वार्षिक प्रतिवेदन
Annual Report
2025









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ICAR

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ICAR-Indian Institute of Rice Research

Rajendranagar, Hyderabad - 500 030

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Preface



It gives me immense pleasure to present the Annual Report of the ICAR-Indian Institute of Rice Research (ICAR-IIRR) for the year 2025. This annual report encapsulates our institute's continued commitment to advancing rice science and developing resilient, high-yielding, and sustainable rice production systems to meet the emerging challenges of food and nutritional security in India and beyond. During the year 2025, ICAR-IIRR made significant strides in strategic research, technology development, and knowledge dissemination. The institute continued to play a pivotal role in national coordination through the All India Coordinated Research Project on Rice (AICRPR), strengthening varietal evaluation, multi-location testing, and capacity building across the country.

A defining milestone of the year was the historic unveiling of India's first genome-edited rice variety, DRR Dhan 100 (Kamala), by the Hon'ble Union Minister for Agriculture and Farmers Welfare at a national event held at NASC, New Delhi. This pioneering achievement marks a new era in precision crop improvement and demonstrates India's growing leadership in next-generation, science-based agricultural innovation. During the year, the institute also contributed to the development and release of a 10 new generation high-yielding, climate-resilient rice varieties and one hybrid DRRH 7, possessing enhanced tolerance to major biotic and abiotic stresses.

The institute's scientific accomplishments received national recognition through the prestigious Rashtriya Krishi Vigyan Puraskar (RKVP) 2025 for Outstanding Inter-Disciplinary Team Research in Agriculture, Agricultural Education, Extension and Allied Sciences and One Rashtriya Vigyan Puraskar – Vigyan Yuva (Shanti Swarup Bhatnagar Award) 2025, India's highest scientific recognitions.

Our extension and outreach activities, in close association with stakeholders and farming communities, helped promote the adoption of promising technologies and sustainable cultivation practices. The institute Scientists engaged directly with farming communities across numerous Southern villages through field demonstrations, technology dissemination programmes, and farmer–scientist interactions through the Viksit Krishi Sankalp Abhiyan (VKSA) 2025.

We licensed our six technologies to 10 private partners, exchanged MoUs with ten institutes, conducted 18 training programs along with 15 on-farm demonstrations, 12 PPV&FRA registrations, 3 copyrights, 1 patents were granted and Nine novel genetic stocks possessing agronomically important traits have been registered with ICAR-NBPGR. Whole genome sequencing data related to rice lines (nitrogen use efficiency, root system architecture, strong culm, sheath blight), beneficial microbes, fungal pathogens were submitted to the NCBI databases. Major scientific accomplishments included the identification and mapping of QTLs and candidate genes for enhanced yield, heterosis, nutrient use efficiency, high grain zinc content, grain number, complete panicle exertion, culm strength and sheath blight using advanced next-generation sequencing approaches. Our efforts also focused on analysis of soil health, extension of technologies, agronomic management practices, and on-farm demonstrations.

Recognizing the importance of effective science communication, 139 research papers were published in 73 NAAS-indexed journals. More than 500 scientific and outreach posts were published in social media collectively generating over 654,000 views.

I take this opportunity to express my sincere gratitude to Dr. M L Jat, Secretary DARE and DG (ICAR); Dr. D K Yadava, DDG (Crop Science), Dr. S.K Pradhan, ADG (F&FC), Dr. K K Jena, Chairman RAC and members of RAC continued support and strategic guidance, and our partner institutions, universities, and stakeholders for their collaboration. I appreciate the support and cooperation from SAUs, AICRPR centres and sister ICAR institutes for their tremendous support for consistent progress in rice improvement. I take this opportunity to commend the unwavering dedication of our scientists, technical and administrative staff, and research scholars whose collective efforts have driven these outcomes. As we look ahead, ICAR-IIRR remains committed to fostering innovations in rice science that are scalable, farmer-centric, and aligned with national and global sustainable development goals.

Hyderabad
31st December, 2025

Dr. R. M. Sundaram
(Director)

Executive Summary

1. Executive Summary

All India Coordinated Research Project on Rice (AICRPR)

The 60th year of the All India Coordinated Research Project on Rice (AICRP-R) testing programme marks a historic milestone, coinciding with India's emergence as the world's largest rice-producing country. This remarkable achievement is largely attributable to the rice varieties, production technologies, and crop management practices developed, evaluated, and disseminated through the AICRP-Rice network led by ICAR-IIRR.

Crop Improvement - Varietal and Hybrid Rice Evaluation

- During 2024–2025, the AICRP-R constituted 34 varietal trials under irrigated ecology comprising 1,296 entries and four hybrid rice trials comprising 92 entries, resulting in a total of 1,388 entries evaluated, including 166 check varieties.
- The irrigated ecology trials (34) are categorised into duration-based ecology trials (5 IVT & 4 AVT), grain and nutritional quality trials (5 IVT & 4 AVT), salinity stress trials (2 IVT & 2 AVT), nutrient use efficiency trials (2 IVT & 2 AVT), aerobic and boro/rabi trials (3 IVT & 2 AVT), NIL and GEL trial (1), Hill trials (3) and IHRT trials (4). In addition, coloured rice trials and *japonica* trials were also carried out. Promoted varieties and hybrids of the trials were evaluated jointly in a single AVT1 & 2 combined trial.
- The testing programme was conducted at 45 funded centres and 83 voluntary centres across seven zones of the country during 2024-25. Data were received from 87.7% of the funded centres and 74.6% of the voluntary centres, reflecting strong participation and coordination within the AICRP-R testing network.
- During 2024–2025, a total of 574 entries were evaluated under the Initial Varietal Trials (IVT) of Irrigated trials, of which 123 entries were promoted to the next stage of evaluation. In the Advanced Varietal Trials (AVT), 421 entries were tested, and 99 entries qualified for advancement and 54 entries were identified as very promising.
- Under the Breeder's seed production, 44 centres produced 9186.2 quintals of seed across 512 varieties and 3 hybrids. Highest seed indents were for the varieties MTU 7029 (Swarna), MTU 1010 (Cottondora Sannalu), MTU 1001 (Vijetha), MTU 1156 (Tarangini) and Mahamaya. A total of 9186.2 quintals of Breeder Seed was produced against a DAC indent of 2971.1quintals.
- During the 60th ARGM (April 2025), it was reaffirmed that promotion of entries from IVTs to AVT-1 should continue to be based on zonal performance rather than overall national performance. This approach advances entries with consistent superiority within their target agro-climatic zones, enhances selection efficiency, avoids unnecessary testing in poorly adapted regions, and reduces the workload of testing centres, as demonstrated by comparative analyses of ETP and DSR trials.
- Varietal identification committee (VIC) meeting held on 26th April 2025, 60th ARGM, at ICAR-IIRR, Hyderabad under the chairmanship of Dr. DK Yadava, DDG (CS), ICAR, 56 proposals (35 varietal entries and 21 hybrid entries) were reviewed and 47 were identified. For the first time, proposals of genome edited lines DRRdhan100 and Pusa DST 1 were reviewed, and two entries were recommended for CVRC.
- In the year 2025, the Central Sub-Committee on Crop Standards, Notification, and Release of Varieties (CSCCSN & RV) released a total of 56 rice varieties and 19 hybrids. Of them, 42 (24 varieties and 18 hybrids) were central releases, and 33 (32 varieties and 1 hybrid) were state releases.
- During the year 2025, 10 hybrids (all - central releases) were released and notified by CSCCSN&RV for commercial cultivation in different states of the country.
- During *kharif* 2024, totally 92 hybrids were evaluated in four hybrid rice trials *viz*., IHRT-E, IHRT-ME, IHRT-M, IHRT-MS, in different locations representing North, East, Northeast, Central, West, and South zones of the country.

Agronomy

- A total of 333 experiments were conducted at 47 locations (39 funded and 8 voluntary centres), consisting of evaluation of promising cultivars (103 cultures) belonging to 21 groups for their response to integrated nutrient management at 50 and 100% recommended dose of fertiliser (RDF).
- The groups consisted of Early Hill, Medium Hill (MH), Japonica, early (TP and DS), IME, IM, Late, CSTVT, AL& ISTVT, Aerobic, MS, Bio-fortified, LPT (Phosphorus-efficient cultivars), LNT (Nitrogen-efficient cultivars), Basmati, RSL, SDW, NIL (HT- herbicide – trait verification), E(DS), RSL, Early (Rabi), Nitrogen and Phosphorus use efficiency in the transplanted situation.
- Grain yield is the best measure for the evaluation of a given genotype in the screening experiments for its efficiency. Further, field-screening results can be interpreted using the grain yield efficiency index (GYEI) for identifying efficient, stable, suitable and promising cultures at various levels of nutrient application.
- Tolerant genotypes have a (GYEI) of 1 or higher and the susceptible ones have a GYEI in the range of 0 to 0.50 and the genotypes between these two limits (0.50 to 1.00) are considered intermediate types.

Soil Science

- The 36th-year results of the Long-Term Fertilizer Experiment (LTFE) demonstrated that the integrated application of RDF + FYM consistently achieved the highest grain yields and sustainability indices across most centres. Nutrient omission and reduction of NPK to 50% resulted in yield reduction at all three centers in both seasons.
- Soil application of $ZnSO_4$ and foliar application of nano Zn improved grain and straw yields across locations. DRR Dhan 48 performed better at most centres, while CSR 23 was superior at Kanpur.
- Combined application of RDF + dolomite (250 kg ha^{-1}) + potassium silicate sprays significantly increased grain yield by 48% at Moncompu and 11% at Sirsi over RDF alone. At Moncompu, Uma recorded 5.5% higher grain yield than Vasundhara, while at Sirsi, Vasundhara (3.73 t ha^{-1}) significantly outyielded Jyothi (2.63 t ha^{-1}).
- Crop residues can be deployed to substitute one-fourth of the recommended nitrogen without yield penalty. The crop residue treatments were at par with each other and lower than RDF in terms of nutrient uptake and also maintained higher nutrient use efficiencies over RDF.
- A dual spray of nano urea in addition to 100% RDN showed a yield advantage with a minimum value at Khudwani (0.5%) to a maximum at Rajendranagar (20.6%) over RDF treatment. Similarly, this treatment performed well with the total N uptake at the majority of the locations.
- Integrated Crop Management (ICM) with need-based pest management recorded the highest grain and straw yields, along with superior yield attributes, at most locations. Soil health parameters also improved under ICM across the majority of centres, while the AI-NPOF package showed better performance for soil properties at a few locations.
- Foliar application of 0.5% Zn improved grain yield, fertility parameters, and grain Zn content across locations. CR Dhan 315 and Swarna were the best-performing varieties, highlighting the importance of genotype-specific Zn management.
- Soil organic carbon varied widely across rice ecologies. Labile carbon fractions were sensitive indicators of management practices, while surface soils (0–20 cm) stored higher carbon stocks than deeper layers, highlighting their importance for soil health and carbon sequestration.

Physiology

- Physiological evaluation under AICRP 2024–25 across multiple trials and locations identified promising rice genotypes for key abiotic stresses, including drought (RFU115, RFU103, RFU118), heat (HT-101, HT-106), submergence (AC42088, AC1996), shade (IET33159 and others), and dry direct-seeded rice (GEN19, GEN41).
- Multi-stress screening revealed valuable donor lines, particularly AC40331 and CR-4084-2-1-Sal-1, which exhibited combined tolerance to

anaerobic germination, salinity, and osmotic stress, making them strong candidates for climate-resilient rice breeding.

AICRP Experimental Database Portal – http://www.AICRP-intranet.in

- During the 60th ARGM, approximately 89% of centers successfully uploaded their data through the AICRP Intranet. Modules for generating RBD centers/replications report, RBD Analysis were refined to meet evolving requirements. Data from Plant Breeding, Hybrid Rice, Soil Science, and Agronomy trials conducted in 2024 were effectively analyzed using the AICRP Intranet portal (http://www.AICRP-intranet.in).

Entomology

- The All India Coordinated Entomology Programme for *kharif* 2024 was executed at a 99.14% efficiency rate, conducting 345 out of 348 planned experiments across 41 locations in 22 states and one Union Territory.
- Pest Survey Reports indicated major crop loss in about 1.5 lakh ha of paddy, with severe hopper burn infestations reported in Gujarat (Ahmedabad, Vadodara) and West Bengal (Hooghly-Singur Block, Ghaghraghat, Masodha).
- Severe pest incidence was recorded in parts of Tamil Nadu, Kerala, Telangana, and Karnataka, including leaf folder, leaf mite, black bug, brown planthopper, whorl maggot, and gall midge, with gall midge outbreaks at some locations of Karnataka causing up to 93% infestation.
- A massive evaluation of 1,967 rice entries against 14 insect pests was conducted through 281 valid tests (58 greenhouse reactions and 223 field reactions), identifying 136 promising lines (6.91%), with 24 (17.65%) of those entering second year of retesting.
- In the pest-specific screening trials under multilocation testing, the entries MTU 2721-7-1-2-1, MTU 2720-28-2-1-1, MTU 2721-7-1-2-2, RP 6740-SP-M-MS-70, MTU 2716-28-2-1-2, MTU 2716-28-2-2-2, RP 5977-MS-112*, ISM B-8, and JGL 38935 were found promising against planthoppers; RMS (ISM24), RMS (ISM26), WGL1909, RGL294, RNR 3500, and NLR 5942-13-1-1-1-1 against gall midge; RP5490, PTB 1-1-2, BPT 3284, ADT 22037, NWGR 18083, NPK 65, and NWGR 18084 against leaf folder; and 0615-PTB-01-23-21, NLR 5892-21-4-1-1-1-2, NLR 5930-2-1-2-4-1-1, HKP-ISM-M8-9, RP5564 PTB 2-4-1-2, IET 32031, and NLR 5932-3-2-3-5-5-2 against stem borer. Entries RP6605-40, NND2, CGR15-49, IBTWGL2, and BPT3194 found promising against multiple insect pests.
- Insect biotype studies comprising PHSS, PHPM, GMBT, and GMPM trials revealed variability in planthopper and gall midge virulence across locations, with promising resistance observed in RP 2068-18-3-5, PTB 33, Salkathi, against BPH, and Aganni (*Gm8*) and W1263 against gall-midge.
- Seed treatment with Chlorantraniliprole 50% W/W FS was most effective against Yellow Stem Borer, reducing dead hearts and white ears by 64.7% and 54.8%, respectively, and increasing grain yield by 32.2% over the control.
- A spray sequence of Triflumezopyrim 10% SC followed by Pymetrozine 50% WG was most effective, reducing BPH, WBPH, and GLH populations by 42.2%, 38.9%, and 27.2%, respectively, and increasing yield by 25.4% in centres of North-Western India.
- Drone spraying of agrochemicals (herbicides, fungicides, and insecticides) outperformed knapsack spraying by effectively reducing major insect pests and diseases, while increasing grain yield without causing phytotoxicity.
- *Bacillus thuringiensis* NRRI TB 261 reduced stem borer damage to 2.56 - 5.80% at specific sites and supported yields up to 6,067 kg/ha, as compared to other formulations tested when three rounds of liquid formulations were sprayed at 14 days intervals.
- Dry DSR had the lowest pest incidence, with stem borer damage at 5.7% DH and gall midge at 11.3% SS, compared to 14.2% DH in wet DSR and 29.6% SS in normal transplanting.
- Integrated Crop Management (T5), which used a 50-50 split of organic and inorganic nutrients with need-based pesticides, resulted in the lowest incidence of major pests compared to

pure organic or control treatments.

- The slow-release sex pheromone formulations of yellow stem borer and leaf folder were effective compared to the normal formulations at several locations.
- A collaborative trial involving agronomists, entomologists, and plant pathologists led to the holistic implementation of IPM modules in Direct Seeded Rice, resulting in yield advantages over farmers' practices and up to 82.87% reduction in weed biomass, with a higher Benefit–Cost (BC) ratio in IPM plots (1.43–3.14) compared to farmers' practice (1.31–2.31) due to increased yields and reduced input costs.
- Light trap and field data confirmed that key pests like yellow stem borer and leaf folder reach their peak levels during October and November in the *kharif* season, Gall midge continues to be an endemic pest. Brown Planthopper numbers in light traps were higher at the end of the cropping season.

Pathology

- A total of 16 Plant Pathology trials were conducted at 47 AICRPR locations on host plant resistance, field monitoring of virulence of major rice pathogens and disease management.
- Seventy-eight entries were found as resistant/ moderately resistant to two or more than two diseases at 47 locations among 1579 entries screened.
- Field monitoring of virulence of *Pyricularia grisea* revealed that, a slight shift in the pathogen population structure and based on virulence patterns grouped the isolates into eight major clusters at 30% dissimilarity coefficient with isolates from Ghagraghat and Almora forming separate cluster.
- Virulence monitoring of *Xanthomonas oryzae* pv. *oryzae* (*Xoo*) revealed that, differentials possessing single bacterial blight resistance genes like *Xa1, Xa3, Xa7, xa8, Xa10, Xa11 and Xa14* were susceptible at most of the locations.
- The incidence and severity of leaf blast and sheath blight was more in early-normal sown crops while brown spot, bacterial blight and sheath rot was high in late sown crops in different locations.
- The new combination fungicide product, azoxystrobin 5.1% + tebuconazole 9.1% + prochloraz 18.2% EC (3.5 ml/l) was found most effective molecule with broad- spectrum activity against leaf blast, neck blast, sheath blight, brown spot and sheath rot.
- Across the locations, seed treatment followed by seedling dip @ 10 g/l by *T. asperellum* strain TAIK1 of liquid formulation, followed by one fungicide spray for the respective disease gave higher disease control and increased plant yield
- In different zones, IPM practices reduced the incidence and severity of leaf blast, neck blast, sheath blig2ht, brown spot, sheath rot, false smut and bacterial blight disease under DSR conditions.
- Yield losses due to brown spot disease across all locations revealed that, a mean disease severity index of 53.98%, 38.55% and 27.10% caused the yield reduction of 31.7%, 23.7% and 15.0% respectively.
- Special screening trial on false smut conducted at five hot spot locations identified eleven entries as moderately tolerant with the smut ball ranged from 3 to 4 per panicle with the disease score of 5.
- Drone spraying of agrochemicals was found to be effective in reducing the disease index of leaf blast, sheath blight and grain discoloration compared to battery-operated knapsack sprayer in different locations.

Production oriented survey (POS)

- During 2024, POS was carried by 18 AICRP centres and several state agriculture departments; they surveyed 972 villages in 125 districts in 15 states contacting 1295 farmers.
- The monsoon season, spanning from June to September, witnessed rainfall across the country amounting to 108% of its long period average (LPA), indicating near normal for the year.
- Out of 36 meteorological subdivisions, 3 subdivisions involving Arunachal Pradesh, Punjab, J & K and Ladak received deficient rainfall.

- In addition to several monsoon depressions in Bay of Bengal and Arabian Sea, there were four major cyclones (Remal, Asna, Dana, Fengal) occurred during 2024 which significantly affected normal human life and extensive damage to agricultural crops.
- Hybrid rice varieties occupied a significant area in states like Uttar Pradesh, Haryana, Chhattisgarh and Gujarat and its area is increasing in states like Karnataka, West Bengal and Maharashtra.
- Among the diseases, sheath blight and bacterial blight were observed at high intensities in several states, while among the insect pests, brown planthopper infestation was recorded at very high levels in many areas of eastern Uttar Pradesh and parts of Kerala.

Lead Research

Crop Improvement

Plant Breeding

- **New varieties and hybrids released:** ICAR-IIRR achieved a significant milestone during 2025 with the release and notification of ten rice varieties and one hybrid, reaffirming its leadership in the development of high-yielding, climate-resilient, and farmer-preferred rice cultivars. The released varieties include DRR Dhan 81, DRR Dhan 82, DRR Dhan 83, DRR Dhan 84 (Mahajaya), DRR Dhan 85, DRR Dhan 87, DRR Dhan 88, DRR Dhan 89 (Super Swarna), DRR Dhan 90, and DRR Dhan 91, along with the hybrid DRRH-7. These releases represent a major contribution towards enhancing rice productivity, nutrient use efficiency, resilience to biotic and abiotic stresses, grain quality, and nutritional security, while supporting the sustainable intensification of rice production in diverse agro-ecological regions of the country.
- **Novel donors registered with NBPGR:** ICAR-IIRR strengthened the national genetic resource repository through the registration of nine novel rice genetic resources with the National Bureau of Plant Genetic Resources (NBPGR). These registered donors constitute valuable genetic stocks for rice improvement and provide novel sources of resistance to major insect pests and diseases, as well as enhanced grain nutritional quality. In 2025, Five novel donors exhibiting stable resistance to brown planthopper (BPH) were registered viz., INGR24058, INGR25003, INGR25004, INGR25046, INGR25047 and INGR25002 with dual resistance to BPH and WBPH. INGR25049 A male fertility restorer line carrying the broad-spectrum blast resistance and 2 genetic stocks INGR25051 and INGR25052 with high grain zinc content and improved protein content were registered as valuable donors for the bio-fortification programme.
- **Protection of Plant Varieties:** 9 varieties (DRR Dhan 63, DRR Dhan 64, DRR Dhan 70, DRR Dhan 71, DRR Dhan 65, DRR Dhan 74, DRR Dhan 75, DRR Dhan 76 and DRR Dhan 77) and three hybrids (DRRH4, DRRH5 and DRRH6) were granted PPV&FRA registration during 2025. Application for registration of DRR Dhan 79 was submitted and is under process.
- **Medium and late maturity breeding with Tolerance to Biotic Stresses and Grain Quality:** Superior breeding lines Akshyadhan, MTU 1262 and YRMB-1 exhibited consistent performance across *kharif* 2025 and Rabi 2025–26, while extensive selection advanced promising F_2–F_6 populations to station trials. A total of 56 hybridization crosses involving elite cultivars and genome-edited lines were completed, and genome-edited breeding generated marker-positive F_3 and F_4 progenies with superior agronomic performance.
- **Nutritionally Enriched High-Yielding Rice Cultivars:** Breeding populations were developed using high-protein, low-glycaemic index and resistant starch donors, while advanced backcross populations involving BPT 5204, RNR 15048 and JAK 686 were successfully advanced. Five F_2 plants with 13.36–14.67% grain protein were identified, and evaluation of 410 germplasm lines identified nutritionally superior accessions with high protein and zinc content.
- **Climate-Smart Rice Varieties:** Screening identified highly salt-tolerant and heat-tolerant

germplasm, while QTL mapping detected 12 major and minor QTLs governing reproductive-stage salt tolerance and yield-related traits. Heat-tolerant breeding populations were advanced to the F_4 generation, providing valuable donor material for future climate-resilient breeding programmes. Extensive hybridization generated breeding populations combining salinity, heat, flooding tolerance and high yield, while 797 advanced breeding lines were evaluated under saline environments. Multi-location screening identified numerous salinity-tolerant breeding lines and elite location-specific genotypes for advancement in climate-resilient rice breeding.

- **Genetic Improvement of Direct Seeded Rice (DSR):** Marker-assisted breeding successfully introgressed AHAS-mediated herbicide tolerance into elite cultivars, leading to the development of superior NILs combining herbicide tolerance, blast resistance and nutrient-use efficiency. Eight significant QTLs for anaerobic germination were identified, while superior MAGIC lines and donor genotypes for brown spot resistance, anaerobic germination and high yield were identified for DSR improvement.
- **Breeding for New Plant Type Architecture:** Two major-effect QTLs (*qCT7* and *qIBW7*) associated with lodging resistance were identified and fine-mapped, with six superior RILs possessing favourable haplotype combinations. Backcrosses were attempted for introgression of *qCT7+qIBW7* in the background of Swarna. Further, towards combining superior haplotypes, 48 F_1's were generated in various combinations involving four elite varieties DRR Dhan 48, DRR Dhan 54, DRR Dhan 79 and DRR Dhan 87 and advanced breeding lines FBL19100 (R to BB and GM), JBB6739-5 (Strong culm and high grain number).
- **Breeding for nutrient use efficiency:** Evaluation of wild introgression lines identified low-phosphorus tolerant genotypes, while eight QTLs controlling phosphorus-use efficiency were mapped on chromosomes 1, 5, 7 and 10. DRR Dhan 82 (IET 30756) was identified as a superior medium-slender variety for Zone III with 15–18% yield advantage over checks, and new breeding populations were initiated for nutrient-use efficiency.
- **Breeding for high grain number:** During *kharif* 2025**,** 582 elite genotypes from elite × elite crosses were evaluated for panicle architecture, grain development, agronomic and culm strength traits (filled grains/panicle**:** 466–1016; unfilled grains/panicle: (28–337)**,** 25 new crosses were made, 321 segregating populations (F_1–F_6) were evaluated, and 1,200 germplasm accessions along with 572 identified donor lines were maintained and assessed to strengthen the breeding programme.
- **Wide hybridization:** Wild rice germplasm was expanded through new collections from multiple Indian states, and a new wild rice garden was established at ICAR-IIRR for conservation and utilization of genetic resources. Characterization of wild accessions using 1K RiCA SNPs and GWAS identified 25 stable marker–trait associations for yield-related traits, facilitating utilization of wild diversity in rice improvement. QTL mapping, GWAS and SNP genotyping identified major genomic regions governing yield, grain size, seedling vigour, nutrient-use efficiency and stress tolerance, including a novel QTL *OsPT11* for high yield under nutrient stress.
- **Molecular Breeding for Aromatic Rice:** Advanced aromatic breeding populations and multi-environment evaluation identified Q025, Q017 and Q006 as stable, high-yielding aromatic genotypes, with new entries nominated to AICRP-R trials. Evaluation of 101 aromatic germplasm lines and molecular characterization of BADH2 enhanced understanding of aroma genetics for future breeding.

Hybrid Rice

- Five new hybrids viz., IIRRH 188, IIRRH 189, (IHRT E); IIRRH 190, IIRRH 191 (IHRT ME); IIRRH 192 (IHRT M) were nominated into AICRPR trials during Kharif 2025.
- Fifteen restorer lines derived from *indica* / tropical *japonica* inter-sub specific hybridization were identified with resistance to bacterial leaf blight (BLB) and blast disease. The population derived from the cross IR68897B × DRR Dhan 62 was advanced to the BC_2F_2 generation for further

selection and advancement of gene-positive plants with maximum recurrent parent genome recovery.

