+*	8.0	7.0	3.5	6.0	8.0	4.0	9.0	-	3.0	5.0	4.5	7.0	**5.3**	**5**	**12**	**23**	**52**	**22**
18	Shi-tia-tao	*Pi-ks*	8.0	7.0	5.0	3.0	9.0	5.0	9.0	5.0	3.0	5.0	5.5	3.0	**5.3**	**6**	**13**	**24**	**54**	**25**
3	C104 PKT	-	7.0	5.0	4.0	7.0	6.0	5.0	6.5	7.0	5.5	8.0	5.5	5.5	**5.4**	**3**	**10**	**24**	**42**	**13**
25	Co - 39	Susceptible	7.0	9.0	7.5	6.0	9.0	6.0	8.5	9.0	4.0	7.0	8.0	6.0	**6.5**	**2**	**5**	**24**	**21**	**8**
23	HR - 12	Susceptible	7.0	9.0	8.0	7.0	6.0	9.0	8.5	8.0	5.5	9.0	5.5	7.0	**6.8**	**3**	**4**	**24**	**17**	**13**
LSI			**4.9**	**6.5**	**4.3**	**5.8**	**6.3**	**3.2**	**4.3**	**5.6**	**5.1**	**5.5**	**5.6**	**3.4**						

(Conti..) Table 8.1A: Reaction of rice differentials to *Pyricularia oryzae* at across the locations in India during *Kharif* -2022

P.No	Differentials	Locations	MND	MTU	MGD	NVS	NWG	NDL	PTN	PTB	PNP	RNR	USG	WBL	SI	<=3*	<=5*	Total	PI 5	PI 3
		Genes/Screening	A	N	N	N	A	A	N	N	N	A	N	N						
22	Tetep	*Pi-kh+*	1.0	4.0	3.0	2.5	3.5	5.0	5.0	2.5	2.5	1.0	3.0	2.0	**3.1**	**15**	**22**	**24**	**92**	**63**
34	RP Biopatho-3	*Pi2*	2.0	2.5	3.0	6.0	4.5	1.0	0.0	2.0	4.5	1.0	1.0	2.0	**3.3**	**14**	**20**	**24**	**83**	**58**
20	Tadukan	*Pi-ta*	1.0	2.0	3.0	3.5	3.0	5.0	5.0	2.5	2.5	1.0	2.5	1.0	**3.4**	**13**	**21**	**24**	**88**	**54**
12	Raminad -STR -3	-	1.0	3.0	1.0	4.5	3.5	0.0	3.0	3.0	4.5	1.0	2.0	3.0	**3.4**	**15**	**19**	**24**	**79**	**63**
35	RP Biopatho-4	*Pi54*	2.0	2.5	5.0	6.5	5.5	5.0	5.0	2.0	3.5	1.0	1.0	4.0	**3.7**	**12**	**20**	**24**	**83**	**50**
13	Zenith	*Pi-z + Pi-a + Pi-i*	4.0	2.0	3.0	4.0	5.0	3.0	5.0	4.0	5.5	1.0	3.0	1.0	**3.8**	**9**	**20**	**24**	**83**	**38**
27	RP Patho-2	*Pi2*	2.0	2.5	5.0	5.0	5.0	2.0	5.0	2.0	5.5	1.0	5.5	4.0	**3.8**	**11**	**19**	**24**	**79**	**46**
36	PRS-17	*(Pi9+Pi54)*	2.0	2.5	3.0	5.5	3.5	5.0	7.0	2.0	2.5	1.0	1.0	1.0	**3.8**	**12**	**17**	**24**	**71**	**50**
38	PRS-58	*Pi9*	1.0	2.0	3.0	6.0	5.0	2.0	5.0	3.0	3.5	1.0	1.0	1.0	**3.9**	**12**	**18**	**24**	**75**	**50**
39	PRS-59	*Pi9*	1.0	4.5	3.0	5.0	4.5	2.0	0.0	3.5	4.5	1.0	3.0	1.0	**3.9**	**9**	**20**	**24**	**83**	**38**
37	PRS-50	*Pi54*	2.0	3.5	3.0	4.0	4.5	2.0	3.0	3.0	2.5	1.0	3.5	3.0	**3.9**	**10**	**19**	**24**	**79**	**42**
28	RP Patho-3	*Pi54*	3.0	2.0	3.0	3.5	4.5	2.0	5.0	3.0	4.5	1.0	1.5	2.0	**3.9**	**10**	**19**	**24**	**79**	**42**
33	RP Biopatho-2	*Pi54*	2.0	2.0	3.0	6.0	4.0	5.0	3.0	2.0	5.5	1.0	3.5	3.0	**4.0**	**9**	**20**	**24**	**83**	**38**
21	IR - 64	Resistant	4.0	2.0	1.0	6.0	4.5	7.0	5.0	4.0	4.5	1.0	2.0	2.0	**4.0**	**9**	**17**	**24**	**71**	**38**
26	RP Patho-1	*Pi1*	1.0	3.0	5.0	6.5	5.0	5.0	5.0	3.5	4.5	1.0	7.5	2.0	**4.1**	**10**	**19**	**24**	**79**	**42**
30	RP Patho-8	*Pi2*	1.0	3.0	3.0	6.0	5.0	4.0	5.0	2.0	4.5	1.0	6.0	1.0	**4.1**	**11**	**18**	**24**	**75**	**46**
29	RP Patho-7	*Pi1*	2.0	2.5	5.0	7.0	4.5	7.0	5.0	2.5	5.0	1.0	4.5	1.0	**4.3**	**8**	**17**	**24**	**71**	**33**
17	Kanto - 51	*Pi-k*	2.0	2.5	3.0	5.5	4.5	7.0	5.0	4.0	5.5	1.0	2.0	3.0	**4.3**	**8**	**17**	**23**	**74**	**35**
14	NP - 125	-	1.0	2.0	3.0	5.5	3.5	5.0	7.0	4.0	4.0	1.0	7.5	2.0	**4.3**	**8**	**14**	**23**	**61**	**35**
16	Dular	*Pi-ka+*	1.0	3.0	3.0	5.5	5.5	5.0	5.0	1.0	5.5	1.0	3.5	1.0	**4.3**	**8**	**15**	**24**	**63**	**33**
31	RP Patho-9	*Pi54*	3.0	3.5	5.0	4.5	4.5	7.0	3.0	4.0	5.5	1.0	6.0	1.0	**4.3**	**7**	**17**	**24**	**71**	**29**
7	O. minuta	*Pi-9*	6.0	3.5	3.0	6.0	6.0	1.0	6.0	4.0	4.5	1.0	3.0	3.0	**4.3**	**7**	**14**	**23**	**61**	**30**
32	RP Biopatho-1	*Pi2*	4.0	3.0	3.0	5.0	4.5	2.0	5.0	4.0	5.5	1.0	6.5	2.0	**4.4**	**7**	**17**	**24**	**71**	**29**
2	C101 A51	*Pi-2*	6.0	2.5	1.0	6.0	4.0	5.0	5.0	2.0	4.0	1.0	5.0	1.0	**4.4**	**7**	**16**	**24**	**67**	**29**
1	C101 LAC	*Pi-1*	5.0	2.0	3.0	6.5	5.0	5.0	3.0	4.0	4.0	1.0	5.0	2.0	**4.5**	**7**	**16**	**24**	**67**	**29**
19	Calaro	*Pi-ks*	4.0	-	3.0	6.0	6.5	5.0	5.0	4.5	4.5	1.0	4.0	2.0	**4.5**	**6**	**15**	**22**	**68**	**27**
8	BL-122	*Pi-1 + Pi-2*	4.0	5.0	3.0	5.5	6.0	4.0	5.0	2.0	4.5	1.0	2.0	3.0	**4.7**	**6**	**15**	**23**	**65**	**26**
4	C101 TTP	*Pi-4b*	4.0	4.0	3.0	5.5	4.5	7.0	5.0	3.0	4.5	1.0	3.0	3.0	**4.8**	**6**	**15**	**24**	**63**	**25**
11	C101 PKT	*Pi-3*	1.0	3.5	5.0	7.0	4.5	7.0	5.0	4.0	4.5	1.0	9.0	2.0	**4.8**	**6**	**15**	**24**	**63**	**25**
5	RIL - 10	*Pi-12*	7.0	-	3.0	5.0	3.5	3.0	3.0	4.0	3.5	1.0	6.0	2.0	**4.8**	**6**	**13**	**22**	**59**	**27**
24	Rasi	Resistant	5.0	3.0	1.0	7.5	6.5	5.0	5.0	4.0	4.5	1.0	3.0	3.0	**4.8**	**6**	**15**	**23**	**65**	**26**
9	BL-245	*Pi-2 + Pi-4*	7.0	3.0	5.0	5.0	5.0	5.0	5.0	3.0	5.0	1.0	3.0	1.0	**4.8**	**6**	**16**	**24**	**67**	**25**
6	RIL - 29	*Pi-7*	6.0	4.5	3.0	5.5	4.0	7.0	5.0	4.0	3.5	1.0	4.0	2.0	**4.9**	**4**	**15**	**24**	**63**	**17**
10	A 57	*Pi-1 + Pi-2 + Pi-4*	3.0	4.5	5.0	6.5	6.5	5.0	5.0	2.0	4.5	1.0	9.0	2.0	**5.0**	**7**	**16**	**24**	**67**	**29**
15	USEN	*Pi-a+*	4.0	3.0	3.0	7.0	6.0	7.0	7.0	3.5	4.5	1.0	8.0	2.0	**5.3**	**5**	**12**	**23**	**52**	**22**
18	Shi-tia-tao	*Pi-ks*	8.0	6.0	5.0	6.5	5.0	7.0	7.0	5.0	5.5	1.0	1.5	2.0	**5.3**	**6**	**13**	**24**	**54**	**25**
3	C104 PKT	-	8.0	3.5	3.0	6.5	5.0	7.0	5.0	4.0	5.5	1.0	6.0	2.0	**5.4**	**3**	**10**	**24**	**42**	**13**
25	Co - 39	Susceptible	6.0	5.0	5.0	7.5	6.5	9.0	7.0	7.0	5.5	1.0	7.0	2.0	**6.5**	**2**	**5**	**24**	**21**	**8**
23	HR - 12	Susceptible	9.0	6.0	3.0	7.0	8.5	9.0	5.0	6.5	7.5	1.0	9.0	3.0	**6.8**	**3**	**4**	**24**	**17**	**13**
LSI			**3.5**	**3.2**	**3.3**	**5.6**	**4.9**	**4.8**	**4.7**	**3.3**	**4.5**	**1.0**	**4.2**	**2.1**						

TRIAL No.9: FIELD MONITORING OF VIRULENCE: *X. oryzae* pv. *Oryzae*

Trial on monitoring virulence of bacterial blight (BB) pathogen, *Xanthomonas oryzae* pv. *oryzae* (*Xoo*) was proposed at 26 hot spot locations across India during *Kharif* season of 2022. However, data were received from 25 locations. 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. 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). Reactions of the *Xoo* isolates were also recorded on differentials possessing combinations of different BB resistance genes. Susceptible check variety, TN1 and resistant check variety Improved Samba Mahsuri was also included in the trial. The *Xoo* isolates collected from Maruteru, IIRR, Chinsurah, Chiplima, Raipur and Pattambi were categorized as highly virulent and produced LSI (location severity index) of more than 7. All these isolates produced a highly susceptible reaction on susceptible check TN1. These isolates produced susceptible reactions on 11-13 differentials out of 13 differentials. These isolates produced moderate to highly susceptible reactions on IRBB21 possessing BB resistance gene *Xa21*. The isolates from Maruteru, Chiplima, Raipur and Pattambi produced susceptible reaction on IRBB 13 possessing BB resistance gene, *xa13*. The isolate from Maruteru also produced highly susceptible reaction on Improved Samba Mahsuri which can be rechecked.

The isolates from New Delhi, Ludhiana, Sabour, Nawagam, Patna, Mashodha, Navsari, Titabar, Cuttack, Coimbatore, Gangavathi, Aduthurai, Chatha and Jagtiyal were categorized as moderately virulent and these isolates produced an LSI of 5-7. These isolates produced susceptible reactions on 3-11 differentials. Majority of these isolates (except isolates from Nawagam, Patna and Coimbatore) showed moderate to high level of resistance to IRBB13. Similarly, most of these isolates (except isolates from New Delhi, Titabar, Sabour, Ludhiana and Coimbatore) showed moderate to high level of resistance to IRBB21. The isolates from Pantnagar, Rajendranagar, Warangal, Karjat and Moncompu were categorized as less virulent as they produced an LSI of below 5. These isolates produced susceptible reactions on 0-7 differentials. The reactions of all these isolates to differentials possessing different combinations of BB resistance genes are presented in Table 9.2. The isolate from Maruteru showed highly susceptible reactions (BB score of 7-9) on all the differentials possessing various combinations of BB resistance genes including Improved Samba Mahsuri. These data can be rechecked. In general, most of the gene combinations except IRBB 51, IRBB 61 and IRBB 62 showed a broad spectrum resistance (Figure 9.1A). Cluster analysis of *Xoo* reaction on differentials possessing different single BB resistance genes at various locations was done and is presented in Figure 9.1B. The isolate from Maruteru formed a distinct cluster. Other highly virulent category isolates like IIRR, Chinsurah, Chiplima, Raipur and Pattambi grouped together or nearby. Low virulent isolate like Karjat, Moncompu, Rajendranagar and Warangal grouped together. Most of the isolates from moderately virulent category grouped together.

Table 9.1: Reaction of rice differentials possessing different single BB resistance genes to *Xanthomonas oryzae* pv. *oryzae* at different locations during *Kharif*'2022

Differentials	Gene combinations	Highly virulent						Moderately virulent						
		MTU	IIRR	CHN	CHP	RPR	PTB	NDL	LDN	SBR	NWG	PTN	MSD	NVS
IRBB 1	*Xa1*	9	9	7	9	9	7	9	7	9	7	7	9	8
IRBB 3	*Xa3*	9	9	9	8	9	9	7	7	9	8	7	8	7
IRBB 4	*Xa4*	8	9	9	7	5	7	7	7	5	6	7	6	6
IRBB 5	*xa5*	8	9	7	8	9	7	7	7	5	7	5	7	7
IRBB 7	*Xa7*	9	9	8	8	7	7	7	7	7	8	7	6	8
IRBB 8	*xa8*	9	9	7	8	9	7	9	7	9	4	7	7	5
IRBB 10	*Xa10*	8	9	9	9	9	7	7	9	9	6	7	5	8
IRBB 11	*Xa11*	9	9	9	8	7	7	9	7	5	7	7	5	6
IRBB 13	*xa13*	9	5	5	7	7	6	5	3	5	7	7	5	4
IRBB 14	*Xa14*	9	9	9	9	7	8	1	7	5	6	7	6	5
IRBB 21	*Xa21*	9	7	9	7	9	6	7	7	7	4	3	4	5
ISM	*xa5+xa13+Xa21*	9	3	3	2	3	5	5	3	3	5	5	3	3
TN1		9	9	9	9	9	9	9	9	9	9	7	9	8
LSI		8.8	8.1	7.7	7.6	7.6	7.1	6.8	6.7	6.7	6.5	6.4	6.2	6.2
Min Score		8	3	3	2	3	5	1	3	3	4	3	3	3
Max Score		9	9	9	9	9	9	9	9	9	9	7	9	8
# of entries>5		13	11	11	12	11	12	10	11	7	10	10	8	8

(Conti.,) Reaction of rice differentials possessing different single BB resistance genes to *Xanthomonas oryzae* pv. *oryzae* at different locations during *Kharif*'2022

Differentials	Gene combinations	Moderately virulent							Low virulent				
		TTB	CTK	CBT	GNV	ADT	CHT	JGL	PNT	RNR	WGL	KJT	MNC
IRBB 1	*Xa1*	6	5	6	6	9	5	4	6	5	2	2	0
IRBB 3	*Xa3*	6	5	4	7	5	6	6	5	5	3	1	1
IRBB 4	*Xa4*	8	7	4	6	7	4	5	6	4	2	1	0
IRBB 5	*xa5*	5	5	5	4	5	5	7	1	4	1	8	2
IRBB 7	*Xa7*	7	7	7	5	7	6	6	5	4	4	3	1
IRBB 8	*xa8*	6	5	6	6	9	7	7	6	4	5	1	2
IRBB 10	*Xa10*	8	5	7	4	3	5	6	7	4	4	1	2
IRBB 11	*Xa11*	6	5	5	6	1	5	7	6	5	5	1	2
IRBB 13	*xa13*	5	3	6	5	3	4	5	7	5	4	1	2
IRBB 14	*Xa14*	7	5	4	6	3	5	3	1	4	3	1	0
IRBB 21	*Xa21*	6	5	6	2	3	5	2	1	5	4	3	0
ISM	*xa5+xa13+Xa21*	2	5	3	2	3	3	2	5	3	1	3	1
TN1		8	9	7	9	9	6	6	8	9	9	5	4
LSI		6.2	5.5	5.4	5.2	5.2	5.1	5.1	4.9	4.7	3.6	2.4	1.3
Min Score		2	3	3	2	1	3	2	1	3	1	1	0
Max Score		8	9	7	9	9	7	7	8	9	9	8	4
# of entries>5		10	3	7	7	5	4	7	7	1	1	1	0

Table 9.2: Reaction of rice differentials possessing different combinations of BB resistance genes to *Xanthomonas oryzae* pv. *oryzae* at different locations during *Kharif*'2022

Differentials	Gene combinations	Locations												
		MTU	NWG	RPR	PTB	RNR	MSD	CBT	SBR	NVS	CHP	NDL	TTB	CHT
IRBB 50	*Xa4+xa5*	9	6	7	6	5	5	4	7	6	7	5	4	5
IRBB 51	*Xa4+xa13*	9	3	5	7	4	5	5	7	5	5	5	4	5
IRBB 52	*Xa4+Xa21*	9	6	5	6	5	5	6	5	6	6	5	5	5
IRBB 53	*xa5+xa13*	7	6	5	5	5	5	4	5	4	6	5	6	3
IRBB 54	*xa5+Xa21*	8	5	7	5	4	5	5	5	6	6	7	4	3
IRBB 55	*xa13+Xa21*	7	6	5	5	5	5	4	5	3	5	5	3	5
IRBB 56	*Xa4+xa5+xa13*	9	6	7	6	5	5	4	5	5	4	5	4	5
IRBB 57	*Xa4+xa5+Xa21*	7	6	7	5	5	5	-	5	6	5	5	4	6
IRBB 58	*Xa4+xa13+Xa21*	9	6	5	5	5	4	6	3	5	3	5	3	4
IRBB 59	*xa5+xa13+Xa21*	8	5	3	4	5	5	-	3	4	4	1	4	4
IRBB 60	*Xa4+xa5+xa13+Xa21*	9	6	3	4	5	3	6	3	3	3	1	3	5
IRBB 61	*Xa4 + xa5 + Xa7*	9	4	5	5	5	5	4	7	5	6	5	6	3
IRBB 62	*Xa4 + Xa7 + Xa21*	9	7	9	5	5	5	5	5	6	4	7	5	4
IRBB 63	*xa5 +Xa7 + xa13*	9	7	5	5	5	5	4	7	3	5	5	5	3
IRBB 64	*Xa4 + xa5 + Xa7 + Xa21*	9	6	5	4	5	3	6	3	4	4	5	5	3
IRBB 65	*Xa4 + Xa7 + xa13 + Xa21*	8	5	5	3	4	5	4	1	3	2	1	5	5
IRBB 66	*Xa4+xa5+Xa7 + xa13 + Xa21*	9	3	3	3	5	3	3	1	3	1	1	4	6
ISM	*xa5+xa13+Xa21*	9	5	3	5	3	3	3	3	3	2	5	2	3
TN1		9	9	9	9	9	9	7	9	8	9	9	8	6
LSI		8.5	5.6	5.4	5.1	4.9	4.7	4.7	4.7	4.6	4.6	4.6	4.4	4.4
Min Score		7	3	3	3	3	3	3	1	3	1	1	2	3
Max Score		9	9	9	9	9	9	7	9	8	9	9	8	6
# of entries>5		19	12	6	5	1	1	5	5	6	6	3	3	3

Differentials	Gene combinations	Locations											
		CHN	GNV	IIRR	LDN	CTK	PTN	JGL	ADT	KJT	PNT	WGL	MNC
IRBB 50	*Xa4+xa5*	**7**	**5**	**7**	**7**	**5**	**2**	**4**	**3**	**1**	**5**	**4**	**0**
IRBB 51	*Xa4+xa13*	5	5	3	3	3	2	5	3	3	1	2	0
IRBB 52	*Xa4+Xa21*	7	2	7	3	3	3	2	3	1	1	1	0
IRBB 53	*xa5+xa13*	5	2	3	3	3	3	3	3	1	1	1	1
IRBB 54	*xa5+Xa21*	5	3	3	3	3	4	2	0	4	1	1	0
IRBB 55	*xa13+Xa21*	3	6	1	3	3	3	2	1	3	0	1	0
IRBB 56	*Xa4+xa5+xa13*	3	5	1	3	3	4	5	0	1	1	1	2
IRBB 57	*Xa4+xa5+Xa21*	5	5	3	3	1	3	3	0	1	1	1	1
IRBB 58	*Xa4+xa13+Xa21*	1	2	1	1	3	3	4	1	3	1	1	2
IRBB 59	*xa5+xa13+Xa21*	3	2	1	3	1	3	4	5	3	0	1	1
IRBB 60	*Xa4+xa5+xa13+Xa21*	1	1	1	3	3	3	2	4	1	0	1	0
IRBB 61	*Xa4 + xa5 + Xa7*	7	5	9	5	5	3	4	-	7	1	2	1
IRBB 62	*Xa4 + Xa7 + Xa21*	7	5	7	3	3	3	3	1	1	1	1	1
IRBB 63	*xa5 +Xa7 + xa13*	3	4	3	3	3	3	2	5	1	5	1	1
IRBB 64	*Xa4 + xa5 + Xa7 + Xa21*	3	5	3	3	3	3	2	-	1	1	1	1
IRBB 65	*Xa4 + Xa7 + xa13 + Xa21*	3	4	1	3	3	3	2	1	1	6	1	0
IRBB 66	*Xa4+xa5+Xa7 + xa13 + Xa21*	3	2	1	3	3	2	2	1	1	0	1	1
ISM	*xa5+xa13+Xa21*	3	2	3	3	5	5	2	3	3	5	1	1
TN1		9	9	9	9	9	7	6	9	5	8	9	4
LSI		4.4	3.9	3.5	3.5	3.4	3.3	3.1	2.5	2.2	2.1	1.7	0.9
Min Score		1	1	1	1	1	2	2	0	1	0	1	0
Max Score		9	9	9	9	9	7	6	9	7	8	9	4
# of entries>5		5	2	5	2	1	1	1	1	1	2	1	0

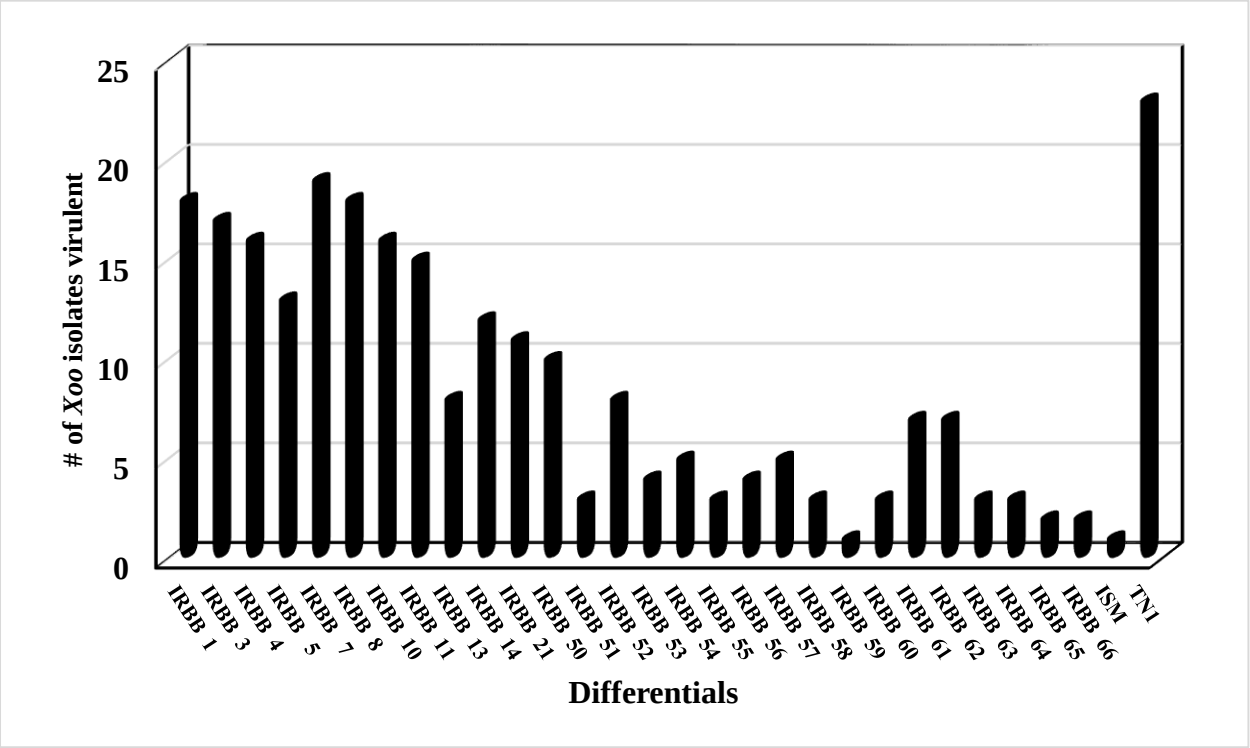

Figure 9.1A: Number of *Xoo* isolates showing moderate to high virulence on different BB resistance genes and their combinations during *Kharif*' 2022

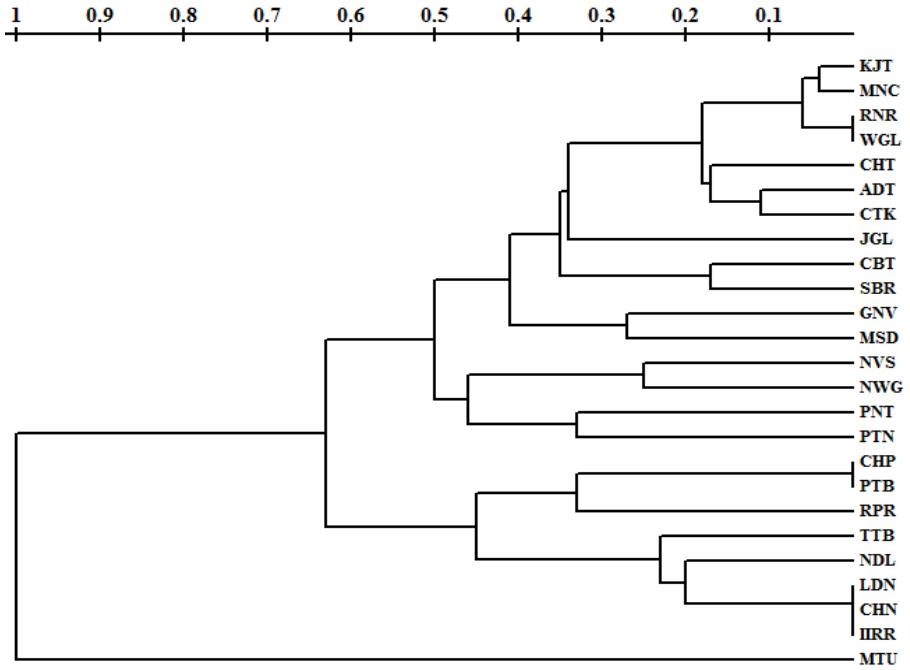

Figure 9.1B: Dendrogram (based on reactions of differentials possessing single BB resistance genes) showing the relatedness of different *Xanthomonas oryzae* pv. *oryzae* isolates from various locations during *Kharif*' 2022

III. TRIAL No. 10. DISEASE OBSERVATION NURSERY – *Kharif*-2022

Disease observation nursery (DON) trials were conducted at several locations with different sowing dates viz., early, normal and late with relevance to the respective locations, with an aim to estimate the effect of such varied sowing/planting dates on the occurrence and severity of the disease in the respective endemic regions. It is generally known that the availability of susceptible host, virulent pathogen and prevalence of favorable weather conditions play important role in the process of disease development. In this context the trial was formulated with a susceptible variety (location specific) to take up sowing in three different dates to collect the information on the incidence of the disease and data was recorded as percent disease index of various rice diseases throughout the cropping period. Knowledge on the occurrence of particular disease in specific location based on susceptible host and time of sowing may help to formulate the best management strategy. The trial was proposed at 11 locations Bankura, Chinsurah, Kaul, Malan, Mandya, Maruteru, Moncompu, Nawagam, Nellore, Pusa and Raipur. The data however was received from 11 centres and Nellore center did not send the data. The center Gangavathi conducted this trial and sent the data. The salient features of this study are presented on location-wise below.