- During Kharif 2025, a total of 38 entries, comprising 29 hybrid rice combinations and nine checks, were evaluated in station trials. Among the 29 hybrid rice combinations evaluated, eight were identified as promising based on their performance. For the Kharif 2026 station trials, seed of 15 new hybrid rice combinations was successfully produced using the barrier isolation method. In addition, breeder seed of parental lines comprising IR 68897A (20 kg), IR 68897B (40 kg), DR 714-1-2R (40 kg), APMS 6A (30 kg), APMS 6B (50 kg), and RPHR-1005 (50 kg) was successfully produced.
- DRRH7 (IET 30165) has been officially notified under the Seeds Act, 1966 (S.O. 6123(E), dated 31 December 2025) as the world's first publicly bred rice hybrid specifically developed for alkaline and saline ecologies for Haryana, UttarPradesh and Tamilnadu.
- The conversion of improved APMS6B carrying bacterial leaf blight resistance genes (*Xa21*, *Xa38* and *Pup1*) into a new CMS line was advanced to the BC_1F_2 and BC_2F_1 stages, while backcross-derived restorer lines of AR9-18/Pusa 44 (NIL) possessing the AHAS (Acetohydroxy Acid Synthase) gene for Imazethapyr herbicide tolerance were genotyped and advanced to BC_1F_2 and F_3 generations for phenotypic evaluation under direct-seeded rice (DSR) and irrigated conditions.
- Promising maintainer lines possessing improved stigma exsertion and desirable plant type traits were backcrossed with the corresponding CMS lines, IR58025A and IR79156A, for conversion into usable CMS lines, and the breeding materials have been advanced to the BC_4F_1 generation. In parallel, crosses involving the mutagenic line TE36 were undertaken to improve upper internode elongation in the maintainer backgrounds of IR58025B, APMS6B, IR79156B, and IR68897B, with progenies currently at the BC_2F_1 stage.
- To enhance resistance against major biotic stresses such as bacterial blight and blast, improvement breeding was carried out in the maintainer line IR68897B through backcrossing, resulting in the development of a BC_3F_1 population, while resistance genes were validated in the BC_2F_1 generation using trait-specific screening approaches.
- As part of heterotic group development and validation in rice, thirteen genetically diverse parental lines with high yield potential were crossed with three CMS lines (APMS6A, IR79156A, and IR58025A) during *kharif* 2025, leading to the development of 39 F_1 hybrids that are currently being evaluated along with parents and standard checks during Rabi 2025–26.
- For improvement of the maintainer line IR79156B, marker-assisted breeding and phenotypic selection were carried out to incorporate resistance against major biotic stresses using *Xa21* and *Pi54*-linked markers in populations derived from crosses with Improved IR58025B and DRR Dhan 62. In parallel, the F_2 population from IR79156B × Improved IR58025B was evaluated for desirable agronomic traits, and superior plants were advanced to the F_3 generation.

Biotechnology

- Functional marker analysis of 150 rice parental lines identified 13 elite restorer lines carrying favorable alleles for yield and fertility restoration. Their hybridization with four CMS lines produced 33 promising hybrid combinations, providing a valuable resource for heterosis evaluation and hybrid rice improvement.
- Comparative expression analysis at the panicle initiation stage in developing panicle tissues of hybrid and its parental lines revealed differential regulation of major yield-associated genes (*GW5*, *NGR5*, *NAL1*, *Gn1a*, *GRF4*, *Ghd7*, *SPL14*, *DEP1*, and *TGW6*) between hybrids and their parental lines, providing molecular evidence for the genetic basis of hybrid vigor.
- Genome-wide identification and comprehensive in silico analysis of 16 *OsZIP* genes involved in zinc (Zn) and iron (Fe) transport uncovered conserved gene structures, regulatory elements, protein features, subcellular localization, interaction

networks, and favorable haplotypes linked to grain zinc accumulation, thus identifying key targets for rice biofortification.

- Tissue-specific expression profiling identified *OsZIP5* (LOC_Os05g39560) and OsZIP9 (LOC_Os05g39540) as major contributors to zinc transport and grain Zn loading, highlighting their importance based on six tissues (node, flag leaf, flag sheath, rachis, and developing grains at 10 days after flowering) transcriptome data sets of high-zinc landrace Karuppunel and MTU1010.
- A PCR-based allele-specific marker for the KAMALA-*CKX2* allele was developed and validated across ten genetically diverse rice backgrounds, demonstrating its effectiveness for marker-assisted introgression and rapid deployment in high-yield rice breeding programmes.
- Structural and functional characterization of KAMALA-*CKX2* mutation retains enzyme stability while moderately reducing CKX2 activity through changes in the cytokinin and FAD-binding domains. The resulting optimal cytokinin accumulation promoted cell proliferation, accelerated floral transition, increased ANK1 expression with improved yield potential.
- An efficient transformation and regeneration system was standardized for the aromatic landrace Chittimuthyalu, enabling multiplex CRISPR/Cas editing of *OsDEP1*, *OsTB1*, *OsCKX2*, and *OsSWEET14*. Primary OsDEP1-edited plants showed larger grains, nearly 100% higher thousand-grain weight, and approximately 50% higher grain yield per plant, demonstrating the potential of genome editing to enhance climate-resilient traditional rice varieties.
- Integrated transcriptome analysis revealed lncRNA-mediated regulatory networks as major determinants of aerobic root adaptation. Candidate lncRNAs, including XLOC_056556, XLOC_011603, XLOC_049924, XLOC_055838, and XLOC_022724, were associated with the regulation of OsWAK55, auxin signaling, redox homeostasis, meristem function, cell wall integrity, and ion transport, providing novel molecular targets for improving root architecture and adaptation to aerobic cultivation.
- The STPKR gene associated with brown planthopper resistance was isolated from the *O. nivara*-derived line RPBio 4918-230S, cloned using Gateway system, and molecularly validated. The pGWB5: STPKR expression construct will be used for functional validation in Taipei rice.

Crop Production

Agronomy

- Weed dynamics study in dry DSR revealed that paddy straw mulch resulted in the highest B:C ratio of 2.77
- Elevated temperature effect on weeds in Wet DSR System revealed that tiller no. and dry matter productions were higher in open plot. Elevated temperature has favoured both weeds and crop vegetative growth but not the yield attributes and grain yield.
- Survey taken up at Palakkad revealed that the farmers are using pre-emergence Pretilachlor, Bensulfuronmethyl + pretilachlor, post-emergence herbicide application with Almix+24-D or Bispyribac sodium.
- Among the nitrogen management treatments, 125% RDN (100% inorganic) and 100% RDN (100% inorganic) were found to be more economical.
- IoT based irrigation with saturation and 10 % depletion of available soil moisture (DASM) were found to be more economical among the irrigation treatments.
- In rice-maize system, the cost–benefit analysis revealed that transplanted rice and conventionally tilled maize fetched higher net returns of INR 111,074 and INR 101,658/ha, respectively, over the direct-wet seeded rice and conservation agriculture.

Soil Science

- The conventional transplanted rice (TPR) method recorded the highest seasonal integrated methane flux, carbon equivalent emissions (CEE), and global warming potential (GWP). In contrast, AWD at 5 cm depletion recorded the lowest

methane flux (20 kg ha^{-1}), CEE (265 kg C ha^{-1}), and GWP (973 kg CO_2 eq. ha^{-1}). Methane emissions decreased by more than 29% in SRI, 40% in DSR, and 41% under AWD over TPR. Similarly, SRI, DSR, and AWD methods lowered GWP by 15–22%, indicating their potential as climate-resilient and low-emission rice cultivation practices.

- Area, field and pixel level monitoring of rice vegetation is possible with Sentinel-2 optical data, which may help in the development of a forewarning system since Sentinel- 2 data is available in near real time.
- System of Rice Intensification (SRI) recorded higher very labile carbon (0.43 and 0.36%) and labile carbon (0.13 and 0.20%) at 0-20 and 20-40 cm depths, respectively, while non-labile carbon was highest under SRI and Direct seeded rice (DSR) (0.50–0.56%), indicating greater carbon stabilization and improved long-term soil health under these practices.
- Minimum tillage and residue incorporation enhanced soil carbon storage by reducing soil aggregate disturbance and minimizing oxidation losses. Surface soils (0–20 cm) recorded 23% and 10% higher SOC stocks than deeper layers
- In a field experiment on seedling root-dip inoculation of DRR Dhan 55 with compatible actinobacteria, the highest grain yield was recorded with *Rhodococcus sp*. (5.89 t/ha), followed by *Streptomyces sp*. (5.35 t/ha) and *Amycolatopsis sp*. (5.26 t/ha). The consortium treatment produced a lower yield (5.05 t/ha) than single-culture inoculations. In pot culture, however, the consortia induced a broad-spectrum defence response, integrating both SA- and JA/ET-mediated signalling cascades where EDS1 (16.91-fold) and NPR1 (7.04-fold), ACO (3.47-fold), EFR3 (2.93-fold), and LOX1 (5.08-fold) were highly induced.
- Two methanotrophic bacterial isolates and 11 zinc-solubilising bacteria with plant growth-promoting potential were isolated from rhizosphere soils, among which *Acinetobacter bereziniae* (IIRRZnSB-8) exhibited the maximum zinc-solubilisation efficiency (216 mg/L).
- Among 15 phosphorus- and zinc-solubilising bacterial cultures screened against *Meloidogyne graminicola*, four isolates showed strong nematicidal activity, causing >70% J2 mortality within 24 h. These promising isolates are being further evaluated under in vivo conditions for nematode management in rice.
- Dual foliar application of Zn through $ZnSO_4$ and ZnO at flowering and grain-filling stages significantly improved grain yield in rice, recording 6993 and 6983 kg ha^{-1}, respectively. External Zn application also enhanced grain Zn concentration, with higher Zn accumulation observed in DRR DHAN 48 than in BPT 5204.
- An in vitro study on DRR DHAN 42, DRR DHAN 48, DRR DHAN 49, and DRR DHAN 63 evaluated the effect of soil and foliar Zn and Fe application on micronutrient transporter activity. qRT-PCR analysis revealed no detectable expression of ZIP-1 and ZIP-8 genes under the tested treatment conditions.
- Root dipping of rice seedlings @ 40 kg P /ha resulted in the highest panicles/m2 (370), grain yield (6530 kg/ha) and straw yield (7460 kg/ha). Moderate P doses (20-40 Kg P) combined with bio-fertilisers like BPSB or seedling dip methods or coated P formulations outperformed zero P and high P doses (60 Kg P). Application of coated phosphorus fertilizers registered higher agronomic and recovery efficiency than their respective uncoated phosphorus treatments.

Physiology

- Conducted GWAS on 3K and 50K rice panels using two years of phenotypic data, identifying significant heat stress tolerance QTLs, with overlapping regions validated through database and meta-analysis as being associated with key regulatory genes and biological processes.
- In accelerated ageing (AA) experiment, Of the three salts, the days required for complete loss of germination was earlier in potassium chloride.
- Proteomic analysis revealed three key proteins and major mechanisms (ubiquitin-mediated proteolysis, ABA-induced inhibition, and amylase inhibitor activity) involved in seed deterioration.

- Evaluated grain quality traits, estimating the glycemic index of 386 rice genotypes (majority with low GI) and profiling fatty acids in 326 genotypes, showing linoleic acid as the predominant essential fatty acid in rice endosperm.

Computer Science

- The climatic potential yield gap was estimated using the Rice DSS for popular rice varieties of Tamil Nadu (CO 51) and Kerala (Uma). The observed climatic yield gap ranged from 1070–4000 kg/ha in Tamil Nadu and 3800–4500 kg/ha in Kerala.
- Rice area was estimated accurately for Khammam District through Google Earth Engine using sentinel satellite data and machine learning algorithms.

Crop Protection

Entomology

- Planting trap crops (either PB1 or RNR 15048) in the main crop varieties (DRR dhan 65, BRRI 75 and RPbio226) significantly increased grain yield compared to the sole crop treatment.
- W1263, IET 21401, RP4919-NSR52, RP6166-M273, and RP6738-42-16-3 exhibited chronic antibiosis against neonate larvae of yellow stem borer.
- Aganni, INRC17470, INRC3021, RP5924, INRC15888, and RP6749-RMS7-17-27-41 were identified as promising sources of gall midge resistance across locations in India. PRP and RPP-del sequences in resistant lines found to be distinct from TN1.
- Screening of 53 mutant lines of BPT 5204 and a mapping population consisting of 150 wild introgression lines against WBPH identified several new sources of resistance. Mutant lines TI-139 and TI-128 showed the highest WBPH 3rd instar probing marks, indicating antibiosis-based resistance.
- Seven *Ocimum* species were evaluated for habitat management and conservation biological control, attracting key parasitoids and predators, with *O. basilicum* and *O. citriodorum* showing higher attraction of stem borer and hopper parasitoids, respectively.
- Synthetic herbivore-induced plant volatiles and green leaf volatiles *viz*., MeJA + octanol and MeSA + octanol were found to be the most effective in attracting egg parasitoids of yellow stem borer.
- Mass trapping of yellow stem borer using a slow-release pheromone formulation showed that the highest catches were recorded in slow-release pheromone formulation with 12 traps per acre, with the highest percent reduction in white ear damage caused by yellow stem borer over the control.
- The distribution of rice leaf folder, *Cnaphalocrocis medinalis*, was predicted using Maxent modelling based on 293 occurrence records and key bioclimatic variables under current and future climate scenarios. Future projections were generated for 2041–2060 and 2081–2100. Climate change projections indicated expansion of low and marginal suitability areas, with potential spread into new moderately suitable regions.
- Study of demographic, life table parameters and expression of detoxification genes in imidacloprid susceptible and resistant brown planthopper populations revealed that the imidacloprid resistance in brown planthopper leads to significant fitness costs, including prolonged developmental stages, reduced fecundity, altered demographic parameters and upregulation of cytochrome P450 genes.
- Identified 13 bacterial isolates from brown planthopper gut, representing ten families from three phyla: Proteobacteria, Actinobacteria and Firmicutes. LC-MS/MS analysis revealed that *P. amylolyticus* and *S. marcescens* after 14 days of inoculation degraded 73.07 and 66.92% of imidacloprid (100 mg/L), respectively underscoring the role of gut bacteria in insecticide degradation.
- Field populations of White backed Planthopper (WBPH), *S. furcifera*, showed the highest resistance to imidacloprid, whereas triflumezopyrim remained highly effective with low LC_{50} values. The population had significantly elevated detoxification enzyme activities *viz*., esterases, glutathione-S-transferase and P450 compared to the susceptible strain.

- Genetic analysis of 44 *S. furcifera* individuals from 16 locations in India revealed very low mitochondrial diversity with only three haplotypes, dominated by a widely distributed H1 haplotype.
- A preliminary field survey conducted during *kharif* 2025 at multiple locations in Telangana recorded gall midge infestation (silver shoot) levels ranging from 20–25%.
- Field study at RARS, Jagtial evaluated wavelength-specific phototaxis in rice-associated arthropods using six light sources (360–950 nm), showing that different insect groups responded distinctly to specific wavelengths, with incandescent (950 nm) attracting maximum abundance and yellow (590 nm) enhancing diversity.
- A conceptual design of the "Integrated Smart Solar Insect Light Trap (ISSILT)" was developed for monitoring and management of rice insect pests under field conditions.
- Identified two land races (Aganni and K2419) and one elite cultivar DRR Dhan 45 as resistant to rice root-knot nematode *M. graminicola*.
- Aganni was significantly less attractive (repellent) to rice root-knot nematode *M. graminicola* J2s compared to the susceptible check TN1. Similarly, nematode penetration, development, and reproduction were reduced in Aganni compared to TN1, indicating both pre- and post-penetration resistance.
- Antioxidant defence enzymes APX, catalase, and SOD were significantly higher in the roots of *M. graminicola*-infected Aganni plants compared to TN1.
- Resistant genotype Aganni was crossed with susceptible TN1, and the harvested F_1 plants were advanced to an F_2 population for phenotyping rice root-knot nematode resistance.
- Phenotyping of 220 indica rice genotypes (3K-panel) identified five resistant lines (IRGC-41663, IRGC-53630, IRGC-6445, IRGC-35054, IRGC-41047) to *M. graminicola*; GWAS (GAPIT, MLM/GLM/FarmCPU) revealed five significant SNPs on chromosomes 1, 2, 4, and 8.
- Four endophytic isolates obtained from roots of rice cultivar TN1 grown in a nematode-infested sick plot were found highly nematicidal to the second-stage juveniles (J2s) of *M. graminicola* under laboratory conditions.

Pathology

- Artificial screening in the Uniform Blast Nursery evaluated 3,333 rice entries for blast resistance, of which 1,212 lines exhibited resistant reactions.
- qRT-PCR analysis revealed early and strong induction of key blast resistance genes (particularly *Pi2*, *Pi1*, *Pi9*, *Pi54*, *OsWRKY45*, and *OsWRKY67*) in the resistant cultivar DRR Dhan 62 between 12–72 h post-inoculation, whereas most of these genes were downregulated in the susceptible cultivar HR-12.
- Injection of conidial suspension on panicle neck was standardised as the most effective inoculation technique for reliable induction of neck blast disease in rice.
- Field screening identified a large number of breeding lines with high resistance to bacterial blight (BB) which included 300 BC_1F_3 plants of DRR Dhan 53 / HWR-36 NIL, 36 lines from BPT 5204 / IRBB-23 and 264 BC_1F_3 from BPT 5204 × HWR-36 NIL exhibited strong BB resistance.
- Virulence profiling of 80 *Xanthomonas oryzae* pv. *oryzae* (Xoo) isolates using 24 IRBB differential lines classified them into eight pathotypes, with pathotypes IXoPt #11, 14, 19, and 22 showing virulence against major BB resistance genes (*xa13* and/or *Xa21*).
- Genotyping of 148 isolates using JEL markers grouped them into eight genetic clusters; however, the correlation between pathotype and genetic diversity was weak.
- Among the antibiotics tested against Bacterial blight, combination of kasugamycin + validamycin was the most effective in reducing disease severity.
- Out of 93 bacterial isolates of *Bacillus* spp. and fluorescent *Pseudomonas* spp. screened against *X. oryzae* pv. *oryzae* (Xoo) three isolates completely inhibited Xoo growth.

- A survey conducted during *kharif* 2025 in Kamareddy, Nizamabad, and Warangal districts of Telangana revealed widespread and severe incidence of bacterial blight in rice fields.
- Thirty pure cultures of *U. virens* were obtained from the false smut infected samples during *kharif*, 2025 and 350 isolates of U. virens cultures are being maintained at IIRR.
- Out of 750 rice genotypes, including NSN lines, landraces, wild rice introgression lines, and germplasm accessions, were artificially screened for false smut resistance during *kharif* 2025 using injection method of inoculation with *U. virens* conidial suspension.
- Among the NSN-1 entries screened, the IETs 29536 (R) & 29549 were recorded moderately resistant reaction with the disease score of 3.
- Upon chlamydospore and conidial treatment, the mean vigour Index I of the tolerant genotypes was reduced to 230 and 359 units and in the susceptible genotypes the value was recorded as 829 and 595 units.
- About 60 *Rhizoctonia* spp. isolates were isolated from the different rice based ecosystem (rice-rice, rice-maize, rice-pulses and rice-vegetable) from Telangana state during *kharif*-2025 and characterized.
- Among the 100 *Rhizoctonia* spp. isolates characterized, significant morphological variability was observed, with 22 producing microsclerotia, 71 macrosclerotia, 7 showing orange pigmentation, and 12 exhibiting honeydew secretion;
- Among the 100 *Rhizoctonia* spp. isolates, molecular analysis identified 96 isolates as *R. solani* and 4 as *R. oryzae-sativae*.
- Virulence assessment of *R. solani* revealed isolates from the middle and upper sub-basins of Krishna and Kaveri River exhibited greater virulence than from the lower sub-basins.
- Among *Rhizoctonia* spp. complex, *R. solani* exhibited the highest radial growth, virulence, and disease progression, followed by *R. oryzae* and *R. oryzae-sativae*, with distinct lesion characteristics observed among the species.
- ITS sequencing and species-specific marker analysis of 60 isolates identified three sheath disease pathogens: *R. solani* (35 isolates), *Ceratorhiza oryza-sativa* (14 isolates), and *Waitea circinata* (11 isolates).
- Long-term exposure of *Rhizoctonia* isolates to elevated CO_2 and temperature for 20 generations accelerated sclerotial maturation and increased sclerotial production indicating differential pathogen responses to elevated CO_2 and temperature.
- The liquid formulation of *Trichoderma asperellum* (TAIK1), when applied as foliar sprays both before and after pathogen inoculation, proved most effective, reducing lesion development of Bacterial blight.
- Among the seed treatments, Pyrone showed the highest reduction in lesion development of Bacterial blight.
- Spray drying-based encapsulation using maltodextrin and gelatin improved stability and controlled release of bioagents.
- By geostatistical interpolation identified major hotspots brown spot disease in Buxar, Saran, and Patna (Bihar); West Singhbhum, Dumka, and Ranchi (Jharkhand); and Jagdalpur, Surajpur, and Korea (Chhattisgarh).
- Cultural characterization revealed that most *B. oryzae* isolates produced light brown, aerial fluffy, raised colonies with white island formation.
- Significant pathogenic variability was observed among the 30 *B. oryzae* isolates, with disease severity ranging from 16.5% to 57.4%, reflecting marked differences in virulence.
- Molecular and phylogenetic analyses identified *Bipolaris oryzae* as the dominant brown spot pathogen, with occasional *Curvularia* species forming distinct phylogenetic lineages.
- Screening of 1,791 rice breeding lines, germplasm accessions, and landraces identified 65 resistant entries to Rice Tungro Disease during *kharif* 2025.
- Re-evaluation of 189 previously selected lines confirmed stable and consistent Rice Tungro Disease resistance in 85 lines.

- Field surveys in Tamil Nadu and West Bengal confirmed the occurrence of Rice Tungro Disease, with severe outbreaks in Purba Bardhaman, West Bengal, associated with high green leafhopper populations.
- PCR analysis confirmed the presence of Rice Tungro Bacilliform Virus (RTBV) in rice samples from multiple locations and identified *Paspalum distichum*, *Cyperus esculentus*, and *Digitaria sanguinalis* as potential alternate hosts and virus reservoirs.
- Field surveys detected sporadic SRBSDV infections in major rice-growing areas of Haryana and Punjab, with localized hotspots and the presence of White-Backed Planthopper vectors.
- Morphological and cultural characterization of 70 sheath rot and 30 stem rot fungal isolates collected from diverse rice-growing regions of Telangana revealed considerable variability among the pathogen populations.
- The toxin concentration was highly in positive correlation with the magnitude of the symptom production by the *Sarocladium oryzae*, the virulent isolates produced higher concentration of the helvaloic acid compared to the avirulant isolates.
- Field evaluation of nine fungicide molecules identified Trifloxystrobin 25% + Tebuconazole 50% WG as the most effective treatment for the management of sheath rot caused by *Sarocladium oryzae*.

Transfer of Technology and Training

- The project examined farmers' readiness to adopt Smart Farm Solutions using behavioral analysis, and found strong willingness when technologies were easy to use, trustworthy, and supported by adequate guidance. Demonstrations of IIRR rice varieties, including DRR Dhan 53 and DRR Dhan 64, showed promising yield, grain quality, and stress-tolerant traits on farmers' fields. Rapid soil testing, water-saving interventions such as Pani Pipes, and the IIRR Rice IPM App improved farmers' access to timely nutrient, water, and crop protection advice.
- Farmers' preference for business models was shaped mainly by affordability, flexible payment options, technical support, and proven returns. Overall, the project highlights the need for stronger extension support, digital tools, and farmer-friendly deployment models to accelerate sustainable rice technology adoption.
- Bt strains were evaluated under laboratory and field conditions at ICAR-IIRR and RARS, KAU, Pattambi, and Bt3, Bt5, and Bt6 showed the most consistent effectiveness across pink stem borer, fall armyworm, stem borer, and leaf folder studies.
- Field and bioassay results indicate that these three strains are the most promising candidates for further development and deployment in rice pest management.
- An assessment of agricultural participation in the Voluntary Carbon Market showed that India accounted for 4.26 percent of global agricultural carbon credits issued by the end of 2025, though the share varied across registries due to different classification systems.
- An exploratory case study on GI-tagged rice varieties identified 31 registered rice GIs across 20 States and Union Territories as of 3 October 2025, highlighting their potential to contribute to multiple SDGs while underscoring the need for stronger governance, value-chain support, fraud prevention, and climate adaptation measures
- Genome-edited rice technologies have strong potential to improve yield, nutritional quality, and resistance to pests and diseases. In a preliminary assessment of 60 stakeholders from KVKs, SAUs, and State Agriculture Departments, awareness was very high at about 97%, mainly through ICAR, IIRR, research institutions, universities, and farmers.
- Nearly 90% expressed willingness to undergo training, and most respondents emphasized the role of extension professionals in technology transfer. Field demonstrations, field trials, and stakeholder training were identified as the most preferred dissemination methods, and a Power–Interest Matrix was developed to map key stakeholders.

2. Introduction

Genesis

The All India Coordinated Research Project on Rice (AICRPR) was established in 1965 at Hyderabad, with the responsibility to organize multi-disciplinary, multi-location testing and develop suitable varietal and production technologies. AICRPR capitalized upon the available research infrastructure in different states of India and successfully introduced a national perspective in technology development and testing. AICRPR was later elevated to the status of Directorate of Rice Research (DRR) from April 1983 with the added mandate of pursuing research on irrigated rice.

In 1965, AICRPR was started with 22 centres (19 main and 3 testing centres) with 7 zonal centres and 12 regional centres. During the fifth five-year plan (1974-79) the main and sub centres were classified as single cropped (24) and double cropped (21) centres. Except Pondicherry and Varanasi which were fully funded by the ICAR, the rest of the centres were financed in the ratio of 75:25 with State Agricultural Universities (SAUs – 25%) or 50:50 per cent basis with State Departments of Agriculture (SDAs – 50%). During VI plan period (1980-85), 8 more sub centres were sanctioned raising the total to 53. There was a total of 61 centres including 8 subject related special centres. In the VII plan period (1985-89) the number of centres was reduced to 50 (18 main and 32 sub centres. During the eighth plan (1992-97) there were 51 approved centres of which six centres were withdrawn and Karnal centre was merged with Kaul in the IX plan period (1997-2002). The total number of centres during X plan (2002-2007) increased to 46 with the approval of Kanpur and Nagina centres and to 47 during XI plan (2007-2012) with the addition of Navsari in southern Gujarat in western India. Two centres were dropped in XII plan due to poor performance. The Institute (AICRPR) has evolved into an efficient and successful program of partnership in rice research bringing together more than 300 rice researchers from 45 funded and over 100 voluntary research centres.

The Organisation

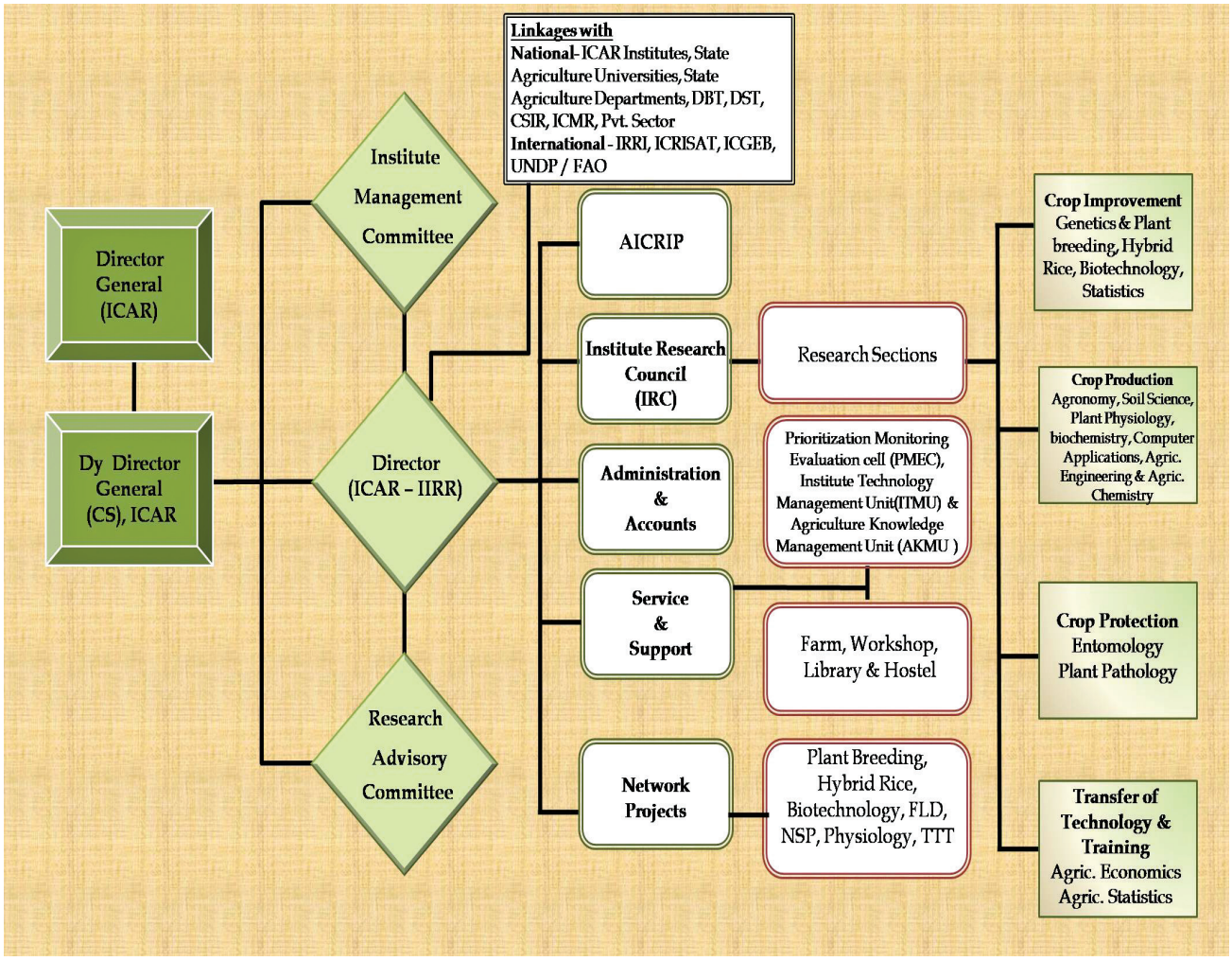
IIRR is an important constituent institute of ICAR under direct supervision of the Deputy Director General for Crop Sciences. The detailed organizational setup of the Institute is provided in the organogram. For fulfilling its mandate effectively, IIRR is organized into four sections and ten units along with centralized service wings and administration. AICRPR activities are integrated into the mandate with senior most scientists of each discipline acting as the PIs of the programme. There are 45 funded and more than 100 voluntary centres involved in rice research activities. Research and institutional activities are planned and guided by Research Advisory Committee and Institute Management Committee while the progress is critically evaluated once in five years by the Quinquennial Review Committee (QRT).

The Mandate

Basic and strategic research for enhancing rice productivity under irrigated ecosystem

Coordination of multi-location testing to develop location specific varieties and technologies for various ecosystems

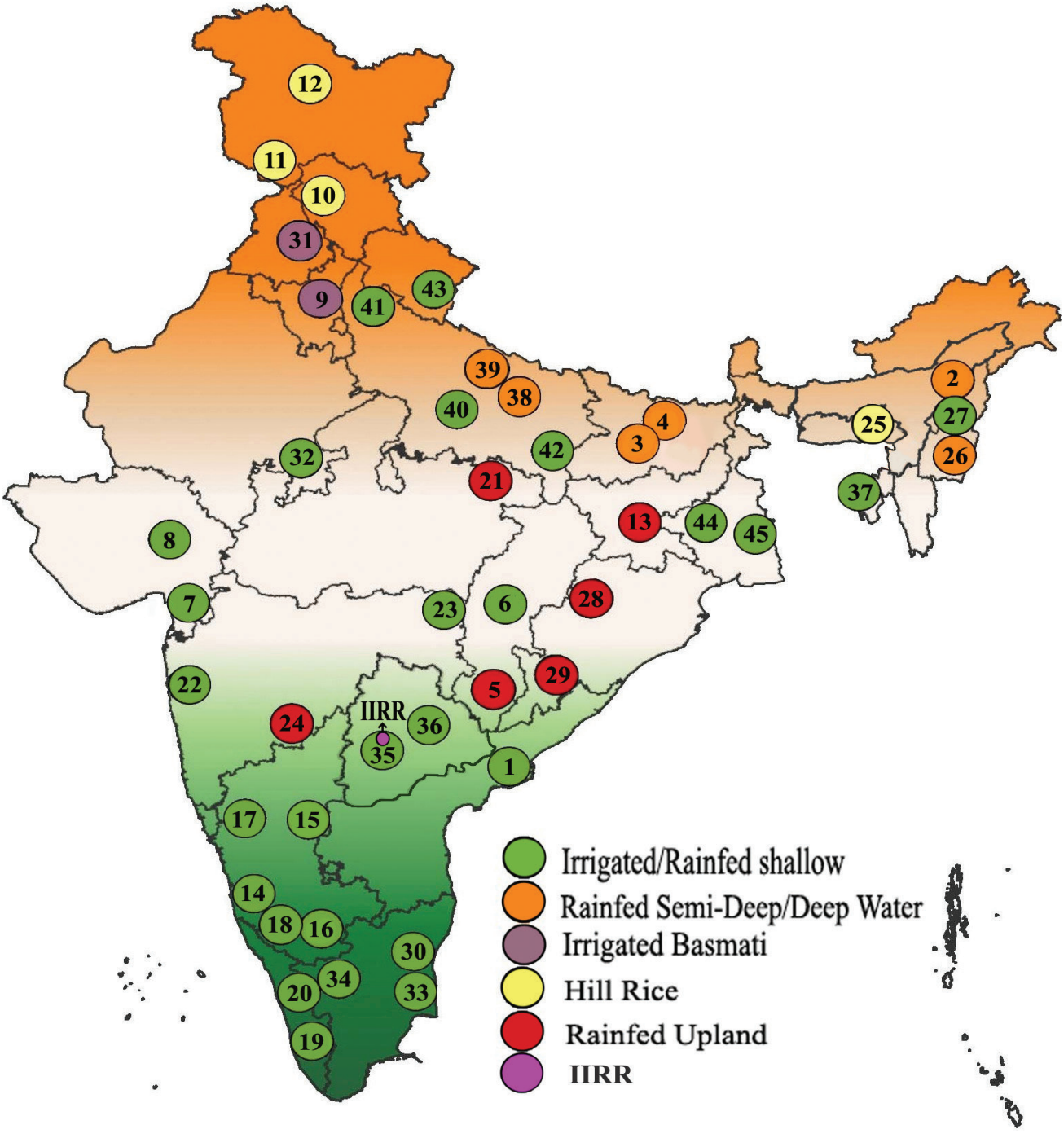
Dissemination of technologies, capacity building and establishing linkages



Organogram of the ICAR-IIRR

AICRPR - Funded Centres

S. No.	Centers	S. No.	Centers	S. No.	Centers	S. No.	Centers
1	Aduthurai	14	Kanpur	26	Nagina	38	Rewa
2	Agarthala	15	Karjat	27	Navasari	39	Sakoli
3	Bankura	16	Kaul	28	Nawagam	40	Titabar
4	Brahmavar	17	Khudwani	29	Pantnagar	41	Tuljapur
5	Chatha	18	Kohima	30	Patna	42	Upper Shillong
6	Chinsurah	19	Kota	31	Pattambi	43	Varanasi
7	Chiplima	20	Ludhiana	32	Pondicherry	44	Wangbal
8	Coimbatore	21	Malan	33	Ponnampet	45	Warangal
9	Faizabad	22	Mandya	34	Pusa		
10	Gangavati	23	Maruteru	35	Raipur		
11	Ghaghraghat	24	Moncompu	36	Rajendranagar		
12	Jagdalpur	25	Mugad	37	Ranchi		
13	Jeypore						

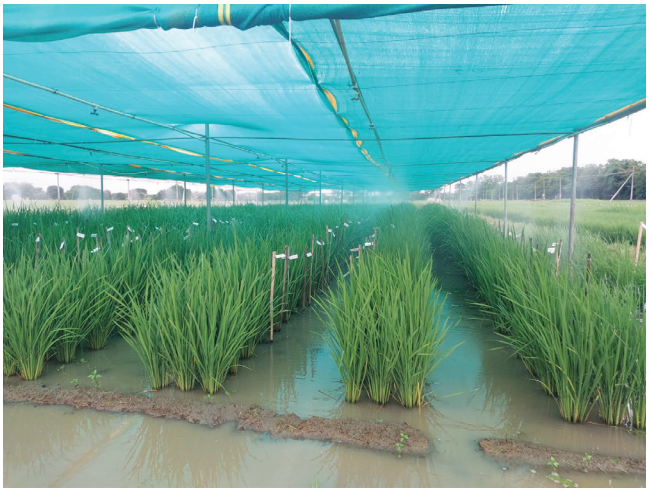


All India Coordinated Research Project on Rice (AICRPR)

Infrastructure

The Institute is equipped with state-of-the-art facilities with fully equipped laboratories for all the sections, centrally air-cooled greenhouses for screening germplasms for resistance against pests and diseases, net-houses, growth chambers, screening nursery beds, containment transgenic poly-houses and heat tunnels. Field facilities include well laid out experimental farms at Rajendranagar (20 ha) and Ramachandrapuram (40 ha) with a wild rice garden and pollination chambers along with adequate farm machinery, warehouses and limited cold storage facilities. A centrally air-conditioned auditorium with a seating capacity of 350, seminar halls, guest house, hostel facilities and a canteen, have been established for imparting training and to disseminate information using the latest multi-media and ICT tools. The Central library of the institute is fully digitized with over 4,654 books, 6,500 bound volumes and subscribes to 55 Indian and 13 foreign journals. The significant achievements of the Institute are exhibited in the form of posters, graphs and other visuals for the benefit of visitors through a state-of-the-art museum.











Linkages & Collaborations

ICAR-IIRR has a strong and wide network of linkages and collaborations with research organizations both in India and abroad. AICRPR has 45 funded centres affiliated to State Agricultural Universities and Departments of Agriculture of 27 states and 2 Union territories, besides five ICAR institutes. About 90-100 voluntary centres are also providing support in the evaluation and testing work.

Research Linkages: ICAR-IIRR has a strong collaboration with CGIAR institutes such as International Rice Research Institute (IRRI), Philippines and International Crop Research Institute for Semi-Arid Tropics (ICRISAT), Hyderabad and many National institutes like CRIDA, Hyderabad, NBAIR (Bengaluru), NBPGR, New Delhi (ICAR); PPV&FRA, New Delhi, IICT (CSIR), NIN (ICMR), Hyderabad, IICPT, Delhi University, Centre for Cellular and Molecular Biology (CCMB), Hyderabad and Centre for DNA Fingerprinting and Diagnostics (CDFD), Hyderabad.

Academic linkages: ICAR-IIRR has accreditation from several universities such as ANGRAU, PJTSAU, IGKV, Osmania University, University of Hyderabad, Jawaharlal Nehru Technological University, Yogi Vemana University, Kakatiya University, University of Agricultural Sciences, Bangalore, Acharya Nagarjuna University, Sanskriti University etc.

ICAR-IIRR also has a strong **Public Private Partnership** (PPP) mode of operational linkage with the private sector, especially relating to hybrid rice technology and its commercialization. This partnership started two decades back has turned out to be one of the best examples of PPP in the country.

The Staff

As on 31st March, 2025

S. No.	Category	Sanctioned	Filled	Vacant
1	Director	1	1	-
2	Scientists	66	56	10
3	Administration	36	15	21
4	Technical	42	34	08
5	Supporting Grade	09	04	05
	Total	**154**	**110**	**44**

The Budget (2024-25)

(Rupees in lakhs) As on 31st March, 2025

Item	2024-25*	
	Outlay	Expenditure
IIRR, Hyderabad	1561.15	1561.15
AICRP on Rice, Hyderabad	936.50	936.50

** Excluding Salaries*

3. Research Achievements

3a. All India Coordinated Research Project on Rice (AICRPR)

I. Crop Improvement

1. Varietal and Hybrid Rice Evaluation

The All India Coordinated Research Project on Rice(AICRPR), the largest national varietal testing network play a pivotal role in the evaluation, identification and promotion of superior rice varieties and hybrids suitable for diverse irrigated ecosystems across the country. The programme was successfully implemented through a well-established national network of funded and voluntary research centres, with emphasis on improving varietal performance, enhancing breeding efficiency, strengthening breeder seed production, and refining evaluation guidelines to address emerging production challenges. During 2024-2025, ICAR-Indian Institute of Rice Research (ICAR-IIRR) coordinated and conducted trials in collaboration with ICAR-NRRI and ICAR-IARI under Irrigated ecology, rainfed ecology and basmati trials respectively.

During 2024-2025, several important recommendations made in the previous AICRPR Group Meeting were successfully implemented. One of the major achievements was the initiation of full-fledged coordinated trials on Direct Seeded Rice (DSR) during *kharif* 2025. These trials were conducted at 33 centres through close collaboration between the Agronomy and Plant Breeding disciplines. Based on their performance, several promising entries have been promoted to the first year of Advanced Varietal Trial (AVT-I), demonstrating the successful establishment of this new testing platform. The guidelines governing promotion and evaluation of entries in problem-prone ecosystems such as rainfed uplands, rainfed lowlands, deep water, coastal salinity, inland salinity and alkalinity were also revised. The permissible coefficient of variation (CV) for these highly variable environments was increased from earlier limits to 40%, while centres recording higher CV values may also be considered on a case-by-case basis depending upon crop mortality and complete yield loss as verified by monitoring teams. These modifications are expected to improve the reliability of varietal evaluation under adverse environments. Further improvements included the incorporation of short-slende r grain type entries into Medium Slender trials with suitable duration and grain type-specific checks, inclusion of DRR Dhan 60 as an observational check in Low Phosphorus Tolerance Trials, and efforts to ensure that all funded and voluntary centres conduct the complete set of coordinated varietal trials. These initiatives strengthened the uniformity and effectiveness of national testing procedures.

AICRPR TRIALS 2024-2025: The AICRPR testing programme during 2024-2025 involved a total of 128 testing centres comprising 45 funded and 83 voluntary centres. The overall data receipt was 83.6%, with funded centres reporting a higher completion rate (87.7%) than voluntary centres (74.6%) indicating scope for improving coordination and monitoring during subsequent years. Overall, 38 coordinated trials consisting of 34 varietal and four hybrid trials were conducted, involving evaluation of 1,388 experimental entries.

Progress of Varietal Evaluation: Extensive evaluation of breeding materials was carried out through Initial Varietal Trials (IVTs) and Advanced Varietal Trials (AVTs). Across irrigated ecology, grain quality, salinity, nutrient-use efficiency, aerobic, boro and other specialized trials, several superior entries were advanced through successive stages, resulting in the identification of numerous promising varieties for national evaluation. During the first year of testing, 574 entries distributed across thirteen irrigated trial categories—including early transplanted, irrigated medium, late, aerobic, biofortification, low phosphorus tolerance, low nitrogen tolerance, coastal salinity and others—were evaluated. Based on their multi-location performance, 123 superior entries qualified for promotion to AVT-I, reflecting a rigorous and competitive selection process.

The second and final year testing included 421 entries across AVT-1 and AVT-2 trials. Of these, 54 entries were categorized as promising based on consistent superior performance in the third-year testing, while

99 entries were promoted for further evaluation or varietal identification. The improved rice production and productivity demonstrate the effectiveness of the coordinated testing system in identifying stable and high-performing rice cultivars for diverse irrigated ecosystems.

Duration-based Irrigated Ecology Trials: The duration-based irrigated ecology trials comprised four categories based on days to 50% flowering (DFF), namely Early Transplanted (ETP; <90 days), Irrigated Mid Early (IME; 91–100 days), Irrigated Medium (IM; 101–110 days) and Late (>110 days). During 2024, a total of 243 varietal entries were evaluated in the Initial Varietal Trials (IVTs), while 145 varietal and hybrid entries were tested in the combined Advanced Varietal Trials (AVT-I and AVT-II). Based on their performance across locations, 51 entries were advanced to the second year of testing, whereas 31 entries were promoted to the third year. In addition, 19 entries completed the prescribed testing period and were identified as promising for further consideration in the varietal release process.

Grain Quality and Nutritional Improvement Trials: Coordinated trials targeting grain quality and nutritional enhancement were conducted under the Medium Slender (MS), Biofortification and other specialty grain categories. A total of 135 entries were evaluated in the Initial Varietal Trials, followed by evaluation of 44 entries in the Advanced Varietal Trials. Based on multi-location performance, 15 entries were promoted from IVT to AVT-I, while seven entries qualified for advancement to the third year of testing. One Medium Slender genotype successfully completed three years of evaluation and was identified as a promising entry for varietal consideration.

Strengthening climate-resilient rice breeding: Specialized trials targeting salinity, low phosphorus, low nitrogen, aerobic conditions, and boro ecology facilitated the identification of genotypes with enhanced tolerance to major abiotic stresses and improved nutrient-use efficiency.

Salinity Stress Trials: To identify rice genotypes suitable for salt-affected environments, coordinated evaluations were undertaken under two categories, namely Alkalinity and Inland Salinity Trials (AL & ISTVT) and Coastal Salinity Trials (CSTVT). In the AL & ISTVT, 23 entries were evaluated during the first year, of which nine superior entries were promoted to AVT-I. Subsequently, 36 entries were evaluated in the advanced trials, resulting in the promotion of seven entries to the third year, while 13 entries completing the evaluation cycle were classified as promising. Under the Coastal Salinity Trial, 38 entries were tested in the first year and 25 entries were evaluated under advanced trials. Three entries qualified for advancement to the subsequent year of testing, whereas six entries exhibited consistent superiority and were identified as promising after completion of multi-year evaluation.

Nutrient Use Efficiency Trials: The Nutrient Use Efficiency (NUE) programme continued to focus on the identification of rice genotypes adapted to phosphorus- and nitrogen-deficient soils. Separate coordinated trials were conducted for Low Phosphorus Tolerance (LPT) and Low Nitrogen Tolerance (LNT), wherein test entries were evaluated under both nutrient-deficient (0% fertilizer application) and reduced fertilizer (50% of recommended dose) conditions. Together, the LPT and LNT trials included 46 entries in the Initial Varietal Trials, of which 23 entries were promoted to the second year of testing. In the Advanced Varietal Trials, 50 entries were evaluated, resulting in the advancement of 25 entries to the third year. Among the entries completing three years of evaluation, 15 were identified as promising based on their stable performance under nutrient-limited environments.

Aerobic, Boro and Rabi Irrigated Trials: Specialized trials were continued to address specific production environments requiring adaptation to water scarcity and seasonal climatic stresses. The Aerobic Trial, intended for water-limited production systems, evaluated 60 entries during the Initial Varietal Trial and 26 entries under Advanced Varietal Trials. Based on their performance, six entries were promoted from IVT to AVT-I and seven entries advanced to the third year of testing.

Special season Trials of Boro and Rabi Season: The Boro Trial, designed to identify genotypes tolerant to low temperatures during the seedling stage and high temperatures during the reproductive phase,

included 37 entries across IVT and AVT stages. However, none of the evaluated entries qualified for further advancement during the reporting year. The Early Transplanted (Rabi) trial comprised 29 entries in the Initial Varietal Trial. Seven entries recorded superior grain yield and agronomic performance across test locations and were promoted to the second year of coordinated evaluation.

Progress in Molecular Breeding: Near-Isogenic Lines (NILs) carrying resistance to major biotic and abiotic stresses were evaluated alongside recurrent parents, with several NILs promoted to advanced trials. The 60th year of AICRP-R continued testing of Genome Edited Lines (GEL) and Direct Seeded Rice (DSR) trials, reflecting the programme's emphasis on emerging breeding technologies and climate-resilient production systems. Simultaneously, Genome Edited Lines (GELs) of elite cultivars Samba Mahsuri and MTU1010 were evaluated for high yield and stress tolerance and identified for release making India as the first country in the world to release genome edited rice varieties for cultivation.

Near Isogenic Lines (NILs) and Genome edited lines (GEL) Trial: NILs were evaluated in an exclusive AVT 2 and 1 trials during *kharif* 2024. The NILs along with their RPs were evaluated for for target traits viz., drought tolerance, submergence tolerance, coastal salinity tolerance, bacterial leaf blight and blast resistance, a separate trial across the hot spot locations across the country were conducted. The recurrent parents under evaluation were Jaya (One NIL promoted to AVT 2-IM.) WGL-14 (One NIL promoted to AVT 2-IM); Improved Samba Mahsuri (ISM) (Nine entries promoted to AVT 2 -Late trial); Krishna Hamsa (One NIL promoted to AVT 2-IM); Samba Mahsuri (two entries promoted to AVT 2 -Late trial); Swarna: Improved Samba Mahsuri two entries promoted to AVT 2 LPT); Pusa 44 (two entries promoted to AVT 2 LPT). Genome edited elite mega cultivars Samba Mahsuri with a target trait of high grain yield and MTU1010 with a target trait of drought and salt stress tolerance were in the second year of testing.

Hybrid Rice: The total area under hybrid rice cultivation reached 3.5 million hectares in 2024 and more than 80% of the total hybrid rice area is in the states of Uttar Pradesh, Jharkhand, Bihar, Chhattisgarh, Madhya Pradesh, Odisha, and Haryana. So far, 162 hybrids have been released in the country for commercial cultivation. During the period under report, 10 hybrids (all - central releases) were released and notified by CSCCSN&RV for commercial cultivation in different states of the country.

Initial Hybrid Rice Trials: During *kharif* 2024, a total of 92 hybrids were evaluated in four hybrid rice trials *viz*., IHRT-E, IHRT-ME, IHRT-M, IHRT-MS, in different locations representing North, East, Northeast, Central, West, and South zones of the country. Hybrids with significant yield advantage over the varietal check and the hybrid checks (CD @5%) are identified as promising. Details of the top three ranking hybrids in each of the trials are given below.

Breeder Seed Production: Breeder Seed Production continued to support the multiplication and dissemination of nationally important rice varieties. During Kharif 2024, breeder seed indents were received for 512 varieties and three hybrids, with a total indent of 2,971.1 quintals and production exceeding 9,186 quintals across 44 production centres. Among the varieties, MTU 7029 (Swarna) remained the most demanded cultivar, followed by MTU 1010 (Cottondora Sannalu), MTU 1001 (Vijetha), MTU 1156 (Tarangini), Mahamaya, Swarna-Sub1, BPT 5204 (Samba Mahsuri), JR 10, JR 21 and RNR 15048 (Telangana Sona). Analysis of breeder seed demand revealed that although recently released varieties accounted for the highest number of indented cultivars, several long-established varieties continue to dominate farmers' preference owing to their proven adaptability and wide acceptance.

60th ARGM recommendations for trials: An important recommendation reiterated during the 60th ARGM held in April 2025 at ICAR-IIRR concerned the promotion of entries from Initial Varietal Trials (IVTs). It was reaffirmed that the promotion of entries from IVTs to AVT-1 should continue to be based on zonal performance rather than on overall national performance. This approach ensures that entries demonstrating consistent superiority within a specific agro-climatic zone are advanced for further evaluation, while avoiding unnecessary testing of materials where they are less likely to be adapted.

The recommendation reinforces the zonal testing strategy that has been followed in recent years to improve the efficiency and relevance of varietal evaluation. Comparative analyses presented for Early Transplanted and Direct Seeded Rice trials clearly demonstrated the advantages of zonal promotion in improving selection efficiency and reducing the workload of testing centres.

The AICRPR Irrigated Rice Programme during 2024 achieved significant progress in strengthening the national coordinated testing system through successful implementation of Direct Seeded Rice trials, comprehensive multi-location evaluation of varietal and hybrid entries, efficient breeder seed production, and refinement of trial evaluation guidelines. The coordinated efforts of funded and voluntary centres enabled the identification and advancement of several promising rice genotypes suitable for diverse irrigated ecosystems. The policy recommendations emerging from the programme, particularly regarding zonal-based promotion of entries and improved evaluation of Near Isogenic Lines, are expected to enhance the efficiency, precision and impact of the national rice varietal development programme in the coming years.

2. Varietal Identification Committee (VIC)

Varietal identification committee (VIC) meeting held on 26th April 2025, 60th ARGM, at ICAR-IIRR, Hyderabad under the chairmanship of Dr. DK Yadava, DDG (CS), ICAR. A total of 56 proposals (35 varietal entries and 21 hybrid entries) submitted by 15 public and private organizations across India were reviewed and critically examined and among these 47 were identified. For the first time, proposals of genome edited lines DRRdhan100 and Pusa DST 1 were reviewed and these two entries were identified and recommended for CVRC.