Bankura:

Three different sowing dates i.e, 15.06.2022 (early), 30.06.2022 (normal) and 15.07.2022 (late) were followed to study the effect of date of sowings on the progression of the leaf blast disease by using the susceptible varieties of this region *i.e.*, HR-12, TN-1, Swarna and Danargunri. The variety TN-1 showed tolerance to blast (15.51% PDI) as compared to the remaining varities HR-12 (19.22%), Swarna (42.31%) and Danargunri (93.03%) in this particular center (Table 10.1). The early sown crop showed more disease development and progression compared to the normal sown and late sown crops in all the four verities tested. Leaf blast was more in early sown crop of variety Danargurni (16.18%-93.03% PDI) followed by the early sown crop of Swarna variety (0-42.31% PDI). Lowest incidence of blast was observed in case of late sown crop of HR-12 (0-1.66% PDI) followed by the late sown crops of TN-1 (0-8.77% PDI), Swarna (0-12.12% PDI) and Danargurni (5.40-35.20% PDI). The table 10.1 showed that in Bankura center, early sown crop is very much prone to leaf blast incidence.

Table 10.1: **Occurrence of different rice diseases in disease observation nursery at different test locations, *Kharif* – 2022 - Bankura**

Location/ Date of sowing	Percent Disease Index								
	Bankura								
	Leaf blast								
V/DOS	**DAT**	**(E)**	**(N)**	**(L)**	**V/DOS**	**DAT**	**(E)**	**(N)**	**(L)**
HR-12	30 DAT	0.00	0.00	0.00	**Swarna**	30 DAT	0.00	0.00	0.00
E:15-06-2022	40 DAT	0.00	0.00	0.00	**E:15-06-2022**	40 DAT	6.56	2.17	2.10
N:30-06-2022	50 DAT	6.05	3.19	0.00	**N:30-06-2022**	50 DAT	16.14	7.61	7.37
L:15-07-2022	60 DAT	9.25	4.26	1.66	**L:15-07-2022**	60 DAT	18.29	12.00	12.12
	70 DAT	16.00	9.78			70 DAT	25.62	17.37	
	80 DAT	19.22				80 DAT	42.31		
	90 DAT					90 DAT			
	100 DAT					100 DAT			
	110 DAT					110 DAT			
TN-1	30 DAT	0.00	0.00	0.00	**Danargunri**	30 DAT	16.18	9.88	5.40
E:15-06-2022	40 DAT	0.00	0.00	0.00	**E:15-06-2022**	40 DAT	29.62	17.32	10.95
N:30-06-2022	50 DAT	0.45	0.00	0.00	**N:30-06-2022**	50 DAT	52.55	43.85	28.33
L:15-07-2022	60 DAT	5.98	8.79	8.77	**L:15-07-2022**	60 DAT	75.18	46.25	35.20

Location/ Date of sowing	Percent Disease Index								
	Bankura								
	Leaf blast								
V/DOS	DAT	(E)	(N)	(L)	V/DOS	DAT	(E)	(N)	(L)
	70 DAT	12.34	15.12			70 DAT	91.55	49.91	
	80 DAT	15.51				80 DAT	93.03		
	90 DAT					90 DAT			
	100 DAT					100 DAT			
	110 DAT					110 DAT			

Chinsurah:

In Chinsurah, three different sowing dates viz., 31.05.22, 16.06.22 and 14.07.22 were followed as early, normal and late sowing periods respectively. The variety MTU 7029 was used to study the disease progress of different diseases. The diseases that were prevalent in this centre were Sheath blight, Sheath rot, brown spot and bacterial leaf blight (BLB). The observations were taken at 10 days interval from 30 DAT to 110 DAT. Higher incidence of Sheath blight was observed in the early and normal sowing periods (11.0 to 69% PDI and 9.0 to 54 % PDI respectively) and significantly less incidence was observed during the late sown crop i.e., 2.0 to 23.5 % PDI. Sheath rot disease was present in the panicle initiation and grain filling stages in all the sowing periods (80 to 110 DAT) and relatively more in normal and late sown crops (11.0 to 42.5% and 16.5 to 50% PDI respectively), when compared to the early sown crop (5.0 to 25% PDI). Brown spot disease was generally less in all the sowings, was generally found to occur in the tillering to grain filling stages (70 to 100 DAT) and more in the late sown crop (5.5 to 23.5% PDI) when compared to early sown crop (3.5 to 16.5% PDI). Similarly, BLB severity more in normal sown crop (5.5% PDI) as compared to the early sown crop (5% PDI). In both the sowing times, there was no progression of the disease was observed in early stages of the crop. This may be due to the fact that the infected plants recovered with the age of the plants (30-80 DAT) and did not show further symptoms (Table 10.2).

Table 10.2: Occurrence of different rice diseases in disease observation nursery at different test locations, *Kharif* – 2022 - Chinsurah

Location/ Date of sowing	Percentage of Disease Index												
		Sheath blight			Sheath rot			Brown spot			BLB		
V/DOS	DAT	(E)	(N)	(L)	(E)	(N)	(L)	(E)	(N)	(L)	(E)	(N)	(L)
MTU-7029	30 DAT	11.0	9.0	2.0									
E:31-05-2022	40 DAT	15.0	13.5	5.5							2.5	3.5	-
N:16-06-2022	50 DAT	23.5	19.0	10.0							5.0	5.5	-
L:14-07-2022	60 DAT	41.0	29.0	14.5					4.0	5.5			
	70 DAT	56.0	38.0	19.0				3.5	6.5	11.0			
	80 DAT	63.0	47.5	23.5	5.0	11.0	16.5	5.5	9.0	18.0			
	90 DAT	69.0	54.0		10.0	16.5	30.0	11.0	13.5	23.5			
	100 DAT				15.0	42.5	50.0	16.5	16.0				
	110 DAT				25.0								

Gangavathi:

Four major diseases *viz*., leaf blast, sheath blight, False smut and BLB were observed in all the sowing periods in Gangavathi during *kharif* 2022. Blast disease was present in very less percentage (2.5 to 10.5 % PDI) in all the stages of the crop (30 to 90 DAT). The severity of blast is more in early sown crop compared to normal and late sown crops in this area. The incidence of BLB was observed in all stages of the crop (30 to 90 DAT) and the incidence was very high in 50 to 80 DAT in all the sowing periods. The disease ranged between 4.0 to 15.6% PDI in early, 11.0 to 23.5% PDI in normal and 8.0 to 25.3% PDI in late sown crop (Table 10.3). In Gangavathi, the incidence of BLB was more in late sown crop. Sheath blight was observed from 50 DAT up to maturity stage and disease ranged between 2.5 to 19.6% PDI in early, 0.5 to 21.0% PDI in normal and 2.5 to 57.90% PDI in late sown crop. However, the incidence of False smut was observed in the grain filling to early maturity stage (70 to 90 DAT) and in highest incidence of 14.5 to 20.5 % PDI in the normal sown crops followed by early sown crop (8.0 to 19.0% PDI) and late sown crop (9.0 to 17.0% PDI).

Table 10.3: Occurrence of different rice diseases in disease observation nursery at different test locations, *Kharif* – 2022 – Gangavathi

Location/ Date of sowing		Percentage of Disease Index											
		Sheath blight			False smut			Leaf blast			BLB		
V/DOS	DAT	(E)	(N)	(L)	(E)	(N)	(L)	(E)	(N)	(L)	(E)	(N)	(L)
GNV-05-01	30 DAT	0.0	0.0	0.0	0.0	0.0	0.0	3.5	5.0	2.5	4.0	11.0	8.0
E:09-07-2022	40 DAT	0.0	0.0	0.0	0.0	0.0	0.0	4.0	5.0	5.5	11.0	14.0	11.5
N:18-07-2022	50 DAT	2.5	0.5	2.5	0.0	0.0	0.0	7.9	6.0	6.0	16.0	16.0	16.0
L:28-07-2022	60 DAT	6.3	6.3	12.3	0.0	0.0	0.0	9.1	3.8	6.5	18.0	18.5	16.5
	70 DAT	11.0	12.2	30.8	8.0	14.5	9.0	10.5	2.5	6.5	21.0	23.5	21.0
	80 DAT	13.6	17.0	48.0	13.0	18.0	14.5	-	4.2	8.0	14.5	18.0	24.0
	90 DAT	16.7	21.0	55.7	19.0	20.5	17.0	-	4.4	9.8	14.3	11.0	25.3
	100 DAT	19.6	21.0	57.9							15.6	12.3	23.8
	110 DAT	0.0	0.0	0.0									

Kaul:

Different varieties were tested for different sowing dates which was not as per the technical programme finalized during the workshop. All the three different cropping dates should have been planted for comparison, but has not been done in this case. Blast and Sheath blight severity data taken at one or two dates, it was not sufficient to compare the progression of disease over different sowing times and also with in the same sowing season from planting to harvesting. The very purpose of comparing the disease severity during the different sowing periods has not been served with the conduct of this experiment. The co-operator is requested to explain this deviation from the finalized protocol for the conduct of DON experiments (Table 10.4). Comparatively the foot rot or bakane disease was more in early sown crop compared to normal sown crop.

Table 10.4: Occurrence of different rice diseases in disease observation nursery at different test locations, *Kharif* – 2022 - Kaul

Location/ Date of sowing	Percentage of Disease Index									
		Foot Rot		Blast			Sheath blight		Brown spot	
V/DOS	DAT	(E)	(N)	(N)	(L)	V/DOS	(E)	(N)		(E)
VARIETY	30 DAT	9.0	4.7	9.9		VARIETY			CSR 30	
PB 1121	40 DAT	-	-	14.7		**HKR 126**			E:25-06-22	
E:11-06-22	50 DAT	10.0	6.3			E:11-06-22				
N:25-06-22	60 DAT	16.2	10.9			N:25-06-22				5.6
L:09-07-22	70 DAT	17.3	12.6							6.4
	80 DAT	15.6	11.4		18.0		13.4	8.8		7.5
	90 DAT	10.8	9.1				9.5	11.8		8.8
	100 DAT	8.5	7.4							
	110 DAT	6.8	5.5							
V/DOS	30 DAT	5.8	3.9	10.6		**V/DOS**				
CSR 30	40 DAT	-	-	17.3		**HKR 127**				
E:11-06-2022	50 DAT	7.3	5.5			E:11-06-22				
N:25-06-2022	60 DAT	11.4	8.2			N:25-06-22				
L:09-07-2022	70 DAT	13	9.6							
	80 DAT	12.4	9.2		21.3		19.9	6.6		
	90 DAT	10	7.3				13.5	11.3		
	100 DAT	6.2	5.7							
	110 DAT	4.8	4.6							

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 (05.06.2022), normal (20.06.2022) and late (05.07.2022) 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 (20.0 to 53.33% PDI) and normal (18.34 to 47.78% PDI) and comparatively low incidence was observed from 60 to 100 DAT in early sowing periods (21 to 43.89% PDI). Among the three sowing periods, the incidence of Sheath rot was found to be maximum in the late sown crop (53.33% 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 normal sown crops, progressing gradually thereafter. But in case of late sown crop, symptoms appear at 50 DAT. Further, the percentage disease index was relatively less in the case of the variety P-203 (maximum of 47.22% PDI) when compared to the variety Gurjari (maximum of 53.33% PDI). (Table 10.5). The same trend was followed in the case of variety P-203 like the late sown crop was more effected by the sheath rot incidence compared to normal and early sown crops.

Malan:

Variety HPU 2216 was used as the susceptible variety against Leaf blast and the crop was sown in i.e., 21.05.2022 (early), 05.06.2022 (normal) and 20.06.2022 (late). The early sown crop was found to be disease free (0.0% PDI) when compared to the normal (4.55 to 21.45% PDI) and late sown crop (4.05 to 33.75% PDI). Excess moisture during the early stages of the crops under the late sown conditions led to the more incidence of the disease, when

compared to the relatively dry season during early sown conditions and as a result the initial stage of the crop was relatively dry and hence incidence was low (Table 10.5).

Table 10.5: Occurrence of different rice diseases in disease observation nursery at different test locations, *Kharif* – 2022-Nawagam and Malan

Location/ Date of sowing	Percent Disease Index								
	Nawagam				Malan				
	Sheath rot				Blast				
V/DOS	DAT	(E)	(N)	(L)	V/DOS	DAT	(E)	(N)	(L)
Gurjari	30 DAT	0	0	0	**HPU 2216**	30 DAT	0	0	0
E:05-06-2022	40 DAT	0	0	0	E:21-05-2022	40 DAT	0	0	4.05
N:20-06-2022	50 DAT	21.00	18.34	20.00	N:05-06-2022	50 DAT	0	4.55	17.05
L:05-07-2022	60 DAT	28.00	28.00	22.00	L:20-06-2022	60 DAT	0	9.5	25.2
	70 DAT	33.57	31.43	29.00		70 DAT	0	21.45	33.75
	80 DAT	39.98	35.00	29.72		80 DAT			
	90 DAT	42.22	36.91	41.11		90 DAT			
	100 DAT	43.89	47.78	53.33		100 DAT			
	110 DAT	-	-	-		110 DAT			
P-203	30 DAT	0	0	0					
E:05-06-2022	40 DAT	0	0	0					
N:20-06-2022	50 DAT	0.00	0.00	5.00					
L:05-07-2022	60 DAT	16.67	10.00	11.77					
	70 DAT	20.48	15.00	20.00					
	80 DAT	21.34	23.34	28.34					
	90 DAT	24.00	29.00	39.14					
	100 DAT	27.00	33.89	45.56					
	110 DAT	35.72	41.67	47.22					

Mandya:

The progression of four diseases (blast, sheath blight, neck blast and brown spot) were studied at three different sowing dates i.e., 15-07-2022 (early), 11.08.2022 (normal) and 16.09.2023 (late) by using two different susceptible varieties like MTU-1001 and IR-64. MTU 1001showed better tolerance for blast disease and late sown crop effected much (17%PDI) compared to early (5.5%PDI) and normal sown crops (11%PDI). IR 64 showed better tolerance to sheath blight compared to MTU 1001. Among the different diseases studied, sheath blight was more severe in normal sown crop (61.5% PDI in both MTU 1001 and IR 64), Necjk blast was more severe in early sown crop (11 to 61.5% PDI in MTU 1001 and 9-65% PDI in IR 64) compared to normal and late sown crops. Incase of brown spot, the variety MTU 1001 showed more disease in late sown crop (1-66% PDI), but incase of IR 64, normal sown crop showed more disease severity (2-44% PDI). Blast disease was more in late sown crop (17% PDI) of MTU 1001 and less in early sown crop (5.5% PDI) (Table 10.6).

TABLE 10.6: Occurrence of different rice diseases in disease observation nursery at different test locations, *Kharif* – 2022-Mandya

Location/ Date of sowing	DAT	Percentage of Disease Severity											
		Blast			SHB			NECK BLAST			Brown spot		
V/DOS		(E)	(N)	(L)	(E)	(N)	(L)	(E)	(N)	(L)	(E)	(N)	(L)
MTU 1001	30 DAT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Location/ Date of sowing	DAT	Percentage of Disease Severity											
		Blast			SHB			NECK BLAST			Brown spot		
V/DOS		(E)	(N)	(L)	(E)	(N)	(L)	(E)	(N)	(L)	(E)	(N)	(L)
E:15-07-2022	40 DAT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
N:11-08-2022	50 DAT	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5
L:16-09-2022	60 DAT	2.5	1.0	1.5	3.0	4.0	0.0	0.0	0.0	5.5	0.0	0.0	13.0
	70 DAT	2.5	1.0	4.0	4.0	5.5	6.0	0.0	0.0	9.0	2.0	2.0	23.5
	80 DAT	2.5	4.5	6.0	4.5	27.0	6.0	11.0	4.0	10.0	3.0	10.0	24.0
	90 DAT	3.0	5.5	14.0	7.5	38.5	19.0	13.0	10.0	14.0	8.0	20.0	33.5
	100 DAT	5.5	10.0	13.0	45.0	60.0	22.0	57.5	15.0	14.0	21.0	36.5	57.5
	110 DAT	5.5	11.0	17.0	53.0	61.5	38.5	61.5	16.0	18.0	21.0	36.5	66.0
IR 64	30 DAT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E:15-07-2022	40 DAT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N:11-08-2022	50 DAT	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
L:16-09-2022	60 DAT	2.5	1.0	2.0	4.0	6.0	0.0	0.0	0.0	6.0	2.0	2.0	2.0
	70 DAT	3.0	1.5	4.5	4.5	9.0	4.0	0.0	0.0	10.0	2.5	3.0	4.0
	80 DAT	3.0	4.5	6.0	4.5	41.5	8.0	9.0	4.0	10.0	3.0	18.0	6.0
	90 DAT	4.5	6.0	6.5	4.5	56.0	16.0	20.0	15.5	10.0	19.0	23.0	12.0
	100 DAT	8.0	12.0	12.0	26.0	59.5	25.0	63.5	19.0	12.0	40.0	38.0	13.0
	110 DAT	10.0	13.0	12.0	32.5	61.5	24.5	65.0	25.0	17.0	42.5	44.0	21.0

Maruteru:

Two varieties viz., BPT5204 and Swarna (MTU 7029) were tested in Maruteru under three different sowing dates i.e, 03.06.2022 (early), 18.06.2022 (normal) and 05.07.2022 (late), for the variations in the percent disease incidence of the two major rice diseases of this region i.e., Sheath blight and BLB. The crop sown in the early 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 BLB viz., BLB (67.35% PDI), when compared to the variety Swarna 61.56% PDI. Sheath blight severity was more in early sown crop (67.41 % in MTU 1001 & 64.45% PDI in BPT 5204) compared to normal and late sown crops. The bacterial leaf blight severity was more in late sown crop (61.56 PDI in MTU 1001 & 67.35% PDI in BPT 5204) compared to early and normal sown crops (Table 10.7).

Table 10.7: Occurrence of different rice diseases in disease observation nursery at different test locations, *Kharif* – 2022-Maruteru

Location/ Date of sowing		Percentage of Disease Index					
		Sheath blight			BLB		
V/DOS	DAT	(E)	(N)	(L)	(E)	(N)	(L)
	30 DAT	-	-	0	-	-	35.18
Swarna	40 DAT	-	-	0		2.775	-
E:03-06-2022	50 DAT	32.22	80.00	18.33	2.78	10.37	6.67
N:18-06-2022	60 DAT	88.34	-	0.00	9.00	-	0.00
L:05-07-2022	70 DAT	-	53.33	0.00	-	0.00	0.00
	80 DAT	64.44	40.56	7.41	5.56	0.00	0.00
	90 DAT	63.33	47.22	0.00	0.00	0.00	21.08
	100 DAT	59.45	51.85	-	2.78	13.34	-

Location/ Date of sowing		Percentage of Disease Index					
		Sheath blight			BLB		
	110 DAT	67.41	44.08	15.19	0.00	52.07	61.56
BPT 5204	30 DAT	-	-	0	-	-	25.55
E:03-06-2022	40 DAT	-	0		-	7.77	-
N:18-06-2022	50 DAT	0.00	7.22	0.00	12.95	34.89	14.94
L:05-07-2022	60 DAT	20.56		0.00	49.19	-	0.00
	70 DAT		31.11	0.00	-	0.00	0.00
	80 DAT	56.67	22.22	1.85	42.00	0.00	20.41
	90 DAT	57.22	2.78	0.00	22.94	0.00	52.74
	100 DAT	62.78	21.12	-	13.67	9.37	-
	110 DAT	64.45	44.45	2.60	24.71	46.96	67.35

Moncompu:

Four different varieties i.e., Uma, Shreyas, Prathyasa and Pournami were sown on different dates i.e, 06.06.2022 (early), 23.06.2022 (normal) and 11.07.2022 (late) for the studies on the effect of the different time of sowing on Sheath blight and BLB 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, both Sheath blight and BLB was relatively high during the fag end of the crop in the late sown crop of prathyasa and pournami compared to early and normal sown crops. Sheath blight was more in the late sown crop of varieties Prathyasa and pournami (49.73 and 15.56 % PDI). In the varieties shreyas and uma, sheath blight severity was more in early sown crop (13.34% in Uma and 30.82% in Shreyas) compared to normal and late sown crops. The incidence of BLB was very less this year and early sown crop effected much compared to normal and late sown crops (Table 10.8).

Table 10.8: Occurrence of different rice diseases in disease observation nursery at different test locations, *Kharif* – 2022-Moncompu

Location/ Date of sowing		Percentage of Disease Index					
		Sheath blight			BLB		
	DAT	**(E)**	**(N)**	**(L)**	**(E)**	**(N)**	**(L)**
Uma	30 DAT	0.00	0.00	0.00	0.00	0.00	0.00
E:06-06-2022	40 DAT	0.00	0.00	0.00	0.00	0.00	0.00
N:23-06-2022	50 DAT	0.00	0.00	0.00	0.00	0.00	0.00
L:11-07-2022	60 DAT	0.00	0.00	0.00	0.00	0.00	0.00
	70 DAT	0.00	0.00	0.00	0.00	0.00	0.00
	80 DAT	0.00	0.00	0.00	0.00	0.00	0.00
	90 DAT	5.12	1.94	2.89	0.00	0.00	0.00
	100 DAT	9.14	3.94	7.59	1.56	1.27	0.00
	110 DAT	13.34	7.22	11.12	3.89	2.78	0.28
Shreyas	30 DAT	0.00	0.00	0.00	0.00	0.00	0.00
E:06-06-2022	40 DAT	0.00	0.00	0.00	0.00	0.00	0.00
N:23-06-2022	50 DAT	0.00	0.00	0.00	0.00	0.00	0.00
L:11-07-2022	60 DAT	0.00	0.00	0.00	0.00	0.00	0.00
	70 DAT	0.00	0.00	0.00	0.00	0.00	0.00
	80 DAT	0.00	0.00	0.00	0.00	0.00	0.00
	90 DAT	21.33	9.72	6.51	3.02	0.00	0.00
	100 DAT	25.99	18.32	14.24	5.84	3.86	0.78

Location/ Date of sowing		Percentage of Disease Index					
		Sheath blight			BLB		
	110 DAT	30.82	25.28	18.61	8.33	8.34	1.67
Prathyasa	30 DAT	0.00	0.00	0.00	0.00	0.00	0.00
E:06-06-2022	40 DAT	0.00	0.00	0.00	0.00	0.00	0.00
N:23-06-2022	50 DAT	0.00	0.00	0.00	0.00	0.00	0.00
L:11-07-2022	60 DAT	0.00	0.00	0.00	0.00	0.00	0.00
	70 DAT	0.00	0.00	0.00	0.00	0.00	0.00
	80 DAT	0.00	0.00	0.00	0.00	0.00	0.00
	90 DAT	22.11	12.77	14.34	1.27	0.83	5.28
	100 DAT	26.91	27.07	33.21	2.56	3.99	10.78
	110 DAT	30.56	37.50	49.73	4.72	8.06	16.95
Pournami	30 DAT	0.00	0.00	0.00	0.00	0.00	0.00
E:06-06-2022	40 DAT	0.00	0.00	0.00	0.00	0.00	0.00
N:23-06-2022	50 DAT	0.00	0.00	0.00	0.00	0.00	0.00
L:11-07-2022	60 DAT	0.00	0.00	0.00	0.00	0.00	0.00
	70 DAT	0.00	0.00	0.00	0.00	0.00	0.00
	80 DAT	0.00	0.00	0.00	0.00	0.00	0.00
	90 DAT	0.00	1.94	6.79	1.62	0.00	0.00
	100 DAT	0.45	4.66	12.27	3.39	0.99	0.53
	110 DAT	1.39	6.67	15.56	5.00	2.22	1.11

Raipur:

Two varieties viz., Swarna and Rajeshwari were tested in Raipur under three different sowing dates i.e.,06-10-2022 (early), 07-05-2022 (normal) and 30-07-2022 (late), for the variation in the percent disease incidence of the three major rice diseases of this region i.e., Sheath blight, Blast and BLB. The variety Rajeshwari was more tolerant to sheath blight and blast compared to the variety Swarna. The variety Swarna was more tolerant to BLB compared to Rajeshwari. Sheath blight disease severity was more in early sown crop of both the varities (5-35% PDI in Swarna & 5-25% PDI in Rajeshwari) vompared to normal and late sown crops. Blast was more in early sown crop of Swarna (30% PDI) compared to normal and late sown crop. No incidence of blast was observed in the case of late sown crop of Rajeshwari. The BLB incidence was more in normal sown crop (30% PDI) of Swarna and early sown crop of Rajeshwari (45% PDI) (Table 10.9).

Table 10.9: Occurrence of different rice diseases in disease observation nursery at different test locations, *Kharif* – 2022-Raipur

Location/ Date of sowing		Percentage of Disease Index								
		Sheath blight			Blast			BLB		
V/DOS	DAT	(E)	(N)	(L)	(E)	(N)	(L)	(E)	(N)	(L)
Swarna	30 DAT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E:06-10-2022	40 DAT	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00
N:07-05-2022	50 DAT	5.00	5.00	5.00	10.00	10.00	5.00	0.00	0.00	5.00
L:30/07/2022	60 DAT	15.00	15.00	16.50	20.00	15.00	16.50	0.00	0.00	5.00
	70 DAT	25.00	15.00	16.50	25.00	15.00	16.50	5.00	10.00	15.00
	80 DAT	35.00	25.00	16.50	25.00	15.00	16.50	15.00	30.00	15.00
	90 DAT	35.00	25.00	16.50	30.00	15.00	16.50	15.00	30.00	15.00
	100 DAT	35.00	25.00	16.50	30.00	15.00	16.50	15.00	30.00	15.00
	110 DAT	35.00	25.00	16.50	30.00	15.00	16.50	15.00	30.00	15.00

Location/ Date of sowing		Percentage of Disease Index								
		Sheath blight			Blast			BLB		
Rajeshwari	30 DAT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E:06-10-2022	40 DAT	0.00	0.00	0.00	0.00	0.00	0.00	5.00	3.00	5.00
N:07-05-2022	50 DAT	5.00	0.00	0.00	0.00	0.00	0.00	15.00	10.00	15.00
L:30/07/2022	60 DAT	15.00	5.00	5.00	0.00	10.00	0.00	25.00	30.00	15.00
	70 DAT	25.00	15.00	5.00	5.00	10.00	0.00	35.00	30.00	25.00
	80 DAT	25.00	15.00	5.00	5.00	10.00	0.00	35.00	30.00	25.00
	90 DAT	25.00	15.00	5.00	5.00	10.00	0.00	45.00	30.00	25.00
	100 DAT	25.00	15.00	5.00	5.00	10.00	0.00	45.00	30.00	25.00
	110 DAT	25.00	15.00	5.00	5.00	10.00	0.00	45.00	30.00	25.00

Pusa:

Variety Sugandha was used as the susceptible variety against brown leaf spott and the crop was sown in i.e., 15.06.2022 (early), 30.06.2022 (normal) and 05.07.2022 (late). The incidence of brown leaf spot was started at 50 days after transplanting. The incidence of brown leaf spot was more in late sown crop (43% PDI) compared to normal (23% PDI) and late sown crops (26% PDI) (Table 10.10).

Table 10.10: Occurrence of different rice diseases in disease observation nursery at different test locations, *Kharif* – 2022-Pusa

BROWN LEAF SPOT				
Location/date of sowing	**Percentage of Disease severity**			
V/DOS	**DAT**	**(E)**	**(N)**	**(L)**
Sugandha	**30 DAT**	0.00	0.00	0.00
E:15-06-2022	**40 DAT**	0.00	0.00	5.00
N:30-06-2022	**50 DAT**	0.00	2.00	9.00
L:05-07-2022	**60 DAT**	1.50	4.50	17.00
	70 DAT	5.00	9.00	22.00
	80 DAT	10.00	14.00	29.00
	90 DAT	15.00	16.00	34.00
	100 DAT	21.00	19.00	39.00
	110 DAT	26.00	23.00	43.00

Influence of weather parameters and date of sowing on different diseases at different locations

To study the impact of weather parameters (temperature, relative humidity and rainfall) in the progress of the disease, the area under disease progress curve was measured and analysed. Accordingly, at Nawagam, the sheath rot disease data was analysed for two varieties *viz*., Gurjari and P-203. The results indicating that sheath rot disease progression was more rapid in Gurjari compared to the P-203. With increasing rainfall the sheath rot disease was increased in the case of the variety Gurjari, but it was reverse with the variety P-203 in which the progression of disease was increased with the decreasing rainfall (Table 10.11).

Table 10.11: Disease Progression with respect to weather factors at Nawagam

Sowing time	Nawagam					Sheath Rot	
	Temperature		Relative Humidity		Rainfall (mm)	AUDPC	
	Max	Min	Max	Min		GURJARI	P-203
Early	33.31	22.08	84.36	65.21	1063.10	2087	1274
Normal	32.78	21.74	84.77	66.35	1055.10	1975	1321
Late	32.36	21.36	85.06	67.22	993.10	1952	1734

At Mandya centre the leaf blast, sheath blight, neck blast and brown spot diseases were analysed with the data obtained for two varieties viz., MTU1001 and IR64. The results indicated that the leaf blast disease was more rapidly progressing in MTU 1001 (480) when compared to IR 64 (385). However, sheath blight disease, brown spot and the neck blast disease was observed to progress during all the three different sowing dates. The progress of sheath blight disease was found to be more rapid in the variety IR64 (2027 maximum in normal sown conditions) when compared to the variety MTU1001 (1658 maximum under normal sown conditions), while it was reverse in the case of brown spot disease, the variety MTU 1001 had the maximum AUDPC of 1880 under late sown conditions when compared to 1060 in IR 64 under normal sown condition. It was also observed that the variety IR 64 has highest AUDPC of 1250 in early sown crop compared to the variety MTU 1001 of 1123 under the same condition. It was also observed that the sheath blight and neck blast disease was more favoured by rainfall, this may be due to the fact that rainfall would have helped the pathogen mycelia to spread more easily to the surrounding plants. But in case of blast and brown spot diseases, the AUDPC increased with the decreasing rainfall (Table 10.12).

Table 10.12: Disease Progression with respect to weather factors at Mandya

Sowing time	Mandya					AUDPC							
	Temperature		Relative Humidity		Rain Fall	Blast		SHB		NB		BS	
	Max	Min	Max	Min		MTU 1001	IR 64	MTU 1001	IR 64	MTU 1001	IR 64	MTU 1001	IR 64
Early	29.13	19.12	91.50	67.61	1080.80	188	260	905	597	1123	1250	445	877
Normal	29.24	18.87	91.91	66.66	716.30	275	315	1658	2027	370	510	868	1060
Late	29.12	18.45	93.23	67.11	432.80	480	385	723	652	615	565	1880	475

Moncompu:

The AUDPC of BLB was observed to differ among the four varieties tested at Moncompu centre. The AUDPC was highest (245) in the lowest rainfall season (late sown with lowest rainfall (1382 mm) in the variety Prathyasa, while the reverse trend is followed for the other varieties Pournami, Uma and Shreyas, where the AUPDC was sound to be directly proportional to the intensity of the rainfall. Among the different varieties, Prathyasa had the highest AUDPC for BLB (245) Sheath blight (724) (Table 10.13). The progression of sheath blight was indirectly proportional to total rainfall received during the crop season. The reverse trend was observed in the case of variety Shreyas, where the sheath blight progress was directly proportional to the amount of rainfall received.

Table 10.13: Disease Progression with respect to weather factors at Moncompu

Sowing time	Moncompu					AUDPC							
	Temperature		Relative Humidity		Rain Fall	SHB				BLB			
	Max	Min	Max	Min		V1	V2	V3	V4	V1	V2	V3	V4
Early	31.53	24.20	87.40	81.60	1909.40	209	627	643	11	35	130	62	75
Normal	31.49	24.20	87.61	81.79	1645.20	95	407	586	99	27	80	88	21
Late	31.57	24.25	87.63	81.83	1382.00	160	301	724	268	1.40	16	245	11

V1=Uma, V2= Shreyas, V3= Prathyasa, V4= Pournami

Raipur:

The AUDPC of three different diseases of two varieties (Swarna and Rajeshwari) were studied in relation to the weather factors. The variety Swarna was more susceptible to sheath blight (1675) and blast (1600) diseases compared to the variety Rajeshwari, but incase BLB, the variety Rajeshwari (2275) is more susceptible than Swarna (1150). For both diseases, the progression of the disease was directly proportional to the amount of the rainfall received (10.14).

Table 10.14: Disease Progression with respect to weather factors at Raipur

Sowing time	Raipur					AUDPC					
	Temperature		Relative Humidity		Rain Fall	SHB		Blast		BLB	
	max	min	max	min		V1	V2	V1	V2	V1	V2
Early	31.85	22.62	87.55	59.44	1077.80	1675	1325	1600	225	575	2275
Normal	31.04	21.98	89.15	60.82	1004.80	1225	725	925	550	1150	1780
Late	31.07	21.32	88.87	57.46	697.80	958	275	957	0	775	1475

V1=Swarna, V2=Rajeshwari

Gangavathi:

The AUDPC was in general very less in Gangavati for the diseases tested viz., blast (170) and false smut (318) except BLB (1522) and sheath blight (1783). While the diseases blast (448) sheath blight (1783) and BLB (1342) showed a clear trend of maximum AUDPC in minimum rainfall conditions. So the progression of the diseases indirectly proportional to the amount of the rainfall received (Table 10.15).

Table 10.15 : Disease Progression with respect to weather factors at Gangavathi

Sowing time	Temperature		Relative Humidity		Rain Fall	AUDPC			
	Max	Min	Max	Min		SHB	FS	LB	BLB
Early	30.70	21.16	97.75	55.67	457.50	599	400	350	1066
Normal	30.78	21.02	98.00	54.96	450.00	675	530	309	1181
Late	30.74	20.87	98.17	54.75	430.50	1783	405	448	1342

IV. DISEASE MANANGMENT TRIALS

TRIAL No.11: EVALUATION OF FUNGICIDES AGAINST LOCATION SPECIFIC DISEASES

The trial was formulated and conducted to identify the effective fungicidal molecule against blast and sheath blight from the commonly available commercial product and to select the single broad spectrum fungicide for managing more number of diseases. The trail was constituted with fungicidal molecules *viz.*, difenoconazole 25% EC (0.5ml), isoprothiolane 40% EC (1.5 ml), kasugamycin 3% SL (2.0 ml), kitazin 48% EC (1.0 ml), propineb 70% WP (3.0 g), tebuconazole 25.9% EC (1.5 ml) and thifluzamide 24% SC (0.8 g). This trial was conducted to confirm the results of the previous year's K-2020 and K-2021. The treatments were based on the commercial availability of fungicides in the rice growing areas, mode of action, spectrum and status of AICRIP testing in the preceding years. All the fungicides are recommended to manage the various rice diseases in India by Central Insecticide Board (CIB). These molecules comprise of different formulations such as suspension concentrates (SC), Slurry Liquid (SL), emulsifiable concentrates (EC) and wet-able powder. Trail was conducted in location specific diseases of all the agro-climatic zones. The trail was conducted during *Kharif*-2022 by using Randomised Block Design (RBD) as a statistical method with four or three replications in each centre.

The trial was proposed at 38 centres and conducted the experiment at 31 centres during *Kharif*-2022. The centres are Aduthurai, Bankura, Chatha, Chinsurah, Chiplima, Coimbatore, Cuttack, ICAR-IIRR, Faizabad (Masodha), Gangavati, Ghagraghat, Jagdalpur, Kaul, Lonavala, Ludhiana, Malan, Mandya, Maruteru, Moncompu, Navsari, Nawagam, Pantnagar, Pattambi, Ponnampet, Pusa, Raipur, Rajendranagar, Ranchi, Rewa, Sabour, Titabar and Varanasi across the rice growing regions in India. The experiment was conducted with locally popular disease susceptible rice varieties among the farmers. In general, sowings were taken up during June and July across the locations except in Mandya, Aduthurai, and Coimbatore during august, September and October, respectively. The details related to 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. In general, fungicides were sprayed immediately after noticing the initial symptoms at all the locations either it's a natural disease incidence or artificial disease augmentation. Each fungicidal product was applied at the rate of two sprays with an interval of 10-15 days in most of the test centres except Ghagraghat, Jagdalpur, and Rewa where various number of sprays were given. The data from the centres were statistically transformed for their analysis and compilation. The fungicides were evaluated against leaf blast (ten locations), neck blast (nine locations), sheath blight (fourteen locations), brown spot (seven locations), sheath rot (six locations), grain discoloration (one location) and stem rot (one location).

Table 11.1: Experimental details of fungicidal evaluation against location specific diseases of rice during, *Kharif*-2022

S. No	Location	Disease Recorded	Test Variety	Screening	Date of activities						
					Sowing/ Transplanting	Inoculation	Initial symptom	No of Spray	Spraying	Observation	Harvesting
1	Aduthurai	Brown spot; Sheath rot	ADT-54	Natural	27.09.2022/ 01.11.2022	-	03.01.2023	1	03.01.2023	18.01.2023	06.02.2023
2	Bankura	Sheath blight	Swarna (MTU7029)	Artificial	06.072022/ 03.08.2022	02.09.2022	07.09.2022	2	08.09.2022 27.09.2022	07.09.2022 14.09.2022 29.09.2022	08.12.2022
3	Chatha	Brown spot	Basmati-370	Natural	25.06.2022 22.07.2022	-	24.09.2022	2	27.09.2022 12.10.2022	10.11.2022	15.11.2022
4	Coimbatore	Leaf blast	CO39	Natural	14.10.2022 12.11.2022	-	-	2	22.12.2022 17.01.2023	08.01.2023 20.01.2023	21.01.2023
5	Chinsurah	Sheath blight	Swarna (MTU 7029)	Artificial	16.06.2022 22.07.2022	24.08.2022	24.09.2022	2	07.09.2022 15.09.2022	-	11.11.2022
6	Chiplima	Sheath blight	Swarna	Artificial	02.07.2022 28.07.2022	27.09.2022	11.10.2022	2	14.10.2022 29.10.2022	29.10.2022 14.11.2022	24.11.2022
7	Cuttack (ICAR-NRRI)	Sheath blight	Tapaswini	Artificial	16.07.2022 22.08.2022	03.10.2022	13.10.2022	2	24.10.2022 04.11.2022	14.11.2022 25.11.2022	16.12.2022
8	ICAR-IIRR	Leaf blast	HR-12	Artificial	12.06.2022 16.07.2022	25.08.2022	03.09.2022	2	03.09.2022 13.09.2022	10.09.2022 20.09.2022 30.09.2022	25.11.2022
		Sheath blight	BPT-5204	Artificial				2			
9	Faizabad (Masodha)	Sheath blight	Pusa Basmati 1	Artificial	25.06.2022 22.07.2022	18.09.2022	27.09.2022	2	30.09.2022 15.10.2022	13.10.2022 07.11.2022	17.11.2022
10	Gangavati	Sheath blight	GNV-1089	Artificial	13.07.2022 21.08.2022	28.09.2022	05.10.2022	2	06.10.2022 17.10.2022	05.10.2022 13.10.2022 25.10.2022	21.12.2022
11	Ghagraghat	Leaf Blast & Neck Blast	Jalpriya	Natural	26.06.2022 26.07.2022	-	-	3	05&26.2022 09.11.2022	-	25.12.2022
12	Jagadalpur	Leaf blast; Neck blast	Swarna	Natural	25.06.2022 22.07.2022	-	20.08.2022	3	27.09.2022 12&28.10.22	26.09.2022 11&26.10.2022	25.12.2022
13	Kaul	Neck blast	CSR 30	Natural	03.06.2022 04.07.2022	-	24.09.2022	2	05.10.2022 15.10.2022	30.10.2022	14.11.2022
14	Lonavala	Leaf Blast	EK-70	Natural	15.06.2022 14.07.2022	-	05.09.2022	2	15.09.2022 30.09.2022	15.09.2022 30.09.2022	27.10.2022
		Neck blast	EK-70	Natural	15.06.2022 14.07.2022	-	22.09.2022	2	15.09.2022 30.09.2022	15.10.2022 30.10.2022	27.10.2022
15	Ludhiana	Sheath blight	PR114	Artificial	10.06.2022 25.07.2022	31.08.2022	-	2	01.09.2022 12.09.2022	03.10.2022	20.10.2022
16	Malan	Neck blast	HPU 2216	Natural	20.06.2022 21.07.2022	-	-	2	16.09.2022 28.09.2022	28.10.2022	10.11.2022
17	Mandya	Leaf & Neck blast/ Sheath blight/ Sheath rot	Jyothi	Natural	11.08.2022 05.09.2022	-	28.10.2022	2	31.10.2022 18.11.2022	28.10.2022 09.11.2022 06.12.2022	03.01.2022

S. No	Location	Disease Recorded	Test Variety	Screening	Date of activities						
					Sowing/ Transplanting	Inoculation	Initial symptom	No of Spray	Spraying	Observation	Harvesting
18	Maruteru	Sheath blight/ Neck blast/ Sheath rot/ Brown spot	Swarna (MTU 7029)	AI (SB)/ NI (Others)	17.06.2022 16.07.2022	22.08.2022	01.09.2022	2	12.09.2022 27.09.2022	14&27.09.2022 13.10.2022 17&18.11.2022	01.12.2022
19	Moncompu	Sheath blight and Grain discolouration	Uma	Natural	07.06.2022 25.06.2022	-	16.09.2022	1	17.09.2022	16.09.2022 15.10.2022	27.10.2022
20	Navasari	Sheath rot	GR-11	Natural	13.07.2022 07.08.2022	-	23.09.2022	2	07.10.2022 18.10.2022	13.10.2022 25.10.2022	25.11.2022
21	Nawagam	Leaf blast	Gurjari	Artificial	20.07.2022 31.08.2022	06.10.2022	15.10.2022	2	15.10.2022 29.10.2022	15&29.10.2022 14.11.2022	09.12.2022
		Sheath rot	Gurjari	Natural	20.07.2022 31.08.2022		14.10.2022	2	15.10.2022 29.10.2022	15&29.10.2022 14.11.2022	09.12.2022
22	Pantnagar	Sheath blight	Pant Dhan-4	Artificial	11.06.2022 06.07.2022	15.09.2022	21.09.2022	2	28.09.2022 14.10.2022	29.09.2022 09.10.2022	11.11.2022
23	Pattambi	Brown Spot	Uma	Natural	08.07.2022 02.08.2022	-	25.09.2022	2	28.09.2022 08.10.2022	27.09.2022 23.10.2022	07.11.2022
23	Ponnampet	Leaf blast	Intan	Natural	22.07.2022 02.09.2022	-	07.09.2022	2	15.09.2022 11.12.2022	15.10.2022	24.01.2022
		Neck blast	Intan	Natural		-	05.12.2022	2		13.01.2022	24.01.2022
24	Pusa	Brown spot	Pankaj (HS)	Artificial	15.06.2022 11.07.2022	16.09.2022	02.09.2022	2	23.09.2022 07.10.2022	-	17.11.2022
25	Raipur	Sheath blight	Swarna	Artificial	28.06.2022 08.09.2022	10.10.2022	-	2	10.10.2022 15.10.2022	13.10.2022 29.10.2022	29.11.2022
26	Rajendranagar	Neck blast	Tellahamsa	Artificial	27.06.2022 23.07.2022	27.09.2022	22.09.2022	2	19.09.2022 04.10.2022	30.10.2022	19.11.2022
		Sheath blight	Tellahamsa	Artificial	23.06.2022 17.07.2022	18.09.2022	18.09.2022	2		27.09.2022 3&14.10.2022	
		Grain discolouration	Tellahamsa	Natural	23.06.2022 17.07.2022	-	-	2		30.10.2022	
27	Ranchi	Leaf blast	Pusa sugandha-3	Artificial	15.07.2022 09.08.2022	17.09.2022	20.09.2022	2	21.09.2022 04.10.2022	15.10.2022	05.12.2022
		Neck blast	Pusa sugandha-3	Artificial	15.07.2022 09.08.2022	17.09.2022	20.09.2022	2	21.09.2022 04.10.2022	25.11.2022	05.12.2022
28	Rewa	Leaf blast	PS4	Artificial	28.06.2022 28.07.2022	12.09.2022	24.09.2022	3	29.09.2022 03.10.2022	02.10.2022 20.10.2022	28.11.2022
29	Sabour	Brown spot	RajendraShweta	Natural	22.06.2022 29.07.2022	-	30.08.2022	2	01.09.2022 15.09.2022	07.09.2022	21.11.2022
30	Titabar	Sheath rot	Gitesh	Artificial	15.07.2022 26.08.2022	27.10.2022	08.11.2022	2	10.11.2022 26.11.2022	15.12.2022	27.12.2022
		stem rot	Basundhara	Artificial	15.07.2022 22.08.2022	04.10.2022	-	2	02.11.2022 18.11.2022	07.12.2022	27.12.2022
31	Varanasi	Brown spot	HUR4-3	Natural	24.06.2022 18.07.2022	-	03.09.2022	2	22.09.2022 07.10.2022	23.10.2022	14.11.2022

Leaf blast: The fungicides were evaluated against leaf blast disease at ten locations across the rice growing regions of the country. In most of the centres, two sprays of fungicides were applied uniformly except in Ghagraghat, Jagdalpur, and Rewa where three sprays were given. Disease severity was recorded at all the test locations. Besides, disease incidence was also observed at three locations *viz.,* Lonavala, Nawagam and Rewa. The test fungicidal products were evaluated against the disease under artificial inoculation at five locations including Ghagraghat, IIRR, Nawagam, Ranchi, and Rewa. Disease severity at test locations in check plots varied from 24.1% (Rewa) to 95.6% (ICAR-IIRR). The severity on the check plot was very high (>50%) at IIRR (95.6%), Jagadalpur (78.3%), Mandya (78.0%), Ponnampet (51.5%), Ghagraghat (70.8%); high (>30-50%) at Nawagam (45.1%), Ranchi (39.5%), Lonavala (35.5%), Coimbatore (34.4%); and moderate (20-29%) at Rewa (24.1%). Disease incidence at test locations in check plots was very high at Nawagam (93.6%), Lonavala (69.0%) and moderate at Rewa (23.5%).

All seven fungicidal treatments significantly reduced the disease severity and incidence at all test locations compared to the control. Test product Kitazin 48% EC (1ml/L) significantly reduced the leaf blast severity at two locations *viz.,* IIRR and Jagdalpur, and its mean disease severity was 26.6% from nine locations. Besides, tebuconazole 25.9% EC (1.5 ml/L) minimized the disease severity significantly at two locations (Ponnempet, Ranchi, and Mandya) and showed the mean disease severity of 25.2%. Isoprothiolane 40% EC (1.5 ml/L) also significantly reduced the disease severity at three locations such as Coimbatore (13.4%), Lonavala (17%) and Nawagam (21.3%) with mean disease severity of 32.3% and on par with best treatment at Mandya (13%) and Ponnempet (26.8%). Isoprothiolane 40% EC also reduced the incidence at Lonavala (29%) and Nawagam (63.4) with an average disease incidence of 46.6%. Thifluzamide 24% SC also reduced the disease severity at Ghagraghat (12.6%) and Rewa (11.9%) and disease incidence at Nawagam (61.5%). It has shown a mean severity of 31.2% and disease incidence of 52.3% (Table 11.2&11.3; Fig.11.1A).

The grain yield data were recorded at all nine test locations and observed that all treated plots were superior to the check plot (3227 Kg/ha). Treatment (T2) Isoprothiolane 40% EC was superior in reducing leaf blast and increasing the mean yield (4458 Kg/ha). This was followed by tebuconazole 25.9% EC (1.5 ml/L) and thifluzamide 24% EC (1ml/L) with 4524 Kg/ha and 4321 Kg/ha, respectively compared to the other treatments (Table 11.4).

Table 11.2: Evaluation of fungicides against leaf blast disease severity and of rice, *Kharif*, 2022

Treatment	Dose/L	Leaf blast disease Severity (%)										
		CBT	**GGT**	**IIRR**	**JDP**	**LNV**	**MND**	**NWG**	**PNP**	**REW**	**RNC**	**Mean**
T1- Difenoconazole 25% EC	0.5 ml	16.0 (23.6)	44.9 (42.1)	74.4 (59.6)	46.7 (43.1)	25.0 (30.0)	15.0 (22.8)	28.7 (32.4)	29.0 (32.6)	18.1 (4.3)	38.1 (38.1)	34.7
T2- Isoprothiolane 40% EC	1.5 ml	13.4 (21.5)	38.6 (38.4)	73.06 (58.7)	45.6 (42.5)	17.0 (24.4)	13.0 (21.1)	21.3 (27.5)	26.8 (31.2)	16.2 (4.0)	30.2 (33.3)	32.3
T3- Kasugamycin 3% SL	2.0 ml	20.1 (26.6)	28.9 (32.5)	68.61 (55.9)	31.1 (33.9)	33.0 (35.1)	24.0 (29.3)	33.9 (35.6)	31.8 (34.4)	17.8 (4.2)	12.5 (20.7)	31.2
T4- Kitazin 48% EC	1.0 ml	17.9 (25)	28.5 (32.2)	52.22 (46.3)	28.9 (32.5)	31.5 (34.1)	21.0 (27.3)	26.3 (30.9)	30.5 (33.5)	16.3 (4.0)	17.8 (25.0)	26.6
T5- Propineb 70% WP	3.0 g	19.0 (25.8)	31.6 (34.2)	68.61 (55.9)	45.0 (42.1)	34.0 (35.7)	23.0 (28.7)	28.9 (32.5)	34.9 (36.2)	15.8 (4.0)	25.2 (30.1)	33.6
T6- Tebuconazole 25.9% EC	1.5 ml	16.3 (23.8)	24.3 (29.5)	58.06 (49.6)	41.1 (39.9)	24.5 (29.7)	11.0 (19.4)	31.4 (34.1)	24.9 (29.9)	14.4 (3.8)	8.4 (16.8)	25.2
T7- Thifluzamide 24% SC	0.8 g	17.9 (25)	13.1 (21.2)	66.67 (54.7)	42.2 (40.5)	32.2 (34.6)	16.0 (23.6)	23.7 (29.1)	33.4 (35.3)	11.9 (3.5)	22.2 (28.1)	31.2
T8- Control	-	34.4 (35.9)	70.7 (57.3)	95.56 (77.8)	78.3 (62.3)	35.5 (36.6)	78.0 (62.0)	45.2 (42.2)	51.5 (45.9)	24.1 (4.9)	39.5 (38.9)	54.8
General Mean		19.4	35.1	57.3	44.9	29.1	25.1	29.9	32.9	16.8	24.2	
LSD @ 5% *(P=0.05)*		1.0	2.0	2.5	2.1	0.5	3.3	2.9	1.5	0.9	3.2	
C.V.		0.7	8.2	14.4	6.5	2.6	18.8	13.6	6.5	6.3	18.7	
Transformation		AT	AT	AT	AT	AT	AT	AT	AT	ST	AT	
Disease		N	N	A	N	N	N	A	N	A	A	

(DS – Disease Severity; 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 incidence of rice, *Kharif*, 2022

Treatment	Dose/L	Leaf blast disease Incidence (%)			
		LNV	NWG	REW	Mean
T1- Difenoconazole 25% EC	0.5 ml	41.0 (39.8)	78.8 (62.6)	14.4 (3.8)	54.2
T2- Isoprothiolane 40% EC	1.5 ml	29 (32.6)	63.4 (52.8)	17.7 (4.2)	46.6
T3- Kasugamycin 3% SL	2.0 ml	58 (49.6)	83.7 (66.2)	16.4 (4.0)	58.7
T4- Kitazin 48% EC	1.0 ml	53.5 (47.0)	76.1 (60.8)	18.1 (4.3)	49.3
T5- Propineb 70% WP	3.0 g	60.0 (50.7)	73.3 (58.9)	17.3 (4.16)	56.1
T6- Tebuconazole 25.9% EC	1.5 ml	39.5 (38.9)	81.7 (64.6)	19.0 (4.36)	54.8
T7- Thifluzamide 24% SC	0.8 g	58.0 (49.6)	61.5 (51.6)	12.9 (3.6)	52.3
T8- Control	-	69.0 (56.2)	93.6 (75.3)	23.5 (4.8)	70.8
General Mean		41.0	76.5	17.5	
LSD @ 5% *(P=0.05)*		1.1	4.4	0.8	
C.V.		3.1	8.1	5.4	
Transformation		AT	AT	ST	
Disease		N	A	A	

(DI – Disease Incidence; Figures in the parenthesis indicate transformed means; AT- Arc sine transformation; ST – Square Root transformation)

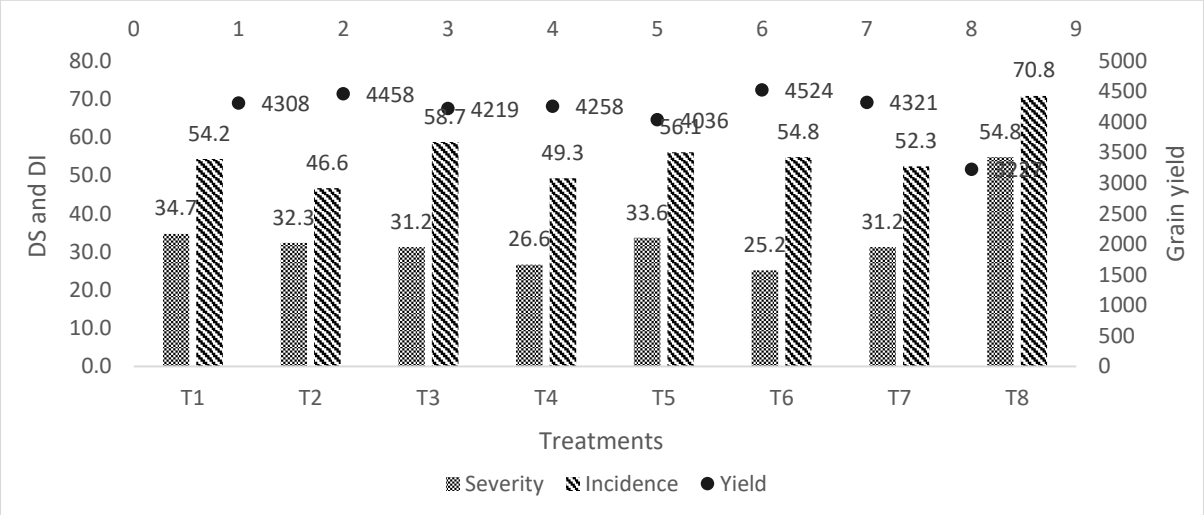

Figure 11.1A: Effect of fungicides against Leaf blast (Severity-10 location; Incidence -3 location) of rice, *Kharif*-2022

Table 11.4: Effect of fungicides on grain yield with respect to leaf blast of rice, *Kharif*, 2022

Treatment	Dose/L	LEAF BLAST GRAIN YIELD (KG/HA)									
		CBT	**IIRR**	**JDP**	**LNV**	**MND**	**NWG**	**PNP**	**REW**	**RNC**	**Mean**
T1- Difenoconazole 25% EC	0.5 ml	4755	4204	3380	3025	4591	6230	3544	4143	4902	4308
T2- Isoprothiolane 40% EC	1.5 ml	4771	4248	3518	3425	4530	6891	3591	4112	5039	4458
T3- Kasugamycin 3% SL	2.0 ml	4622	4046	4005	2825	3102	6156	3175	4152	5890	4219
T4- Kitazin 48% EC	1.0 ml	4631	4397	4253	2725	2617	6475	3303	4158	5761	4258
T5- Propineb 70% WP	3.0 g	4605	4278	3788	2500	2526	6378	2969	4158	5125	4036
T6- Tebuconazole 25.9% EC	1.5 ml	4692	4523	3973	2900	4773	6248	3812	3873	5924	4524
T7- Thifluzamide 24% SC	0.8 g	4649	3942	3820	2625	4321	6856	3089	4215	5374	4321
T8-Control	-	3732	3246	2950	2400	1141	4771	2417	3576	4808	3227
General Mean		4557	4110	3711	2803	3450	6250	3238	4048	5353	
LSD @ 5% *(P=0.05)*		44.0	86.9	73.2	123.8	95.9	635.6	167.9	72.3	372.2	
C.V.		1.4	1.3	2.8	6.2	3.9	14.4	7.3	2.2	9.8	
Disease		N	A	N	N	N	A	N	A	A	

Neck blast: The trail was conducted at ten locations to know the efficacy of the test product against neck blast. Disease pressure was created through artificial inoculation at Rajendranagar, and Ranchi, and the remaining six centers were through the natural incidence. Disease incidence was recorded at nine locations except for Ghagraghat where disease severity was recorded. Grain yield data were recorded at nine locations except for Ghagraghat. Two sprays of fungicidal treatments were given at all the centers except Ghagraghat and Jagadalpur where three sprays were given.