Among the varietal proposals, 30 entries were identified, 4 entries were not identified, and 1 entry was recommended for repeat evaluation due to grain quality concerns. Of the 21 hybrid proposals, 15 hybrids were recommended, while 6 hybrids were not recommended because of inferior grain quality. Overall, 45 of the 56 entries (80.4%) received favourable recommendations, while 10 entries were rejected and one entry was deferred for re-evaluation.

The ICAR–Indian Institute of Rice Research (ICAR-IIRR), Hyderabad was the largest contributor, submitting 15 varietal entries (including DRR Dhan 82–91 and DRR Dhan 100, along with several improved Samba Mahsuri derivatives) and one hybrid (DRRH-7), accounting for 16 of the 56 total proposals (28.6%). Other major contributors included ICAR-Central Rice Research Institute (CRRI), Cuttack with 5 varietal entries and one hybrid (CRHR-169); Professor Jayashankar Telangana Agricultural University (PJTAU), Telangana with 6 early transplanted varietal entries; ICAR-Central Soil Salinity Research Institute (CSSRI), Karnal with five varietal entries; Indian Agricultural Research Institute (IARI), New Delhi with three varietal entries; and state agricultural universities and private seed companies that submitted one or more entries. Among the private sector, JK Agri Genetics Ltd. submitted the highest number of hybrid proposals (4 hybrids), followed by Syngenta India Pvt. Ltd. (3 hybrids), Rasi Seeds Pvt. Ltd., Kaveri Seed Company Ltd., and Mahyco Pvt. Ltd. with two hybrids each, while Rallis India, Limagrain India, Eldorado Agri-tech, Advanta Enterprises, Indo-American Hybrid Seeds, and Taj Shakthi Seeds submitted one hybrid each.

3. New Varieties and Hybrids released

In the year 2025, the Central Sub-Committee on Crop Standards, Notification, and Release of Varieties (CSCCSN & RV) released a total of 56 rice varieties and 19 hybrids. Of them, 42 (24 varieties and 18 hybrids) were central releases and 33 (32 varieties and 1 hybrid) were state releases. During 2025–26, among the varieties released, ICAR–Indian Institute of Rice Research (ICAR-IIRR) emerged as the leading contributor with 9 varieties DRR Dhan 82, DRR Dhan 83, DRR Dhan 84, DRR Dhan 85, DRR Dhan 87, DRR Dhan 88, DRR Dhan 89, DRR Dhan 90, and DRR Dhan 91, and 1 hybrid DRRH-7 released through the CVRC, the highest among all participating AICRPR cooperators. In addition to public sector institutions, several private seed companies, including Advanta, Indo-American, JK Agri, Kaveri, Limagrain, Mahyco, Prabhat Agri and Syngenta, also contributed to the release of improved rice hybrids and varieties, highlighting the collaborative efforts of both public and private sectors in varietal development.

Ecology-wise Distribution of Released Varieties: The rice varieties released during 2025–26 represented a wide range of production ecologies, addressing the diverse agro-climatic conditions of the country. Early Transplanted (ETP) ecology accounted for the highest number of releases (20 varieties with 13 CVRC and 7 SVRC), followed by Irrigated Medium (IM) (18 varieties with 9 CVRC and 9 SVRC), and Irrigated mid early (IME) (9 varieties 6CVRC and 3 SVRC). New varieties were also released for specialized environments, including Early Direct Seeded (EDS) ecologies (2) aerobic cultivation (2), low phosphorus tolerance (LPT) (2), low nitrogen tolerance (LNT) (1), biofortification (2), alkalinity and inland salinity (4), boro ecosystem (1), medium slender grain type (3), coastal salinity (1), and semi deep water (5). Four late varieties and one herbicide tolerant variety was released during 2025. This broad ecological coverage demonstrates the continued emphasis of the AICRPR on developing location-specific rice varieties to enhance productivity, resilience and sustainability across diverse rice-growing ecosystems in India.

During 2025, rice varieties and hybrids were released across 24 states and Union Territories, reflecting the extensive efforts of the coordinated rice improvement programme in developing region-specific cultivars for diverse agro-ecological conditions. The highest number of releases was recorded in Uttar Pradesh (32), followed by Odisha (28), Bihar (25), Jharkhand and West Bengal (24 each), Maharashtra and Telangana (20 each), Karnataka (15), Tamil Nadu (14) and Andhra Pradesh (13). Moderate numbers of releases were reported from Chhattisgarh (12), Haryana (11), Gujarat (10), Madhya Pradesh (9), Assam, Kerala and Puducherry (8 each), Punjab and Tripura (7 each), Rajasthan and Uttarakhand (6 each), Andaman & Nicobar Islands (4), Manipur (2) and Sikkim (1).

The released cultivars included high-yielding varieties, hybrids and specialty rice types developed for irrigated, stress-prone and region-specific production environments. Several varieties, including varieties of ICAR-IIRR and ICAR-NRRI, were recommended for cultivation in multiple states, indicating their broad adaptability and superior performance across diverse agro-climatic regions. These releases are expected to strengthen varietal diversification, enhance productivity and improve resilience of rice cultivation throughout the country.

Rice varieties and hybrids released during 2025 by CVRC

S. No	Variety Name	IET No	Cross Combination	50% FD	Ecology	GT	Pest/disease reaction	Yield (t/ha)	Recommended States
1	Sabour Kunwar Dhan (BRR 2176)	29140	IR97443-11-2-1-1-1-1-B / HUR-1304	85-90	ETP	MS	R-SB, R-NB	5.2	BR, UK, JH, WB, OD, MP, CG, GJ & MH
2	PNPG 114	30819	PNP 115 / PNP 310	101	IM	SB	MR-BLB, MR-NB	6.2	OD, BR, WB, UK & JH
3	KKL (R) 5	32036	ADT 45*4 / FL478 // CSR 27	90	AL & ISTVT	MS	MR-NB	3.4	WB, TN, PU & KL
4	TS Rice-1719 (WGL 1719)	30669	MTU 1081 / R 1556-2577	85-90	ETP	LS		5.7	MH, MP & CG
5	TS Rice-35105 (RNR35105)	36041	JGL 24423 / MTU 1156	93	ETP	MS	MR-NB	5.9	HR, RJ, PB, UK, OD, WB, JH, BR, UK, MH, MP & CG
6	TS Rice 12509 (KNM-12509)	30642	KNM 118 / IR 72// MTU 1156	88	ETP	LS	MR-NB	5.7	OD, WB, JH, BR, UK, TR, AS, MH, MP, MH, GJ & CG
7	Jagtiala Vari 28639 (JGL 28639)	30636	MTU 1010 / NLR 34449	90	ETP	LS	MR-BLB, MR-ShB, MR-NB	5.8	OD, WB, JH, BR, UK, TR & AS
8	CR Dhan 812	32123	Swarna-Sub1*4 / Robin	110-115	NIL	SB	MR-ShR	5.2	OD, WB, JH, BR, UK, TR & AS

S. No	Variety Name	IET No	Cross Combination	50% FD	Ecology	GT	Pest/disease reaction	Yield (t/ha)	Recommended States
9	CSR 108	31055	Pusa 44 / CSR 27	82-91	AL & ISTVT	LS	MR-LF	3.5-3.9	HR & UK
10	CR DHAN 417	30961	CR 3969-24-1-2-1-1-1 / CB 09 123	95-117	MS	LS	MR-SB, MR-LF	6.4	TR, AS, TN, KL, KA, PU, TS & AP
11	Mangala/B Dhan 24	29940	N22/ IET 25701	89	ETP	SB	MR-NB	6	HR, RJ, PB, UK, OD, WB, JH, BR, UP, MH, MP, CG, TN, KL, KA, PU, TS & AP
12	OUAT Kalinga Rice 20 (Jayada) (ORJ 1356)	30336	Sampada / IRGC 25966 // RP Bio 226	84	EDS	LB	MR-BPH	4.7	OD, WB&JH
13	DRR Dhan 82	30756	Swarna / MTU 1010	99	IME	MS	MR-BL	5.9	OD, WB, JH, BR & UK
14	DRR Dhan 83	32045	Krishna Hamsa /IRBB60//KH/ Tetep /// KH/ IR 96321 1447-561-B-1//KH / IR81896-96-B-B-195 ////KH/ IR 74371-46-1-1 13 //KH/DSB2	91	IME	LS	MR-BL, MR-BLB	4.6	TR, AS, TN, KL, KA, PU, TS & AP
15	DRR Dhan 84 (Mahajaya)	32051	Jaya*2 / Isogenic line of MTU1010	100-105	IM	SB	MR-BL,MR-BLB, R-PH	5.5	OD, BR, JH, MH, TN, TS & AP
16	DRR Dhan 85	32054	Improved Samba Mahsuri*2 / Abhaya// ISM*2 / Aganni	96-105	MS	MS	R-BLB	5.4	TS, AP, TN, KA, CG, JH, BR, OD, JH & BR
17	DRR Dhan 87	31110	Swarna*1 / IRGC 4105	109	LPT	MS	MR-BS	5.1-5.5	OD, JH, BR, KA, TS & AP
18	DRR Dhan 88	28070	KMR3 / *Oryza rufipogon*	100	LPT	SB		5.7-5.9	MH, KA, TS & AP
19	DRR Dhan 89 (Super Swarna)	32064	Swarna*2 / Improved Samba Mahsuri	103-108	Late	MS	R-BL, R-BLB, MR-SB, MR-LF	5.3	OD, WB, JH, BR & UK
20	DRR Dhan 90	29581	BPT5204/ Varadhan	100-103	LNT	SB	MR-SB, MR-BPH, MR-WBPH, MR-PH, MR-NB	4.1-4.6	KA, TS & AP
21	DRR Dhan 91	32061	Improved Samba Mahsuri*2 // Tetep / Swarna Sub1	98	MS	MS	MR-PH	4.9	TS, AP, TN, KA, CG, OD, JH, BR, GJ & MH
22	IIAB Dhan 5	30656	PR 36921-B-6-1-3-4 / IRRI 154 // IR09A228	94	Irrigated ETP	LS	MR-NB	5.7	OD, WB, JH, BR, UP, TR & AS
23	ADV 8200 UPLRH181325	29694	OCN3563A / OCN4895	115-120	ETP	LB	MR-BS, MR-GM, MR-NB	6.3	HR, RJ, UK,PB, UP, OD, WB, JH, BR,UP, MH, MP, CG, MH & GJ
24	JKRH-2062 (JKRH-1004)	29700	JKRA 1132 / JKRR 10728	80-85	ETP	LS		6.8	HR, RJ, UK, PB & UP
25	JKRH-2082 Suraksha (JKRH-1135)	30579	JKRA 1119 / JKRR 10657	98	IME	LB	MR-SB, MR-NB	6.6	OD, WB, JH, BR & UP
26	JKRH-2601	28956	JKRA 1121 / JKRR 10708	90	ETP	LB	MR-NB	5.9	MH, MP, CG, MH & GJ

S. No	Variety Name	IET No	Cross Combination	50% FD	Ecology	GT	Pest/disease reaction	Yield (t/ha)	Recommended States
27	JKRH-2092 (JKRH-1170)	30561	JKRA 1121 / JKRR 10752	85-90	ETP	LB	MR-NB	6.8	HR, RJ, UK, PB & UP
28	Srikar 2123 (SRH 333)	30573	SRA104 x SRR103	85-95	IME	LB	MR-BS, R-GM	6.4	OD, WB, JH, BR, UP, TR & AS
29	LG90303	30593	ATPDA 0029 / ATPR 2096	93-97	IME	LB	MR-BLB, R-NB	6.8	OD, WB, JH, BR, UP, MH, MP, CG, TN, KL, KA, PU, TS & AP
30	Indam 200-055	30604	IAHS24A / IA 17 R	105	IM	LB	MR-LF, MR-NB	6.9	OD, WB, JH, BR, UP, MH, GJ, TN, KL, KA, PU, TS & AP
31	MRP 5499 (MEPH 170)	30608	PMS575 / PR 935	97-100	IM	LS	R-RTV, R-NB	6.5	HR, UK,PB & UP
32	RRX 3366	30574	RP36A / RPV1897	91-95	IME	LS	MR-LF, MR-NB	6.7	HR, UK, PB & UP
33	CR Sankar Dhan -706	30613	CRMS31A / CR22-1-5-1-2	105-109	IM	LB	MR-BPH, MR-WBPH, MR-LF	6.9	OD, WB, UP, JH & BR
34	RNE-0456 (NK7104)	30603	10112A / XaR593	105	IM	LS	MR-BLB, MR-ShB, MR-BS, MR-NB, MR-ShR	7.1	TN, KL, KA, PU, TS & AP
35	RNE-0463 (NK7006)	30605	10192A / XaR593	105	IM	LS	MR-BLB, MR-ShB, MR-BS, MR-NB	6.6	OD, WB, JH, UP & BR
36	ICAR NEH TRC 739	30772	Gomati / TRa Sarat	105	IM	LS	MR-BLB, MR-ShB, MR-BS, MR-NB, MR-ShR	5.5	OD, BR, WB, UP & JH
37	DRRH-7	30165	IR 79156A / PSV729R	95-100	AL & ISTVT	LS	MR-BS, MR-NB	3.5	HR, UP, UP & TN
38	Pusa Rice Hybrid 60 (Pusa RH 60)	28965	Pusa 1S/ PRR 418	91	ETP	LS	MR-NB	5.4	BR & UP
39	KRH 7374 (Kaveri-7374)	30565	KR20SA 049 / KR20SR 055	85-90	ETP	SB	MR-BLB,MR-NB	6.9	HR, RJ, UK,PB & UP
40	KRH 7117 (Kaveri-7117)	31193	KR20SA 050 / KR20SR 054	75-80	EDS	LB	MR-BS	2.8-4.8	MH & GJ

Rice varieties and hybrids released during 2025 by SVRC

S. No	Variety Name	IET No	Cross Combination	50% FD	Ecology	GT	Pest/disease reaction	Yield (t/ha)	Recommended States
1	Jagtiala Vari- 33124 (JGL-33124)	28764	JGL 1798 / Mahamaya	105-110	IM	MS	MR-BPH, MR-NB, MR-ShR	6.7	TS
2	Jagtiala Vari- 28639 (JGL-28639)	30636	MTU 1010 / NLR 34449	90	ETP	LS	MR-BLB, MR-SB, MR-LF, MR-NB	5.8	TS
3	Warangal Vari-1246 (WGL 1246)	28406	Kavya/ JGL 13595	95-100	ETP	MS	MR-ShB, MR-BPH, MR-NB	6.8	TS
4	Kampasagar Vari-6251 (KPS-6251)	29975	MTU 1010 /Chittimuthyalu	85-90	ETP	MS	MR-BPH, MR-GM, MR-MB	5.5	TS
5	Rudrur Vari-1162 (RDR-1162)	29160	JGL11727 / JGL17004	85-90	ETP	SS	MR-BPH, MR-GM	6.6	TS

S. No	Variety Name	IET No	Cross Combination	50% FD	Ecology	GT	Pest/disease reaction	Yield (t/ha)	Recommended States
6	Rudrur Vari-1200 (RDR-1200)	29305	JGL-3844 / NLR 34449	100-105	IL	SS	MR-BPH, MR-GM	6.4	TS
7	Indravati Dhan	28634	IR 86857-46-1-1-2/ Danteshwari	75-80	Aerobic/ Rainfed	LS	MR-LF	5.1	CG
8	Malviya Dhan 105 Sub 1	28024	HUR 105*2/ IR64 Sub1	100-105	SVT	MS	MR-NB	4.6	UP
9	Phule Super Pawana (IGP-13-12-19)	30816	Mutant of Pawana	106	IR	LS	MR-BS, MR-SB,MR-BPH	4.7	MH
10	Sikkim Organic Chirakey Selection-1	30517	NA	140	IR	SM	MR-RTV, MR-ShR	5.9	SK
11	Gangavathi Churumuri (GNV 1109)	30167	Selection from introgressed population of ISH58 /MATATAGA 6 from INGER material	95-100	IVT-AL & ISTVT	LS		5.9	KA
12	CAU-R5 (Emoinu phou)	30811	CAU-R1 / Akhanphou	90-100	IM	LB	MR-FS	6	MN
13	RC Manichakhao-1	32893	Chakhao Poireiton/ RC Maniphou7	105±3	Coloured Rice	LS	MR-BL, MR-SB, MR-GM, MR-ShR	4.5-5.0	MN
14	Irabati CN2068	25903	Rajdeep / IR 84196-32	119	SDW	LS	MR-SB, MR-LF	5.4	WB
15	Suvashini HTW-46-IR 16L1833	29216	IR09L204*3 / CICIH GEDU	95	IME	LB	R-BS,MR-NB	5.2	WB
16	Lachmanti HTW-33-IR 105690-1-1B-B	28367	MTU1010*3 / Khao Nok	90	ETP	LS	MR-BLB, MR-BS, MR-LF, MR-ShR	5.3	WB
17	Musafir HTW-30-IR 90257-B-273-1-B-B	28374	CT 9993-5-10-1-M / Sambha Mahsuri*2	96	ETP	LB	MR-BPH, MR-LF, MR-NB, MR-FS	5.5	WB
18	ADT 60	28471	AD 01246 /CO (R) 49	95-100	IM	MS	MR-BLB, R-RTV, R-ShB, MR-SB, MR-GM, MR-LF, MR-ShR, MR-FS	6	TN
19	CO 59 (CBMAS 14065)	24247	Improved white ponni / Apo	105	IM	MS	MR-WBPH, MR-LF	5.8	TN
20	PDKV Sakshi	31949	Mahamaya/ PKV HMT	90	Biofort	LS	MR-SB	4.3	MH
21	Phule Maval-7 (VDN-1808)	31691	VDN 3-3-2-1 / KJT-2	105-110	Late	LS	MR-BS, MR-SB, MR-NB	NA	MH
22	Konkan Suwas (RTN 15M6-52)	30820	Mutant selection from Super Basmati	85-90	IM	LS	R-SB, R-GM, MR-NB, MR-ShR	4	MH
23	CR Dhan 325	29240	DH of 27P69	90-95	IME	MB	MR-BS, MR-SB, R-LF,MR-NB, MR-ShR	5.4	OD
24	CR Dhan 215	29446	DH of Savitri/ Pokkli	77	Aerobic	MB	MR-BS, MR-BPH, R-LF, MR-NB, MR-ShR	4.1	OD
25	CR Dhan 335	30754	Doubled haploid through anther culture of 27P69 (three-line hybrid)	90-95	IME	MS	MR-BPH, MR-NB, MR-SHR	5.5	OD

S. No	Variety Name	IET No	Cross Combination	50% FD	Ecology	GT	Pest/disease reaction	Yield (t/ha)	Recommended States
26	CR Dhan 912	26446	Doubled haploid derivative of BS 6444G	100	Boro	LS	R-SB, MR-BPH, R-LF, MR-NB, MR-FS	5.9	OD
27	CSR 64 (CSR TPB 99)	27723	PB1/ TRY1	100	Salt affected soil	LS	MR-LF, MR-NB, MR-ShR	4.3	UP
28	HKR-49	27866	IR 09L272 / IR 10L146	88	ETP	LS	MR-BS, MR-SB, MR-BPH, MR-LF, R-FS	5.7	HR
29	Dweep Dhan-7	25008	SBIR 67471-M-8-1-1-1-1/SABITA	105	Rain-fedlow-land	MS	R-BLB, MR-ShB, MR-SB	5.5	AN
30	Dweep Dhan-8	25010	Selection from local highly popular landrace of rice C14-8 (Aath Number Dhan	185	Rain-fedlow-land	SB	MR-ShB	4.1	AN
31	Dweep Dhan-9	25019	PLS from local highly popular landrace of rice C14-8 (Aath Number Dhan),	186	Rain-fedlow-land	SB	MR-ShB	4.1	AN
32	Dweep Dhan-10	32176	IR HHZ 4-DT3-Y1-Y1	134	Rainfed lowland	SB	MR-ShB, MR-SB	6.3	AN
33	CR Sankar Dhan-705 (Ganga)	29752	CRMS32A/CR22-1-5-1	100-102	IM	LS	MR-BPH, MR-LF, MR-NB, MR-ShR, MR-FS	7.5	OD

4. Monitoring of AICRP on Rice trials during 2025

- The monitoring teams comprising of scientists from IIRR, CRRI and IARI visited different AICRIP centres during *kharif* 2025. The information received from field monitoring and evaluation of AICRIP trial across different zones of India, coordinated from IIRR and zone wise proceedings of the monitoring was compiled and employed in evaluation trials and entries.
- Multi-disciplinary teams comprising scientists from Crop Improvement, Crop Production and Crop Protection of IIRR, NRRI and IARI monitored the AICRP-R trial conduct in various ecologies in all the seven zones of the country. To assess the performance of the entries, 12 teams visited the centres mostly during crop reproductive phase.
- Overall conduct of AICRP-R trials was highly satisfactory, with the majority of funded and voluntary centres conducting the allotted varietal, hybrid, agronomy, pathology, entomology and special ecology trials as per the technical programme. Most trials exhibited good crop stand, proper field layout and satisfactory expression of test entries.
- Segregation, off-types and varietal mixtures were observed in several entries across centres, particularly in IVT, biofortification, coloured rice, DSR and hybrid trials, indicating the need for improved seed purification and quality assurance before nomination to coordinated trials.
- Biotic stresses varied across production ecologies, with brown planthopper, stem borer, gall midge, blast, bacterial leaf blight, false smut, sheath blight, leaf folder and neck blast being the major constraints affecting trial performance at several

locations, reaffirming the importance of multi-location screening for identifying stable resistant genotypes.

- Weather-related factors significantly influenced trial performance at several centres. Heavy rainfall, flooding, salinity, delayed sowing, lodging, poor germination and submergence affected crop establishment and expression in some trials, while a few locations were considered unsuitable for specific ecologies because of climatic or edaphic limitations.
- Several centres demonstrated excellent infrastructure and strong technical capacity, including advanced facilities for drought and salinity screening, herbicide tolerance evaluation, speed breeding, marker-assisted breeding, genome-edited materials, nutrient-use efficiency and Direct Seeded Rice (DSR) research, highlighting the strengthening of the national coordinated rice research network.













5. National Seed Project and Breeder Seed Production

Breeder seed production of rice varieties and parental lines of rice hybrids as per the DAC indents was organized at 42 centers across the country, involving 565 varieties and parental lines of 2 rice hybrids. A total of 11005.69 quintals of breeder seed was achieved against a target of 3491 quintals during *kharif* 2025. Zone wise Breeder seed production was for 69 varieties in Northern zone with a production of 1102.73 q against 406.67 q allotment, eastern zone for 190 varieties with a production of 162.41 against 690.41 q allotment, southern zone for 73 varieties with a seed production of 1066.78 q against 329.13 allotment and central and western zone for 61 varieties with 4382.14 against 730.3q allotment.

At IIRR center, 35 varieties were included in breeder seed production with a total production of 328.75 quintals against the target of 203.17 quintals.

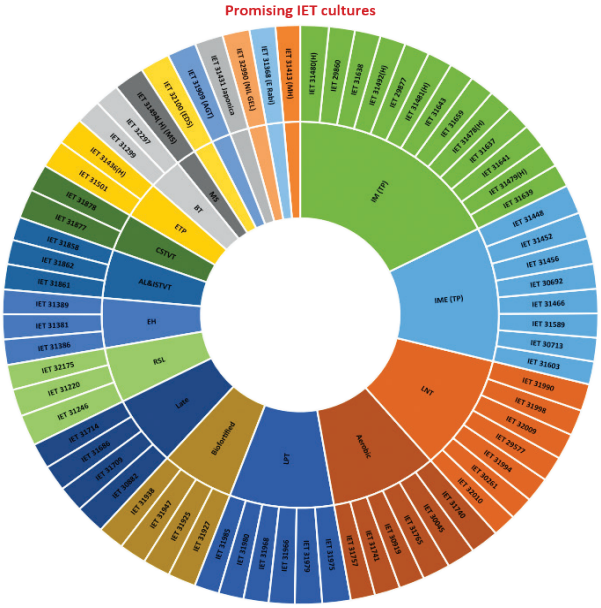
6. DUS tests in Rice

During *kharif* 2025, testing of 162 entries, including 11 varieties of common knowledge (VCKs), 3 farmer varieties (FVs), 87 first-year entries (including 2 essentially derived varieties [EDVs] and their initial varieties [IVs]), and 61 second-year entries (including 1 EDV and its IV), along with 39 reference varieties (RVs), was carried out at ICAR-Indian Institute of Rice Research, Hyderabad, as per the DUS guidelines. The entries were evaluated following standard operating procedures including standard agronomic practices. Adequate plant population, as per crop-specific guidelines, was maintained to ensure the recording of observations. DUS characterization for 62 traits was completed systematically, and off-types were documented with photographic evidence. Bacterial leaf blight screening was also conducted for 3 EDVs, 3 IVs, and 3 check varieties to evaluate disease response as per protocol. ICAR-IIRR, being the nodal centre for DUS testing in rice, has facilitated the revision of rice DUS testing guidelines (under the chairmanship of Padmashri Dr. AK Singh). Further, a final approved draft of the revised DUS testing guidelines in rice has been submitted to the Chairperson, PPV & FRA for the final approval. The suggested special characters, including grain nutritional traits, screening for disease and pest resistance, and associated molecular assays, are also added to the revised guidelines. During rabi 2025-26, maintenance breeding activities were conducted on 114 reference and example entries.

II. Crop Production

1. Agronomy

- A total of 103 AVT-2 entries belonging to 21 categories were evaluated at different locations under two levels of nutrient application, i.e., 50 and 100 % of the recommended dose of nutrients along with standard and local cultivars to identify stable, high yielding and efficient genotypes. The promising genotypes under different trials are listed in tabular form and given below.



Trial No.	Trial name	Promising genotypes
4.1(a)	AVT 2 E (H)	IET 31381
4.1(b)	AVT 2 M (H)	IET 31413
4.1(c)	AVT-2 Japonica	IET 31431
4.1(d)	AVT-2 E (TP)	IET 31501 and IET 31436 (H)
4.1(e)	AVT-2 IME (TP)	IET 31448, IET 31452 and IET 31456
4.1(f)	AVT-2 IM (TP)	IET 31480 (H), IET 29860 and IET 31638
4.1(g)	AVT-2 Late	IET 28524
4.1(h)	AVT-2 Aerobic	IET 31740 and IET 30045
4.1(i)	AVT 2 MS	IET 31494(H)
4.1(j)	AVT 2 Biofort	IET 31927, IET 31925 and IET 31947
4.1(k)	AVT 2 AL & ISTVT	IET 31861 and IET 31862
4.1(l)	AVT 2 CSTVT	IET 31871 and 31878
4.1(m)	AVT 2 AGT	IET 31909
4.1(n)	AVT 2 LPT (Phosphorus efficient cultivars)	IET 31966, IET 31986 and IET 31985
4.1(o)	AVT 2 LNT (Nitrogen efficient cultivars)	IET 32009 and 31998
4.1(p)	AVT 2 NIL & GEL	IET 32990 and IET 32964
4.1(q)	AVT 1 HT	G1
4.1 (r)	AVT 2 BT	IET 32297
4.1 (s)	AVT 2 - EDS	IET 32100
4.1 (t)	AVT 2 E (Rabi)	IET 32072
4.1 (u)	AVT 2 – Rainfed Shallow Lowland	IET 31246

- **Suitable package and practices for higher yield in dry DSR:** Across locations, raised bed sowing (4.6–4.9 t/ha), mechanized line sowing (5.0–5.1 t/ha), improved methods (4.8–5.0 t/ha) and location-specific methods (up to 5.2 t/ha) recorded superior grain yield compared to broadcasting (3.8 t/ha).
- **Suitable package and practices for higher yield in wet DSR:** Mechanized and line sowing methods proved superior and more economical, ensuring higher productivity and better resource-use efficiency in wet DSR systems across diverse locations.
- **Conservation Agriculture/system based management practices in rice and rice-based cropping systems (crop diversification) for higher profitability:** The trial on Conservation Agriculture (CA) and crop diversification in rice-based systems at Karjat and Ghaghraghat reveals that while traditional transplanting remains the most productive method, specific diversification options like Chickpea and Mustard offer viable pathways for system profitability.
- **Analysis of long-term meteorology data (temperatures and rainfall) for identifying the reasons for yield reduction:** The Random forest (R^2=0.95) algorithm resulted in predicting the yield of the rice crop; its predictive capability can be further enhanced by incorporating larger multi-year datasets.

Long term trial on Weed Dynamics in Direct Seeded Rice (DSR)

Weed Groups (Dominant species)	Zones
Grasses – *Echinochloa colona fb Echinochloa crusgalli, Isachne miliacea, Leersia hexandra, Leptochloa chinensis*	Northern, Eastern, Central
Sedges – *Cyperus iria, Cyperus difformis, Fimbristylis miliacea, Cyperus rotundus*	Western, Southern
BLW - *Ludwigia parviflora, Eclipta alba, Monochoria vaginalis* and *Marsilea quadrifolia*, along with aquatic weeds like *Sagittaria* and *Vallisneria*	Highest diversity & strong regional specificity across zones

- The systematic weed monitoring survey conducted across 11 locations in seven agro-climatic zones reveals a complex and shifting weed landscape influenced by establishment methods, regional moisture regimes, and management intensities.

- Farmers' field weed monitoring in different rice establishment systems across five zones and 11 locations reveals a significant shift in weed dynamics, characterized by the emergence of drought-tolerant grasses (*Leptochloa chinensis, Eleusine aegyptiaca. Cyanodon dactylon*), perennial sedges, weedy rice, aquatic weeds (Algae, *Ceratophyllum*, Water hyacinth) in West Bengal, Assam, Kerala. Management strategies range from 100% chemical-led systems in the North Zone to totally manual, labour-intensive practices in the Western and Northeast Zones.
- Yield maximization Trial was conducted at 15 locations confirmed that, 125% Location Specific Recommended Dose of Fertilizer + FYM @ 5 t/ha consistently recorded higher grain yield.
- A yield gap assessment across major rice-producing States demonstrated significant disparities between potential and actual rice yields, with gaps of 4.38% to 15% with average gap of 4.66% indicating the substantial untapped potential. A comparative analysis of yield performance across Districts in Assam, Gujarat, Kerala and Puducherry indicated 14.80% lower yields in DSR than TPR reflecting current Agronomic and Adoption challenges except Kerala with a gain of 3.57%.
- Integrated Pest Management – on farm management of Insects, Diseases and Weeds in DSR conducted across five zones in nine locations, showed that IPM consistently outperformed traditional farmers' practices delivering significant weed control (reduced weed population and biomass) and grain yield advantages.
- To evaluate the suitability of drones to different Agronomic practices and pesticide application, a multidisciplinary trial was conducted at eight locations in six Zones, revealed that herbicides application by drone was comparable to application by knapsack sprayer in efficacy in controlling grasses, sedges and broad-leaved weeds, and recorded grain yield and economical than knapsack sprayer application.

2. Soil Science

Long-term soil fertility management in rice-based cropping systems (RBCS)

The 36th-year results of long-term soil fertility management experiments in rice-based cropping systems indicated the superior performance of RDF + FYM in recording maximum grain yield at Maruteru (MTU) and Titabar (TTB) in the Rabi season. Nutrient omission and reduction of NPK to 50% resulted in yield reduction at all three centres in both seasons. Replacement of 50% NPK using FYM and GM+FYM recorded a decrease in grain yield, i.e. -17, -27, -18 and 7% over RDF in Maruteru; an increased trend (ranging 8-20%) was observed in TTB over RDF. In contrast, 50% NPK replacement with organics exhibited improvement over RDF during Kharif at MTU and TTB. The addition of organics improved soil fertility in general, especially organic carbon to a great extent. Considerable reduction of soil available NPK was observed in omission plots compared to RDF at all three locations. Supplementary doses of FYM along with RDF recorded a higher growth rate in productivity with 82, 63 and 52 kg/ha/year at MTU, TTB and MND, respectively, in Kharif for 36 years. The higher sustainable yield index (SYI) was maintained with the RDF + FYM added treatment across the years at MTU and TTB; 50% NPK + 25% FYM + 25% GM treatment recorded the highest SYI in the rice-cowpea system at Mandya. The long-term effects of nutrient management practices on soil fertility parameters are reflected in Table 1.

Table 1: Changes (%) in soil fertility parameters from 1989 to 2024

Treatments	Maruteru (MTU)				Titabar (TTB)			Mandya (MND)			
	OC	N	P	K	OC	P	K	OC	N	P	K
Control	18.0	-61.0	168	-17.3	-43.2	-17.4	-51.0	-31.4	-52.8	69.0	-16.1
100% NPK + Zn + S	40.4	-45.2	221	-10.5	61.1	174.2	7.9	57.1	3.5	150.3	84.0
100% NPK + Zn + S + 5 t/ha FYM	62.9	-37.0	296	-14.6	76.8	169.7	20.1	97.1	17.7	195.9	109.3
50% NPK + 25% GM-N + 25% FYM-N	53.9	-41.5	242	-5.4	61.1	160.6	11.1	91.4	20.6	185.8	114.4
FYM @ 10 t/ha	67.4	-50.0	234	-9.9	66.3	152.3	10.9	105.7	15.8	162.9	105.8

Management of sodic soils using nano zinc formulations

In a study on "Management of Sodic soils using nano zinc formulations", two genotypes were evaluated with seven different set of nutrient management practices at four different locations. Significant genotypic and location-specific differences in yield parameters and yield were observed at all four locations. At Kanpur, soil application of ZnSO4 @ 50 kg/ha registered higher grain (4.35 t/ha) and straw (5.36 t/ha) yields whereas at Mandya and Faizabad, foliar application of nano Zn @ 50 ppm recorded significantly higher grain (6.29 t/ha, 4.97 t/ha) and straw yields (6.90 t/ha, 6.65 t/ha) respectively. Foliar spray of silicic acid @ 80 ppm has recorded higher grain yields (3.90 t/ha) straw (5.32 t/ha) yields at Pusa. In case of Varieties, DRR Dhan 48 found superior at Mandya, Pusa and Faizabad and CSR23 performed better at Kanpur. Nutrient uptake also followed similar trend as that of grain and straw yields. The variety DRR Dhan 48 has accumulated higher amount of NPK Zn at Mandya, Pusa and Faizabad, whereas CSR 23 recorded significantly higher nutrient uptake at Kanpur.

Management of acid soils

The acid soil management trial demonstrated that the combined application of the recommended fertilizer dose along with dolomite (250 kg ha^{-1} applied 30 days after transplanting) and potassium silicate (four foliar sprays at 15-day intervals from 15 DAT) significantly enhanced grain yield over RDF alone, recording yield increase of 48% at Moncompu and 11% at Sirsi**.** The variety Uma recorded 5.5 % higher grain yield than Vasundhara at Moncompu, while at Sirsi, a significantly higher grain yield was observed in Vasundhara (3.73 t/ha) compared to Jyothi (2.63 t/ha) variety.

Residue management in rice-based cropping systems

The disposal of huge quantities of paddy residues is a big problem, particularly in North-West Indian states, resulting in farmers preferring to burn the residues in situ, leading to air pollution, smog and loss of appreciable amounts of plant essential nutrients besides being deleterious to soil microbes. The trial was conducted this year at ten centres. Supplementing one fourth (25% N) of the recommended N through residues along with microbial consortium, Pusa Decomposer yielded at par with RDF (100% N) in terms of grain yield at eight of the ten centres studied. The results show that the crop residues along with Pusa decomposer can be deployed to substitute 25% of the recommended nitrogen without yield penalty. Application of RDF alone or combined with crop residues/MC/GM to supply the N requirement on equal basis (50%:50%) or (75%:25%) resulted in nutrient uptake values (17-148 kg N/ha, 2.66-73.8 kg P/ha and 14-156 kg K/ha) which were at par with each other and significantly higher than absolute control, across the centres. Nutrient use efficiencies were lower in RDF as compared to crop residue treatments which were mostly at par with each other.

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

Application of nano urea improved the tiller, panicle numbers, and grain yield of rice crops over the absolute N control. A dual spray of nano urea in addition to 100% RDN showed a yield advantage with a minimum value at Khudwani (0.5%) to a maximum at Rajendranagar (20.6%) over RDF treatment. Similarly, this treatment performed well with the total N uptake at the majority of the locations. Replacement of 25 and 50% of RDN with nano urea spray at two intervals (T3 and T5) recorded a declining trend in the grain yield to the tune of -4 to -38% (T3) and -0.4 to -17.5% (T5), respectively over the recommended dose of practice i.e. 100% N and found ineffective for yield attributes, N content etc. across the locations.

Evaluation of organic fertilizers and natural farming practices for enhancing productivity and soil health

The study on Evaluation of Organic fertilisers and Natural farming practices for enhancing the productivity and soil health, in terms of grain and straw yield, the treatment Integrated Crop Management (need-based pest management) was significantly superior as compared to other treatments at most of the locations. With regards to yield parameters, the treatment integrated crop management (need-based pesticides) recorded significantly higher values as compared to other treatments at CHN, CHP, KUL, MND, MTU, PNT, PUSA, GHT, PTB and RPR locations, but at MNC and CHT, the integrated

crop management treatment and AI-NPOF package recorded higher values respectively. Most of the location soil properties improved with Integrated Crop Management (need-based pest management), while at TTB and CHT, soil properties improved with the AI-NPOF package compared to other treatments.

Assessment of bio-fortified rice genotypes response to Zn application and assessing agronomic bio fortification potential

The zinc bio fortification trial revealed that foliar application of 0.5% Zn at active tillering, panicle initiation, and one week after flowering consistently enhanced grain yield, panicle fertility, and spikelet fertility across locations. Soil test-based zinc application combined with foliar Zn sprays at panicle initiation and one week after flowering, as well as the three-stage foliar Zn application schedule, resulted in higher grain Zn concentration, particularly at Cuttack, Maruteru, and Varanasi. Among the tested varieties, CR Dhan 315 and Swarna recorded the highest grain yields. Significant genotype × Zn treatment interactions for yield, yield attributes, and grain Zn content underscored the importance of location- and genotype-specific zinc management strategies.

Assessment of carbon dynamics in rice ecologies and recarbonising rice soils for sustainable production

The study on Assessment of Carbon Dynamics in Rice Ecologies and Recarbonisation of Rice Soils for Sustainable Rice Production aimed to evaluate the status of soil organic carbon across major rice-growing ecologies of India and develop carbon stock estimates and maps under All India Coordinated Improvement Programme on Rice (AICRPR). The highest Soil Organic carbon status (maximum of 0.97%) was estimated in rice ecologies of Udhamsingh Nagar district of Pantnagar, and the lowest of 0.15% from Karaikal centre. Very labile carbon varied from 0.03 - 0.90 %, labile carbon varied from 0.02 to 0.26%, less labile carbon varied from 0.01 - 0.59%, and non-labile carbon varied from 0.03 to 0.76% across the depths. The soil organic C stock in the first 0-20cm increased considerably over soil depths such as 20-40 and 40-60 cm depths, and an increase of more than 10% was observed. On an average, in all rice ecologies top surface soils recorded 23% and 10% higher soil carbon stocks over lower soil profiles and were on par with each other in different rice ecologies of the same zone.

3. Plant Physiology

- Physiological studies under AICRIP 2024-25 were constituted in six trials at eight funded centres, two ICAR institutions and six voluntary centres.
- A new trial for DSR was initiated during 60th ARGM 2025, for phenotyping of rice germplasm for physiological traits for dry direct seeded rice to identify donors and traits which contribute to the success of DSR. Among the tested entries, entry GEN19 and GEN41 performed the best in terms of various physiological traits at all four locations.
- On the basis of various parameters and drought susceptibility indices, it was found that RFU115 is the outstanding drought-tolerant genotype, followed by RFU103 and RFU118. These entries can be used as donors in breeding programmes targeting rainfed ecosystems.
- Among the tested entries for heat stress tolerance, it was observed that entry HT-101 and HT-106 possess robust physiological mechanisms for maintaining grain yield and stability under heat stress.
- As per the observations, entry AC 42088 and AC 1996, were found to be highly tolerant to submergence stress with high survival ability of 90.56% and 84.44%, respectively. The high submergence stress tolerance and survival ability can be attributed to the lower internode elongation and conservation of high leaf starch content during the stress period.
- Out of 35 entries, AC40331, AC1303, NICRA 20, AC42088, and CR-4084-2-1-Sal-1 were found to be tolerant to both anaerobic germination and salinity stress. The genotypes, AC40331 and CR-4084-2-1-Sal-1, were tolerant to both anaerobic germination and osmotic stress. The genotypes, AC40331, CR6509-300gy-11-Sal-4-3-B, CR 6509-400gy 6-Sal-3-5-B, CR-4084-2-1-Sal-1, RP6469-143 were tolerant to both salinity and osmotic stress. Interestingly, we identified two promising entries, AC40331 and CR-4084-2-1-Sal-1, which showed tolerance to all three stress conditions.

- Among all genotypes evaluated, IET33159 emerged as the most promising shade-tolerant cultivar, consistently outperforming others in grain yield, panicle weight, spikelet number, and grain number per panicle under stress across locations. IET33125, IET33264, IET33127, CR6549, IET33150, and IET31237 also demonstrated notable tolerance, contributing superior chlorophyll maintenance, biomass production, and grain quality under reduced irradiance.

III. Crop Protection

1. Entomology

All India Coordinated Entomology Programme was organized and conducted during kharif 2024 with seven major trials encompassing various aspects of rice Entomology. During kharif 2024, 345 experiments were conducted (99.14%) out of 348 experiments at 41 locations (IIRR, 30 funded & 10 voluntary centres) in 22 states and one Union Territory.

Host Plant Resistance Studies:

Host plant resistance studies screened 1,967 entries against 14 insect pests in 281 valid tests, identifying 136 promising lines (6.91%), including 24 under retesting, through six experiments comprising pre-breeding lines, hybrids, varieties, donors, and checks evaluated under both greenhouse and field conditions for multiple pest resistance.

In the pest-specific screening trials under multilocation testing, the entries MTU 2721-7-1-2-1, MTU 2720-28-2-1-1, MTU 2721-7-1-2-2, RP 6740-SP-M-MS-70, MTU 2716-28-2-1-2, MTU 2716-28-2-2-2, RP 5977-MS-112*, ISM B-8, and JGL 38935 were found promising against planthoppers; RMS (ISM24), RMS (ISM26), WGL1909, RGL294, RNR 3500, and NLR 5942-13-1-1-1-1 against gall midge; RP5490, PTB 1-1-2, BPT 3284, ADT 22037, NWGR 18083, NPK 65, and NWGR 18084 against leaf folder; and 0615-PTB-01-23-21, NLR 5892-21-4-1-1-1-2, NLR 5930-2-1-2-4-1-1, HKP-ISM-M8-9, RP5564 PTB 2-4-1-2, IET 32031, and NLR 5932-3-2-3-5-5-2 against stem borer. Entries RP6605-40, NND2, CGR15-49, IBTWGL2, and BPT3194 found promising against multiple insect pests.

National Screening Nurseries (NSN) comprised of IIRR- NSN for irrigated ecology and CRRI -NSN for rainfed ecology IRRI-National Screening Nurseries (NSN) comprised of 4 trials -National Screening Nursery 1 (NSN1), National Screening Nursery 2 (NSN2), National Screening Nursery – Hills (NSN hills) and National Hybrid Screening Nursery (NHSN). A total of 1,580 entries were evaluated against major insect pests of rice, leading to the identification of several promising entries.

Insect biotype studies: Screening of 20 gene differentials against BPH across 12 locations identified RP2068-18-3-5, PTB33, Salkathi, and T12 as resistant to planthopper. Assessment of BPH virulence at five locations showed that Gangavathi population as most virulent. Evaluation of 20 gene differentials in 13 field tests across 12 locations identified Aganni (*Gm8*) and INRC3021 (*Gm8*) as resistant in 8 tests, RP6749 (*Gm4+Gm8*) in 6, and W1263 (*Gm1*) and Kavya in 4, validating *Gm8/Gm1* genes. Monitoring of gall midge virulence at seven locations revealed regional variations.

Chemical Control Studies: Seed treatment with Carbosulfan 25% DS or thiamethoxam 70% WS caused 59.2% and 57.2% reduction in gall midge silver shoots, while treatments with chlorantraniliprole 50% W/W FS reduced yellow stem borer dead hearts and white ears by 64.7% and 54.8%. Chlorantraniliprole treatment recorded the highest grain yield gain (32.2%), followed by carbosulfan (26.3%) and thiamethoxam (21%). Sequential application of triflumezopyrim 10% SC @236 ml/ha and pymetrozine 50% WG @300 g/ha effectively suppressed brown planthopper, white-backed planthopper, and green leafhopper populations by 42.2%, 38.9%, and 27.2%, respectively. Grain yield improved by 25.4% over the control. Evaluation of *Nilaparvata lugens* from five major rice regions revealed regional differences in susceptibility to acephate, dinotefuran, pymetrozine, and triflumezopyrim. Gangavathi populations showed the lowest sensitivity, whereas triflumezopyrim was consistently the most potent, with LC_{50} values ranging between 0.17-2.08 ppm.

Drone spraying of agrochemicals (Herbicides, Fungicides & Insecticides) outperformed knapsack spraying, achieving reductions of 65.5% in dead hearts, 51.9% in white ears, 59.4% in silver shoots, 70.5% in leaf folder damage, and 63.4% in WBPH populations. Drone application also lowered disease

incidence (leaf blast 53.6%, sheath blight 48.7%) and increased grain yield by 25%, with no phytotoxicity observed.

Biocontrol and Biodiversity Studies: *Bacillus thuringiensis* NRRI TB 261 showed superior control of stem borer (2.56–5.80%) and leaf folder (6.31%) with yields up to 6067 kg/ha. Chemical treatments recorded higher yields (6433–7567 kg/ha) but caused significant reductions in mirid, spider, and coccinellid populations. Untreated plots showed the highest pest incidence with low yield (1700–3049 kg/ha).

Ecological Studies: Dry DSR recorded the lowest stem borer incidence (5.7% DH, 8.4% WE) and gall midge (11.3% SS), compared to wet DSR (14.2% DH, 14.7% SS) and normal transplanting (9.4% DH, 29.6% SS). Leaf folder (11.5%), thrips (28.3%), and caseworm (15.7%) were highest in normal transplanting, indicating overall lowest pest incidence under dry DSR. Natural farming treatments revealed lowest pest incidence in T5 (50% organic + 50% inorganic + need-based pesticides), showing minimal dead hearts, white ears, leaf folder, and BPH compared to T1 (control) and T3 (AI-NPOF). Slow-release sex pheromone formulations trapped more yellow stem borers - 94/trap (Jagtial), 81/trap (Pusa), 41/trap (Pattambi) - than normal formulations (73, 40, 37nos/trap respectively).

Integrated Pest Management Studies: a multi-disciplinary trial which included entomologists, plant pathologists and weed specialists was carried out across 9 locations in 16 farmers' fields following practices defined for each zone. IPM plots showed significantly lower pest incidence, weed populations and dry biomass, alongside reduced disease progression for various location specific diseases, resulting in higher gross returns and superior benefit-cost ratios due to lower input costs and better yields as compared to farmers' practice.

Studies on **Population dynamics of insect pests and natural enemies** conducted across 32 locations in seven agroclimatic zones during Kharif 2024 revealed that the major pests as yellow stem borer, planthoppers, leaf folder, and gall midge, while whorl maggot and rice hispa occurred sporadically. Overall, temperature and humidity significantly influenced pest population trends across all zones.

Population dynamics of insect pests through **Light trap catches (LT)** revealed that yellow stem borer, leaf folder, and hoppers remained the predominant pests across locations, while gall midge persisted as an endemic problem. A rising trend in caseworm and gundhi bug incidence was also noted. Pest populations peaked during October–November in kharif and late January–early February in rabi, emphasizing the need to strategically time pest management measures for effective control during these critical infestation periods.

2. Plant Pathology

Host Plant Resistance: Five national screening nurseries *viz*., NSN-1, NSN-2, NSN-H, NHSN and DSN comprising of 1579 entries of advanced breeding lines and rice hybrids were evaluated at 47 centres for their reactions to rice diseases. Among the entries tested across the locations, total of 78 entries found resistant/moderately resistant to minimum of two and maximum of four diseases. A few promising entries having resistance or tolerance to three/four diseases were listed in the Table.

Nursery	No. of entries	IET No/ Designation	Resistant or tolerant to three/ four diseases
NSN-1	11	32983	BB, SHR and RTD
NSN-H	13	31415	LB, NB, BS
		32358	LB, NB, BB, RTD
NHSN	25	33048	BS, SHR, RTD
		33053	LB, BS, BB
		33058	BB, SHR, RTD
		33078	LB, NB, BB
DSN	28	CBMASP 9015	LB, NB, BB
		CBMASP 9016	LB, NB, BB, SHR
		GLB 94	LB, NB, BS
		ISHB 30	NB, BB, SHR
		JGL 47870	NB, BS, RTD
		N 4933	NB, BS, RTD
		NWGR-17048	BS, BB, SHR

(LB-Leaf blast; NB-Neck blast; SHB-Sheath blight; BS-Brown spot; BB-Bacterial blight; SHR-Sheath rot; RTD-Rice tungro)

Field monitoring virulence of *Pyricularia oryzae:*

The experiment was conducted across 25 locations in India during *Kharif* 2024 to assess the virulence

pattern of *Pyricularia oryzae* (rice blast), using 39 cultivars consisting of near isogenic lines, international differentials, donors and commercial cultivars possessing different gene(s) combinations for blast resistance. Disease severity varied, with high pressure (LSI>6.0) at Ghagarghat, Lonavala, Cuttack, Uppershillong and Almora, while several locations recorded moderate to low severity. Among differentials, Tetep, Raminad str-3, RP BioPath-3, PRS-58, RP Bio Path-1, Dular, RP BioPath-2 and RP BioPath-4 demonstrated stable resistance with severity index of 4.0-4.1 across the locations. Tetep showed high resistance at 14 locations but was susceptible at Ghagarghat, Hazaribagh, Karjat, Almora, and Uppershillong. Raminad str-3 was highly resistant at Coimbatore, Gudalur, IIRR, Jagdalpur, Karjat, Mandya, New Delhi, while it was found highly susceptible at Cuttack, Gangavathi, and Ghagharghat. Differentials *viz*., RP Bio Patho-3, RP Bio Patho-1 and RP-Patho-2 possessing *Pi2* gene showed similar reaction pattern across all the locations, indicating effectiveness of *Pi2* gene. The *Pi2* gene conferred resistance to most isolates, except at Almora, Cuttack, Ghagarghat, and Lonavala, where it was not effective. Similarly, *Pi54* gene present in RP Biopatho-2, RP Biopath-4, PRS 50 and RP Patho-3 was moderately resistant across the locations with SI of 4.0-4.1 while *Pi9* gene (PRS-58) was resistant at 8 locations. Susceptible checks (HR-12, CO-39) were highly affected, while resistant checks like Rasi showed mixed reactions. Cluster analysis grouped isolates into eight major clusters and isolates from Ghagarghat and Almora were unique and formed separate cluster.

Field monitoring virulences of *Xanthomonas oryzae* pv. *Oryzae*:

A trial on monitoring the virulence of bacterial blight (BB) pathogen, *Xanthomonas oryzae* pv. *oryzae* (*Xoo*) was conducted at 23 locations. At Ludhiana, the trial was conducted with 10 isolates. The rice differentials used in this trial consisted of eleven near isogenic lines (IRBB lines) possessing different single BB resistant genes in the genetic background of rice cultivar IR 24. Susceptible check varieties like IR 24, TN1 and resistant check variety Improved Samba Mahsuri was also included in the trial. Most of the differentials possessing single bacterial blight resistance genes like *Xa1*, *Xa3*, *Xa7*, *xa8*, *Xa10*, *Xa11* and *Xa14* were susceptible at most of the locations. BB resistance gene *xa13* was susceptible in 11 locations while *Xa21* was susceptible in 15 locations. Based on their virulence, the isolates were grouped into high, moderate and low virulence groups. Based on the reactions of the isolates on differentials possessing single BB resistance genes, the isolates from IIRR, Hyderabad, Chinsurah, Chiplima, Pantnagar and Raipur were categorized as highly virulent. Majority of the isolates were categorized as moderately virulent. The isolate from Raipur and strain 8 from Ludhiana were unique and formed separate cluster.