Disease severity and incidence were recorded and all the data were statistically transformed for analysis. The incidence on check plots was about 24.8% at Ranchi and 81% at Mandya. Disease incidence in control plot was very high (>50%) at Jagadalpur (67.6%), Mandya (81%), Ponnampet (55.2%), Kaul (50.6%), Malan (58.9%), and high (30-50%) at Lonavala (30.3%), Maruteru (30.9%), Rajendranagar (41.9%); and moderate (20-29%) at Ranchi (30.8%). The disease severity at Ghagraghat was about 48.6%.

The performance of all the seven fungicidal treatments was superior in reducing the neck blast incidence all the test locations compare to control (Mean DI: 49.3%). Formulation Isoprothiolane 40% EC (1.5 ml/L) significantly reduced the incidence of the neck blast at four locations *viz.*, Lonavala (6%), Kaul (15.2%), Maruteru (24.3%) and Rajendranagar (31.3%) and on par with the best treatments at Malan (26.6%) and Ponnampet (16.4%). In addition to this, low mean disease incidence (24%) was observed from the plots where isoprothiolane 40% EC (1.5 ml/L) is applied, followed by difenoconazole 25% EC (DI: 25.0%) and tebuconazole 25.9% EC (DI: 25%) (Fig.11.1B and Table 11.5). In respect to disease severity, Kitazin 48% EC (1.0 ml/L) treatment (T4) found significant at Ghagraghat (14.4%). The mean yield across the locations in check plot was 3127 Kg/ha. Among the seven fungicidal treatments, tebuconazole 25.9% EC sprayed plots gave highest mean yield of 4342 Kg/ha was followed by Isoprothiolane 40% EC (4113 Kg/ha) compared to other treatments.

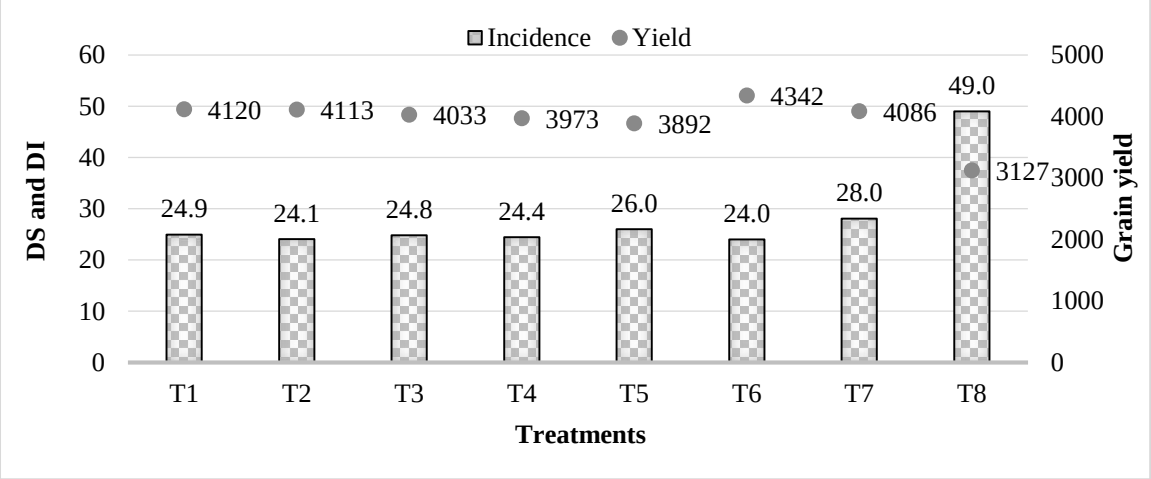

Figure 11.1B: Effect of fungicides against neck blast (Severity-1 location; Incidence-9 location) of rice

Table 11.5: Evaluation of fungicides against neck blast disease incidence and severity of rice, *Kharif*, 2022

Treatment	Dose/ L	NB-DS (%)	Neck blast disease Incidence (%)									
		GGT	JDP	KAU	LNV	MLN	MND	MTU	PNP	RNC	RNR	Mean
T1- Difenoconazole 25% EC	0.5 ml	27.1 (31.4)	46.65 (43.08)	18.95 (25.8)	17.50 (4.18)	26.3 (30.9)	21 (27.27)	23.09 (28.41)	17.95 (25.07)	18.3 (4.28)	32.4 (34.7)	24.7
T2- Isoprothiolane 40% EC	1.5 ml	24.9 (29.9)	45.16 (42.22)	15.2 (22.9)	6 (2.45)	26.6 (31.0)	33 (35.06)	24.28 (29.17)	16.35 (23.85)	18 (4.24)	31.3 (34.0)	24.0
T3- Kasugamycin 3% SL	2.0 ml	21.2 (27.4)	25.21 (30.14)	24.75 (26.90)	28.5 (5.34)	27.6 (31.7)	25 (30)	24.93 (29.89)	22.37 (28.23)	7.8 (2.79)	40.67 (39.6)	25.2
T4- Kitazin 48% EC	1.0 ml	14.4 (22.3)	23.81 (29.21)	26.9 (31.2)	23 (4.80)	30.3 (33.4)	31 (33.83)	30.78 (33.40)	19.4 (26.13)	8.8 (2.97)	36.0 (36.9)	25.6
T5- Propineb 70% WP	3.0 g	18.0 (25.1)	44.67 (41.94)	17.74 (24.9)	19 (4.36)	34.9 (36.2)	24 (29.33)	26.85 (31.09)	21.87 (27.89)	14.3 (3.78)	38.6 (38.4)	26.9
T6- Tebuconazole 25.9% EC	1.5 ml	14.8 (22.7)	41.43 (40.06)	36.1 (36.9)	16 (4)	31.1 (33.9)	20 (26.57)	26.54 (30.67)	14.3 (22.22)	5.5 (2.35)	34.15 (35.8)	25.0
T7- Thifluzamide 24% SC	0.8 g	13.4 (21.4)	42.50 (40.69)	38.3 (38.2)	29 (5.39)	31.9 (34.4)	19 (25.84)	29.77 (32.97)	25.23 (30.15)	12.3 (3.51)	39 (38.6)	29.7
T8- Control	-	48.6 (44.1)	67.66 (55.34)	50.6 (45.3)	30.25 (5.50)	58.9 (50.1)	81 (64.16)	30.92 (33.77)	55.2 (47.98)	24.8 (4.98)	41.9 (40.4)	49.0
General Mean		22.8	42.1	28.6	21.2	33.5	31.8	27.1	24.1	13.7	36.8	
LSD @ 5% *(P=0.05)*		0.3	1.4	2.2	0.9	1.9	4.1	3.5	2.4	2.7	2.9	
C.V.		1.7	4.6	11.0	6.3	6.9	18.3	18.2	14.3	27.9	11.0	
Transformation		AT	AT	AT	ST	AT	AT	AT	AT	ST	AT	
Disease		N	N	N	N	N	N	N	N	A	A	

(DS – Disease Severity; DI – Disease Incidence; Figures in the parenthesis indicate transformed means; AT- Arc sine transformation; ST – Square Root transformation)

Table 11.6: Effect of fungicides on grain yield with respect to neck blast of rice, *Kharif*, 2022

Treatment	Dose/L	Neck blast grain yield (Kg/ha)									
		JDP	**KAU**	**LNV**	**MLN**	**MND**	**MTU**	**PNP**	**RNC**	**RNR**	**Mean**
T1- Difenoconazole 25% EC	0.5 ml	3380	3891	3500	2570	4591	3865	3544	4902	6840	4120
T2- Isoprothiolane 40% EC	1.5 ml	3518	4106	3300	2569	4530	3333	3591	5039	7026	4113
T3- Kasugamycin 3% SL	2.0 ml	4005	3630	3425	2500	3102	3260	3175	5890	7311	4033
T4- Kitazin 48% EC	1.0 ml	4253	3611	3250	2431	2617	3157	3303	5761	7373	3973
T5- Propineb 70% WP	3.0 g	3788	3942	3650	2222	2526	3552	2969	5125	7251	3892
T6- Tebuconazole 25.9% EC	1.5 ml	3973	3310	3450	2361	4773	4007	3812	5924	7467	4342
T7- Thifluzamide 24% SC	0.8 g	3820	3288	3525	2292	4321	4367	3089	5374	6698	4086
T8-Control	-	2950	2855	3750	1736	1141	2854	2417	4808	5630	3127
General Mean		3711	3579	3481	2335	3450	3549	3238	5353	6949	
LSD @ 5% *(P=0.05)*		73.25	175.49	110.60	172.61	95.94	273.45	167.86	263.20	446.58	
C.V.		2.79	6.93	4.49	9.05	3.93	10.90	7.33	372.22	9.09	
Disease		N	N	N	N	N	N	N	A	A	

Sheath blight: Fungicides were evaluated against sheath blight disease at 14 disease hot spot locations. The experiment was conducted under artificial inoculation at all the test locations except Mandya and Moncompu. *The data from Bankura and Raipur were excluded from the analysis due to various fungicides used in this trial which in turn deviated from the technical program.* Disease severity was observed at all thirteen test locations and only disease incidence was observed at Rajendranagar. Both disease severity and incidence were observed at five locations viz., Cuttack, Ludhiana, Marateru, Masodha, and Pant Nagar. All the centers uniformly applied two sprays of fungicidal treatments. Disease severity in check plots varied between 91.4% (Chinsurah) and 58.6% (Moncompu). Disease severity on untreated plot was very high (>50%) at most of the test locations *viz.*, Chinsurah (71.8%), Bankura (91.1%), IIRR (91.4%), Cuttack (68.4%), Gangavathi (86.3%), Mandya (69%), Maruteru (60.1%), Masodha (75.4%), Pantnagar (75.5%), Chiplima (64.1%) and Moncompu (58.6%); and high (30-50%) at Ludhiana (47.8%) and Raipur (33.3%). Disease incidence was very high at Ludhiana (99.3%), Cuttack (70.2%), Maruteru (78.29%), Pantnagar (96.6%), and Masodha (54.9%) and Rajendranagar (62.2%).

All fungicidal applications significantly reduced the sheath blight compared to control across the test locations. Commercial fungicide difenoconazole 25% EC reduced disease severity at a maximum of five locations *viz*., Chinsurah (22.6%), ICAR-IIRR (30.9%), Cuttack (17.2%), Mandya (15.0) and Moncompu (8.06%). The same treatment reduced the severity on par with other best treatments at Maruteru (35.0%) and Masodha (27.7%). Tebuconazole 25.9% EC (1.5 ml/L) also significantly reduced the severity at four locations *viz.*, Gangavathi (28.2%), Ludhiana (8.0%), Mandya (15%) and Masodha (25.8%). and on par with other best treatments at Cuttack (19.4%) and Maruteru (34.6%). Thifluzamide 24% SC (0.8g/L) significantly reduced the severity maximum at three locations viz., Chiplima (11.5%), Maruteru (31.9%), and Pant Nagar (35.6%). with a mean disease severity of 35.8%. The overall mean disease severity from all 11 locations was low in difenoconazole 25% EC (33.8%) followed by Tebuconazole 25.9% EC (37.0%) and thifluzamide 24% SC (42.0%).

Tebuconazole 25.9% EC (1.5 ml/L) significantly reduced the incidence at Masodha (54.9%) and Pant Nagar (62.5%) and was on par with the best treatments at Cuttack (21.6) and Mareteru (48.0). Commercial fungicides thifluzamide 24% SC and difenoconazole 25 EC significantly reduced the incidence and were on par with each other at different locations. Thifluzamide 24% SC also showed low mean disease incidence (40.30%) followed by tebuconazole 25.9% EC (1.5 ml /l) and difenoconazole 25 EC (1.0 ml/l) at 41.5% and 47.6%, respectively (Fig.11.1C and Table. 11.7 & 11.8).

Grain yield in the experimental plots was recorded at all the test locations. It was observed that grain yield was more in fungicide treated plots compared to check plot (3865 Kg/ha). The highest yield was recorded in the plots where tebuconazole 25.9% is sprayed (5436 Kg/ha) followed by difenoconazole 25 EC (5368 Kg/ha) and thifluzamide 24% SC (5350Kg/ha) sprayed plots (Table 11.8).

Table 11.7: Evaluation of fungicides against sheath blight disease incidence of rice, *Kharif*, 2022

Treatment	Dose/L	Sheath blight disease Severity (%)											
		CHN	**CHP**	**GNV**	**IIRR**	**LUD**	**MND**	**MSD**	**MTU**	**MNC**	**NRRI**	**PNT**	**Mean**
T1- Difenoconazole 25% EC	0.5 ml	22.6 (28.4)	20.0 (26.6)	37.8 (37.9)	30.9 (33.8)	22.6 (28.4)	15.0 (22.8)	27.7 (31.8)	34.9 (36.2)	8.1 (16.5)	17.2 (24.5)	44.6 (41.7)	33.8
T2- Isoprothiolane 40% EC	1.5 ml	39.4 (38.9)	37.0 (37.5)	40.9 (39.8)	63.3 (52.7)	8.5 (17.0)	19.0 (25.8)	42.2 (40.5)	41.3 (40.0)	11.9 (20.2)	23.0 (28.7)	50.5 (45.3)	52.7
T3- Kasugamycin 3% SL	2.0 ml	44.3 (41.7)	38.5 (38.4)	43.6 (41.4)	67.0 (54.9)	21.0 (27.3)	28.0 (31.9)	33.6 (35.5)	35.2 (36.2)	31.4 (34.1)	35.6 (36.6)	51.7 (46.0)	55.0
T4- Kitazin 48% EC	1.0 ml	25.0 (30.0)	27.0 (31.3)	41.9 (40.4)	55.7 (48.3)	25.0 (30.0)	38.0 (38.1)	38.1 (38.1)	38.1 (38.1)	24.1 (29.4)	42.2 (40.5)	49.7 (44.8)	48.3
T5- Propineb 70% WP	3.0 g	44.2 (41.7)	20.7 (27.1)	46.3 (42.9)	52.8 (46.6)	11.9 (20.2)	21.0 (27.3)	39.3 (38.8)	42.2 (40.5)	25.0 (30.0)	28.8 (32.5)	56.9 (49.0)	46.6
T6- Tebuconazole 25.9% EC	1.5 ml	27.5 (31.6)	26.3 (30.8)	28.2 (32.1)	36.1 (36.9)	8.08 (16.5)	15.0 (22.8)	25.7 (30.5)	34.7 (36.1)	20.3 (26.8)	19.4 (26.1)	43.3 (41.1)	36.9
T7- Thifluzamide 24% SC	0.8 g	30.4 (33.5)	11.5 (19.8)	32.8 (34.9)	44.8 (42.0)	15.3 (23.1)	16.0 (23.6)	29.5 (32.9)	31.9 (33.8)	27.2 (31.4)	21.6 (27.7)	35.6 (36.6)	42.0
T8- Control	-	71.7 (57.9)	64.1 (53.2)	86.3 (68.3)	91.4 (72.9)	47.8 (43.8)	69.0 (56.2)	75.4 (60.2)	60.1 (50.8)	58.6 (50.0)	68.4 (55.8)	75.4 (60.3)	73.0
General Mean		40.4	32.2	45.7	55.3	19.7	29.4	40.6	40.5	28.4	34.1	51.9	
LSD @ 5% *(P=0.05)*		2.4	3.7	3.0	3.8	1.8	2.9	1.9	5.4	6.8	3.2	1.1	
C.V.		8.9	14.7	8.1	16.5	10.8	14.8	7.0	19.2	37.1	14.3	2.6	
Transformation		AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	
Disease		A	A	A	A	A	N	A	A	N	A	A	

(DS – Disease Severity; Figures in the parenthesis indicate transformed means; AT- Arc sine transformation)

Table 11.8: Evaluation of fungicides against sheath blight disease incidence of rice, *Kharif*, 2022

Treatment	Dose/L	Sheath blight disease Incidence (%)						
		LUD	MTU	MSD	NRRI	PNT	RNR	Mean
T1- Difenoconazole 25% EC	0.5 ml	71.9 (58.0)	45.3 (42.3)	28.1 (32.0)	18.8 (25.7)	65.2 (53.9)	56.0 (48.5)	47.6
T2- Isoprothiolane 40% EC	1.5 ml	30.0 (33.3)	59.9 (51.1)	40.0 (39.3)	29.2 (32.7)	70.7 (57.2)	60.3 (50.9)	48.4
T3- Kasugamycin 3% SL	2.0 ml	54.4 (47.5)	56.8 (49.2)	33.2 (35.2)	40.8 (39.7)	72.6 (58.5)	59.7 (50.6)	52.9
T4- Kitazin 48% EC	1.0 ml	68.1 (55.6)	63.2 (52.8)	35.6 (36.7)	48.2 (44.0)	67.2 (55.1)	60.5 (51.1)	57.1
T5- Propineb 70% WP	3.0 g	40.3 (39.4)	63.5 (53.3)	36.6 (37.2)	32.4 (34.7)	75.4 (60.3)	59.3 (50.4)	51.3
T6- Tebuconazole 25.9% EC	1.5 ml	35.5 (36.6)	48.0 (43.8)	24.8 (29.9)	21.6 (27.7)	62.4 (52.2)	56.4 (48.7)	41.5
T7- Thifluzamide 24% SC	0.8 g	54.0 (47.3)	47.5 (43.5)	30.8 (33.7)	25.0 (30.0)	58.1 (49.7)	26.3 (30.9)	40.3
T8- Control	-	99.3 (85.3)	78.3 (62.6)	54.8 (47.8)	70.2 (56.9)	96.6 (79.4)	62.2 (52.1)	76.9
General Mean		54.5	59.6	36.6	38.2	71.9	55.0	
LSD @ 5% *(P=0.05)*		3.0	9.6	2.1	3.4	1.4	2.5	
C.V.		6.6	23.4	8.2	13.6	2.4	6.5	
Transformation		AT	AT	AT	AT	AT	AT	
Disease		A	A	A	A	A	A	

(DI – Disease Incidence; Figures in the parenthesis indicate transformed means; AT- Arc sine transformation)

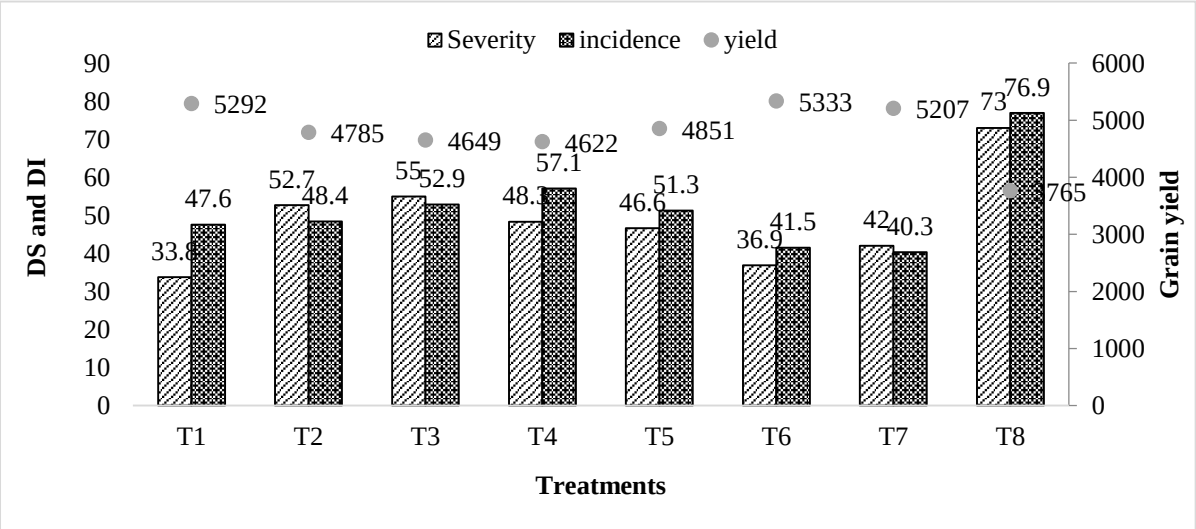

Figure 11.1C: Effect of fungicides against sheath blight (Severity-11 location; Incidence-6 location) of rice, *Kharif*-202

Table 11.9: Effect of fungicides on grain yield with respect to sheath blight of rice, *Kharif*, 2022

Treatment	Dose/ L	Sheath blight grain yield (Kg/ha)												
		CHN	**CHP**	**GNV**	**IIRR**	**LUD**	**MND**	**MNC**	**MSD**	**MTU**	**NRRI**	**PNT**	**RNR**	**Mean**
T1- Difenoconazole 25% EC	0.5 ml	4704	5713	6012	4457	4998	4745	7565	3713	3865	5180	5711	6840	5292
T2- Isoprothiolane 40% EC	1.5 ml	4144	5167	5350	3434	6034	4527	6085	2963	3333	4250	5109	7026	4785
T3- Kasugamycin 3% SL	2.0 ml	3758	5273	4992	3114	5353	3172	6818	3338	3260	4040	5365	7311	4649
T4- Kitazin 48% EC	1.0 ml	4597	5433	5708	3768	5095	2478	5798	3175	3157	3620	5261	7373	4622
T5- Propineb 70% WP	3.0 g	4077	5550	5348	3846	5832	4483	5885	3063	3552	4280	5043	7251	4851
T6- Tebuconazole 25.9% EC	1.5 ml	4670	5460	6100	4196	6255	4635	6895	3825	4007	4840	5641	7467	5333
T7- Thifluzamide 24% SC	0.8 g	4827	5817	5782	3630	5807	4515	6700	3613	4367	4460	6264	6698	5207
T8-Control	-	3340	4870	4054	2663	4466	1392	5485	2188	2854	3320	4920	5630	3765
General Mean		4202	5367	5333	3639	5549	3600	6238	3166	3504	4116	5372	6965	4754
LSD @ 5% *(P=0.05)*		293.4	156.9	316.3	257.6	141.6	137.7	769.3	154.5	273.4	405.2	93.2	446.6	-
C.V.		9.7	3.6	7.1	8.1	3.2	5.2	17.0	6.8	10.9	13.5	2.1	9.1	-
Disease		A	A	A	A	A	N	N	A	A	A	A	A	-

Sheath rot: The fungicidal molecules were tested against sheath rot disease at six locations namely Aduthurai, Navasari, Nawagam, Mandya, Maruteru and Titabar. Both disease severity and incidence was recorded at Navasari, Nawagam, and Titabar. Only disease severity was observed at Aduthurai, and only disease incidence was observed at Mandya, Maruteru. The test fungicidal products were evaluated against the disease under natural incidence at most of the locations except Maruteru and Titabar. Uniformly two sprays of fungicides were applied in all the centers. Disease severity in check plots was very high (>50%) at Aduthurai (58.6%); high (30-50%) at Navasari (39.5%) and Nawagam (37.6%) and Titabar (46.6%). Disease incidence in check plots was very high (>50%) at Nawagam (89.7%), Mandya (66%); and moderate at Navasari (43.3%), Titabar (46.4%), and Maruteru (30.0). All the fungicides significantly reduced the disease incidence and severity when compared to check and also increased the yield.

Among all the test fungicides tebuconazole 25.9% EC reduced the severity at Navasari (20.7%) and Titabar (9.8%), with mean severity from four locations being 24.9%. treatment isoprothiolane 40% EC has maximum reduced the severity at Nawagam (18.5%). Difenoconazole 25 EC (1.0 ml/L) reduced the disease severity on par with the best treatments at Navasari (22.4%).

Regarding, disease incidence treatment (T6) tebuconazole 25.9% EC (1.5ml) significantly reduced the incidence at two locations namely, Navasari (23.8%) and Titabar (13.7%) compared to other treatments. The mean disease incidence from five test locations was low at tebuconazole 25.9% EC (31.5%) followed by difenoconazole 25 EC (31.8%) (Fig.11.1D; Table 11.10). The mean yield across the experimental locations in check plot was 3521 Kg/ha. Among the treatments, tebuconazole 25.9% EC sprayed plot yielded higher (5064 Kg/ha) compared to other treatments followed by difenoconazole 25 EC (0.5ml) (5007 Kg/ha), (Table 11.11).

Table 11.10: Evaluations of fungicides against Sheath rot disease severity and incidence of rice, *Kharif*, 2022

Treatment	Dose/L	Disease severity (%)					Disease incidence (%)					
		ADT	NVS	NWG	TTB	Mean	MND	MTU	NWG	NVS	TTB	Mean
T1- Difenoconazole 25% EC	0.5 ml	32.7	22.4 (28.2)	26.1 (32.1)	24.9 (34.5)	26.5	16.0 (23.6)	18.6 (23.7)	71.8 (58.0)	26.9 (31.3)	25.3 (30.2)	31.8
T2- Isoprothiolane 40% EC	1.5 ml	38.1	23.7 (29.1)	17.2 (32.7)	31.6 (34.9)	27.7	23.0 (28.7)	23.0 (28.4)	65.3 (53.9)	28.3 (32.2)	31.2 (33.9)	34.2
T3- Kasugamycin 3% SL	2.0 ml	48.5	30.6 (33.6)	33.3 (35.4)	26.1 (36.5)	34.6	24.0 (29.3)	22.8 (28.3)	83.4 (66.0)	37.6 (37.8)	26.8 (31.2)	38.9
T4- Kitazin 48% EC	1.0 ml	30.3	29.5 (32.9)	22.4 (35.0)	17.3 (36.3)	24.9	41.0 (39.8)	28.0 (31.8)	71.9 (58.0)	35.6 (36.6)	19.2 (25.9)	39.2
T5- Propineb 70% WP	3.0 g	37.3	28.3 (32.1)	23.1 (34.5)	29.0 (36.0)	29.5	38.0 (38.1)	28.6 (32.3)	79.1 (62.8)	32.9 (34.9)	32.2 (34.5)	42.2
T6- Tebuconazole 25.9% EC	1.5 ml	38.7	20.7 (27.0)	30.5 (31.3)	9.8 (34.0)	24.9	17.0 (24.4)	22.9 (28.4)	80.1 (63.5)	23.8 (29.2)	13.7 (21.7)	31.5
T7- Thifluzamide 24% SC	0.8 g	47.2	27.0 (31.3)	18.5 (34.0)	21.4 (35.7)	28.5	26.0 (30.7)	23.6 (28.8)	64.9 (53.7)	30.1 (33.3)	23.2 (28.8)	33.6
T8- Control	-	58.6	39.4 (38.9)	37.5 (38.6)	46.6 (38.4)	45.6	66.0 (54.3)	29.9 (33.2)	89.7 (71.3)	43.3 (41.2)	46.4 (42.9)	55.1
General Mean		41.4	27.7	26.1	25.9	30.3	31.4	24.7	75.8	32.3	27.3	38.3
LSD @ 5% *(P=0.05)*		4.4	3.0	3.9	0.5	-	5.8	3.6	3.5	2.5	3.9	-
C.V.		14.2	15.1	21.0	2.5	-	26.3	6.6	19.9	11.1	21.1	-
Transformation		NT	AT	AT	AT	-	AT	AT	AT	AT	AT	-
Disease		N	N	N	A	-	N	N	N	N	A	-

(Figures in the parenthesis indicate transformed means; AT- Arc sine transformation)

Table 11.11: Evaluation of fungicides on grain yield with respect to Sheath rot of rice, *Kharif*, 2022

Treatment	Dose/L	Sheath rot disease grain yield (Kg/ha)						
		ADT	MND	MTU	NVS	NWG	TTB	Mean
T1- Difenoconazole 25% EC	0.5 ml	5190	4570	3865	6051	6230	4135	5007
T2- Isoprothiolane 40% EC	1.5 ml	4842	3766	3333	5997	6891	3999	4805
T3- Kasugamycin 3% SL	2.0 ml	4618	3102	3260	5170	6156	4037	4390
T4- Kitazin 48% EC	1.0 ml	4813	2587	3157	5285	6475	4322	4440
T5- Propineb 70% WP	3.0 g	4695	2501	3552	5339	6378	3995	4410
T6- Tebuconazole 25.9% EC	1.5 ml	4594	4504	4007	6242	6248	4790	5064
T7- Thifluzamide 24% SC	0.8 g	4456	3686	4367	5392	6856	4197	4825
T8- Control	-	4331	1179	2854	4259	4771	3734	3521
General Mean		4692	3237	3549	5467	6250	4151	4558
LSD @ 5% *(P=0.05)*		243.5	103.7	273.4	374.6	635.6	79.8	
C.V.		7.3	4.5	10.9	9.7	14.4	2.7	
Disease		N	N	N	N	N	A	

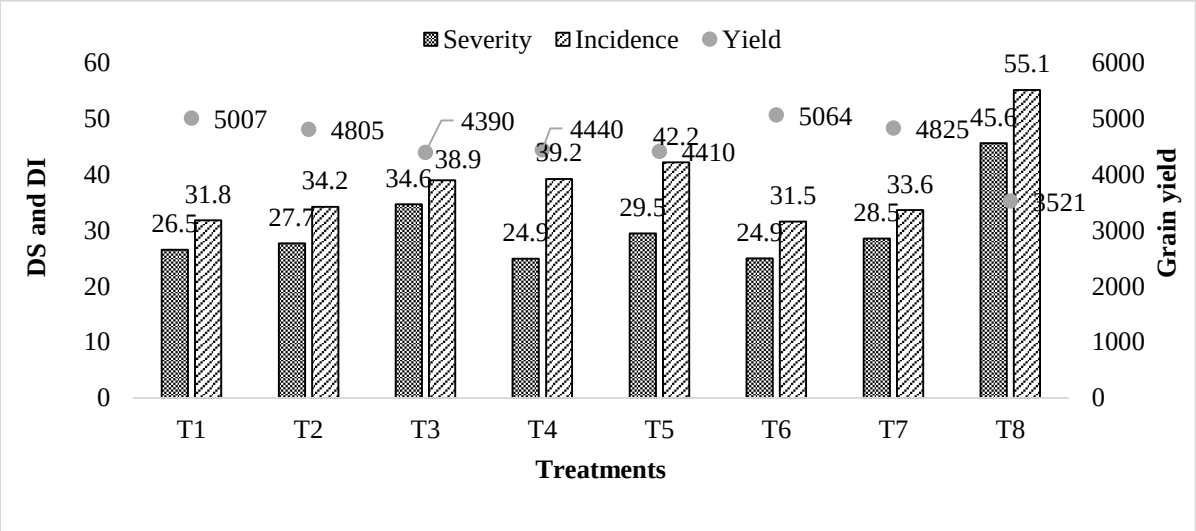

Figure 11.1D: Effect of fungicides against sheath rot (Severity-4 location; Incidence -5 location) of rice

Brown spot: Fungicides were evaluated against brown spot at seven different locations. Disease severity was recorded from five locations namely Chatha, Maruteru, Pattambi, Pusa, Sabour and Varanasi. Disease incidence was observed at Aduthurai. Bio-efficacy of the fungicides was tested under natural infection at all the centers except Pusa. Disease severity in the control plot was very high (>50%) at Pattambi (64.7%), Chatha (55.3 %), Sabour (56.6%), and; high (30-50%) at Pusa (37.8%), Varanasi (49.2%) and very low at Maruteru (2.2%). In Aduthurai very high disease incidence was recorded (51.2%). All seven fungicidal treatments performed better in reducing the brown spot at all six centers compared to the untreated control.

Among all the treatments, difenoconazole 25 EC (1.0 ml/L) significantly reduced the disease severity at six locations *viz.,* Chatha (15.1%), Pattambi (42.2%), Pusa (11.3%), Sabour (15.2%) Varanasi (19.3%) and Maruteru (1.8%) with mean severity of 17.5%. The same treatment (T1) showed significantly less disease incidence at Aduthurai (26.3). The next best treatment was tebuconazole 25.9% EC minimized the brown spot at Chatha (21.3%), Maruteru (1.8%), Pusa (16.3%) and Varanasi (22.2%), and showed low mean severity (24.1%) compared to other treatments. This was followed by thifluzamide 24% SC with mean disease severity of 23.41% (Table 11.12; Figure 11.1E). Regarding yield data, fungicide sprayed plots showed significantly higher yield compared to the control plot (3527 Kg/ha). The highest mean yield (4747 Kg/ha) was obtained from the plots where difenoconazole 25 EC (1.0 ml/L) was sprayed followed by tebuconazole 25.9% EC (4299 Kg/ha) and thifluzamide 24% SC (4246 Kg/ha) treatments (Table 11.13).

Grain discoloration: The experiment was conducted at Moncompu and Rajendranagar through natural occurrence. Both disease incidence and severity were observed at Moncompu and only incidence was observed at Rajendranagar. The low (<30%) disease incidence was recorded at both Moncompu (18.8%) and Rajendranagar (28%) and very high severity was recorded in Moncompu (70.8%). Difenoconazole 25 EC (1.0 ml/L) significantly reduced the disease incidence (5.8%) and severity (40.2%) at Moncompu compared to the other treatments. Kitazin 48% EC (1.0 ml/l) sprayed plot showed less disease incidence (9.9%) at Rajendranagar. Regarding yield data, fungicide sprayed plots showed significantly higher yield compared to the control plot (5557 Kg/ha). The highest mean yield of 7203 Kg/ha was obtained from the plots where difenoconazole 25 EC (1.0 ml/L) was sprayed plot followed by tebuconazole 25.9% EC (7181 Kg/ha) (Table 11.14; Fig 11.1F).

Stem rot: The experiment was conducted at Titabar through artificial inoculation and only disease incidence was observed. Disease pressure was recorded as very high (52.0%) in control plots. Tebuconazole 25.9% sprayed plot showed less disease incidence (10.7%) followed by Kitazin 48% EC (1.0 ml/l) treatment (16.5%). These two treatments produced more grain yield (4796 and 4623 Kg/ha) when compare to other treatments (Table 11.14; Fig 11.1G).

Table 11.12: Evaluation of fungicides against Brown spot disease severity and incidence of rice, *Kharif*, 2022

Treatment	Dose /L	Brown spot disease severity (%)							Incidence (%)
		CHT	MTU	PTB	PSA	SBR	VRN	Mean	ADT
T1- Difenoconazole 25% EC	0.5 ml	15.1 (22.8)	1.8 (1.3)	42.3	11.2 (19.6)	15.2 (22.9)	19.3 (26.0)	17.5	26.3 (30.8)
T2- Isoprothiolane 40% EC	1.5 ml	28.7 (32.4)	1.8 (1.3)	50.5	21.5 (27.6)	25.4 (30.2)	41.9 (40.3)	28.3	34.9 (36.2)
T3- Kasugamycin 3% SL	2.0 ml	37.3 (37.6)	1.9 (1.4)	50.0	28.5 (32.2)	41.5 (40.1)	39.6 (39.0)	33.1	35.2 (36.4)
T4- Kitazin 48% EC	1.0 ml	34.0 (35.67)	2.2 (1.4)	49.5	25.0 (30.0)	37.3 (37.7)	37.9 (38.0)	31.0	32.1 (34.5)
T5- Propineb 70% WP	3.0 g	44 (41.5)	2.1 (1.4)	43.0	26.5 (30.9)	34.1 (35.7)	32.3 (34.6)	30.3	28.4 (32.2)
T6- Tebuconazole 25.9% EC	1.5 ml	21.2 (27.4)	1.8 (1.3)	48.0	16.2 (23.7)	35.2 (36.4)	22.2 (28.1)	24.1	29.1 (32.7)
T7- Thifluzamide 24% SC	0.8 g	23.6 (29.1)	1.8 (1.3)	53.3	18.5 (25.5)	20.1 (26.6)	23.1 (28.7)	23.4	29.6 (32.9)
T8- Control	-	55.3 (48.0)	2.3 (1.45)	64.7	37.5 (37.7)	56.6 (48.8)	49.2 (44.5)	44.3	51.2 (45.7)
General Mean		32.4	2.0	50.2	23.1	33.2	33.2	29.0	33.4
LSD @ 5% *(P=0.05)*		4.0	0.2	3.5	2.3	1.7	2.6		3.5
C.V.		17.4	13.2	9.9	14.1	6.3	9.5		15.0
Transformation		AT	ST	NT	AT	AT	AT		AT
Disease		N	N	N	A	N	N		N

(Figures in the parenthesis indicate transformed means; AT- Arc sine transformation; ST – Square Root transformation)

Table 11.13: Effect of fungicides on grain yield with respect to Brown spot of rice, *Kharif*, 2022

Treatment	Dose/L	Brownspot disease grain yield (Kg/ha)						
		ADT	CHT	PTB	PSA	SBR	VRN	Mean
T1- Difenoconazole 25% EC	0.5 ml	5190	3233	4463	4435	5839	5321	4747
T2- Isoprothiolane 40% EC	1.5 ml	4842	2426	3925	4050	5256	4601	4183
T3- Kasugamycin 3% SL	2.0 ml	4618	2490	3850	3875	3842	4542	3869
T4- Kitazin 48% EC	1.0 ml	4813	2540	3850	3975	4859	4272	4052
T5- Propineb 70% WP	3.0 g	4695	2306	4325	3950	5007	5107	4232
T6- Tebuconazole 25.9% EC	1.5 ml	4594	2703	4025	4250	5017	5203	4299
T7- Thifluzamide 24% SC	0.8 g	4456	2485	3750	4150	5595	5039	4246
T8- Control	-	4331	2267	3675	3475	3240	4176	3527
General Mean		4692	2556	3983	4020	4832	4783	4144
LSD @ 5% *(P=0.05)*		243.5	48.4	132.3	299.0	82.2	218.4	
C.V.		7.3	2.7	4.7	10.5	2.1	5.6	
Disease		N	N	N	A	N	N	

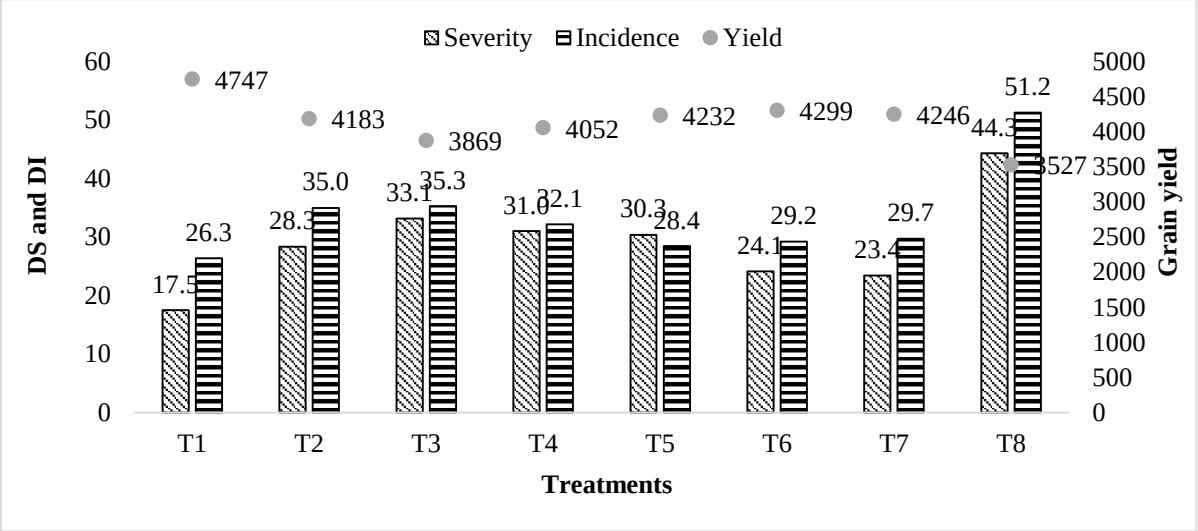

Figure 11.1E: Effect of fungicides against brown spot (Severity-6 location; Incidence-1 location) of rice

Table 11.14: Effect of fungicides on severity, incidence, and grain yield with respect to grain discolouration (GD) and stem rot of rice, *Kharif*, 2022

Treatment	Dose /L	GD severity (%)	Grain discolouration incidence (%)			Grain discolouration grain yield (kg/ha)			Stem rot incidence (%)	Stem rot yield (kg/ha)
		MNC	MNC	RNR	Mean	MNC	RNR	Mean	TTB	TTB
T1- Difenoconazole 25% EC	0.5 ml	40.2 (39.3)	5.8 (2.4)	14.0 (3.7)	10.0	7565	6840	7203	22.5 (28.3)	4409
T2- Isoprothiolane 40% EC	1.5 ml	47.1 (43.3)	8.6 (2.9)	11.3 (3.4)	10.0	6085	7026	6555	20.8 (27.1)	4458
T3- Kasugamycin 3% SL	2.0 ml	50.0 (45.0)	11.6 (3.4)	14.9 (3.8)	13.3	6818	7311	7064	23.2 (28.8)	4392
T4- Kitazin 48% EC	1.0 ml	52.2 (46.3)	9.4 (3.1)	9.9 (3.1)	9.7	5798	7373	6586	16.5 (23.9)	4623
T5- Propineb 70% WP	3.0 g	50.5 (45.3)	9.9 (3.1)	13.2 (3.6)	11.6	5885	7251	6568	23.5 (29.0)	4358
T6- Tebuconazole 25.9% EC	1.5 ml	46.3 (42.9)	7.9 (2.8)	10.3 (3.2)	9.1	6895	7467	7181	10.6 (19.0)	4796
T7- Thifluzamide 24% SC	0.8 g	42.8 (40.8)	6.9 (2.6)	16.6 (4.1)	11.8	6700	6698	6699	19.8 (26.4)	4610
T8- Control	-	70.8 (57.3)	18.84 (4.34)	28.1 (5.3)	23.5	5485	5630	5557	52.0 (46.2)	4116
General Mean		50.0	9.9	14.8	12.4	6403.9	6949.4	6676.7	23.6	4470.2
LSD @ 5% *(P=0.05)*		2.6	3.0	2.0	-	769.3	446.6	-	1.6	130.0
C.V.		7.4	42.8	19.5	-	17.0	9.1	-	9.3	4.1
Transformation		AT	ST	ST	-	-	-	-	AT	-
Disease		N	N	N	-	-	-	-	A	A

(Figures in the parenthesis indicate transformed means; AT- Arc sine transformation; ST – Square Root transformation)

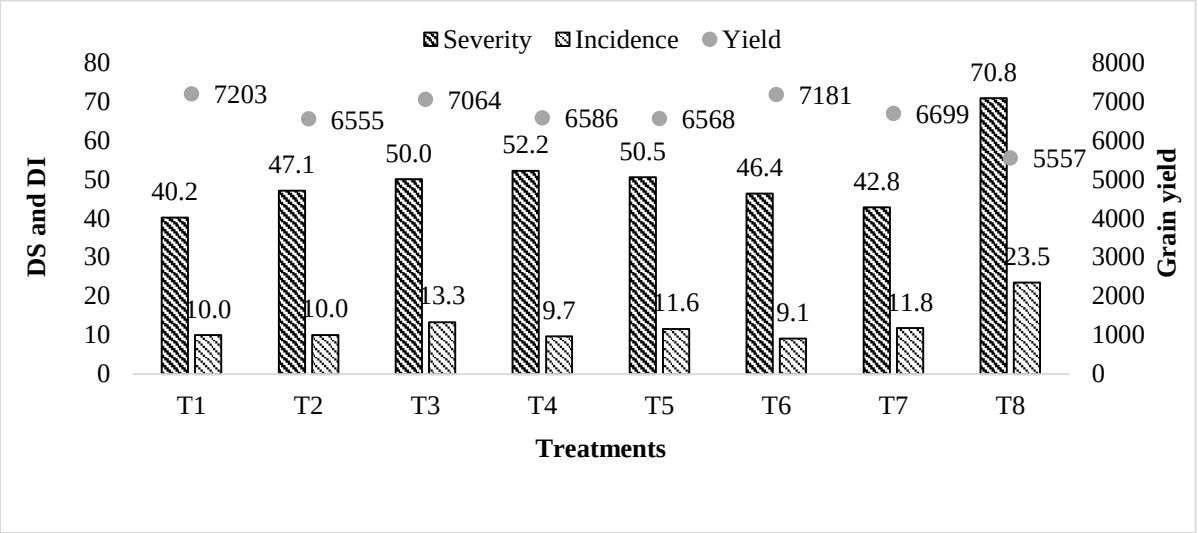

Figure 11.1F: Effect of fungicides against grain discoloration (Severity-1 location; Incidence-2 location) of rice

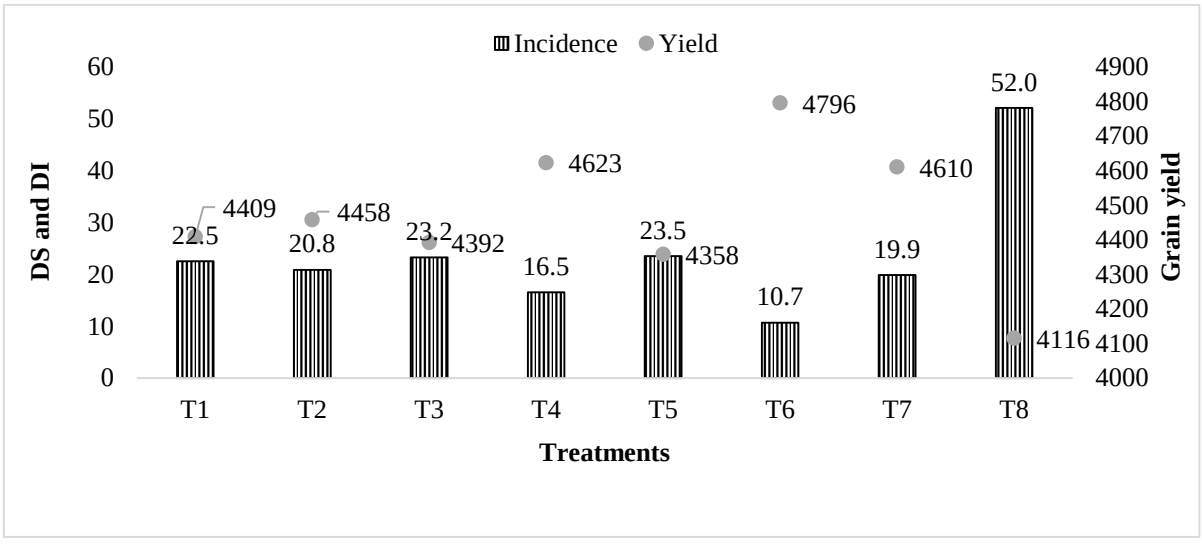

Figure 11.1G: Effect of fungicides against stem rot (Incidence-1 location) of rice

TRIAL No. 12: EVALUATION OF BIO-CONTROL FORMULATIONS AGAINST FUNGAL DISEASES

The integrated disease management trials were initiated with the identification and characterization of an efficient strain of *Trichoderma asperellum viz*., *T. asperellum* Strain TAIK1 by ICAR-IIRR. In the trials conducted in the institute research farm and in the farmer's fields over a period of 4 years have established the plant growth capabilities and biocontrol efficiency against major pathogens of rice. With the objective of studying the efficiency of tow formulations of the strain viz., a liquid and solid bioformulation in different rice growing regions of the country, the formulations were tested against naturally occurring diseases of about seven centres.

The experiment was conducted with 8 different treatments *viz*., T1=Seed treatment followed by seedling dip @ 10 g/l of solid Formulation, T2= Seed treatment followed by seedling dip @ 10 g/l of liquid Formulation, T3= T1 followed by foliar Spray @ 5g/l of solid Formulation, T4=T2 followed by foliar Spray @ 5g/l of liquid Formulation, T5=T1 followed by fungicide for the respective disease, T6=T2 followed by fungicide for the respective disease, T7= Only the fungicide for the respective disease and T8=Control (No treatment).

Results were obtained from seven centres, 5 centres viz., Maruteru, Moncompu, Navsari, Pantnagar and IIRR reporting on sheath blight disease, false smut, sheath rot and neck blast from Karaikal, leaf blast from Rewa and brown spot from Maruteru. Results obtained from different centres are discussed below.

Sheath blight: Among the different centres that has reported sheath blight percent disease severity (DS), Pantnagar has reported the highest DS of 76.19% followed by Moncompu at 70.34% in the untreated plots (Control). Among the different formulations tested viz., the liquid formulation was found to be better than the solid formulation. Similarly, the combination of bioagent formulation and fungicides were providing higher percent disease control and increased plant yield than when compared to the fungicide treatment alone. Among the different treatments overall for the management of the sheath blight disease, Moncompu reported the highest percentage control over the disease (DC) viz., 91.05% followed by IIRR (90.73) when applied with the liquid formulation of the bioagent as seed treatment followed by seedling dip @ 5g/l followed by Hexaconazole @ 2ml/l at tillering stage (T6). Among the treatments with the bioagents alone, the treatment with the liquid formulation of the bioagent as seed treatment followed by seedling dip @ 5g/l with liquid formulation was found to be offering the highest percent decrease of disease severity over control (80.67%). Regarding the plant yield, Maruteru centre reported the highest percent increase in grain yield over control (60.86%) when the plants were applied with bioagent as seed treatment followed by seedling dip @ 5g/l with liquid formulation followed by Hexaconazole @ 2ml/l at tillering stage (T6) followed by the treatment of bioagent as seed treatment followed by seedling dip @ 5g/l with solid formulation followed by Hexaconazole @ 2ml/l at tillering stage (T5) (Table 12.1 to 12.5).