Disease observation nursery trial was conducted at eight locations with different sowing dates *viz*., early, normal and late sowings with an aim to find the effect of such varied sowing/planting dates on the occurrence and severity of the disease in both transplanted and direct seeded rice (DSR). The incidence and severity of different diseases varied among the locations in different dates of sowing. The incidence and severity of blast, brown spot and sheath blight was high in early sown crops while Bacterial blight was more in normal sown crops at Bankura. At Chatha, brown spot and Bacterial blight diseases high in late sown crop in both transplanted and DSR conditions. In Chinsurah and Maruteru, sheath blight and Bacterial blight was high in normal sown crops in transplanted rice; sheath blight was more in early sown crops in DSR conditions. In Moncompu, sheath blight and Bacterial blight diseases were more in late sown crops in both transplanted and DSR conditions. Brown spot and sheath rot diseases were reported high in late sown crops in different locations. At Raipur, sheath blight was more in early sown crop under both transplanted and DSR conditions.

Disease management with fungicides against location specific diseases: The objective of this trial was to identify an effective combination fungicidal molecule against rice diseases at 31 centres. Leaf blast was effectively reduced by combination fungicide molecule azoxystrobin 5.1% + tebuconazole 9.1% + prochloraz 18.2% EC (3.5 ml/l) with low mean severity of 19.5% followed by Tebuconazole 50%+ trifloxystrobin 25% w/w WG (0.4 g/l) with low mean severity and incidence 19.5% and 28% respectively.

Minimum level of neck blast was recoded in Tebuconazole 50%+ trifloxystrobin 25% w/w WG (0.4 g/l) treatment with 11.4% and 12.7% of incidence and severity, followed by azoxystrobin 5.1% +tebuconazole 9.1% + prochloraz 18.2% EC (3.5 ml/l) with 10% incidence. In sheath blight, azoxystrobin 14 % + epoxiconazole 9 % SC (1.5 ml/l) was found effective in minimizing the disease severity (DS:25.4% and DI:45.5%) and azoxystrobin 5.1% +tebuconazole 9.1% + prochloraz 18.2% EC (3.5 ml/l) minimizing the disease incidence (DS:27% and DI:45%). Fungicide, azoxystrobin 5.1% + tebuconazole 9.1% + prochloraz 18.2% EC (3.5 ml/l) also found effective in reducing the brown spot (DS: 27.6%). Sheath rot disease incidence and severity was effectively reduced by Tebuconazole 50%+ trifloxystrobin 25% w/w WG (0.4 g/l) with low incidence and severity of 29.8% and 21.9% respectively followed by azoxystrobin 5.1% + tebuconazole 9.1% + prochloraz 18.2% EC (3.5 ml/l). The new combi-product, azoxystrobin 5.1% + tebuconazole 9.1% + prochloraz 18.2% EC (3.5 ml/l) showed broad spectrum activity against leaf blast, neck blast, sheath blight, brown spot and sheath rot.

Bio-control formulations against fungal diseases: Among the formulations, the liquid formulation was found to be better than the solid formulation. The combination of bioagent formulation and fungicides given the higher percent disease control and increased plant yield compared to the fungicide treatment alone. Across the locations, seed treatment @ 10 g/kg followed by seedling dip @ 10 g/l by *T. asperellum* strain (T6) TAIK1 of liquid formulation followed by one fungicide spray for respective disease gave higher disease control and increased plant yield. At Navasari and Varanasi, treatment T6 *viz*., seed treatment plus seedling dip (10g/l liquid formulation) and one foliar spray of fungicide was highly effective in controlling the sheath blight by 62.4% and 61.4%, respectively and same treatment brought leaf blast reduction in 49.1% over untreated check at Rewa. Highest per cent disease control of false smut, neck blast and sheath rot diseases over check was achieved at Karaikal, with the same treatment (T6).

Integrated pest management (special – IPM) trial was conducted under direct seeded rice conditions at three different zones, *viz*., Zone II (Northern zone - Kaul); Zone VI (Western zone - Navsari) and Zone VII (Southern zone - Aduthurai, Mandya, Gangavathi). Disease severity of various diseases, recorded at weekly intervals was converted in to AUDPC values and compared. Under Zone II, the IPM practices were effective against leaf blast, neck blast, sheath blight and bacterial blight. Similarly, IPM practices were effective against sheath blight and sheath rot compared to farmer's practices at Navasari. In Zone VII, IPM practices reduced the disease severity of leaf and neck blast, bacterial blight at Aduthurai, Gangavathi and Mandya. Sheath blight disease severity was reduced due to adoption of IPM practices at Mandya.

Special trial on yield loss assessment due to brown spot disease was conducted to assess the impact of brown spot disease on rice yield. The study involved three treatments (T1, T2, and T3) with varying number of *Bipolaris oryzae* inoculation to create different disease gradients and a control (T4). The trial was implemented in a randomized block design (RBD) at four hotspot locations *viz*., Gangavathi, Jagdalpur, Moncompu, and Pusa. Susceptible rice varieties were used in the experiment in each location. Results showed that, highest percent disease severity (PDI) of 70.37%, 34.17%, 57.40% caused the yield loss of 62%, 22% and 32% respectively at Jagdalpur, Moncompu and Pusa, when pathogen inoculum sprayed thrice at an interval of 2 days. Similarly, when inoculum sprayed twice at an interval of 2 days (T2) and when inoculum was sprayed once (T1), progressively lower PDIs and yield reductions were reported at Jagdalpur, Pusa and Moncompu. However, at Gangavathi, there was no variation in disease severity and yield loss among treatments (T1, T2 and T3). The mean values across all locations indicated a clear correlation between disease intensity and yield loss; a mean PDI of 53.98%, 38.55% and 27.10% in T1, T2 and T3 caused the yield reduction of 31.7%, 23.7% and 15.0% respectively. The control (T4) consistently showed the lowest disease severity and higher yields. These findings confirm that maximum disease severity of 54% can cause potential yield loss up to 32%, emphasizing the need for effective brown spot management strategies.

Special screening trial on false smut disease was conducted with selected entries, which were screened artificially at IIRR and naturally at Gangavathi,

Gudalur, Ludhiana, Masodha and Radhanagari (RDN). Among the 41 entries (coded as DL) screened across the five location either artificially (ICAR-IIRR) or naturally (GNV, LDN, MSD, RDN); eleven entries *viz*., IET29536 R, IET29549, Rasi, RL-348, RL-479, PAU 1044, NPS-13, IET29939, RL-4, RL-1516 and RL-4609 recorded moderately tolerant disease reaction with the smut ball ranged from 3 to 4 per panicle with the disease score of 5. With respect to 44 GGV coded entries screened at ICAR-IIRR, Gangavathi, Ludhiana and Masodha, 31 entries recorded 0 to 3 smut balls per panicle, which will be further screened for confirmation.

Evaluation of drones for spraying of agrochemicals (herbicides, insecticides, and fungicides) in rice pest management: The trial was conducted to evaluate the drone spray of agrochemicals for the management of leaf blast, sheath blight and grain discoluration. The trial was conducted at Gangavathi, Nawagam and Rajendranagar. With respect to leaf blast, spraying of chemicals (tank mix of compatible fungicide and insecticide) at maximum tillering and booting stage using battery operated knapsack sprayer recorded 45.55% disease reduction and use of drone for spraying the chemicals recorded the percent disease reduction of 53.58% as compared to control. Similarly, for sheath blight disease, spraying of chemicals with drone recorded the PDI reduction of 48.65% as against 45.73% in the treatment when battery operated Knapsack sprayer was used for spraying the chemicals. In case of grain discolouration disease (chemicals were sprayed only at booting stage), the percentage of reduction of PDI was 43.91% when chemicals were sprayed with drone and 39.42% reduction of PDI was recorded when chemicals were sprayed with battery operated knapsack sprayer.

Production oriented survey (POS)

Production oriented survey (POS) was conducted with an objective to collect information on different aspects of rice cultivation from different rice growing states of India. During 2024, POS was done in 15 states by 18 AICRPR centres. A total of 133 scientific staffs from the different cooperating centres and several officials from state department of agriculture surveyed 972 villages in 125 districts in 15 states. A total of 1295 farmers were contacted during the survey. The monsoon season, spanning from June to September, witnessed rainfall across the country amounting to 108% of its long period average (LPA), indicating near-normal for the year. Different regions of India experienced varying degrees of rainfall *viz*., Northwest India, Central India, South Peninsula and Northeast (NE) India were 107%, 119%, 114% and 86% of respective LPA. The southwest monsoon seasonal (June to September) rainfall over the monsoon core zone, which consists of most of the rainfed agriculture regions in the country received 122% of LPA. Out of the total 36 meteorological subdivisions, 2 subdivisions received large excess rainfall (9% of the total area of the country), 10 subdivisions constituting 26% of the total area received excess, 21 subdivisions received normal rainfall (54% of the total area). Notable among those with deficient rainfall are Arunachal Pradesh, Punjab, J & K and Ladak. Monthly rainfall over the country as a whole was 89% of LPA in June, 109% of LPA in July, 115% of LPA in August, and 112% of LPA in September. In addition to several monsoon depressions in Bay of Bengal and the Arabian sea, there were 4 major cyclones (Remal, Asna, Dana, Fengal) during 2024 which significantly affected normal human life and extensive damage to crops.

Hybrid rice varieties occupied a significant area in states like Uttar Pradesh, Haryana, Chhattisgarh and Gujarat and its area is increasing in states like Karnataka, West Bengal and Maharashtra. Among diseases, leaf and neck blast, brown spot, sheath blight, sheath rot, grain discoloration and bacterial blight were widespread in different rice growing states of India. Sheath blight and bacterial blight were observed in high intensities in several states. Among insect pests, stem borer, leaf folder and brown plant hopper were widespread in different rice growing states. Brown plant hopper infestation was very high in many areas of eastern Uttar Pradesh and parts of Kerala.

3b. Research Achievements - Lead Research

GEY-Genetic enhancement of yield and stress tolerance

GEY/CI/BR/31 (2022-2026): Breeding for high yielding, medium to late maturing rice varieties with tolerance to biotic stresses and good grain quality

- **Selection of superior varieties:** Significant variability among the tested genotypes, indicating promising material for further advancement. Akshyadhan, MTU 1262 and YRMB-1 performed consistently well across both *kharif* 2025 and Rabi 2025–26.
- **Trait associations:** Grain yield showed positive correlation with days to flowering, maturity, plant height and productive tillers. Biomass also had a strong positive association with grain yield, while canopy temperature showed a negative correlation with plant height and productive tillers.
- **Hybridization programme:** A total of 56 crosses were successfully made during Rabi 2024–25 (21), *kharif* 2025 (18) and Rabi 2025–26 (17) involving elite rice varieties and genome-edited lines.
- **Advancement of breeding populations:** Selection was carried out across F_2 to F_6 generations, with promising plants identified based on plant type, maturity, yield and field performance. The selected F_6 lines were advanced to station trials during *kharif* 2025.
- **Genome-edited breeding:** Crosses involving the genome-edited line Kamala produced several marker-positive plants in F_3 and F_4 generations with superior performance. Four F_2 populations along with parents were also shared with collaborating centres under the segregating generations screening nursery (SGSN) programme.



Crosses made with genome-edited line Kamala

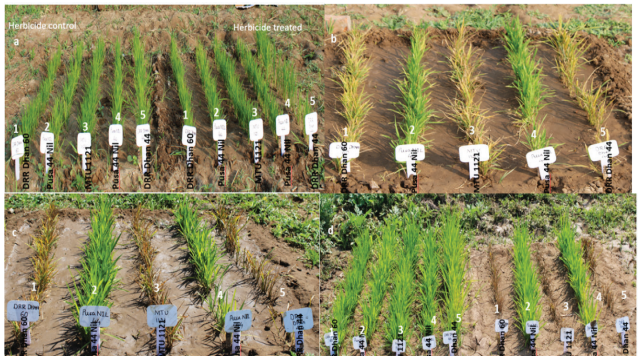
GEY/CI/BR/27 (2020-2025): Novel genetic approaches for development of climate smart rice varieties

- **Identification of tolerant germplasm:** Evaluation of 257 germplasm lines under saline conditions identified highly salt-tolerant genotypes such as Rupsal, Machokonta, Radhasri, Vasamanik and Radhatilak (SES score 1). Additionally, 114 heat-tolerant lines with high spikelet fertility (60–95%) were validated for future breeding.
- **Physiological and quality characterization:** Salt-tolerant genotypes showed significant variation in physiological traits under stress, with AC39416A recording the highest photosynthetic rate. Sundarbans germplasm exhibited wide variability in milling quality, grain type and amylose content, with several lines recording ~29% amylose.
- **Genetic analysis for salt tolerance:** QTL mapping identified 12 major and minor QTLs associated with plant height, panicle length, grain weight, tillering and reproductive-stage salt tolerance, providing valuable genomic regions for marker-assisted breeding.

- **Advancement of breeding programme:** Heat-tolerant breeding material involving Nerica L 44 was advanced to the F4 generation, and newly identified tolerant donors will be utilized in future hybridization programmes.

GEY/CI/ BR/29 (2021-2026): Genetic improvement of direct seeded rice traits using elite varieties and wild species

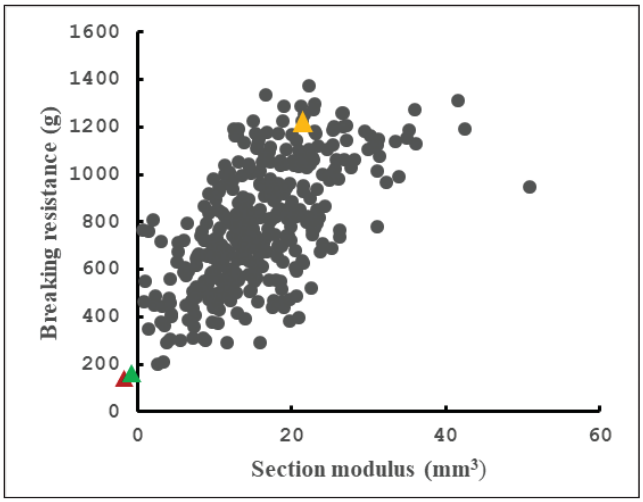
- **Marker-assisted introgression of herbicide tolerance:** The AHAS mutant allele conferring imidazolinone herbicide tolerance was successfully introgressed into the elite rice varieties DRR Dhan 60, MTU1121 and WGL1487 through marker-assisted backcross breeding using the SSR marker RM6844.
- **Recovery of recurrent parent genome:** Background selection using the 1K RiCA SNP genotyping platform enabled maximum recovery of the recurrent parent genome and facilitated the development of superior near-isogenic lines (NILs).
- **Development of improved DRR Dhan 60 lines:** Screening of 144 BC_3F_2 plants identified 4 plants carrying the target genes (*AHAS*, *Pi54* and *Pup1*), resulting in promising herbicide-tolerant and disease-resistant lines.
- **Improvement of MTU1121 and WGL1487:** Marker-assisted selection identified 8 homozygous BC_2F_4 plants in MTU1121 and 28 homozygous BC_2F_4 plants in WGL1487 carrying desirable genes for herbicide tolerance, blast resistance and Pup1 QTL.
- **Evaluation under different cultivation systems:** Selected stable lines are being evaluated for herbicide tolerance and yield performance under Direct Seeded Rice (DSR) and Puddled Transplanted Rice (PTR) cultivation systems.
- **Identification of QTLs for stress tolerance:** Eight significant QTLs associated with anaerobic germination and related stress-response traits were identified across chromosomes 3, 6, 7, 9, 11 and 12, providing valuable targets for marker-assisted breeding.
- **Identification of high-yielding MAGIC lines:** Evaluation of 300 MAGIC lines revealed wide variation in grain yield (557–7055 kg ha^{-1}), with MAGIC347, MAGIC21, MAGIC72, MAGIC186 and MAGIC279 identified as superior high-yielding genotypes.
- **Screening for brown spot resistance:** Screening of the MAGIC population identified highly resistant and moderately resistant genotypes, including MAGIC9, MAGIC29, MAGIC37, MAGIC52, MAGIC231 and MAGIC386, providing valuable donor lines for brown spot resistance breeding.
- **Identification of anaerobic germination tolerant genotypes:** Wide phenotypic variation for anaerobic germination tolerance (10–98%) was observed, with MAGIC139, MAGIC24, MAGIC104, MAGIC206, MAGIC240 and MAGIC285 identified as promising donor lines.
- **Population improvement for DSR:** New breeding populations were developed using diverse donor parents to combine traits such as herbicide tolerance, anaerobic germination, drought and nematode tolerance, early seedling vigour, brown spot resistance, improved root traits and nutrient-use efficiency for Direct Seeded Rice.



Response of rice genotypes to imidazolinone herbicide. Survival in Pusa 44 NIL possessing *AHAS* for herbicide tolerance and death of other entries at 30 days after spraying (a) 30 day old seedlings on the day of spraying herbicide, (b)15 days after spraying, (c) 21 days after spraying and (d) 30 days after spraying. (1) DRR Dhan 60, (2) Pusa 44 NIL, (3) MTU 1121, (4) Pusa 44 NIL, (5) DRR Dhan 44.

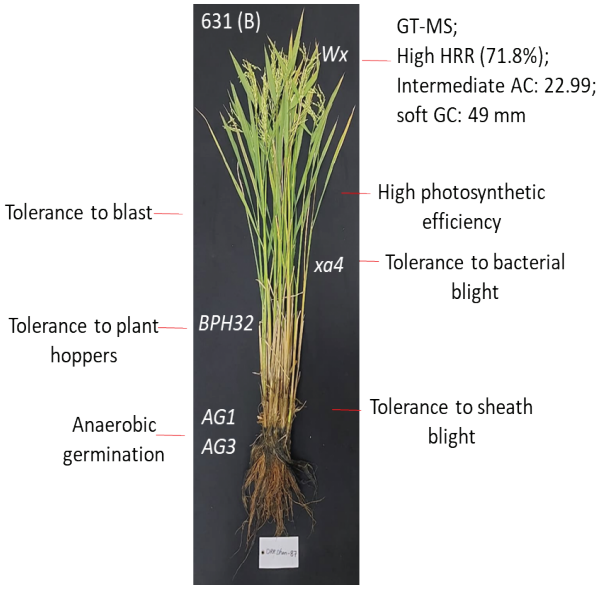
GEY/CI/BR/34 (2023-2028): Conventional and haplotype based breeding for new plant type architecture in rice

- **Identification of QTLs for lodging resistance:** Using RILs derived from Swarna *cv.* (*Indica*) and IRGC 39111 (Tropical *japonica*), two consistent and major-effect QTLs—*qCT7* (R2-14.49%; 109 kb) and *qIBW7*-16.57 %; 33.83 kb) —on chr7 were identified for lodging resistance. *In-silico* analysis of *qCT7* revealed BRITTLE CULM1 like (*OsBC1L 6, 7, 8*), Cellulose synthase genes (*OsCesA 3, 6, 8*) and *OsCSLF 1, 2, 9* involved in key processes underpinning cell wall thickening.



Scatter plot demonstrating the relationship between culm morphology and physical strength (section modulus and breaking resistance), with individual genotypes represented as grey dots. Swarna (red), IRGC 39111 (blue), Samba Mahsuri (green) and IRGC 10658 (yellow).

- **Identification of superior genotypes:** Six RILs (RIL-143, 205, 244, 271, 305 and 316) were identified with superior haplotype combinations for *qCT7* and *qIBW7*.
- **Role of Biochemical components in culm mechanical strength:** Ligno-cellulosic components contributed more to the variation in mechanical strength compared to silica. The elevated cell wall polymers (Cls = 0.24 mg/g, HCls = 0.18 mg/g, Lg = 0.24 mg/g) and silicon content (Sc = 7.09 mg/g) in strong culm RILs likely strengthened the secondary cell wall, reinforcing the organic matrix of the culm bio-composite, whereas weak culm RILs exhibited comparatively lower values. RIL-300, 301, 352, 308, 178, 297, and 337, exhibited superior culm strength and high lignin.
- **Development of two new climate resilient varieties:** DRR Dhan 87, derived from sub-species hybridization demonstrates high resource-use efficiency, including a strong photosynthetic rate (23.34 µmol CO_2/m²/s), superior nutrient and phosphate utilization, and vigorous root–shoot growth under aerobic conditions. The plant exhibits New Plant Type as a semi-dwarf stature, erect V-shaped leaves for efficient light interception, a stay-green habit, and a well-developed root system suitable for low-input and aerobic cultivation and multiple biotic stress tolerance.
- **Combining superior haplotypes and introgression of** *qCT7* and *qIBW7* in elite backgrounds: For combining traits in elite parents based on superior haplotypes for desirable traits, 48 F_1's were generated in various combinations involving four elite varieties DRR Dhan 48, DRR Dhan 54, DRR Dhan 79 and DRR Dhan 87 and advanced breeding lines FBL19100 (R to BB and GM), JBB6739-5 (Strong culm and high grain number). Further, backcrosses progenies (BC_1F_2) were developed for introgression of *qCT7*+*qIBW7* for strong culm and lodging resistance in the background of Swarna.



DRR Dhan 87 combining broad genetic diversity with superior agronomic and physiological performance

GEY/CI/ BR/24 (2022-2026): Genomic assisted breeding for development of low phosphorous and nitrogen stress tolerant rice varieties

- **Evaluation of low-phosphorus tolerant lines**: 494 landraces of rice were screened under both Low Phosphorus and control condition. Wide variation observed for all the traits studied. Grain yield per plant under Low Phosphorus condition ranged from 2.17 g/plant to 17.62 g/plant where as under control condition it ranged from 4.84 g/plant to 18.99 g/plant.
- **Genome wide association studies for low Nitrogen tolerance in Rice:** GWAS for low Nitrogen tolerance was taken up by phenotyping 270 association panel for traits associated with Low nitrogen tolerance. The panel was genotyped with 1K Rica. GWAS identified 3,1 and 2 MTAs for total number of tillers, productive tillers and filled grains per panicle respectively under Low Nitrogen conditions.
- **Development of DRR Dhan 82**: DRR Dhan 82 (IET 30756) It was released through CVRC for irrigated ecology of Zone 3 for the states of Bihar, Jharkhand, West Bengal, UP, Odisha developed with the cross Swarna / MTU 1010. It is mid early duration with seed to seed 130 duration having medium slender grain type. It gives an average yield of 6.0 to 6.5 t/ ha under normal irrigated condition. It recorded average grain yield advantage of +15.5%, + 17.59% and + 14.8% over the National check (Gonthra Bindhan 3), Zonal check (Lalat) and Local check respectively during 3 years of testing viz., 2022, 2023 and 2024 under AICRPR in Zone III.
- **Seed production and maintenance breeding**: Breeder seed production of DRR Dhan 60 (40q), DRR Dhan 66 (2q), DRR Dhan 78 (3q) and DRR Dhan 80 (4q) was produced and distributed to farmers.

Variation for agromorphological characters under Low Phosphorus and control condition among landrances studied.

	DFF	Plant height cm)	Total no. of tillers/plant	Productive tillers/plant	Panicle length (cm)	Grain yd/ plant (g)
Under Low Phosphorus condition						
Min.	88	47.66	4	2	12.33	2.17
Max.	132	148.66	20	18	32	17.62
Under Control condition						
Min.	77	57.33	5	4	9.33	4.84
Max.	128	145.66	23	18	32.33	18.99



Variation among landraces under Low Phosphorus plot

GEY/CI/BR/32 (2023-2026): Target 1000: Towards revolutionizing rice yields through increasing number of grains per panicle

- **Evaluation of Elite Breeding Material:** During Kharif 2025, 582 elite genotypes from elite × elite breeding populations were evaluated for panicle architecture, grain development, yield, and associated agronomic traits. Considerable variability was observed, with filled grains per panicle ranging from 466–1016 and unfilled grains from 28–337, indicating substantial scope for selection of superior genotypes.
- **Advancement of Breeding Populations:** 25 new crosses were developed during Kharif 2025. In addition, breeding populations comprising 17 F_1, 111 F_2, 23 F_3, 21 F_4, 69 F_5, and 80 F_6 generations were evaluated and advanced to facilitate the development of improved rice varieties.
- **Germplasm Conservation and Maintenance:** Approximately 1,200 germplasm accessions, including collections from different Indian states, International Rice Research Institute (IRRI) lines, Green Super Rice lines, INGER lines, and elite breeding lines, were evaluated and maintained. Additionally, 572 donor lines identified through AICRPR screening were conserved and maintained to support future rice improvement programmes.



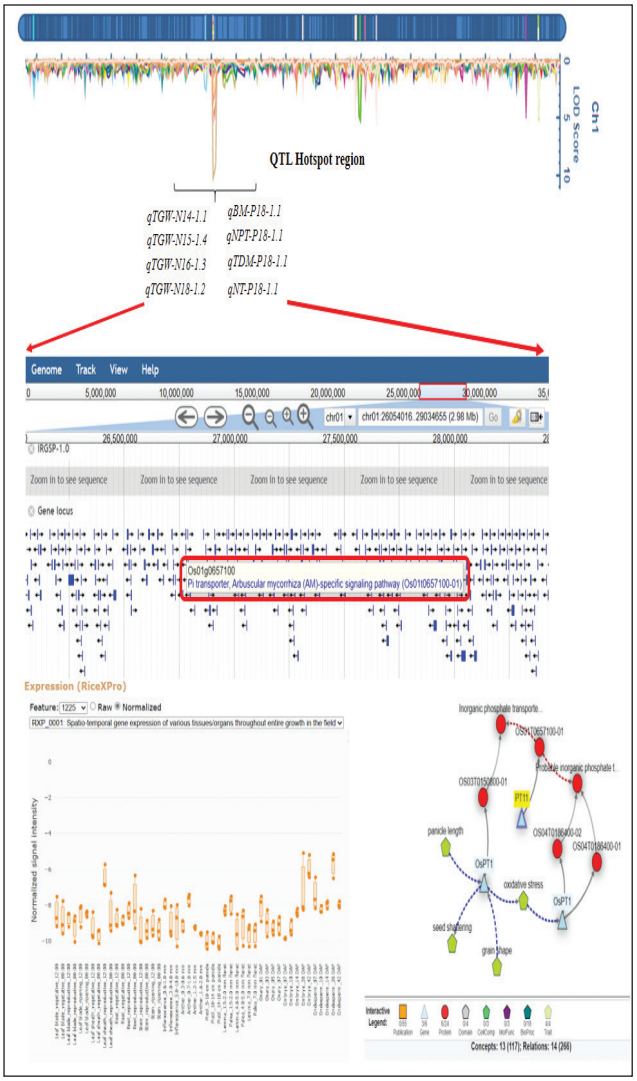
Field view and panicle of elite rice genotypes grown at ICAR-IIRR, Hyderabad

GEY/CI/BR/30 (2021-2025): Breeding high yielding rice varieties using interspecific wild introgression lines derived from Oryza nivara and Oryza rufupogon

- **QTL mapping and genotyping:** Multiple mapping populations involving Swarna, KMR3, MTU1010 with *O. rufipogon* and *O. nivara* were genotyped using SSR and SNP markers, leading to the identification of several major QTLs for yield, grain size, seedling vigour, biomass and low-phosphorus tolerance.
- **Identification of key genomic regions:** Major QTLs such as *qAS7.1, qPL7.1, qL7.1, qTW7.1* and *qPW7.1* were identified, with *qTW7.1* fine-mapped to a 199 kb region containing candidate genes associated with stress tolerance. GWAS on 355 diverse rice lines identified 25 stable marker–trait associations for yield traits across multiple environments.
- GBS based QTL mapping revealed novel genomic regions for nutrient stress tolerance. QTL hotspot region detected on chromosome 1, harboured the candidate gene OsPT11 for Pi acquisition, translocation and activation of mycorrhizal symbiosis at phosphorus starvation
- **Selection of superior genotypes:** High-yielding and stable introgression lines (NSR60, NSR101, NSR105, NSR85, NSR86, NSR135, NSR5 and NSR88) were identified under normal and low-phosphorus conditions. Multi-location evaluation of 368 backcross-derived lines identified promising genotypes such as SN-32, SN-122-1 and SN-47, combining high yield with resistance to multiple biotic stresses. DRR Dhan

74 was notified for cultivation, while DRR Dhan 88 and three advanced breeding lines showed promising performance in national trials.