TABLE 12.1: Evaluation of bio control formulations against Sheath Blight at Maruteru and Moncompu

S.No	Treatments	Sheath blight								
		Maruteru				Moncompu				
		DS (%)	% Decrease over control (DS)	Grain yield (Kg/ha)	% Increase in Grain Yield	DI (%)	DS (%)	% Decrease over control (DS)	Grain yield (Kg/ha)	% Increase in Grain Yield
T1	**ST + SD @ (10 g/l) (Solid Formulation)**	47.96 (43.51)	29.28	3524.07	31.24	35.47 (36.20)	24.44 (29.45)	65.25	4200	29.95
T2	**ST + SD @ (10 g/l) Liquid Formulation)**	50.27 (45.19)	25.88	3084.26	14.86	38.17 (38.09)	34.07 (35.59)	51.56	4107	27.07
T3	**T1+ Foliar Spray @ 5g/l (Solid Formulation)**	55.69 (48.78)	17.89	3155.55	17.52	40.25 (38.53)	24.07 (28.62)	65.78	4759	47.25
T4	**T2 + Foliar Spray @ 5g/l (Liquid Formulation)**	44.86 (41.78)	33.85	3785.18	40.97	29.54 (32.81)	19.26 (25.09)	72.62	4099	26.83
T5	**T1+ Fungicide for the respective disease**	42.61 (40.60)	37.17	4203.70	56.55	28.22 (31.94)	8.15 (16.43)	88.41	5397	66.99
T6	**T2+ Fungicide for the respective disease**	34.88 (35.89)	48.57	4319.44	60.86	22.60 (28.36)	6.30 (14.38)	91.05	4529	40.13
T7	**Fungicide for the respective disease**	44.06 (40.86)	35.03	4081.48	52.00	31.67 (33.35)	32.59 (34.57)	53.67	5096	57.67
T8	**T8=Control**	67.82 (55.78)		2685.18		50.27 (45.21)	70.34 (57.01)		3232	
	C.D.	10.077		455.71			8.66		N/A	
	SE(m)	3.403		153.91			2.83		577.84	
	SE(d)	4.813		217.67			4.00		817.19	
	C.V.	**15.458**		**8.539**			**16.25**		**22.607**	

(DS – Disease Severity; DI – Disease Incidence; Figures in the parenthesis indicate transformed means; AT- Arc sine transformation)

Table 12.2: Evaluation of bio control formulations against Sheath Blight at Navasari

S.No	Treatments	Navasari							
		DS (%)	% Decrease over control (DS)	Root length	Shoot length	No of tillers	1000 grain weight	Grain yield (Kg/ha)	% Increase in Grain Yield
T1	**ST + SD @ (10 g/l) (Solid Formulation)**	29.67 (32.98)	26.25	16.55	91.33	9.87	19.62	5,024.33	18.84
T2	**ST + SD @ (10 g/l) Liquid Formulation)**	27.73 (31.74)	31.07	17.067	92.00	10.53	19.887	5,065.33	19.81
T3	**T1+ Foliar Spray @ 5g/l (Solid Formulation)**	25.8 (30.50)	35.87	17.483	92.33	10.80	20.353	5,290.00	25.13
T4	**T2 + Foliar Spray @ 5g/l (Liquid Formulation)**	24.9 (29.92)	38.11	17.507	95.67	11.00	20.9	5,392.33	27.55
T5	**T1+ Fungicide for the respective disease**	19 (25.82)	52.77	19.067	99.33	12.67	23	5,902.67	39.62
T6	**T2+ Fungicide for the respective disease**	16.93 (24.27)	57.92	20.683	100.67	13.20	23.067	6,270.33	48.32
T7	**Fungicide for the respective disease**	22.1 (27.98)	45.07	17.683	98.33	11.73	21.773	5,514.67	30.44
T8	**T8=Control**	40.23 (39.34)		14.367	81.33	8.47	18.433	4,227.67	
	C.D.	2.88		1.738	9.271	0.596	0.777	798.109	
	SE(m)	0.94		0.568	3.027	0.195	0.254	260.6	
	SE(d)	1.33		0.803	4.281	0.275	0.359	368.545	
	C.V.	5.38		5.602	5.586	3.055	2.103	8.459	

(DS – Disease Severity; DI – Disease Incidence; Figures in the parenthesis indicate transformed means; AT- Arc sine transformation)

Table 12.3: Evaluation of bio control formulations against Sheath Blight in Pantnagar

S.No	Treatments	Sheath blight								
		DS (%)	% Decrease over control (DS)	Root length	Shoot length	No of tillers	1000 grain weight	Dry matter content (g)	Grain yield (Kg/ha)	% Increase in Grain Yield
T1	**ST + SD @ (10 g/l) (Solid Formulation)**	51.81 (46.02)	32.00	8.26	118.27	50.33	26.52	363.33	5584.67	12.83
T2	**ST + SD @ (10 g/l) Liquid Formulation)**	48.53 (44.14)	36.30	8.43	118.80	52.00	26.54	393.33	5719.67	15.56
T3	**T1+ Foliar Spray @ 5g/l (Solid Formulation)**	42.36 (40.59)	44.41	9.24	118.73	54.33	26.58	441.67	5819.33	17.57
T4	**T2 + Foliar Spray @ 5g/l (Liquid Formulation)**	41.06 (39.83)	46.10	9.64	119.00	57.33	27.42	491.67	6019.67	21.62
T5	**T1+ Fungicide for the respective disease**	40.42 (39.46)	46.94	9.55	119.69	59.00	27.08	510.00	6153.33	24.32
T6	**T2+ Fungicide for the respective disease**	38.82 (38.52)	49.05	9.81	120.40	61.67	27.09	551.67	6304.00	27.36
T7	**Fungicide for the respective disease**	43.40 (41.19)	43.04	9.68	119.07	56.33	26.63	497.33	6054.67	22.32
T8	**T8=Control**	76.19 (60.80)		7.60	115.93	44.67	24.98	310.33	4949.67	
	C.D.	1.989		1.108	1.771	4.251	1.064	71.83	160.50	
	SE(m)	0.650		0.362	0.578	1.388	0.348	23.45	52.40	
	SE(d)	0.919		0.512	0.818	1.963	0.491	33.17	74.11	
	C.V.	2.568		6.945	0.844	4.415	2.262	9.13	1.55	

(DS – Disease Severity; Figures in the parenthesis indicate transformed means; AT- Arc sine transformation)

Table 12.4: Evaluation of bio control formulations against Sheath blight at IIRR

S.No	Treatments	Sheath blight								
		IIRR								
		DS (%)	% Decrease over control (DS)	Root length	Shoot length	No of tillers	1000 grain weight	Dry matter content (g)	Grain yield (Kg/ha)	% Increase in Grain Yield
T1	**ST + SD @ (10 g/l) (Solid Formulation)**	18.22 (25.26)	67.78	45.20	81.50	14.33	17.13	1,520.00	5933.33	15.96
T2	**ST + SD @ (10 g/l) Liquid Formulation)**	17.59 (24.79)	68.88	49.30	81.50	14.00	16.15	1,460.00	6030.00	17.85
T3	**T1+ Foliar Spray @ 5g/l (Solid Formulation)**	12.35 (20.57)	78.16	54.10	91.50	17.00	19.08	1,606.67	6540.00	27.82
T4	**T2 + Foliar Spray @ 5g/l (Liquid Formulation)**	10.93 (19.30)	80.67	53.80	90.71	18.00	20.13	1,786.67	6400.00	25.08
T5	**T1+ Fungicide for the respective disease**	6.45 (14.70)	88.60	35.20	72.40	13.00	15.88	1,466.67	5436.67	6.25
T6	**T2+ Fungicide for the respective disease**	5.24 (13.23)	90.73	34.20	72.48	13.00	15.51	1,453.33	5836.67	14.07
T7	**Fungicide for the respective disease**	11.46 (19.78)	79.73	34.00	68.35	11.67	13.44	1,423.33	5370.00	4.95
T8	**T8=Control**	56.54 (48.74)		32.10	81.50	10.00	12.13	1,306.67	5116.67	
	C.D.	0.499		0.585	0.922	1.424	0.618	67.894	183.97	
	SE(m)	0.163		0.191	0.301	0.465	0.202	22.169	60.07	
	SE(d)	0.23		0.27	0.426	0.658	0.285	31.352	84.95	
	C.V.	1.212		0.783	0.668	5.805	2.16	2.555	1.78	

(DS – Disease Severity; Figures in the parenthesis indicate transformed means; AT- Arc sine transformation)

Table 12.5: Comparison of the effect of bio formulations against Sheath Blight in different centres

S.No	Treatments	Maruteru		Moncompu		Navsari		Pantnagar		IIRR	
		% Decrease over control (DC)	% Increase in Grain Yield	% Decrease over control (DC)	% Increase in Grain Yield	% Decrease over control (DC)	% Increase in Grain Yield	% Decrease over control (DC)	% Increase in Grain Yield	% Decrease over control (DC)	% Increase in Grain Yield
T1	**ST + SD @ (10 g/l) (Solid Formulation)**	29.28	31.24	65.25	29.95	26.25	18.84	32.00	12.83	67.78	15.96
T2	**ST + SD @ (10 g/l) Liquid Formulation)**	25.88	14.86	51.56	27.07	31.07	19.81	36.30	15.56	68.88	17.85
T3	**T1+ Foliar Spray @ 5g/l (Solid Formulation)**	17.89	17.52	65.78	47.25	35.87	25.13	44.41	17.57	78.16	27.82
T4	**T2 + Foliar Spray @ 5g/l (Liquid Formulation)**	33.85	40.97	72.62	26.83	38.11	27.55	46.10	21.62	80.67	25.08
T5	**T1+ Fungicide for the respective disease**	37.17	56.55	88.41	66.99	52.77	39.62	46.94	24.32	88.60	6.25
T6	**T2+ Fungicide for the respective disease**	48.57	60.86	91.05	40.13	57.92	48.32	49.05	27.36	90.73	14.07
T7	**Fungicide**	35.03	52.00	53.67	57.67	45.07	30.44	43.04	22.32	79.73	4.95

False smut:

In the study of IDM against falsesmut disease using the bioagent *T.asperellum* Strain TAIK1, Karaikal centre reported the highest percent decrease in disease severity over control (91.80%) when the plant were treated with bioagent as seed treatment followed by seedling dip @ 5g/l with liquid formulation (T4) followed by the treatment bioagent as seed treatment followed by seedling dip @ 5g/l with solid formulation (T3). Interestingly the application of fungicide Propiconazole @ 1ml/l at booting stage either alone (T7) or in combination with the bioagents (T5 and T6) were not as effective as the bioagent applications. Similarly the bioagents were found to induce highest percent decrease in grain yield over control T4 and T3 in that order viz., 26.20 % and 25.80% respectively (Table 12.6).

Table 12.6: Evaluation of bio control formulations against False smut at Karaikal

S.No	Treatments	False smut							
		DS (%)	% Decrease over control (DS)	No of tillers	1000 grain weight	Dry matter content (g)	Grain yield (Kg/ha)	% Increase in Grain Yield	DI (%)
T1	ST + SD @ (10 g/l) (Solid Formulation)	12.56 (20.74)	58.62	12.67	16.67	1473.33	5933	18.66	13.87 (21.85)
T2	ST + SD @ (10 g/l) Liquid Formulation)	10.71 (19.08)	64.71	12.67	17.67	1460.00	6130	22.60	11.93 (20.15)
T3	T1+ Foliar Spray @ 5g/l (Solid Formulation)	4.57 (12.31)	84.94	14.67	18.33	1606.67	6290	25.80	4.6 (12.36)
T4	T2 + Foliar Spray @ 5g/l (Liquid Formulation)	2.49 (8.98)	91.80	16.00	20.00	1720.00	6310	26.20	2.87 (9.67)
T5	T1+ Fungicide for the respective disease	5.28 (13.21)	82.60	13.33	17.00	1466.67	5477	9.54	9.67 (18.09)
T6	T2+ Fungicide for the respective disease	5.02 (12.88)	83.46	12.67	17.33	1460.00	5800	16.00	6.93 (15.23)
T7	Fungicide for the respective disease	18.18 (25.21)	40.10	11.67	16.33	1380.00	5370	7.40	19.32 (26.06)
T8	T8=Control	30.35 (33.40)		10.67	15.67	1266.67	5000		33.21 (35.15)
	C.D.	2.004		2.437	1.585	114.599	372.985		2.228
	SE(m)	0.654		0.796	0.518	37.419	121.788		0.728
	SE(d)	0.925		1.125	0.732	52.919	172.234		1.029
	C.V.	6.216		10.566	5.159	4.382	3.644		6.356

(DS – Disease Severity; DI – Disease Incidence; Figures in the parenthesis indicate transformed means; AT- Arc sine transformation)

Neck blast:

Karaikal centre has reported the effectivity of *T.asperellum* Strain TAIK1 either alone or in combination of the fungicide Isoprothiolane @ 1.5ml/l at panicle emergence against the neck blast disease. Accordingly the highest percent decrease in disease severity over control (78.85) when the plant were treated with bioagent as seed treatment followed by seedling dip @ 5g/l with liquid formulation (T4) followed by the treatment bioagent as seed treatment followed by seedling dip @ 5g/l with solid formulation (T3). Further the application of fungicide Isoprothiolane @ 1.5ml/l at panicle emergence either alone (T7) or in combination with the bioagents (T5 and T6) were not as effective as the bioagent applications. Also the bioagents were found to induce highest percent decrease in grain yield over control T4 and T3 in that order viz., 26.20 % and 25.80% respectively (Table 12.7).

Table 12.7: Evaluation of bio control formulations against Neck Blast at Karaikal

S.No	Treatments	Neck blast							
		DS (%)	% Decrease over control (DS)	No of tillers	1000 grain weight	Dry matter content (g)	Grain yield (Kg/ha)	% Increase in Grain Yield	DI (%)
T1	**ST + SD @ (10 g/l) (Solid Formulation)**	9.67 (3.26)	60.53	12.67	16.67	1,473.3	5,933.3	18.66	11.37 (19.69)
T2	**ST + SD @ (10 g/l) Liquid Formulation)**	8.29 (3.04)	66.14	12.67	17.67	1,460.0	6,130.0	22.60	9.30 (17.73)
T3	**T1+ Foliar Spray @ 5g/l (Solid Formulation)**	6.93 (2.81)	71.72	14.67	18.33	1,606.7	6,290.0	25.80	7.30 (15.35)
T4	**T2 + Foliar Spray @ 5g/l (Liquid Formulation)**	5.18 (2.48)	78.85	16.00	20.00	1,720.0	6,310.0	26.20	5.24 (13.19)
T5	**T1+ Fungicide for the respective disease**	11.47 (3.52)	53.16	13.33	17.00	1,466.7	5,476.7	9.54	11.57 (19.80)
T6	**T2+ Fungicide for the respective disease**	10.37 (3.35)	57.67	12.67	17.33	1,460.0	5,800.0	16.00	10.47 (18.72)
T7	**Fungicide for the respective disease**	15.49 (4.06)	36.76	11.67	16.33	1,380.0	5,370.0	7.40	15.91 (23.49)
T8	**T8=Control**	24.49 (5.05)		10.67	15.67	1,266.7	5,000.0		33.21 (35.15)
	C.D.	0.445		2.437	1.585	114.599	372.985		3.059
	SE(m)	0.145		0.796	0.518	37.419	121.788		0.999
	SE(d)	0.205		1.125	0.732	52.919	172.234		1.413
	C.V.	7.294		10.566	5.159	4.382	3.644		8.484

(DS – Disease Severity; DI – Disease Incidence; Figures in the parenthesis indicate transformed means; ST – Square Root transformation)

Sheath rot:

The centre Karaikal reported the effectivity of *T.asperellum* Strain TAIK1 either alone or in combination of the fungicide Hexaconazole against the sheath rot disease. The complete control of disease reported as percent decrease in disease severity over control (100%) when the plant was treated with bioagent as seed treatment followed by seedling dip @ 5g/l with liquid formulation (T4) followed by the treatment bioagent as seed treatment followed by seedling dip @ 5g/l with solid formulation (T3). Further the application of fungicide Hexaconazole either alone (T7) or in combination with the bioagents (T5 and T6) were not as effective as the bioagent applications. Also the bioagents were found to induce highest percent decrease in grain yield over control T4 and T3 in that order viz., 26.20 % and 25.80% respectively (Table 12.8)

Table 12.8: Evaluation of bio control formulations against Sheath rot in Karaikal

S.No	Treatments	Sheath Rot							
		DS (%)	% Decrease over control (DS)	No of tillers	1000 grain weight	Dry matter content (g)	Grain yield (Kg/ha)	% Increase in Grain Yield	DI (%)
T1	**ST + SD @ (10 g/l) (Solid Formulation)**	4.13 (2.26)	62.23	12.67	16.67	1,473.3	5,933.3	18.66	4.27 (2.29)
T2	**ST + SD @ (10 g/l) Liquid Formulation)**	3.53 (2.12)	67.68	12.67	17.67	1,460.0	6,130.0	22.60	3.67 (2.15)
T3	**T1+ Foliar Spray @ 5g/l (Solid Formulation)**	1.47 (1.56)	86.55	14.67	18.33	1,606.7	6,290.0	25.80	1.49 (1.57)
T4	**T2 + Foliar Spray @ 5g/l (Liquid Formulation)**	0.00 (1.00)	100.00	16.00	20.00	1,720.0	6,310.0	26.20	0.00 (1.00)
T5	**T1+ Fungicide for the respective disease**	3.21 (2.05)	70.61	13.33	17.00	1,466.7	5,476.7	9.54	3.23 (2.05)
T6	**T2+ Fungicide for the respective disease**	2.59 (1.89)	76.34	12.67	17.33	1,460.0	5,800.0	16.00	2.60 (1.89)
T7	**Fungicide for the respective disease**	6.25 (2.69)	42.87	11.67	16.33	1,380.0	5,370.0	7.40	6.39 (2.71)
T8	**T8=Control**	10.93 (3.45)	0.00	10.67	15.67	1,266.7	5,000.0		13.25 (3.77)
	C.D.	0.241		2.437	1.585	114.599	372.985		0.199
	SE(m)	0.079		0.796	0.518	37.419	121.788		0.065
	SE(d)	0.111		1.125	0.732	52.919	172.234		0.092
	C.V.	6.397		10.566	5.159	4.382	3.644		5.161

Leaf Blast:

The effectivity of *T.asperellum* Strain TAIK1 either alone or in combination of the fungicide against the leaf blast disease was reported by the Rewa centre. Results indicated that the treatment T6 viz., when applied with the liquid formulation of the bioagent as seed treatment followed by seedling dip @ 5g/l followed by application of fungicide was found to offer the highest percent decrease in the disease severity over control (57.99%) followed by treatment (T5) where the plants were applied with the solid formulation of the bioagent as seed treatment followed by seedling dip @ 5g/l followed by the fungicide (52.49%). The treatments T5 and

T6 were on par in increasing the grain yield of the treated plants viz., 14.78 and 13.61% respectively (Table 12.9).

Table 12.9: Evaluation of bio control formulations against Leaf blast at Rewa

S.No	Treatments	Leaf blast						
		DS (%)	% Decrease over control (DS)	No of tillers	1000 grain weight	Grain yield (Kg/ha)	% Increase in Grain Yield	DI (%)
T1	**ST + SD @ (10 g/l) (Solid Formulation)**	12.8 (3.72)	24.26	8.83	26.07	4,047	10.28	15.7 (4.09)
T2	**ST + SD @ (10 g/l) Liquid Formulation)**	10.4 (3.37)	38.46	9.07	26.77	4,057	10.54	14.5 (3.94)
T3	**T1+ Foliar Spray @ 5g/l (Solid Formulation)**	9.4 (3.22)	44.38	9.03	27.17	4,139	12.90	12.6 (3.71)
T4	**T2 + Foliar Spray @ 5g/l (Liquid Formulation)**	8.6 (3.09)	49.11	9.47	27.97	4,165	13.35	11.1 (3.47)
T5	**T1+ Fungicide for the respective disease**	8.03 (3.00)	52.49	9.63	27.50	4,205	14.78	10.4 (3.37)
T6	**T2+ Fungicide for the respective disease**	7.1 (2.85)	57.99	10.90	28.80	4,191	13.61	8.7 (3.11)
T7	**Fungicide for the respective disease**	8.9 (3.14)	47.34	9.80	28.17	4,095	12.13	11.4 (3.51)
T8	**T8=Control**	16.9 (4.23)	0.00	8.57	25.60	3,635	0.00	24.43 (5.04)
	C.D.	0.176		0.735	0.878	81.344		0.190
	SE(m)	0.057		0.24	0.287	26.561		0.062
	SE(d)	0.081		0.339	0.406	37.563		0.088
	C.V.	2.984		4.415	1.822	1.131		2.838

(DS – Disease Severity; DI – Disease Incidence; Figures in the parenthesis indicate transformed means; ST – Square Root transformation)

Brown Spot:

In the study of IDM against brown spot disease using the bioagent *T.asperellum* Strain TAIK1 and the fungicide mancozeb, Maruteru centre reported that all the treatments of the bioagents alone and in combinations were at par in managing the disease. However, the bioagents and fungicide combination (T5, T6 and T7) were found to increase the grain yield over the other treatments.

TABLE 9: Evaluation of bio control formulations against Brown Spot in Maruteru

S.No	Treatments	Brown spot			
		DS (%)	% Decrease over control (DS)	Grain Yield	% Increase in Grain Yield
T1	**ST + SD @ (10 g/l) (Solid Formulation)**	1.68 (1.63)	14.10	3,524.07	31.24
T2	**ST + SD @ (10 g/l) Liquid Formulation)**	1.53 (1.58)	21.79	3,084.26	14.86
T3	**T1+ Foliar Spray @ 5g/l (Solid Formulation)**	1.58 (1.60)	19.23	3,155.55	17.52
T4	**T2 + Foliar Spray @ 5g/l (Liquid Formulation)**	1.53 (1.58)	21.79	3,785.18	40.97
T5	**T1+ Fungicide for the respective disease**	1.55 (1.59)	20.51	4,203.70	56.55
T6	**T2+ Fungicide for the respective disease**	1.55 (1.59)	20.51	4,319.44	60.86
T7	**Fungicide for the respective disease**	1.55 (1.59)	20.51	4,081.48	52.00
T8	**T8=Control**	1.95 (1.71)	0.00	2,685.18	0.00
	C.D.	N/A		455.719	
	SE(m)	0.03		153.916	
	SE(d)	0.043		217.67	
	C.V.	3.758		8.539	

TRIAL No.13: INTEGRATED PEST MANAGEMENT-SPECIAL TRIAL

The special integrated pest management trial was conducted against rice diseases at four different zones *viz*., Northern zone (Pantnagar, Kaul); Eastern zone (Chiplima, Masodha); Western zone (Nawagam) and Southern zone (Aduthurai, Mandya). According to the existence of specific problems of each zone, Integrated Pest Management (IPM) module was designed and tested along with the farmers practices (FP). The detailed treatments can be referred from the AICRIP Plant Pathology Technical Programme, 2022. The trial was conducted by the experts 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 to till the maturity of the crop both in the IPM and Farmers practices (FP) adopted fields. Later, Area Under the Disease Progress Curve (AUDPC) was calculated based on the weakly 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.

Northern zone

Under Northern zone, the trial was conducted at Pantnagar and Kaul. At Pantnagar, the trial was evaluated for the management of sheath blight, brown spot and bacterial blight. Adoption of IPM practices effectively reduced the disease progression of sheath blight (243 - 258 AUDPC units) when compared to Farmers practices (420 to 453 AUDPC units). Similar trend was observed with respect to brown spot disease, wherein the significant reduction was observed with respect to disease development. At Pantnagar the same IPM practices were not effective against bacterial blight disease. At Kaul, the trial was conducted for the management of leaf blast, neck blast, bacterial blight and sheath blight. The leaf blast AUDPC value of 210 and 182 units were reduced to 146 and 147 units respectively due to the adoption of IPM practices as against farmer management practices. In case of sheath blight disease, adoption of IPM practices reduced the AUDPC units from 120 to 89; 116 to 87. With respect to bacterial blight there is no significant difference was observed between IP and Farmer management practices (Table 13.1).

Table 13.1: AUDPC values based on disease severity (%) of rice diseases at different dates at Pantnagar and Kaul, *Kharif* – 2022

		AUDPC Values						
	Treatment	Pantnagar			Kaul			
		Sheath blight	BS	BB	LB	NB	BB	Sheath blight
F 1	IPM	243	28	2	146	23	10	89
	FP	422	96	24	210	27	26	120
F2	IPM	258	33	2	147	25	23	87
	FP	420	89	3	182	17	24	116
F 3	IPM	244	30	2	-	-	-	-
	FP	453	98	2	-	-	-	-

(F- Farmer Location; IPM – Integrated Pest Management Practices; FP- Farmer Practices; BS – Brown spot)

Eastern Zone

Trials were conducted at Chiplima and Masodha. Adoption of IPM Practices like seed treatment with *Trichoderma* @10g/kg recorded low disease severity (6.30 %) was 30 DAT for leaf blast as compared to farmers practices (without the seed treatment & fungicide spray) where in the disease severity was 17.33%. In case of brown spot disease, disease severity was reduced from 15.33% to 12.24% at 60 DAT.

Significant reduction in the disease development of leaf blast, neck blast and bacterial blight was recorded at Masodha. Adoption of IPM practices, reduced the disease severity of leaf blast and sheath blight to almost nil as compared to farmers practices. With respect to neck blast, bacterial blight the AUDPC values *viz*., 287 and 274 were reduced to 172 and 78 respectively (Table 13.2).

Table 13.2: AUDPC values based on disease severity (%) of rice diseases recorded at different dates at Chiplima and Masodha, *Kharif* – 2022

	Treatment	Chiplima		Masodha			
				AUDPC Values			
		Leaf Blast – Disease severity (%)	Brown spot	Leaf blast	Neck blast	BB	Sheath blight
F 1	IPM	6.30	12.24	0	172	78	0
	FP	17.33	15.33	245	287	274	131.6

(F- Farmer Location; IPM – Integrated Pest Management Practices; FP- Farmer Practices; BB- Bacterial blight)

Western Zone

Under this zone, the trial was conducted at Nawagam at 3 different locations for the management of sheath rot and grain discolouration. The AUDPC value was reduced due to the adoption of IPM practices (IPM = 308 - 311 AUDPC values; FP = 349 - 366 AUDPC values). Similarly, disease progress was low in case of grain discoloration (IPM = 119 - 128 AUDPC units; FP = 145 - 153 AUDPC values) in the IPM practices adopted field (Table 13.3).

Table 13.3: AUDPC values based on disease severity (%)of rice diseases recorded at different dates at Nawagam, *Kharif* '2022

Treatment	Nawagam							
	AUDPC Values							
	Sheath rot	GD		Sheath rot	GD		Sheath rot	GD
L1 - IPM	311	122	L2- IPM	308	119	L3 - IPM	322	128
L1-- FP	349	146	L2 - FP	346	153	L3 - FP	366	145

(F- Farmer Location; IPM – Integrated Pest Management Practices; FP- Farmer Practices; GD- Glume Discolouration)

Southern Zone

The trial was conducted at Aduthurai and Mandya. At Aduthurai, adoption of IPM practices reduced the disease severity of bacterial blight. In all the three locations disease severity of was significantly reduced compared to farmers practices (L1 = IPM - 95; FP-258; L2 = IPM – 28; FP – 220; L3 = IPM – 53; FP – 225). In case of false smut disease, among the three locations, application of IPM practices were effective at two locations, wherein the

disease was reduced from 119 to 41 AUDPC units (L1) and 64 to 11 AUDPC units (L2) (Table 13.4). At Mandya, the IPM practices were evaluated against leaf blast wherein the AUDPC values reduced significantly (L1: IPM-77, FP-225; L2: IPM-83, FP-202 IPM-71, FP-179)

Table 13.4: AUDPC values based on disease severity (%) of rice diseases recorded at different dates at Aduthurai and Mandya, *Kharif* '2022

		Aduthurai		Mandya
		AUDPC Values		AUDPC Values
		Bacterial Blight	False smut	Leaf Blast
L1	IPM	95	41	77
	FP	258	119	225
L2	IPM	28	11	83
	FP	220	64	202
L3	IPM	53	22	71
	FP	225	0	179

(L= Location; IPM – Integrated Pest Management Practices; FP- Farmer Practices)

Central Zone

Under Central zone, the trial is conducted only at Jagdalpur**,** wherein IPM practices and Farmers practices were compared for the management of leaf blast, neck blast and sheath blight. The trial results revealed that in general the disease progress was significantly low in the IPM practices adopted field compared to the farmers practices. With respect to leaf blast, the AUDPC values were ranged from 0 to 141 in the IPM practices adopted field, whereas the values were ranged from 84 to 426 in the farmers practices adopted fields. Similar trend was also observed in case of neck blast wherein the AUDPC values were ranged from 0 to 135 as against 135 to 411 in farmers adopted practices. Similarly sheath blight disease severity was also reduced significantly wherein the AUDPC values were reduced from 225 to 42, 444 to 279 and 363 to 219 (Table 13.5).

Table 13.5: AUDPC values based on disease severity (%) of rice diseases recorded at different dates at Jagdalpur, *Kharif* '2022

	Treatment	AUDPC Values		
		Leaf Blast	Neck blast	Sheath blight
L1	IPM	0	48	42
	FP	173	159	225
L2	IPM	141	0	279
	FP	426	411	444
L3	IPM	0	135	219
	FP	84	213	363

(F- Farmer Location; IPM – Integrated Pest Management Practices; FP- Farmer Practices)

TRIAL No.14: SPECIAL TRIAL ON YIELD LOSS ASSESSMENT DUE TO MAJOR RICE DISEASES – *Kharif* 2022

The yield loss trial was formulated to study the impact of the major rice diseases *viz*., leaf blast, sheath blight, and bacterial blight on the grain yield of the rice crop. The trial includes 3 different treatments, i.e., different graded levels of disease infections and one control treatment where there is no infection of the pathogen. Each treatment is replicated five times in an RBD pattern. The respective pathogens were artificially inoculated by standardized method and observations were recorded as percent disease index. The trail was proposed at 11 hot spot locations and data was received from 10 locations. With respect to leaf blast, the trial was taken up at Jagdalpur, Malan, and Mandya and IIRR. In case of sheath blight, the trial was conducted at Gangavathi, Ludhiana, Mandya, Maruteru, Moncompu, and IIRR. The trial on bacterial blight was taken up at Maruteru, Moncompu, Pantnagar, Pattambi and IIRR. Trail details of each location are given in the Table 14.1.

Leaf blast

Leaf blast susceptible varieties *viz*., Swarna (at Jagdalpur & Maruteru), HPU 2216 (at Malan), MTU 1001 (at Mandya) and TN 1 (at IIRR) were used for yield loss assessment. In all the locations, pathogen was artificially inoculated either spraying conidial suspension or supplementing with spreading of diseased leaves. Disease was recorded as percent disease index (PDI) and grain yield was recorded as kg/ha.

The highest Per cent disease index (PDI) of leaf blast was recorded at Malan (83.08%) followed by IIRR (59.26%), Jagdalpur (53.78%) and Mandya (43.4%), where pathogen was inoculated thrice at interval of two days (T1). The disease severity was low in un-inoculated plots at Mandya (8.8%), IIRR (11.48%) and Malan (13.06%) and it was recorded as 40.00% at Jagdalpur. Regarding grain yield, across the locations, 59.88, 46.15 and 39.02% of PDI reduced the grain yield up to 52.34, 38.36 and 19.66% respectively. At Jagdalpur, the T1 treatment recorded 53.78% PDI, which reduced the grain yield up to 37.34%. There was no distinct variation between T2 and T3 treatment where the PDI was 44.89% and 43.11% respectively. Though the pathogen was not inoculated artificially in the T4 treatment 40% PDI was recorded. At Malan, the trial results revealed that PDI of 83.08% recorded the grain yield of 1040 Kg/ha; 72.46 and 65.06% recorded 1460 Kg/ha, and 2040 Kg/ha respectively as against 3100 Kg/ha in control treatment. About 66.45 % yield reduction was recorded with 83.08% PDI. At Mandya, 43.4% PDI was maintained in the T1 treatment, which resulted in a 78.03% yield reduction in the grain yield when compared to the control treatment. Similarly, 28% of PDI reduced the grain yield up to 53.01% (Table 14.2). At IIRR, 59.26, 39.26, and 26.3% PDI recorded 27.53, 22.21, and 17.89% yield reduction respectively.

Table 14.1: Experimental details of yield loss assessments of rice diseases, *Kharif*-2022

S. No	Location	Disease Recorded	Test Variety	Screening	Date of activities					
					Sowing/ Transplanting	Inoculation	Initial symptom	Spraying Date	Observation	Harvesting
1	Gangavathi	Sheath blight	GNV-10-89	Artificial	16.07.2022 25.08.2022	08.10.2022	14.10.2022	-	14.10.2022	21.12.2022
2	Jagdalpur	Leaf blast	Swarna	Artificial	25.06.2022 25.07.2022	-	12.08.2022	-	07.09.2022	25.12.2022
3	Ludhiana	Sheath blight	PR114	Artificial	10.06.2022 25.07.2022	31.08.2022	21.09.2022	-	21.09.2022	14.10.2022
4	Malan	Leaf blast	HPU 2216	Artificial	20.06.2022 21.07.2022	18.08.2022 20.08.2022 22.08.2022	-	06.09.2022 16.09.2022	25.10.2022	08.11.2022
5	Mandya	Leaf blast	MTU1001	Artificial	11.08.2022 05.09.2022	07.10.2022	12.10.2022	12.10.2022 28.10.2022	12.10.2022	03.01.2023
		Sheath blight	MTU1001	Artificial	11.08.2022 05.09.2022	07.10.2022	12.10.2022	12.10.2022 28.10.2022	12.10.2022	03.01.2023
6	Moncompu	Sheath blight	Uma	Artificial	07.06.2022 27.06.2022	27.08.2022	04.09.2022	05.09.2022	25.09.2022	22.10.2022
		Bacterial leaf blight	Uma	Artificial	12.07.2022 03.08.2022	13.09.2022	20.09.2022	21.09.2022	11.10.2022	28.11.2022
7	Maruteru	Sheath blight	Swarna (MTU 7029)	Artificial	17.06.2022 20.07.2022	12.09.2022 13.09.2022	22.09.2022	14.09.2022 02.10.2022 19.10.2022	15.10.2022	04.12.2022
		Bacterial leaf blight	MTU - 2077 (Krishnaveni)	Artificial	17.06.2022 20.07.2022	26.08.2022 27.08.2022	02.10.2022	14.09.2022 27.09.2022 10.10.2022	06.10.2022	06.12.2022
8	Pantnagar	Bacterial leaf blight	TN1	Artificial	27.06.2022 29.07.2022	22.09.2022	-	03.10.2022 13.10.2022	-	18.11.2022
9	Pattambi	Bacterial leaf blight	Jyothi	Artificial	08.07.2022 02.08.2022	06.10.2022	12.10.2022	14.10.2022	22.10.2022	06.11.2022
10	IIRR	Leaf blast	TN1	Artificial	13.06.2022 16.07.2022	22.08.2022 25.08.2022 29.08.2022	29.08.2022	29.08.2022	-	-
		Sheath blight	BPT 5204	Artificial						
		Bacterial leaf blight	TN1	Artificial		09.09.22	12.09.22	-	29.09.22	

Table 14.2: Effect of leaf blast disease severity on rice grain yield, *Kharif*-2022

T. No	Leaf Blast									Leaf Blast				
	JDP			MLN			MND			IIRR			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	PDI	% yield reduction over control
T1	53.78	1980	37.34	83.08 (65.75)	1040	66.45	43.40 (41.17)	1210	78.03	59.26 (50.32)	**3550**	**27.53**	**59.88**	**52.34**
T2	44.89	2360	25.32	72.46 (58.33)	1460	52.9	28.00 (31.87)	2589	53.01	39.26 (38.78)	**3363**	22.21	**46.15**	**38.36**
T3	43.11	2720	13.92	65.06 (53.76)	2040	34.19	21.60 (27.63)	4812	12.65	26.30 (30.82)	3133	17.89	**39.02**	**19.66**
T4	40.00	3160	0	13.06 (21.14)	3100	0	8.80 (17.19)	5509	0	11.48 (19.79)	4323	0	**18.34**	**0.00**
C.V (%)	**7.21**	**8.99**		**3.06**	**14.2**		**7.63**	**5.43**		**3.24**	**3.53**			
LSD @ 5% *(P= 0.05)*	**4.52**	**316.49**		**2.09**	**373.8**		**3.1**	**263.97**		**2.26**	**253.7**			
Transformation	NT			AT			AT			AT				

(PDI – Percent Disease Index; Figures in the parenthesis indicates Arc sine transformation)

Treatment details:

T1- Inoculum sprayed thrice at an interval of 2 days (disease intensity is more than 50%)
T2- Inoculum sprayed twice at an interval of 2 days (disease intensity is 30-50%)
T3- Inoculum sprayed once (disease intensity is below 30%)
T4- Un-inoculated + fungicide/antibiotic-treated control plot

Sheath blight: Sheath blight susceptible varieties *viz*., GNV-10-89, BPT- 5204, PR114, MTU 7029, MTU 1001 and Uma were used as a test variety at Gangavathi, IIRR, Ludhiana, Maruteru, Mandya and Moncompu respectively. In all the six locations sheath blight pathogen *R. solani* was artificially inoculated at tillering stage (45-55 DAT) to ensure a very high disease pressure. To avoid the disease occurrence at control plot propiconazole @ 1 ml/l was sprayed. At all the test locations disease severity was recorded and calculated the Percent Disease Index (PDI) for the entire plant population in a block and grain yield was measured as Kg/ha.

Across the test locations, the control treatment – T4, where no artificial inoculation of sheath blight pathogen was followed, the PDI was varied between 2.0 (IIRR) to 23.10% (Moncompu). In the treatment T1, where all the hills per square meter were inoculated, PDI was very high at Gangavathi (82.12%), Maruteru (82.67%), IIRR (75.66%), and Ludhiana (63.50%) and it was moderate at Moncompu (48.43%). The treatment - T2, where in alternate plants inoculated (50% plants) recorded high PDI at Gangavathi (62.58%) and Maruteru (61.33%) and IIRR (56.10%); moderate at Moncompu (37.77) and Ludhiana (31.37). In the T3 treatment, PDI was high at Maruteru (55.56%); moderate at Gangavathi (49.89%), IIRR (40.46%); low at Moncompu (28.66%) and Ludhiana (21.06%). Finally, in the un-inoculated treatment (T4) the natural occurrence of disease was low at Gangavathi (8.05), IIRR (2.0), and Ludhiana (0.21%) and Maruteru (0.0%) except Moncompu (23.10%). Among all the four treatments, the mean Percent Disease Index was very high (68.53%) at 100% diseased block (T1) followed by 50% diseased block (T2) (46.93%) and 33% diseased block (T3) (36.51%). The mean percent yield reduction over control (PDR) showed a yield reduction of 46.18% in 100% diseased block (T1), 31.57% in 50% diseased block (T2), 14.80% in 30% diseased block (T3) and 0% in naturally diseased block (T4). At Gangavathi, 82.12% PDI resulted in the 48.7 % yield reduction whereas at Mandya 58.8% PDI resulted in a 77.06% yield reduction. All the treatments reduced the grain yield based on the population disease severity in the respective treatments. Results from the present study revealed that increase of sheath blight severity reduced the rice grain yield in the ratio of 2:1. Sheath blight disease severity and yield loss in rice shows strong negative correlation (Table 14.3).

Table 14.3: Impact of Sheath blight disease severity on rice grain yield, *Kharif*-2022

Sheath Blight									
T. No	GNV			LUD			MND		
	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	82.12 (65.02)	3330	48.70	63.50 (52.82)	4466	37.73	58.80 (50.10)	1279	77.06
T2	62.58 (52.30)	4361	32.82	31.37 (34.04)	5254	26.74	32.40 (34.61)	2741	50.85
T3	49.89 (44.92)	5675	12.59	21.06 (27.29)	6214	13.36	23.40 (28.87)	4870	12.67
T4	8.05 (16.35)	6492	0.00	0.21 (4.42)	7172	0.00	10.80 (19.12)	5577	0.00
C.V (%)	**6.05**	**9.80**		**4.36**	**3.61**		**6.68**	**7.50**	
LSD @ 5% *(P= 0.05)*	**3.73**	**670.10**		**1.78**	**287.61**		**3.05**	**373.65**	
Transformation	**AT**			**AT**			**AT**		

(PDI- Percent disease index; Figures in the parenthesis indicates Arc sine transformed means)

(Conti.) Table 14.3: Impact of Sheath blight disease severity on rice grain yield, *Kharif*-2022

Sheath Blight											
T. No	MTU			MNC			IIRR			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 reduction over control
T1	82.67 (65.55)	3020	28.94	48.43 (44.04)	4008	33.04	75.66 (60.52)	2390	51.61	68.53	46.18
T2	61.33 (51.55)	3210	24.47	37.77 (37.87)	4511	24.62	56.10 (48.50)	3461	29.93	46.93	31.57
T3	55.56 (48.17)	3760	11.53	28.66 (32.28)	4782	20.10	40.46 (39.62)	4022	18.56	36.51	14.80
T4	0.00 (4.05)	4250	0.00	23.10 (28.36)	5985	0.00	2.00 (8.13)	4938	0.00	7.36	0.00
C.V (%)	**4.46**	**16.01**		**18.36**	**9.03**		7.71	5.45			
LSD @ 5% *(P= 0.05)*	**2.60**	**785.23**		**9.02**	**600.04**		2.67	127.52			
Transformation	**AT**			**AT**			**AT**				

(PDI – Percent Disease Index; Figures in the parenthesis indicate transformed means; AT- Arc sine transformation)

Treatment details:

T1 - Inoculation of all the plants/hills (disease intensity is more than 50%)

T2 – Inoculation of alternate plants/ hills (disease intensity is 30-50%)

T3 – Inoculation one in every three plants/hills (disease intensity is below 30%)

T3 - Un-inoculated + fungicide treated control plot

Bacterial blight: Yield loss trial on bacterial blight was conducted at five locations viz., maruteru, Moncompu, Pantnagar, pattambi and IIRR. The trial was conducted with three treatments, *viz*., artificial inoculation of *Xoo* of all the plants/hills (T1), inoculation of alternate plants/ hills (T2) and inoculation one in every three plants/ hills (T3) and uninoculated control (T4) along with 5 replications. Highly susceptible varieties *viz*., TN1 was selected at IIRR and Pantnagar, Uma at Moncompu, MTU 2077 at Maruteru and Jyothi at Pattambi to conduct the trial. In all the locations, *Xoo* was inoculated at the tillering stage and disease was recorded as percent disease index (PDI). Results revealed that across the locations, very high to high PDI recorded at Pantnagar (95.81%) followed by Pattambi (94.00%), Maruteru (75.48%), Moncompu (68.67%) and IIRR (48.29%). Though the pathogen was not inoculated in control treatment (T4), high incidence of BB was recorded at Maruteru (52.04%). Among the locations, at Pantnagar, highest yield reduction of 47.3% was recorded due to 95.81% PDI. Whereas at Moncompu, highest PDI of 68.67% resulted in the less grain yield reduction of 12.36% only. At IIRR, PDI was varied from 48.29% to 20.28% and the yield reduction was also varied from 24.14% to 20.69%. To conclude, across the locations the bacterial blight mean PDI of 76.45%, 56.64% and 45.49% resulted in the grain yield reduction of 23.26%, 16.36% and 15.84% respectively (Table 14.4).

Table 14.4: Impact of bacterial blight disease severity on grain yield - *Kharif' 2022*

Bacterial Blight									
T. No	**MTU**			**MNC**			**PNT**		
	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	75.48 (60.63)	4380	8.06	68.67 (56.08)	4635	12.36	95.81 (78.45)	3320	47.30
T2	66.34 (54.53)	4520	5.12	40.67 (39.84)	4472	15.45	76.61 (61.09)	4580	27.30
T3	55.6 (48.20)	4650	2.39	22.22 (27.86)	4317	18.37	56.12 (48.50)	5240	16.83
T4	52.04 (46.15)	4764	0.00	9.56 (17.18)	5289	0.00	11.93 (20.12)	6300	0.00
C.V (%)	**6.60**	16.16		**27.82**	**15.08**		**2.89**	**10.66**	
LSD @ 5% *(P= 0.05)*	**4.77**	1019.7		**13.51**	**972.34**		**2.07**	**713.82**	
Transformation	**AT**			**AT**			**AT**		

(PDI – Percent Disease Index; Figures in the parenthesis indicate transformed means; AT- Arc sine transformation)

(Conti.) Table 14.4: Impact of bacterial blight disease severity on grain yield - *Kharif' 2022*

Bacterial Blight								
T. No	PTB			IIRR			Mean	
	PDI	Yield (Kg/ha)	% yield reduction over control	PDI	Yield (Kg/ha)	% yield reduction over control	PDI	% yield reduction over control
T1	94.00 (76.30)	2600	24.42	48.29 (43.99)	6600	24.14	76.45	23.26
T2	78.92 (62.70)	2760	19.77	20.65 (26.94)	7467	14.18	56.64	16.36
T3	73.22 (58.83)	2720	20.93	20.28 (26.73)	6900	20.69	45.49	15.84
T4	8.61 (17.95)	3440	0.00	0 (4.05)	8700	0.00	16.43	0.00
C.V (%)	**5.98**	**6.76**		**10.83**	**16.32**			
LSD @ 5% *(P= 0.05)*	**4.45**	**268.33**		**5.50**	**2418.9**			
Transformation	**AT**			**AT**				

(PDI – Percent Disease Index; Figures in the parenthesis indicate transformed means; AT- Arc sine transformation)

Treatment details:

T1 - Inoculation of all the plants/hills (disease intensity is more than 50%)
T2 – Inoculation of alternate plants/ hills (disease intensity is 30-50%)
T3 – Inoculation one in every three plants/hills (disease intensity is below 30%)
T3 - Un-inoculated + antibiotic treated control plot

TRIAL No: 15. SPCIAL TRIAL ON SCREENING FOR FALSE SMUT RESISTANCE UNDER ARTIFICIAL SCREENING

This trial was formulated to identify the promising donors against false smut disease under artificial disease pressure. The trial was proposed at 6 locations viz., Chinsurah, Gudalur, IIRR, Ludhiana, Masodha (Faizabad) and Varanasi to screen the Advanced Variety Trials (NSN-1). However, the trial was conducted at two locations *viz*., IIRR and Gudalur.

At IIRR, 200 NSN-I entries were screened artificially. *Ustilaginoidea virens* conidial suspension (2x 10^5) was used and injection method of inoculation was adopted as described in the technical programme 2022. Data were scored in terms of number of smut balls per panicle. Among the 200 entries IET # 29421, 30066, 29284 and CO-51 recorded more than 30 smut balls per panicle. Few entries viz., IET # 30088, 30097, 29268, 29246,30020, 30022, 30000, 30006, 29358 and 29360 showed tolerance against false smut disease. However, these entries should be screened for two more seasons to confirm the tolerance. At Gudalur the NSN-1 entries (338) were screened under natural conditions. Disease was recorded in terms of Number of Hills free from smut Balls; Number of Hills with 1 smut ball; Number of Hills with 2 smut balls and Number of Hills with ≥3 smut balls. Among the tested entries, IET # 30022, 30032, 29422, 29284, 29808 and 29807 were recorded less than 3 smut balls.

TRIAL No.16: SPCIAL TRIAL ON SCREENING FOR BROWN SPOT RESISTANCE UNDER ARTIFICIAL SCREENING

The aim of this trial is to introduce/expand artificial inoculation method of screening against emerging diseases like brown spot in different centres and to identify promising cultures in Advanced Variety Trials (NSN-1) under artificial method of screening. During 2022, the trial was proposed at five centres *viz*., Chinsurah, Gudalur, Masodha, IIRR and Ludhiana; however, the trial was conducted at four centres except at Masodha.

The National Screening Nursery (NSN-1) comprised of 338 entries evaluated under artificial inoculation conditions at Chinsurah, Gudalur, IIRR and Ludhiana. The frequency distribution of disease scores and the representative location severity index (LSI) are presented in the Table 16.1A. The disease pressure was high (LSI 6-7) at IIRR (7.0), Ludhiana (6.6) and Gudalur (6.0); while it was moderate (LSI 4-6) at Chinsurah (4.2). The selection of promising entries was done based on the data of all the four locations and presented in Table 16.1B. None of the entry was found resistant (SI≤3) against brown spot disease under NSN-1 based on the selection from four locations; however, a few promising entries with low SI (<4.8) and high PI included IET# 30106, 29539, 30827, 30634, 30093, 30826, 30165, 30176, 28982, 29574, 30830, 30828, 30760, 30824, 30109 and 30178.

Table 16.1A: Location severity index(LSI) and frequency distribution of brown spot scores of NSN-1, *Kharif* 2022 under artificial inoculation condition.

Score	Location/Frequency of score (0-9)			
	CHN	**GDL**	**IIRR**	**LDN**
0	0	0	0	0
1	0	0	0	0
2	57	0	0	0
3	85	2	0	11
4	56	35	11	0
5	78	85	54	77
6	24	101	55	0
7	21	81	59	216
8	17	34	94	0
9	0	0	53	33
Total	**338**	**338**	**326**	**337**
LSI	**4.2**	**6.0**	**7.0**	**6.6**
Screening	**A**	**A**	**A**	**A**

(LSI-Location Severity Index; A-Artificial)

Table 16.1B: Promising entries with low susceptibility index (<=4.8) and high PI in NSN-1 to brown spot, *Kharif* 2022 under artificial inoculation condition

P.No.	Br.No	IET No.	Location/Frequency of score (0-9)				SI	Total	<=3*	PI (<-3)**	<=5*	PI (<-5)**
			CHN	GDL	IIRR	LDN						
55	4906	30106	2	7	5	3	**4.3**	**4**	**2**	**50**	**3**	**75**
109	4804	29539	2	7	5	3	**4.3**	**4**	**2**	**50**	**3**	**75**
292	4318	30827	3	4	5	5	**4.3**	**4**	**1**	**25**	**4**	**100**
296	3528	30634	3	5	4	5	**4.3**	**4**	**1**	**25**	**4**	**100**
59	4910	30093	2	6	4	5	**4.3**	**4**	**1**	**25**	**3**	**75**
290	4316	30826	3	5	5	5	**4.5**	**4**	**1**	**25**	**4**	**100**
278	5309	30165	2	5	6	5	**4.5**	**4**	**1**	**25**	**3**	**75**
274	5305	30176	4	5	4	5	**4.5**	**4**	**0**	**0**	**4**	**100**
103	3714	28982	2	5	-	7	**4.7**	**3**	**1**	**33**	**2**	**67**
256	6004	29574	3	5	6	5	**4.8**	**4**	**1**	**25**	**3**	**75**
283	5315	30830	3	5	6	5	**4.8**	**4**	**1**	**25**	**3**	**75**
293	4319	30828	3	5	6	5	**4.8**	**4**	**1**	**25**	**3**	**75**
251	5820	30760	2	6	6	5	**4.8**	**4**	**1**	**25**	**2**	**50**
287	4313	30824	2	6	6	5	**4.8**	**4**	**1**	**25**	**2**	**50**
70	4921	30109	4	5	5	5	**4.8**	**4**	**0**	**0**	**4**	**100**
273	5304	30178	5	4	5	5	**4.8**	**4**	**0**	**0**	**4**	**100**
333	Co-39		3	8	8	7	**6.5**	**4**	**1**	**25**	**1**	**25**
329	Vikramarya		7	5	8	7	**6.8**	**4**	**0**	**0**	**1**	**25**
LSI			**4.2**	**6.0**	**7.0**	**6.6**						

(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)

Annexure I

Weather conditions at test locations where Plant Pathology Coordinated Trials were conducted, *Kharif*-2022

S. No	Location/ Details		Weather data from May-2022 to January-2023								
1	**Aduthurai**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		32.0	23.0	77.5	124.0	109.3	179.8	184.2	153.4	6.8
	Rainfall (mm)		4	3	4	5	7	7	10	7	1
	Temp. (ºC)	Maximum	35.6	35.9	35.0	35.0	34.6	32.4	30.1	29.7	29.8
		Minimum	23.3	23.0	22.4	21.9	22.0	21.6	20.2	22.0	19.9
	RH (%)	Morning	86.0	84.3	86.3	89.2	87.8	92.5	94.8	92.9	94.8
		Evening	60.0	59.4	61.5	64.0	63.6	71.2	79.0	77.9	68.2
2	**Almora**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Weather data not available										
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.)		13	11	12	18	15	6	0	0	-
	Rainfall (mm)		13.23	101.09	44.9	98.7	135.5	54	0	0	-
	Temp. (ºC)	Maximum	35.72	35.45	32.15	33.23	34.32	32.06	30.16	29.18	-
		Minimum	24.19	25.2	28.27	27.19	27.77	25.35	19.32	14.27	-
	RH (%)	Morning	72.16	76.76	75.79	80.67	77.63	77.87	63.65	57.84	-
		Evening	-	-	-	-	-	-	-	-	-
5	**Chatha**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		-	4	15	8	9	2	3	1	-
	Rainfall (mm)		-	91.8	460.4	339	137.6	48.2	24.8	9.6	-
	Temp. (ºC)	Maximum	-	38.9	33.5	34.1	33.4	31.2	25.8	21	-
		Minimum	-	24.3	25.8	26	23.6	17.3	10	5.7	-
	RH (%)	Morning	-	56	88	85	88	85	90	93	-
		Evening	-	33	72	67	62	48	48	53	-
6	**Chinsurah**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		11	17	22	18	11	6	Nil	-	-
	Rainfall (mm)		133.1	194	200	255.8	235.9	67.1	Nil	-	-
	Temp. (ºC)	Maximum	33.92	35.1	34.71	33.92	33.78	32.3	29.52	-	-
		Minimum	23.35	24.58	24.48	24.15	23.6	21.22	13.7	-	-
7	**Chiplima**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		4	4	14	16	8	6	0	0	-
	Rainfall (mm)		64.6	51.6	444.4	344.4	257.6	68.4	0	0	-
	Temp. (ºC)	Maximum	38.4	38.3	32	32.1	33.2	31.9	30.1	29.2	-
		Minimum	25.1	25.9	25.2	24.9	24.6	21.1	14.8	12	-
	RH (%)	Morning	77.8	90.9	92.2	92.4	92	89.5	90.2	92	-
		Evening	48.5	85.6	79.1	88.7	82	68.9	57.9	47.2	-
8	**Coimbatore**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		3	1	13	7	2	8	7	6	-
	Rainfall (mm)		0.61	0.32	2.8	4.23	1.08	3	4.6	3.32	-

S. No	Location/ Details		Weather data from May-2022 to January-2023								
	Temp. (ºC)	Maximum	32.97	32.98	30.09	30.49	31.24	30.62	29.35	28.93	-
		Minimum	23.87	23.71	23.09	22.98	22.57	22.4	21.79	20.64	-
	RH (%)	Morning	81.65	81.23	83.06	84.42	76.61	84.97	85.63	85.03	-
		Evening	55.58	51.07	61.35	61.13	54.43	57.61	58.1	53.39	-
9	**Cuttack**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		-	7	21	20	10	7	0	0	-
	Rainfall (mm)		-	105	415.7	297.5	175.8	177.1	0	0	-
	Temp. (ºC)	Maximum	-	35.5	31.7	32	32.2	31	30.4	28.9	-
		Minimum	-	27.6	26.5	26.4	26.5	24.6	19.9	16.7	-
	RH (%)	Morning	-	92	95.3	94.2	94.3	94.6	91.6	90.6	-
		Evening	-	59.9	80	74.8	72.7	69.9	53	50.2	-
10	**Faizabad (Masodha)**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		-	2.0	8.0	9.0	10.0	5.0	0.0	-	-
	Rainfall (mm)		-	34.8	152.9	127.4	203.4	212.0	0.0	-	-
	Temp. (ºC)	Maximum	-	39.6	34.9	33.1	32.7	30.8	28.2	-	-
		Minimum	-	28.0	26.4	25.6	24.7	19.2	12.4	-	-
	RH (%)	Morning	-	74.2	80.0	90.5	90.2	87.3	81.9	-	-
		Evening	-	45.7	64.2	73.9	73.1	69.8	59.4	-	-
11	**Gangavati**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		7.00	13.00	20.00	15.00	16.00	11.00	1.00	4.00	-
	Rainfall (mm)		2.11	1.95	2.73	4.71	4.07	3.53	0.18	1.29	-
	Temp. (ºC)	Maximum	36.24	34.45	30.93	30.75	30.77	31.09	30.31	30.31	-
		Minimum	25.07	24.27	23.69	23.45	22.86	21.22	18.27	18.21	-
	RH (%)	Morning	87.19	90.00	95.23	95.16	98.70	99.71	18.27	98.23	-
		Evening	38.26	44.17	60.77	64.26	65.20	99.71	45.80	43.19	-
12	**Gerua**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Weather data not available										
13	**Ghaghraghat**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		2	3	6	6	10	7	Nil	Nil	-
	Rainfall (mm)		19	32.2	150.6	131.8	270.5	318.8	Nil	Nil	-
	Temp. (ºC)	Maximum	41.87	38.93	34.23	32.83	31.43	29.32	28.0	22.87	-
		Minimum	25.43	27.6	25.71	26.94	26.03	22.35	15.63	9.16	-
14	**Gorakhpur**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Weather data not available										
15	**Gudalur**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		16	18	23	22	14	21	7	2	-
	Rainfall (mm)		352	828	720	610	286	226	31	18	-
	Temp. (ºC)	Maximum	28.2	23	21.9	22.3	25.7	26	25.6	25.2	-
		Minimum	18.7	16.8	17	16.8	17.2	16.5	15.1	14.3	-
	RH (%)	Morning	92.8	98.1	98.3	99.7	95.3	93.6	91.2	88,7	-
		Evening	81	91.3	92.5	92.1	78.5	74.7	68.2	62.2	-