- **Maintenance and sharing of genetic resources:** Chromosome Segment Substitution Lines (CSSLs) and wild introgression lines were characterized, multiplied and shared with ICAR institutes, NARES partners and State Agricultural Universities (SAUs) for research and breeding.
- **Breeding programme advancement:** A total of 28 new crosses were developed using wild species, landraces and elite cultivars, while mapping populations were advanced to subsequent generations. Additionally, 43 high-yielding breeding lines were multiplied and evaluated for plot yield.



Candidate genes detected under QTL hotspot region for yield and their expression under different developmental stages

- **Improvement of stress tolerance**: Several introgression lines showed strong resistance to blast, bacterial leaf blight and brown planthopper, making them valuable donors for future breeding programmes. DBA-1 and DBA-2 populations developed to improve DRR Dhan 65 were evaluated under low phosphorus and nitrogen conditions, with several lines (DBA-1-125, DBA-1-336, DBA-1-186, DBA-1-384 and DBA-1-174) showing superior growth and yield.
- **Genetic studies for nutrient efficiency and grain quality**: GWAS using a 3K SNP panel identified nine significant marker–trait associations for nutrient-use efficiency, while QTL mapping was undertaken in a 277-line backcross population to study nutritional traits and anthocyanin content.

GEY/CI/ BR/33 (2023-2027): Molecular breeding approach to improve special aromatic rice through pheno genomic trait interventions

- **Advancement of aromatic rice breeding populations**: F_5 and F_6 generations from eight crosses and F1/F2 populations involving aromatic donor varieties were raised, selected and advanced to subsequent generations.
- **Identification of stable high-yielding lines**: Multi-season evaluation using the AMMI model identified Q025 (9338 kg/ha), Q017 (8789 kg/ha) and Q006 (8596 kg/ha) as the most stable and high-yielding genotypes. Three new entries were nominated for AICRPR AGT 2024, while one previously nominated line was promoted to the next stage of testing.
- **Evaluation of aromatic germplasm**: A total of 101 germplasm lines (96 entries and 5 checks) were evaluated for morphological, grain quality and aroma traits, and classified into strongly, moderately, low aromatic and non-aromatic groups.
- **Molecular analysis of aroma**: Gene expression analysis revealed a negative correlation between BADH2 expression and aroma intensity, supporting the role of BADH2 in aroma (2AP) biosynthesis.

- **Gene validation**: DNA from selected aromatic genotypes was amplified using BADH2-specific primers, and the PCR products were purified and submitted for sequencing to validate aroma-associated genetic variation.

GEY/CI/HY/13 (2016-2028): Development and evaluation of three-line hybrids with better grain quality and resistance to major pests and diseases

❖ Five new hybrids viz., IIRRH 188, IIRRH 189, (IHRT E); IIRRH 190, IIRRH 191 (IHRT ME); IIRRH 192 (IHRT M) were nominated into AICRPR trials during Kharif 2025.

❖ Fifteen restorer lines (derived from the indica/ tropical japonica inter-subspecific hybridization) with BLB and blast resistant genes were identified.

❖ IR 68897B is crossed with DRR Dhan 62 (Donor Parent having xa5, xa13, Xa21, Pi2 and Pi54), with an objective to improve this maintainer line for these major biotic stresses.

❖ IR 68897A-20 kg, IR 68897B-40 kg, DR 714-1-2R –40 kg, APMS 6A-30 kg, APMS-6B-50 kg and RPHR-1005-50 kg were produced. Through barrier isolation method, 15 new hybrids were produced, and the seed will be used for preliminary evaluation in station trials.

❖ During *kharif* 2025, a total of 38 entries, comprising 29 hybrid rice combinations and nine checks, were evaluated in station trials. Among the 29 hybrid rice combinations evaluated, eight were identified as promising based on their performance.

GEY/CI/HY/15 (2018-2025): Genetic enhancement of parental lines suitable for aerobic and tolerance to salinity conditions through conventional and molecular approaches

- DRRH7 has been notified under the Seeds Act, 1966 (S.O. 6123(E), dated 31 December 2025) as the world's first publicly bred rice hybrid specifically developed for alkaline and saline ecologies for Haryana, UttarPradesh and Tamilnadu.

Ecology	:	Alkaline & inland saline
Grain Type	:	Long Slender
Duration	:	115-123 days
Yield	:	35.35 q/ha (Alkalinity), 34.78 q/ha (Inland saline)
Quality	:	HRR-61.97%; AC-24.41%; GC-46 mm; ASV-4.17
Salient features	:	Moderate Resistant to Leaf Blast, Neck Blast, Brown Spot, Grain Discoloration, Plant Hoppers



DRRH7 Alkaline & inland saline Rice Hybrid

- Conversion of improved APMS6B possessing Bacterial leaf blight resistance (*Xa21*, *Xa38*) and *PuP1* into new CMS line is in BC_1F_2 and BC_2F_1 stage.
- This project is completed and a new project is initiated towards development of climate resilient rice hybrids for DSR with leads from the completed project.

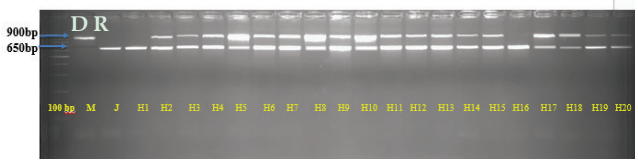
GEY/CI/HY/17(2022-2027): Development and evaluation of biotic stress-resistant restorers and their hybrids for yield and grain quality traits by conventional and molecular approaches in rice

- The improved restorer lines carrying broad-spectrum blast resistance genes *Pi9*, *Pi54*, and the gene combination *Pi54+Pi9* were evaluated in the AICRPR disease screening nursery over two consecutive years. They consistently exhibited high level of resistance to both leaf and neck blast diseases. These restorer lines are utilized to develop blast resistant three-line rice hybrids.
- By recurrent selection breeding strategy IR36 GMS restorer population as the base population, restorer lines with multiple stress resistance were developed at ICAR-IIRR. These lines possess resistance to key biotic stresses (bacterial leaf blight, blast, brown plant hopper, sheath blight, and gall midge) as well as tolerance to abiotic

stresses (drought, salinity, and low-phosphorus soils). These multi-stress tolerant restorer lines are utilized in three-line hybrid rice breeding programs to develop highly heterotic hybrids with multiple stress tolerance. A new restorer GMS population for grain quality traits (medium to short slender grain type with high iron, zinc and protein) is in progress.

GEY/CI/HY/16 (2021-2027): Genetic improvement of maintainer lines for biotic stress and yield enhancing genes

- A source nursery comprising 1,050 entries was established, and 360 test crosses were attempted, of which 330 were successfully generated. These crosses were evaluated in the test cross nursery, leading to the identification of 14 maintainer lines: TCN 5055, 5064, 5068, 5069, 5071, 5078, 5079, 5086, 5087, 5088, 5097, 5151, 5156, and 5169.
- Promising and improved maintainer lines for stigma exsertion and desirable plant type were backcrossed with the corresponding CMS lines, IR 58025A and IR 79156A, to convert them into usable CMS lines. These are currently in the BC_4F_1 generation.
- During the reporting period, crosses were also attempted with TE 36, a mutagenic line, and the resulting progenies are in the BC_2F_1 generation for improving upper internode elongation in the maintainer backgrounds of IR 58025B, APMS 6B, IR 79156B, and IR 68897B.
- To improve biotic stress resistance—specifically against blight and blast—in the maintainer line IR 68897B, crosses were made and a BC_3F_1 population was developed. The presence of resistance genes was validated in the BC_2F_1 generation.



Confirmation of true hybrids using Xa21 (pTA248) marker

GEY/CI/HY/18 (2023-2028): Development and validation of heterotic groups in rice and improvement of maintainer lines for major biotic stresses

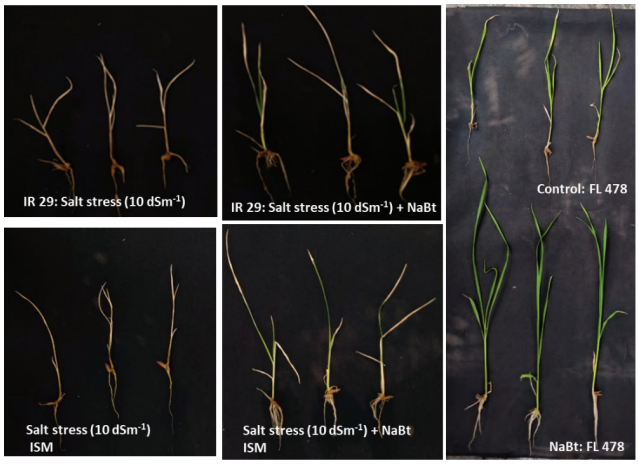
- As a part of development and validation of heterotic groups in rice, thirteen parental lines representing extremes of genetic distance (lowest and highest) and possessing high yield potential were selected to validate the significant positive association between genetic distance (based on random molecular markers) and the general combining ability (GCA) of male parents for various yield-attributing traits.
- Three cytoplasmic male sterile (CMS) lines, namely APMS6A, IR79156A, and IR58025A, were crossed with the selected restorer (R) lines during *kharif* 2025.
- A total of 39 F_1 hybrids were generated. The generated hybrids, along with their parents and standard checks are being evaluated during Rabi 2025–26.
- With respect to the Improvement of maintainer lines (IR79156B) for major biotic stresses, molecular screening of BC_1F_1 plants derived from the crosses IR79156B / Improved IR58025B and IR79156B / DRR Dhan 62 was carried out using trait-specific markers, namely pTA248 for *Xa21* and Pi54MAS for *Pi54*, to confirm the presence of target genes.
- Confirmed positive BC_1F_1 plants were backcrossed with IR79156B during *kharif* 2025.
- During Rabi 2025–26, BC_2F_1 progenies were validated for the presence of *Pi54* and *Xa21* genes, and phenotypic screening for bacterial leaf blight resistance was carried out to identify resistant plants. The selected positive plants were further backcrossed with the recurrent parent to advance the breeding programme for the development of disease-resistant maintainer lines.
- The F_2 population derived from the cross IR79156B / Improved IR58025B (BXB) was evaluated during *kharif* 2025, and superior plants were selected based on desirable plant type traits such as plant height, total number of productive tillers, panicle size, and overall vigour. The selected F_2

plants were advanced to the F_3 generation, which is being further selected during Rabi 2025–26 based on desirable phenotypic characteristics to develop improved breeding lines.

New Research Project initiated in 2025

GEY/CI/ BR/36 (2025-2030): Smart traits for climate resilience: Breeding for salt tolerance and its associated stress tolerance in rice

- **Population improvement for multiple stress tolerance:** Hybridization was initiated to combine salinity tolerance with associated stress tolerance traits, including seedling- and reproductive-stage salinity tolerance, flooding tolerance and heat tolerance in rice.
- **Development of F_1 populations:** A total of 97 F_1 crosses were generated during *kharif* 2025, of which 22 F_1 cross combinations involving salinity and associated stress-tolerant donors were raised and confirmed during Rabi 2025-26.
- **Utilization of diverse salinity-tolerant donors:** Multiple stress-tolerant donor parents, including Sadri, Heera, IR22LT1233, IR24LT1095, PANVEL 2, IR28, Jarava, MTU1153, IR10F360, CSR30, CSR56, CSR49, Vytilla 11, IR24LT1755 and IRRI147, were utilised to broaden the genetic base for salinity tolerance.
- **Development of heat × salinity tolerant populations:** Twelve F_1 crosses involving heat- and salinity-tolerant donors were generated during *kharif* 2025, raised during Rabi 2025-26 and confirmed for further breeding.
- **Integration of elite cultivars with stress-tolerant donors:** Heat- and salinity-tolerant donors (N22, Giza178, CSR76, Heera, Rasi, IR24LT1233, Vytilla11, Dular and Wazuhophek) were crossed with high-yielding cultivars DRR Dhan 75, BR28 and MTU1153 to develop multiple stress-tolerant breeding populations.
- **Evaluation of advanced breeding generations:** A total of 797 breeding lines from 12 cross combinations in the F_4:F_5 generations were evaluated during *kharif* 2025, and 584 superior single plants were selected for further evaluation during Rabi 2025-26.
- **Multi-location screening under saline environments:** 438 breeding lines derived from five mapping populations were evaluated across saline hotspot locations at Machilipatnam, Navsari (Danti) and Kampasagar to assess adaptability and stress tolerance.
- **Identification of salinity-tolerant lines:** Multi-location evaluation identified 65 salinity-tolerant lines at Machilipatnam, while 228 and 180 breeding lines survived under saline conditions at the other evaluation sites, indicating location-specific stress adaptation.
- **Selection of location-specific elite genotypes:** Breeding lines exhibited differential responses across saline environments, enabling the identification of elite genotypes suitable for advancement under specific target locations.
- **Development of genetic resources for climate resilience:** The breeding programme generated valuable populations combining salinity, heat and flooding tolerance with high yield potential, providing promising genetic resources for developing climate-resilient rice varieties.



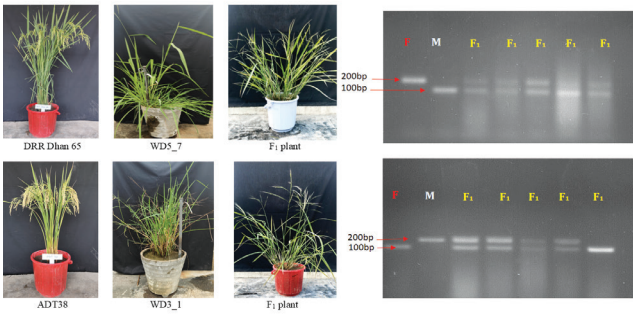
Response of genotypes FL-478, ISM, IR-29 with Histone Deacetylase (HDAC) inhibitor

GEY/CI/BR/37 (2025-2029): Bridging the biodiversity and breeding using unexplored wild species to detect novel sources for yield & stress tolerance

- Collection, conservation and characterisation of germplasm including various wild accessions and maintenance of germplasm at two wild

rice gardens are carried out. Developed a new wild rice garden at the ICAR-IIRR farm, using accessions collected from various states of India and imported from IRRI. Collected new wild accessions from Gujarat, Chhattisgarh, and Andhra Pradesh & Telangana.

- Characterization of wild accessions for agro-morphological, photosynthesis and DUS traits was carried out with 1k RiCA SNP data. Interspecific crosses between elite cultivars and wild accessions were developed.
- 355 lines, including Land races, cultivars and selected wild introgression lines and checks, were grown for 2 years in 3 environments in Telangana, Uttar Pradesh, and Bihar for yield traits GWAS analysis using 1k RiCA SNP Panel and identified 25 consistent marker–trait associations for more than two environments for yield and yield-related traits.



Interspecific hybrids developed and their parents along with molecular marker confirmation of true F1's

GEY/CI/ HY/19 (2025-2029): Development of climate-resilient rice hybrids for DSR and abiotic stresses through conventional and genomic-assisted breeding

- Backcross inbred restorer lines of AR9-18/Pusa 44 (NIL) possessing *AHAS* gene (Imazethapyr) trait were genotyped for herbicide tolerance and advanced to BC_1F_2 and F_3 generation for phenotyping in DSR and irrigated conditions.
- Backcross and pedigree restorer lines of AR9-18/KHO possessing *AG2* (Anaerobic germination trait) were screened for parental polymorphism and population were subjected to 15-20cm inundation and advanced for further generation, similarly DRRH4 restorer (AR9-18) utilized for introgression of bacterial leaf blight, blast, high zinc content and drought tolerance with reported QTL(s)/genes.
- The advanced backcross lines of improved APMS6B possessing Bacterial leaf blight resistance (*Xa21*, *Xa38*) and *PuP*1 into new CMS line are in BC_3F_1, BC_2F_1 and BC_1F_1 stages.
- The restorers of DRRH5 (NH12-124R), utilized in improvement of salinity tolerance with Saltol QTL and improved restorers of KMR3 with Drought QTLs (*qDTY12.1* and *1.1*) *Saltol* and *Subl* are utilized in development of abiotic stress tolerant hybrids.

GEQ-Genetic enhancement of quality for domestic and export purpose

GEQ/CI/ BR/35 (2024-2029): Developing nutritionally-enriched high yielding rice cultivars

- **Development of nutri- rich rice lines:** Breeding populations (F_2–F_5) were developed using high-protein, low glycaemic index and high resistant starch donors crossed with popular rice varieties. Advanced backcross populations (BC_2F_3) involving BPT 5204, RNR 15048 and JAK 686 were also developed.
- **Selection of superior high-protein plants:** Five F_2 plants from the BPT 5204 × JAK 686 cross recorded high grain protein content (13.36–14.67%) along with desirable agronomic traits.
- **Germplasm characterization:** A total of 410 germplasm lines were evaluated, identifying 49 promising lines with superior yield, head rice recovery, amylose content, test weight and grains per panicle. Sixteen lines had high protein (>10%), of which five also possessed high zinc content (>24 ppm).

GEQ/CP/PP/1 (2021-2025): Selective biochemical and molecular analysis of natural and accelerated ageing in rice

- In accelerated ageing (AA) experiment, In accelerated ageing (AA) experiment, Of the three salts, the days required for complete loss of germination was earlier in potassium chloride. The two rice genotypes were subjected to proteomics analysis. Three proteins were found responsible for the loss of germination in the accelerated ageing treated samples of both rice varieties. Ubiquitin based proteolysis, ABA induced protein expression followed by inhibition of germination and amylase inhibitors were the mechanisms identified for the complete loss of germination. Glycemic index (GI) was analyzed by in-vitro method in 386 rice genotypes and results indicates that most of the rice samples were low in GI followed by medium and high. Fatty acid profile was estimated using gas chromatograph (Agilent 8890) in 326 rice genotypes and the results indicates that endosperm also contains fats, linoleic acid is more commonly observed than linolenic acid of the two essential fatty acids. Project period ended by 31-05-2025 and in continuation, a new IRC project entitled "Identification of biochemical methods and markers for assessing age, cooking and nutrition quality of rice grain." (Code: GEQ/CP/BC/1) (duration: 2025 to 2029) has been approved.

New Research Project initiated in 2025

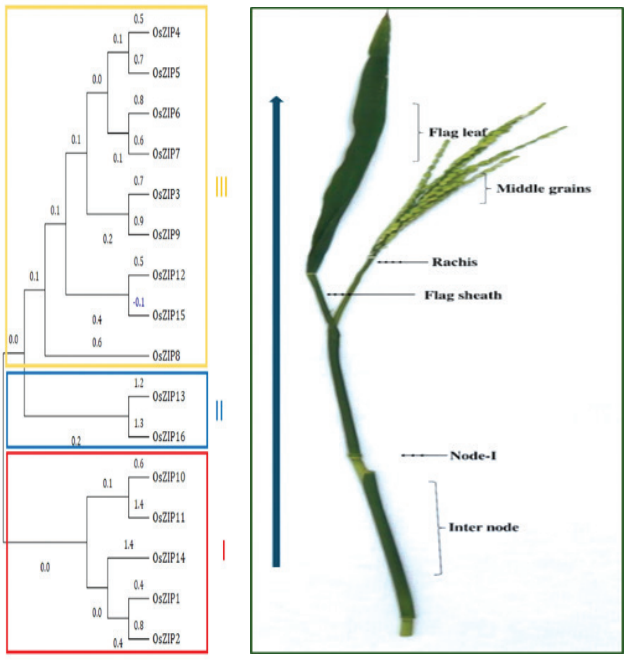
GEQ/CP/BC/1 (2025-2029): Identification of methods and biochemical markers for assessing age cooking and nutrition quality of rice grain

- **Development or Improvement of Protocols:** The protocols developed and standardized under this objective will serve as valuable resources for rice researchers working on grain quality and post-harvest studies. In the previous project, artificial ageing studies conducted in ISM revealed the presence of amylase inhibitor activity in aged rice, indicating its potential role in lowering the glycemic response. Metabolite profiling carried out during the previous artificial ageing studies also revealed substantial variation in metabolite composition. Repeating similar analyses at different intervals of natural ageing may help identify reliable metabolite markers associated with the age of harvested rice grains. Such markers could be useful for determining the storage age of rice and may find applications in detecting market adulteration, ensuring transparency in the Public Distribution System (PDS), and other quality assurance and regulatory purposes.
- **Effect of Abiotic Stress on Fatty Acid Profile of Rice Grain:** This objective is proposed based on preliminary observations from high-temperature stress trials conducted in the previous project, where significant alterations in the fatty acid profile of rice grains were detected. The study aims to validate these findings and identify fatty acid components associated with heat stress tolerance. If the observed trends are confirmed, the results could provide a basis for developing strategies to enhance high-temperature tolerance in rice through breeding or metabolic interventions.
- **Effect of Natural Ageing on Rice Grain:** This objective aims to investigate the biochemical and nutritional changes that occur during the natural ageing of rice grains. Particular emphasis will be placed on evaluating changes in the glycemic index, amylase inhibitor activity, and metabolite composition over different storage intervals. The study will also explore the identification of metabolite-based markers for estimating the age of stored rice grains, which could support grain quality assessment, authentication, and consumer health.

ABR-Application of biotechnology tools for rice improvement

ABR/CI/BT/21 (2024-2027): Characterization of candidate genes associated with grain zinc in rice

- **Genes for Biofortification** - Identification and structural analysis of Zinc-regulated, Iron-regulated transporter-like Proteins *OsZIP* genes - A total of 16 *OsZIP* genes involved in zinc and iron transport were identified and characterized, with promoter analysis revealing unique cis-regulatory elements (GCN4 motifs (TGA(G/C)TCA), CGT (CCACGT(C/G)), ATGA (GGATGAC), Prolamin box (TGTAAAG), and AACA motif (AACAAAA)), suggesting their role in regulating zinc accumulation under specific conditions.
- **In-silico analysis of *ZIP* genes –** thorough analysis 16 *OsZIP* genes-structure, conserved motifs, cis-elements, proteins, expressions levels, gene interactions, haplo-pheno analysis in 3 K panel revealed significant *OsZIP* genes at crucial stages in zinc accumulation

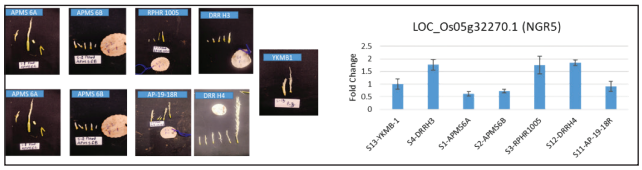


a) Phylogenetic analysis of 16 OsZIP genes for grouping and in-silico analysis of gene interaction network. b) Schematic representation of six tissues of high zinc rice line showing higher relative gene expression of OsZIP 5 and OsZIP 9 throughout the tissues at grain filling stage

- **Expression-based functional insights –** differential expression of two *OsZIP* genes on Chr. 5 indicated their potential role in grain zinc in high zinc grain content rice lines.