S. No	Location/ Details		Weather data from May-2022 to January-2023								
16	**Hazaribagh**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Weather data not available										
17	**IIRR**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		-	18	27	17	21	17	0	3	0
	Rainfall (mm)		-	62.52	195.69	34.40	129.38	66.75	0.00	16.50	0.00
	Temp. (ºC)	Maximum	-	31.08	25.88	26.06	26.37	24.35	22.97	22.82	21.78
		Minimum	-	23.94	21.51	22.45	22.30	19.78	17.87	18.07	15.89
	RH (%)	Morning	-	86	92	89	90	89	83	89	84.9
		Evening	-	51	73	67	70	59	42	45	38.2
18	**Imphal**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		18	13	10	11	8	8	1	1	0
	Rainfall (mm)		382.9	286.2	148.4	94.8	98.6	146.3	5.4	18.8	0
	Temp. (ºC)	Maximum	27.8	28.7	31	30	30.5	28.9	27.2	23.7	23.6
		Minimum	20	22	22.9	22.4	23.9	18.6	11.9	8.9	5.5
	RH (%)	Morning	87.9	87.6	80.9	87.1	88.3	88.1	90.8	95.3	92.5
		Evening	68.5	69.6	63.5	66.5	62.4	59.3	44.3	47.7	35.3
19	**Jagadalpur**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		4	7	25	20	14	7	0	0	0
	Rainfall (mm)		84.1	144.8	582.4	679.9	452.4	88.8	0.0	0.0	0.0
	Temp. (ºC)	Maximum	36.1	33.5	28.1	29.3	29.9	29.6	28.9	29.7	29.6
		Minimum	23.2	23.2	22.0	21.8	21.7	18.7	12.9	12.5	10.8
	RH (%)	Morning	74.8	74.8	92.7	92.6	92.6	91.9	88.9	89.2	87
		Evening	43.7	43.7	79.5	74.6	71.7	60.3	40.3	38.9	32
20	**Jagtial**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		4.00	5.00	23.00	11.00	10.00	4.00	0.00	0.00	-
	Rainfall (mm)		48.40	202.00	914.20	164.60	231.90	28.40	0.00	0.00	-
	Temp. (ºC)	Maximum	39.58	36.59	29.53	31.78	31.05	31.58	31.21	12.70	-
		Minimum	25.83	25.22	22.78	23.88	22.84	20.11	14.79	6.79	-
	RH (%)	Morning	71.68	76.97	91.71	86.77	90.97	90.39	85.30	36.16	-
		Evening	44.81	47.53	76.77	71.29	75.57	62.16	36.67	18.19	-
21	**Karaikal**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		2	1	5	8	7	8	14	12	2
	Rainfall (mm)		21	10.8	57.6	160.5	130.4	164.5	419.6	214.3	21
	Temp. (ºC)	Maximum	36.6	36.7	35.8	34.4	34.6	32.2	30	29.3	36.6
		Minimum	26.5	26.6	26.2	25.3	25.4	24.9	23.2	23	26.5
	RH (%)	Morning	79	75	78	82	84	89	92	92	79
		Evening	52	47	50	58	57	66	72	75	52
22	**Karjat**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		0	13	28	24	23	10	0	-	-
	Rainfall (mm)		0	191.4	2023.6	713.4	660.2	165.6	0	-	-
	Temp. (ºC)	Maximum	42.4	39	33.5	33.8	34	34.8	35.2	-	-
		Minimum	22.8	22.8	17.4	21.8	19.6	16.2	14.2	-	-

S. No	Location/ Details		Weather data from May-2022 to January-2023								
	RH (%)	Morning	78.1	91.3	91.5	92.2	90.8	90	88.5	-	-
		Evening	44.9	78.4	83.2	78.5	82.1	57	47	-	-
23	**Kaul**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		3	3	8	1	6	2	0	0	NA
	Rainfall (mm)		71.9	27.9	287.8	31.7	243.1	8.9	0	0	NA
	Temp. (ºC)	Maximum	44.5	44.7	37	35.5	35.5	34	31.5	26	NA
		Minimum	18.5	21	23.8	24.5	21.5	13.2	6	5.2	NA
	RH (%)	Morning	83	83	91	93	96	94	94	96	NA
		Evening	83	67	83	73	75	56	52	64	NA
24	**Khudwani**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		9	7	15	9	6	2	8	-	-
	Rainfall (mm)		65.8	104.6	177.8	82	20	40	98.6	-	-
	Temp. (ºC)	Maximum	25.63	27.26	28.88	28.96	28.7	22.6	13.72	-	-
		Minimum	10.55	13.33	18.83	17.38	13.15	5.19	1.8	-	-
	RH (%)	Morning	72.19	71.2	83.48	83.77	78.73	86.29	92.28	-	-
		Evening	48.87	61.35	61.54	61.48	47.1	53.61	74.56	-	-
25	**Lonavala**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		0	8	26	30	23	9	2	1	-
	Rainfall (mm)		0	203.1	2513.3	1528.5	771.1	190.8	23.6	9.2	-
	Temp. (ºC)	Maximum	37.46	31.125	26.275	27.42	28.6	27.625	30.12	30.475	-
		Minimum	20.62	19.55	18	18.16	15.975	17.85	11.14	11.5	-
	RH (%)	Morning	83.7	89.425	90.775	92.38	91.55	93.975	76.5	63.6	-
		Evening	78.6	84.35	91	82.24	86.5	84.8	61.98	62.325	-
26	**Ludhiana**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		2	4	10	5	4	2	0	-	-
	Rainfall (mm)		25.6	70.6	323.8	59.2	125.7	5.4	0	-	-
	Temp. (ºC)	Maximum	39.2	38.7	33.5	33.9	30.1	31.3	26.8	-	-
		Minimum	26.1	27	27.3	27.3	23	18.8	12.2	-	-
	RH (%)	Morning	51	59	81	81	95	87	89	-	-
		Evening	27	36	66	63	69	43	36	-	-
27	**Malan**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		-	6	12	9	14	1	0	-	-
	Rainfall (mm)		-	230.8	486.1	260.6	179.6	8.4	0	-	-
	Temp. (ºC)	Maximum	-	32.4	30.1	28.6	27.4	25.2	26.6	-	-
		Minimum	-	18	20.1	21.4	20	14.9	13.9	-	-
	RH (%)	Morning	-	81.6	78.4	77.7	75.5	76.5	76.1	-	-
		Evening	-	74.4	72.4	71.7	68.5	71.1	70.6	-	-
28	**Mandya**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		16	6	10	13	6	12	2	3	-
	Rainfall (mm)		285.3	234.5	149	447.1	102.4	371.4	11	30.4	-
	Temp. (ºC)	Maximum	30.5	31.2	28.5	29	29.9	29.7	20.5	29.2	-
		Minimum	21.1	20.8	18.2	19.6	19.7	19.4	14.1	16.8	-

S. No	Location/ Details		Weather data from May-2022 to January-2023								
	RH (%)	Morning	89.2	89	88.1	88.7	89	90	93	103	-
		Evening	65.8	61	72.8	66.4	69	68	77	62.2	-
29	**Maruteru**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		-	10	14	11	14	12	4	2	-
	Rainfall (mm)		-	163.5	226.6	158.8	205.4	224.2	34.6	68.8	-
	Temp. (ºC)	Maximum	-	34.95	30.4	31.65	31.4	31.26	29.83	29.26	-
		Minimum	-	27.65	26.9	27.02	26.57	26.29	22.93	21.23	-
	RH (%)	Morning	-	84.63	77.29	89.16	86.4	83.4	82.5	88.81	-
		Evening	-	52.52	55.48	73.84	74.5	78.3	52.7	58.71	-
30	**Moncompu**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		15	16	17	16	14	15	10	5	-
	Rainfall (mm)		416.3	430.2	237.5	510.8	134.6	212.3	286.6	165.2	-
	Temp. (ºC)	Maximum	32.27	31.88	30.39	30.19	31.35	32.07	32.9	32.66	-
		Minimum	25.09	24.44	24.23	23.99	24.81	24.3	24.18	23.7	-
	RH (%)	Morning	83.548	83.366	84.096	86.193	78.366	79.02	86.76	86.34	-
		Evening	75.483	82.166	84.967	82.516	85.133	77.9	87.1	87.68	-
31	**Mugad**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		3.00	9.00	19.00	15.00	10.00	7.00	1.00	-	-
	Rainfall (mm)		111.00	102.40	404.40	155.00	169.00	154.60	5.40	2.00	-
	Temp. (ºC)	Maximum	32.10	29.90	26.60	27.40	28.70	28.90	29.60	29.60	-
		Minimum	21.40	21.40	20.50	20.30	20.00	18.60	16.50	15.50	-
	RH (%)	Morning	84.00	85.70	91.70	90.70	89.80	85.60	72.80	76.90	-
		Evening	61.50	76.50	82.50	82.40	74.20	67.80	45.60	44.30	-
32	**Navsari**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		0	11	20	16	15	3	0	0	-
	Rainfall (mm)		0	164	995	527	660	74	0	0	-
	Temp. (ºC)	Maximum	34.9	33.3	29.4	30.07	31.04	33.6	33.7	29.3	-
		Minimum	26.8	25.5	24.3	24	23.7	21.3	16.9	15.6	-
	RH (%)	Morning	85	91	96	93	96	87	82	76	-
		Evening	62	68	87	78	75	58	33	36	-
33	**Nawagam**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		0	2	26	12	3	2	0	0	-
	Rainfall (mm)		0	48.0	677.6	207.0	95.4	35.7	0	0	-
	Temp. (ºC)	Maximum	42.1	39.5	32.2	31.8	33.3	34	32.6	30.4	-
		Minimum	25.8	26.5	25.7	25.6	25	20.8	20.8	15	-
	RH (%)	Morning	73	80	90	87	90	84	79	78	-
		Evening	34	51	76	84	78	53	55	58	-
34	**Nellore**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		4	3	9	4	4	5	12	5	4
	Rainfall (mm)		65.2	74.5	201.8	125.1	36.8	38.6	439.2	246	94.8
	Temp. (ºC)	Maximum	34.4	35.3	31.7	32.7	32.4	30.5	27.6	27.7	26.4
		Minimum	23.9	27.8	25.3	25.5	24.7	23.8	21.8	21.4	21.7

S. No	Location/ Details		Weather data from May-2022 to January-2023								
	RH (%)	Morning	67.5	63.7	74.9	73.9	73.2	75.8	85.3	87.9	84.6
		Evening	58.2	53.2	62.6	60.9	60.4	69.3	75.7	80.5	74.1
35	**New Delhi**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		5	2	13	8	9	3	0	0	-
	Rainfall (mm)		1.9	3	10.5	2.6	6.3	4.35	0	0	-
	Temp. (ºC)	Maximum	39.8	40.4	35.1	34.1	31.6	31.6	28.05	22.4	-
		Minimum	24.8	26	26.1	25.5	24.5	19.96	14.38	16.69	-
	RH (%)	Morning	73.6	60.4	81.4	80.7	84.3	89.06	88.8	102.38	-
		Evening	36.1	40.4	69.1	67.6	69.6	55.48	46.2	46.61	-
36	**Pantnagar**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		5	4	9	10	11	6	0	0	-
	Rainfall (mm)		45.5	104.8	174.8	182.1	401.9	294.3	0	0	-
	Temp. (ºC)	Maximum	35.7	37.8	33.5	33.5	31.6	29.8	27.3	22.7	-
		Minimum	23.8	26.1	27.1	26	24.2	18.3	12.1	7.1	-
	RH (%)	Morning	66	71	82	87	89	88	90	93	-
		Evening	40	41	66	67	69	55	46	52	-
37	**Patna**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Weather data not available										
38	**Pattambi**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		16	18	19	14	10	9	5	5	-
	Rainfall (mm)		320.9	231.9	631.4	408	231.5	92.1	43.1	71.8	-
	Temp. (ºC)	Maximum	30.5	30.7	29.3	29.9	30.6	31.8	31.8	31.7	-
		Minimum	22.7	22.8	22.9	21.8	22.2	22.3	21.8	20.5	-
	RH (%)	Morning	91	94	94	94	91	90	91	91	-
		Evening	71	70	75	75	71	60.5	62	56	-
39	**Ponnampet**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		17.0	13.0	24.0	21.0	13.0	10.0	0.0	0.0	22.2
	Rainfall (mm)		345.1	219.3	988.4	836.6	339.4	134.9	0.0	0.0	1.0
40	**Pusa**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		8	6	11	11	16	7	0	0	-
	Rainfall (mm)		126	2.5	205.3	162.5	167.6	64.3	0	0	-
	Temp. (ºC)	Maximum	33.6	34.6	34.5	33.6	32.6	32.1	29.3	24	-
		Minimum	23	25.2	25.9	25.1	24.6	20.5	14.1	9.9	-
	RH (%)	Morning	86	88	87	91	94	95	96	99	-
		Evening	61	66	68	73	77	63	48	59	-
41	**Raipur**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		-	-	-	-	-	-	-	-	-
	Rainfall (mm)		-	2.3	11.3	14.1	5.8	1.9	0	-	-
	Temp. (ºC)	Maximum	-	39.27	31.6	31.4	31.5	31.2	29.9	-	-
		Minimum	-	26.8	25.3	25	24.7	21.5	13.82	-	-
	RH (%)	Morning	-	66.9	90.1	90.3	90	89	86.4	-	-
		Evening	-	39.1	74.8	70	71	55	32.93	-	-

S. No	Location/ Details		Weather data from May-2022 to January-2023								
42	**Rajendranagar**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		-	5	19	9	12	10	0	0	0
	Rainfall (mm)		-	87.6	368.8	92.4	228.0	171.8	0.0	3.6	0.0
	Temp. (ºC)	Maximum	-	35.4	28.7	30.0	30.0	29.6	29.4	29.2	30.0
		Minimum	-	24.7	22.5	22.9	22.5	19.8	15.9	15.9	14.1
	RH (%)	Morning	-	86	92	89	90	89	83	89	84.9
		Evening	-	51	73	67	70	59	42	45	38.2
43	**Ranchi**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		4	6	16	19	17	4.0	0	0	0
	Rainfall (mm)		36.5	99.0	280.8	790.8	528.6	83.0	0.0	0.0	0.0
	Temp. (ºC)	Maximum	36.6	36.7	33.0	32.7	33.3	30.6	26.9	24.9	-
		Minimum	24.8	25.9	24.0	24.1	24.7	20.9	9.2	5.7	-
	RH (%)	Morning	86.2	86.6	85.8	85.6	85.9	85.4	86.2	86.7	-
		Evening	69.5	69.5	69.6	66.9	69.9	69.8	69.4	69.2	-
44	**Rewa**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		-	8	14	18	9	4	0	-	-
	Rainfall (mm)		-	69.4	216.6	339.8	86.8	122.4	0	-	-
	Temp. (ºC)	Maximum	-	39.42	34.56	32.2	32.47	31.83	29.5	-	-
		Minimum	-	26.61	25.65	24.87	24.33	18.88	12.62	-	-
	RH (%)	Morning	-	57.27	77.71	87.55	86.63	86.06	80.27	-	-
		Evening	-	38.13	59.81	69.94	71.3	57.58	39.53	-	-
45	**Sabour**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		5	8	9	10	9	6	0	0	-
	Rainfall (mm)		68.6	161	43.6	77	48.4	134	0	0	-
	Temp. (ºC)	Maximum	35.4	35.8	36	33.7	32.7	31.8	29.6	24.9	-
		Minimum	23.5	25.3	26.1	25.9	25.4	21.4	13.6	9	-
	RH (%)	Morning	82.3	84.9	85	87.2	89.8	92.5	95.5	96.1	-
		Evening	-	-	-	-	-	-	-	-	
46	**Titabar**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		12	19	22	14	13	15	Nil	1	-
	Rainfall (mm)		2.5	7.8	10.6	6.6	4.7	7	Nil	0.2	-
	Temp. (ºC)	Maximum	31	28.3	34.2	34	33.2	31.1	29.1	27.2	-
		Minimum	20	24.8	23.6	23.8	22.5	19.5	12.1	10.1	-
	RH (%)	Morning	94.6	93.4	92.1	91.9	94.8	94.6	93.6	94.3	-
		Evening	74.5	78.7	71.1	68.4	69.9	72.4	57.9	60.4	-
47	**Umiam**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		25	24	19	17	20	9	2	1	0
	Rainfall (mm)		499.2	446.1	278.2	253.6	241.1	313.6	30.4	5	0
	Temp. (ºC)	Maximum	25.2	26.4	28.9	28.9	27.7	26.1	25	22.1	21.3

S. No	Location/ Details		Weather data from May-2022 to January-2023								
		Minimum	17.6	19.7	20.8	20.8	19.5	16.2	11.4	8.4	6.6
	RH (%)	Morning	83.9	91.7	90	89.9	88.3	89.2	82.7	88.4	86.6
		Evening	85.8	90.1	86.3	85.4	88.3	80	62.5	67.2	60.5
48	**Upper Shillong**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		19	23	20	16	20	11	-	-	-
	Rainfall (mm)		626	1129	189.8	212.8	220.6	281.8	-	-	-
	Temp. (ºC)	Maximum	23.96	24.11	26.08	27.14	25.36	24.2	-	-	-
		Minimum	14.68	15.28	15.88	15.61	14.65	10	-	-	-
	RH (%)	Morning	97.97	98.87	98.01	98.48	98.73	78.71	-	-	-
		Evening	46.57	72.63	61.38	61.17	61.08	48.29	-	-	-
49	**Varanasi**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		-	-	-	-	-	-	-	-	-
	Rainfall (mm)		-	347.2	410.8	297.4	227.4	27.4	0	0.2	-
	Temp. (ºC)	Maximum	-	42.9	35.9	37.9	31.6	32	26.9	23.4	-
		Minimum	-	22.5	23.2	22.5	21.5	15.4	9	7.4	-
	RH (%)	Morning	-	86	89	91	92	94	95	94	-
		Evening	-	30	53	67	76	46	40	44	-
50	**Wangbal**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Weather data not available										
51	**Warangal**		**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
	Rainy days (No.)		-	8	21	15	8	7	0	0	-
	Rainfall (mm)		-	186	444.8	397.3	184.8	93.6	0	0	-
	Temp. (ºC)	Maximum	-	33	29.8	31.1	33	30.4	30.2	30.9	-
		Minimum	-	26.5	22.8	24.2	23.9	21.5	17.4	18.2	-
	RH (%)	Morning	-	73.4	91.6	88.8	92	91.2	86.2	87.4	-
		Evening	-	55.4	77.5	71.3	76.3	68.1	50.6	49.7	-

Annexure - II

Details on the locations where Coordinated Pathology Screening trials were conducted during, *Kharif* 2022-2023

S. No.	Location	Latitude (North)	Longitude (East)	Elevation (m. from MSL)	Ecosystem	Sowing (Year, 2022)	Fertilizer Basal - NPK (Kg/ha)	Fertilizer top dressing (Kg/ha)
1	**Aduthurai**	11º N	79 º E	19.5 m	Irrigated	27-09-2022	37.5:50:25	112.5:0:25 (NPK)
2	**Almora**	29º36'N	79º40'E	1250 m	Upland	06-07-2022 LB 13-07-2022 BS	60:60:40 20:60:40	20 + 20 N (30 DAT & 60 DAT)
3	**Bankura**	23º24' N	87º05'E	84 m	Upland (Rainfed) Rainfed Shallow lowland Upland (Irrigated – Boro only)	18-07-2022 LB,BS,SHB,SHR	10:26:26 18Kg+SSP 9Kg+Urea 10Kg	1st top dressing at 21 DAT urea10Kg and 2nd top dressing at 42 DAT urea 10 Kg
4	**Chatha**	32º40'N	74º18'E	293 m	Irrigated	26-06-2022	40:60:30	40+40 N (1st and 2nd top dressing)
5	**Chinsurah**	22º52'N	88º24'E	8.62 m	Irrigated	27-06-2022	60:50:30	60
6	**Chiplima**	20º21'N	80º55'E	178.8 m	Irrigated	18-07-2022	120:40:40 60:40:20	30:0:20 NPK (tillering stage) 30:0:0 NPK (PI stage)
7	**Coimbatore**	11º N	77ºE	409 m	Irrigated and Potted plants	17 & 18-11-2022 BL, 27-07-2022 ShB, ShR, BLB	-	Urea 25kg for entire uniform blast nursery bed; 10g/pot (RTD)
8	**Cuttack**	20º23'N	85º 17'E	36 m	Irrigated Shallow lowland	24-06-2022 ShR 22-07-2022 BL & BLB 17-07-2022 ShB	100:40:40; 50 120 40	Twice @ 25 kg Nitrogen - 20N
9	**Faizabad (Masodha)**	26º47'N	82º47'E	113 m	Irrigated	26-06-2022	ShB- 120:60:60 BLB-150:60:60	ShB-60, BLB-75 N & 25 $ZnSo_4$
10	**Gangavati**	15º43'N	76º53'E	406 m	Irrigated	11-10-2022 LB 11-10-2022 BS 07-07-2022 ShB & BLB	250:75:75-Blast, ShB & BLB 50:75:75- BS	-
11	**Gerua**	26º14'N	91º33'E	49 m	Rainfed lowland	-	-	-
12	**Ghaghraghat**	27°50'N	81°20'E	112m	Irrigated	21/7/2022	-	-
13	**Gudalur**	11°30'N	76°30'E	950 m	Irrigated	02-08-2022	-	Urea 15kg for entire uniform Blast nursery bed
14	**Hazaribagh**	23° 95'91'' N	85° 37'20'' E	614 m	Upland	-	-	-
15	**IIRR**	17°19'N	78°23'E	542m	Irrigated	13-06-2022	45:60:40	135N
16	**Imphal**	24º45' N	93º54' E	774 m	Rainfed lowland			
17	**Jagadalpur**	19°05' N	81º57'E	556 m	Upland / Rainfed	22-07-2022	60:60:60	30:30 (N:N)
18	**Jagtial**	18°831'N	78°96'E	264m	Irrigated	24-07-2022 BLB 12-11-2022 BL	120 Nitrogen 40	40+40
19	**Karaikal**	10º55' N	79º52'E	4	Irrigated	14-09-2022	150:50:50:25Zn 75:50:50:25Zn	75N
20	**Karjat**	18º55' N	73º15'E	51.7 m	Rainfed lowland	29-06-2022 BLB & ShR 27-07-2022 BL	-	70 N
21	**Kaul**	29º51'N	76º39'E	230.7 m	Irrigated	16-06-2022 BL 26-06-2022 SHB	50:0:60	100 N
22	**Khudwani**	33.73ºN	75.15ºE	1601 m	Irrigated	06-08-2022	60:60:30	60 N
23	**Lonavala**	18.9ºN	73.5ºE	622m	Rainfed lowland	25-07-2022 28-08-2022 in UBN	60:50:50	60 N
24	**Ludhiana**	30º90'N	75º 85'E	262 m	Irrigated	21-06-2022	Urea 37kg / Acre	Urea 74kg / Acre
25	**Malan**	32º1'N	76º2'E	950 m	Upland	10-08-2022 BL 20-06-2022 NB	120:40:40 60:40:40	60 N

S. No.	Location	Latitude (North)	Longitude (East)	Elevation (m. from MSL)	Ecosystem	Sowing (Year, 2022)	Fertilizer Basal - NPK (Kg/ha)	Fertilizer top dressing (Kg/ha)
26	**Mandya**	12°36'N	76°15'E	694.65 m	Irrigated	28-10-2022 BL 09-09-2022 ShB 09-09-2022 NB	200:50:50 100:50:50	50:0:0 (15 DAT) 50:0:0 (30 DAT)
27	**Maruteru**	16°38'N	81°44'E	5m	Irrigated	01-07-2022	150:40:40 50:40:20	50:0:0 (NPK) 50:0:20
28	**Moncompu**	$9^0$51'N	76°5'E	Below MSL	Irrigated	28-06-2022	90:45:45 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 down lowland	22-06-2022	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°52'E	10 m	Irrigated	16-07-2022	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	20-07-2022	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/Irrigated	26-10-2022	15:60:40 75:60:20 20 kg/acre-Zn	37.5+ 37.5 0 20 (30DAT & 60DAT)
33	**New Delhi**	28° 08'N	77°12'E	216 m	Irrigated	20-06-2022 BLB 22-06-2022 ShB 03-08-2022 BL	60:60:40 20:60:40	20+20 N (30DAT & 60DAT)
34	**Pantnagar**	29°N	$79^0$30`E	343.84 m	Irrigated	22-06-2022	60:60:40-25Kg (ZnSO4)	60N
35	**Patna**	25°13N	84°14E	77m	Irrigated	23-06-2022	120:60:40 NPK kg/ha	-
36	**Pattambi**	10°48'N	76°12'E	25.35 m	Upland Rainfed lowland	28-06-2022 BL 05-07-2022 ShB & BLB	120:30:30 80:30:15	40:0:15
37	**Ponnampet**	12°29'N	75°56'E	856 m	Rainfed lowland	12-09-2022 UBN 25-07-2022 Field	75:75:90 37.5:75:45	37.5:0:45
38	**Pusa**	25°98'N	85°67'E	51.8 m	Irrigated	22-06-2022	80:40:20	20+20 N
39	**Raipur**	21° 16'N	81°36'E	681 m	Irrigated	07-02-2022	120 60	60N as a spray in two split doses
40	**Rajendranagar**	17° 19'N	78°23'E	542 m	Irrigated	08-11-2022 BL 15-07-2022 NB 01-07-2022 ShR	45:60:40 2.5 N for UBN	155 N (Kg/ha) in equal splits for three times and spraying of Urea solution (0.5%) 2 days prior to the inoculation of blast pathogen; Remaining 2.5 kg of N was applied 15-20 DAS for UBN. Zn deficiency was noticed and sprayed ZnSo4 @ 2 g per liter.
41	**Ranchi**	23° 17'N	85° 19'E	625m	Upland	29-07-2022 (direct sown)	60:30:20 30:30:20	15+15 N
42	**Rewa**	24°30'N	81°15'E	360 m	Upland Irrigated	02-08-2022	80:60:40 60	-
43	**Sabour**	25°23'N	87°07'E	37.19 m	Rainfed lowland	27-06-2022	40:40:20	20+20 N
44	**Titabar**	26°35'N	92°10' E	99 m	Irrigated	30-06-2022	60:20:40 30:20:40	15+15 N
45	**Umiam (Barapani)**	25°68' N	91°93' E	1060m	Rainfed		-	-
46	**Upper Shillong**	25° 31'03" N	91° 47' 89" E	1708 m	Rainfed	19-07-2022	120:40:40 60:40:40	-
47	**Varanasi**	25°20' N	23°03'E°	75.7 m	Irrigated	23-06-2022	180:60:60 120:60:60	15+15 N
48	**Wangbal**	24°8'N	94'E	781 m	Rainfed lowland	25-07-2022	-	-
49	**Warangal**	18°01' N	79°60' E	9.4m	Irrigated	28-06-2022	18:60:40 30:60:40	50+50+50 N

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	GSN	Germplasm Screening Nursery
Gerua	GER	IC No.	Indigenous collection Number
Ghaghraghat	GGT	IET No.	Initial Evaluation Trail Number
Gudalur	GDL	IVTs	Initial variety trails
Hazaribagh	HZB	LB	Leaf blast
Imphal	IMP	LSD	Least significant difference
Indian Institute of Rice Research	IIRR	LSI	Location Severity Index
Jagadalpur	JDP	MSL	Mean sea level
Jagtial	JGT	N	Natural Infection
Karjat	KJT	NB	Neck blast
Kaul	KUL	NdB	Node blast
Kudhwani	KHD	NHSN	National Hybrid Screening Nursery
Lonavala	LNV	NSN-1	National Screening Nursery 1
Ludhiana	LDN	NSN -2	National Screening Nursery 2
Malan	MLN	NSN-H	National Screening Nursery- Hills
Mandya	MND	PI	Promising index
Maruteru	MTU	RTD	Rice Tungro Disease
Masodha (Faizabad)	MSD	RTV	Rice Tungro Virus
Moncompu	MNC	SE	Standard error
Mugad	MGD	ShB	Sheath blight
Navsari	NVS	ShR	Sheath rot
Nawagam	NWG	SI	Susceptibility Index
Nellore	NLR	StR	Stem rot
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-2022 report was compiled by the following scientists of Department of Plant Pathology, ICAR-IIRR, Hyderabad.

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