ABR/CI/BT/17 (2021-2026): Application of genomic, transcriptomic and proteomic tools for understanding and improvement of yield heterosis in rice hybrids

- **Parental line improvement, hybrid development -** Molecular characterization using functional markers (7 yield-related + 2 fertility restoration) revealed significant allelic variation among 150 parental lines, leading to identification of 13 elite restorer lines with favorable gene combinations for yield enhancement.
- For heterosis studies, crosses involving selected restorers and four CMS lines, 33 crosses successfully produced seeds, generating a robust set of mapping populations for evaluating heterosis and yield-related traits.
- **Differential gene expression underlying heterosis-** qRT-PCR analysis at the panicle initiation stage demonstrated variation in expression patterns of key yield-related genes (*GW5, NGR5, NAL1, Gn1a, GRF4, Ghd7, SPL14, DEP1, TGW6*) between hybrids and parental lines, indicating their potential role in regulating hybrid vigor

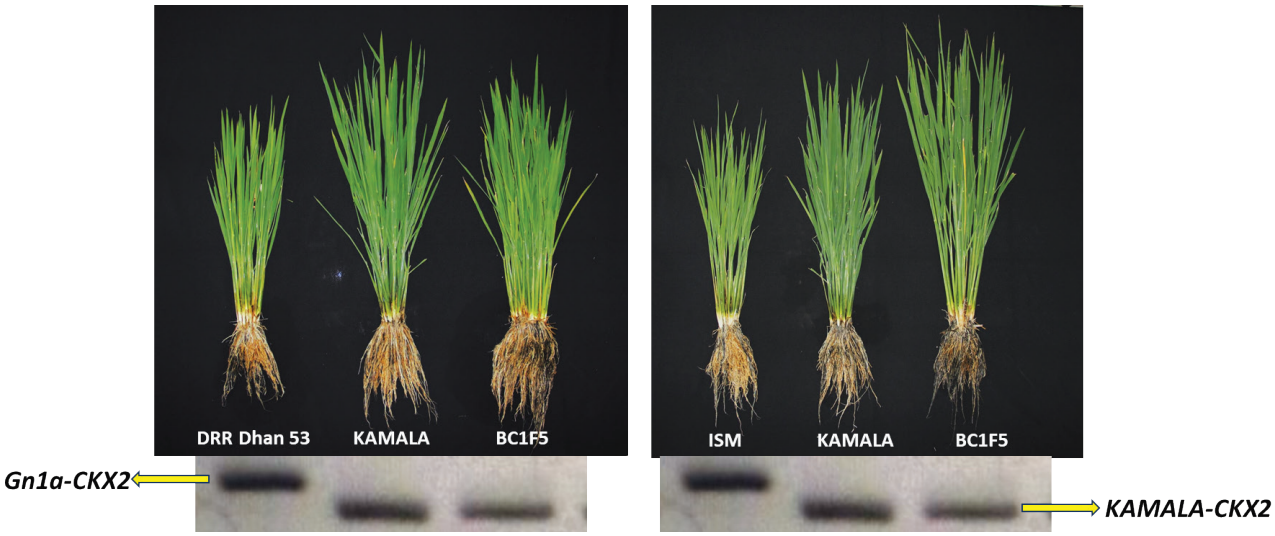


a) The panicle tissues at panicle initiation stage of A, B, R, hybrid and high yield check lines for gene expression studies. b) The relative gene expression pattern (fold change) of *NGR5* (Nitrogen-Mediated Tiller Growth Response 5) in the A, B, R, hybrid and high yield check lines

Lead Research

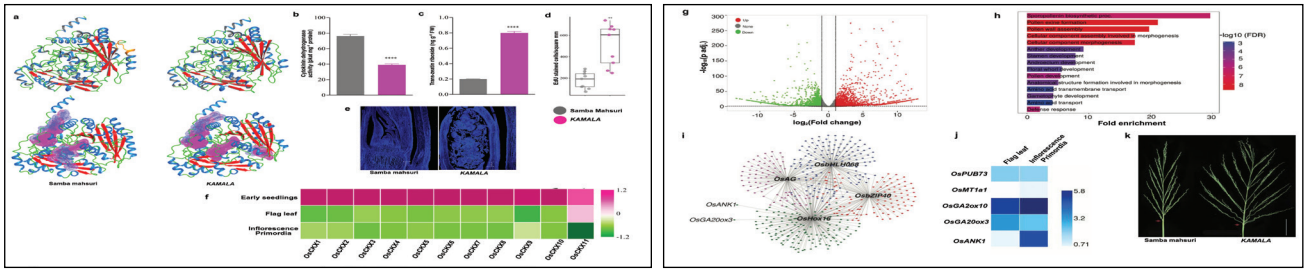
ABR/CI/BT/18 (2021-2029): Genomics and genome editing approaches for abiotic stress tolerance (low P and heat), biotic stress tolerance (sheath blight and bacterial blight), and yield improvement of rice

- **KAMALA-CKX2 allele-specific marker: a promising tool for next-generation rice breeding:** A PCR-based DNA marker was developed for efficient introgression of KAMALA-CKX2 (Cytokinin Oxidase/Dehydrogenase 2). Its successful deployment across ten diverse rice backgrounds through marker-assisted selection demonstrates the broad utility of this novel *CKX2* allele in rice breeding.



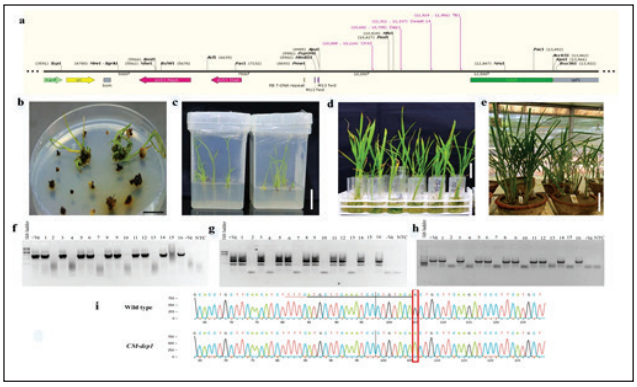
The plant architecture of DRR Dhan 53, Kamala and their backcross inbred lines (BC1F5), Improved Samba Mahsuri, Kamala and their backcross inbred lines (BC1F5). The gel image presented below confirms the presence of specific alleles of *Gn1a* (CKX2) and Kamala. Detection of the Kamala-specific allele (KAMALA-CKX2) in the BC_1F_5 lines indicates successful introgression of the target genomic region from Kamala into the recipient backgrounds.

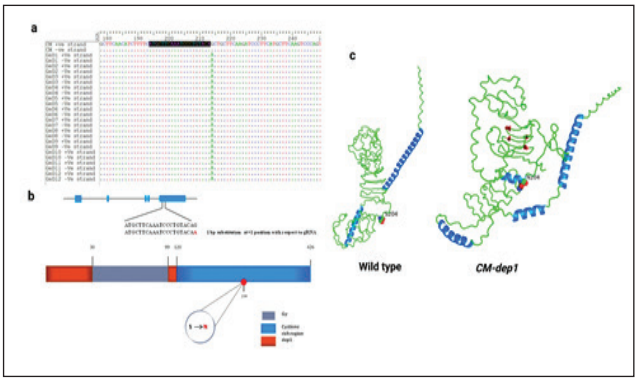
- **Molecular Basis of phenotypic traits exhibited by genome edited variety DRR Dhan 100 (Kamala):** The mutation in KAMALA CKX2 preserves the overall three-dimensional structure of the enzyme. Targeted mutations in the cytokinin- and FAD-binding domains result in a moderate reduction in enzyme activity, rather than complete loss, leading to optimal cytokinin enhancement. KAMALA, with moderately elevated cytokinin levels, exhibits enhanced cell division and a faster transition from shoot to floral primordia. Panicle architecture appears to be regulated by ANK1, which shows increased mRNA expression under elevated cytokinin levels in KAMALA.



Fine-tuning of cytokinin metabolism and reproductive gene networks drive enhanced panicle development in KAMALA. a, three-dimensional structural models of *CKX2* of Samba Mahsuri and *KAMALA*, predicted b, reduced affinity corresponds to decreased cytokinin dehydrogenase activity. C, increased trans-zeatin riboside content in *KAMALA* inflorescence tissue. d, quantification of EdU-stained actively dividing cells is depicted, and e, displays representative images of shoot apices with enhanced cell proliferation F, heat map representing expression profiles of *OsCKX1-OsCKX11* in different tissues and growth stages. G, volcano plot of differentially expressed genes from inflorescence RNA-seq h, gene ontology enrichment analysis of upregulated DEGs highlights pathways involved in reproductive organ development. i, transcription factor (TF) regulatory networks showing interactions j, RT-qPCR validation of key DEGs k, compares panicle architecture.

- **Tissue culture optimization and genome editing for yield improvement of valuable landrace Chittimuthyalu:** The tissue culture protocol for transformation and regeneration of high-value aromatic landrace Chittimuthyalu was developed. A multiplex genome-editing construct targeting *OsDEP1, OsTB1, OsCKX2,* and *OsSWEET14* genes was transformed and edited lines for *OsDEP1* were obtained. The primary edited rice plants exhibit enhanced grain size, ~100% increase in the thousand-grain weight, and ~50% increase in total grain yield per plant. This study open avenues to bring these hardy, climate-resilient, and nutrient-rich accessions into mainstream cultivation

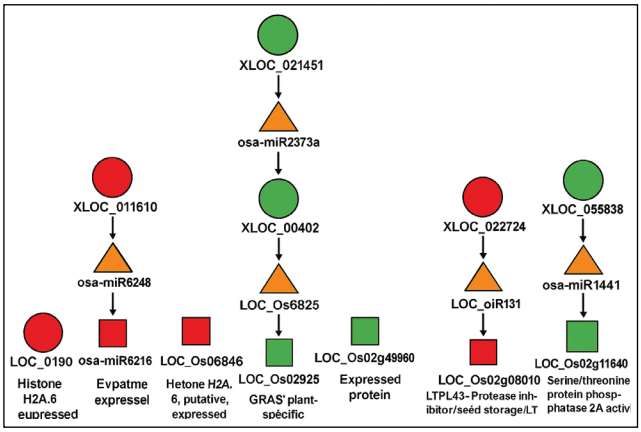




Construction of a multiplex gene editing vector targeting OsDEP1, OsTB1, OsGn1a, and OsSWEET14 genes, and its transformation into Chittimuthyalu. a Multiplex gene editing vector, b Calli regeneration after the transformation and antibiotic selection (bar=1 cm), c) Plantlets formation in rooting media (bar=2 cm), d Hardening in the Yoshida media (bar=3 cm), e T0 plants at the Biosafety glasshouse (bar=10 cm). T0 plant investigation for the presence of transgene using primers of Cas12a (f), 35S CaMV (g), hygromycin phosphotransferase (HPT) gene (h), Sequence chromatogram showing gene editing confirmation in the OsDEP1 gene of T0 plants through Sanger sequencing (i)

ABR/CI/BT/19 (2021-2025): Elucidation of long non-coding RNAs and association of molecular markers for important root traits under aerobic condition

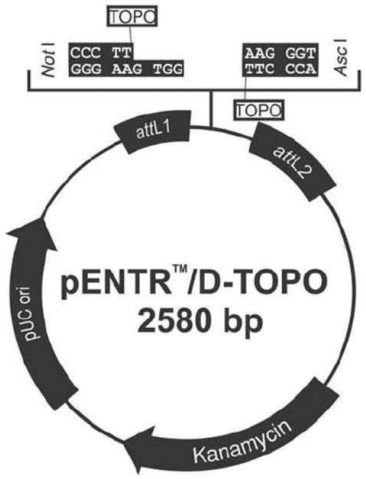
- **Long-non coding RNAs (lncRNAs) as key regulators of aerobic root adaptation -** Distinct sets of lncRNAs form regulatory triplets with miRNAs and target genes, modulating root architecture and stress responses. Notably, lncRNA XLOC_056556 co-regulates *OsWAK55* via osa-miR444a-3p.2, contributing to cell wall integrity and oxidative stress tolerance in aerobic-adapted genotypes.
- **lncRNAs drive functional pathways for root growth and stress resilience -** lncRNAs (e.g., XLOC_011603, XLOC_049924, XLOC_055838, XLOC_022724) regulate genes involved in redox balance, auxin signaling, meristem activity, and ion transport for adaptation to low-moisture aerobic soils.



Co-relation and network of lncRNAs, miRNAs and mRNA targets for each triplet regulation (co-relation gene expression mRNA-lncRNA-miRNA) in roots under aerobic condition for adaptation

ABR/CI/BT/20 (2023-2028): Genetic improvement of brown plant hopper (BPH) tolerance in rice through novel breeding technologies

- **Isolation and cloning of serine/threonine protein kinase receptor (STPKR) gene, associated with resistance to Brown Planthopper – STPKR gene** was amplified as a ~1.4 kb fragment from *Oryza nivara*-derived line RPBio 4918-230S and successfully cloned into the pENTR vector using Gateway cloning, with insertion confirmed by colony PCR, NotI digestion, and sequencing.



pENTR vector using Gateway cloning deployed for the transformation of STPKR gene

- **Construct development for functional validation: pENTR: STPKR construct (3.7 kb)** transferred into PGWB5 expression vector, enabling downstream transformation and functional studies to assess its role in enhancing Brown Plant hopper resistance.

New Research Project initiated in 2025

ABR/CI/BT/22 (2025-2028): Epigenetic mechanisms of aerobic adaptation in rice roots through DNA methylation

- An extensive literature review was completed to identify candidate genes, transcription factors, and epigenetic regulators associated with aerobic adaptation and root development in rice.
- Publicly available genomic, transcriptomic, and DNA methylation datasets were compiled for in silico analysis. Promoter analysis, functional annotation, and preliminary gene regulatory network analyses were performed to prioritize candidate genes for subsequent methylome and transcriptome validation.

RUE-Enhancing Resource and Input Use Efficiency

AGRO/IUE/11 (2020-2026): Strategic research on enhancing water use efficiency and productivity in irrigated rice system

- IoT based irrigation with saturation and 10 % depletion of available soil moisture (DASM) were found to be more economical among the irrigation treatments.
- In eighth year of conservation agricultural practices in rice-maize system revealed that *kharif* rice transplanted at 1st July followed by *rabi* conventional tilled maize resulted in the highest system productivity (13.2 t/ha) and weed control efficiency.
- Nitrogen application of 125% RDN with 100% inorganic consistently resulted in higher growth parameters (plant height, number of tillers m^{-2} and dry matter production) followed by 100% RDN (100% inorganic) and 100% RDN (50% inorganic and 50% organic) in pooled data.

RUE/CP/AG/18 (2020-2028): Development of Climate smart and economic weed management technologies for changing rice establishment systems

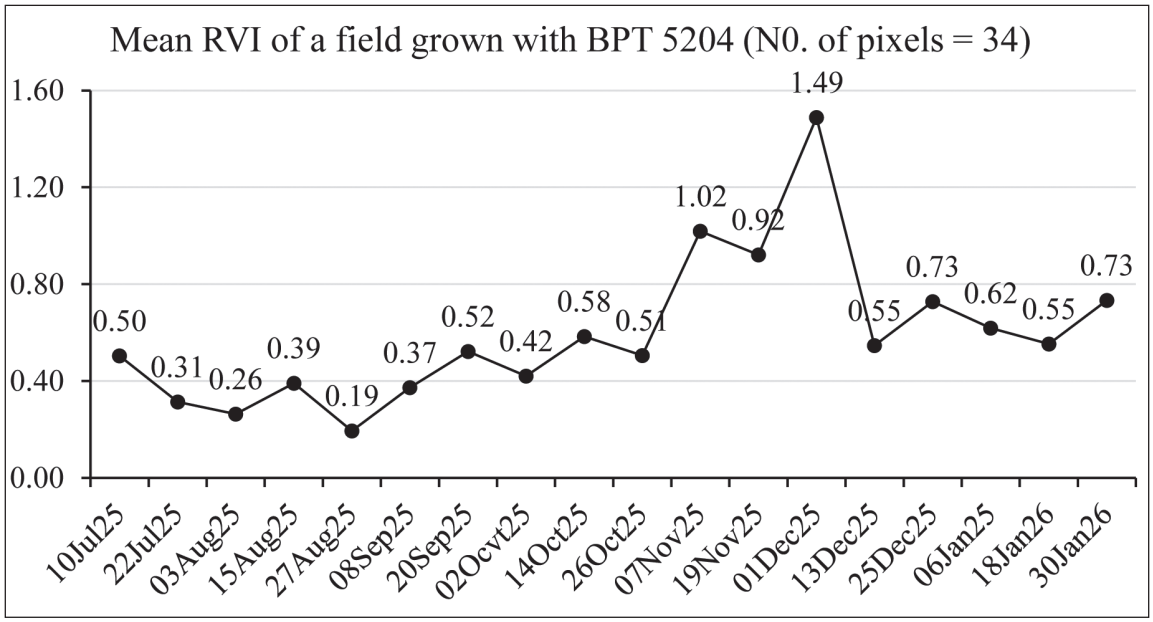
- For weed management in dry DSR/Aerobic cultivation, bio-degradable plastic mulching was comparable to weed-free situation followed by surface mulching with paddy straw or mechanical weeding (weeder) are non-chemical weed control options.
- Two-year study on elevated temperature effect on Weeds and Crop in Wet DSR System showed that higher temperature of 2-4^{0}C has favoured weeds and crop vegetative growth, but crop yield attributes and grain yield were negatively affected.
- The weed population and biomass of *Echinochloa colona*, *Cyperys rotundus* were significantly higher than *Panicum*, *Cyperus difformis*, *Alternanthera* at seedling, tillering and panicle initiation stages of the crop in heat tunnel.

Yield and energetics in Dry DSR (*Rabi* season 2024-25)

Treatments	Grain yield (kg ha^{-1})	Straw yield (kg ha^{-1})	B:C Ratio	Net energy output (MJ ha^{-1})	Energy productivity (kg MJ^{-1})
Seed Hardening	3476^{e}	4332^{d}	2.16^{c}	79488^{d}	0.13^{c}
High seed rate	4122^{d}	4852^{c}	2.51^{b}	95551^{c}	0.16^{b}
Brown manuring	3518^{e}	4495^{d}	2.11^{c}	82416^{d}	0.14^{c}
Paddy straw mulch	4592^{abc}	5364^{ab}	2.77^{a}	37511^{f}	0.05^{e}
Biodegradable film mulch	4803^{ab}	5549^{a}	1.88^{d}	112946^{a}	0.18^{a}
Pre fb Post emergence herbicides application	4381^{cd}	5070^{bc}	2.68^{a}	101729^{bc}	0.17^{ab}
Mechanical weeding	4475^{bc}	5342^{ab}	2.71^{a}	105905^{ab}	0.17^{ab}
Weed free	4815^{a}	5598^{a}	1.8^{d}	114280^{a}	0.18^{a}
Weedy check	2810^{f}	3668^{e}	1.91^{d}	61686^{e}	0.11^{c}
S.Em±	107.57	119.88	0.06	3079	0.004
LSD (p=0.05)	322	359	0.18	9231	0.012

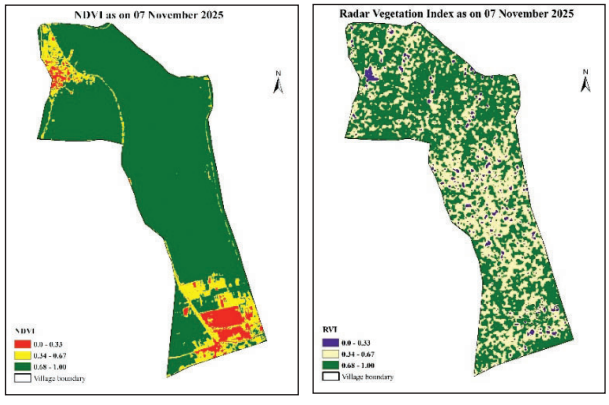
RUE/CP/SS/16 (2018-2026): Study of rice vegetation in terms of crop stress to the model the yield using NDVI

- Rice vegetation in Jammulapalem was monitored using temporal data of cloud free Sentinel-2 data covering the season from the gaining to the end (harvest stage). Although optical data was technically available at every 5 days, cloud posed problem sometimes masking the selected fields leading to irregular intervals. Area, field and pixel level monitoring of health of rice vegetation is possible by using satellite data derived vegetation indices including NDVI. It is possible to monitor fields in near real time as Sentinel-2 data is available a few hours later after the pass which may help in developing possibly a forewarning system. Optical remote sensing has a limitation posed by clouds whereas Sentinel-1 SAR is all weather data not impacted by clouds thus giving regular data at 12 days interval. Eighteen Sentinel-1 images were downloaded and pre-processed to obtain the Radar Vegetation Index (RVI) and studied the response pattern. The pattern of change in RVI in a field grown with BPT 5204 was shown in the following figure.



Mean RVI of pixels extracted from a field

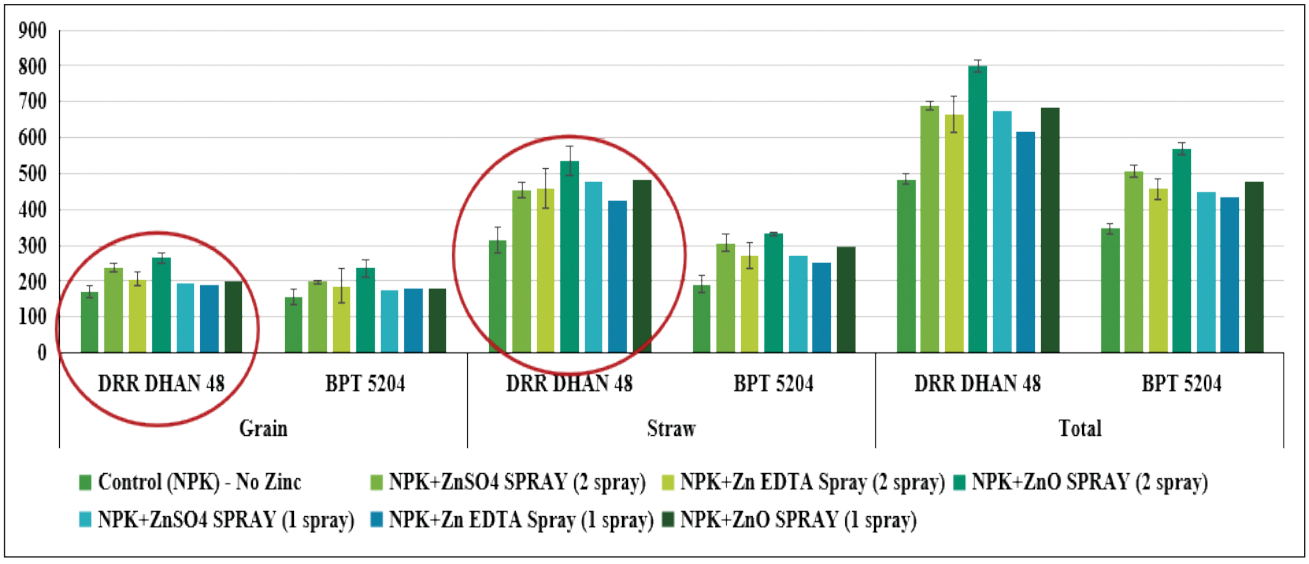
- A positive and good correlation (r = 0.534) existed between NDVI and RVI although both indices are technically very different from each other. Likewise, the spatial distribution of NDVI and RVI in Jammulapalem was depicted in the following figure.



Spatial distribution of NDVI and RVI in Jammulapalem village

RUE/CP/SS/22 (2022-2026): Study on the release pattern, kinetics, and impact of nanoparticles in soils

- A comprehensive field experiment was conducted using BPT 5204 and DRR DHAN 48 to evaluate the influence of different zinc (Zn) sources and application strategies on rice productivity and grain Zn enrichment. Among the tested treatments, dual foliar application of Zn through $ZnSO_4$ and ZnO at flowering and grain filling stages proved to be the most effective, recording higher grain yields of 6993 and 6983 kg ha^{-1}, respectively. The findings suggest that repeated Zn supplementation during key physiological stages is essential for achieving a positive yield response in rice.
- Apart from yield improvement, the study also focused on Zn biofortification potential in rice grains. External Zn supplementation significantly increased grain Zn concentration, particularly in DRR DHAN 48, which exhibited greater Zn accumulation compared to BPT 5204. The enhanced Zn enrichment observed in DRR DHAN 48 demonstrates its suitability for addressing micronutrient malnutrition through agronomic biofortification strategies.
- In addition to the field study, a detailed in vitro investigation was carried out using four rice genotypes, namely DRR DHAN 42, DRR DHAN 48, DRR DHAN 49, and DRR DHAN 63, to understand the physiological and molecular responses associated with Zn and iron (Fe) nutrition. The experiment evaluated the effect of soil and foliar application of Zn and Fe on micronutrient transporter activity and their role in nutrient uptake and mobilization within the plant system. To further elucidate the molecular mechanisms underlying Zn and Fe transport, qRT-PCR analysis was performed using selected Zn/Fe transporter genes, namely ZIP-1, ZIP-8, HMA-1, HMA-2, and HMA-3, with MBP (Membrane Binding Protein) employed as the endogenous control. The gene expression analysis revealed that ZIP-1 and ZIP-8 did not show detectable expression under the imposed treatment conditions, indicating their limited involvement under the experimental environment or nutrient regime. However, differential expression patterns were observed for HMA transporter genes, suggesting their possible role in micronutrient transport, sequestration, and homeostasis in rice under Zn and Fe supplementation.



Effect of Zn supplementation on Zn uptake in rice

RUE/CP/SS/20 (2021-2026): Exploiting legacy phosphorus and enhancing phosphorus use efficiency in irrigated rice

- During Rabi 24-25, results revealed that, root dipping of rice seedlings @ 40 kg P /ha resulted in highest panicles/m² (376), grain yield (6850 kg/ha) and straw yield (7570 kg/ha). Moderate P doses (20-40 Kg P) combined with bio fertilizers like BPSB or seedling dip methods or coated P formulations outperformed zero P and high P doses (60 Kg P). Application of coated phosphorus fertilizers registered higher agronomic and recovery efficiency than their respective uncoated phosphorus treatments. Between the varieties, DRR Dhan 60 better than Improved samba Mahsuri across the key growth and yield parameters.
- To better understand the influence of rice establishment methods on soil phosphorus dynamics, soil samples (0–15 cm depth) were collected from fields under three rice establishment methods, normal transplanted rice (NTP), four years of direct-seeded rice (4 DSR), and eight years of direct-seeded rice (8 DSR) and analysed for available phosphorus content. NTP soils recorded the highest available phosphorus concentration, averaging 75.51 kg/ha, which was more than twice the levels observed in 4 DSR (34.92 kg/ha) and 8 DSR (28.76 kg/ha). The consistently lower P values in DSR systems suggest reduced P retention and availability, likely due to differences in water management, soil redox conditions, and fertilizer incorporation efficiency compared to puddled, transplanted systems.

RUE/CP/AG/19 (2025-2029): Enhancing yield input use efficiency and economics of dry DSR through best agronomic practices

- **Continental variations in fertilizer use and efficiency call for judicious fertilization to ensure agricultural sustainability and environmental safety:** Between 1980 and 2022, global fertilizer consumption increased by 59%, while agricultural production rose by 58%, demonstrating a linear relationship. South America experienced the highest growth in fertilizer consumption (391%) and production (71.8%) despite a 3.2% reduction in agricultural land. In Asia, fertilizer use surged by 230% alongside a 29.7% expansion in land area, with production increasing by 68.8%. Conversely, Europe reduced fertilizer use by 60% and agricultural land by 67.7%, yet achieved a 3% increase in production. Global per-hectare NPK consumption rose by 47.3% to 113.1 kg/ha, with South America and Asia leading (283% and 169% increases, respectively), while Europe experienced a 49.1% decline. Africa, with minimal growth, maintained the lowest fertilizer use (21.6 kg/ha in 2022).
- **Global and regional trends in agricultural pesticide use (1990-2022) and its implications for sustainable agriculture:** Globally, pesticide use more than doubled, rising by 104.7% from 1.81 million tons (MT) in 1990 to 3.70 MT in 2022. Per-hectare use increased by 93% (from 1.2 to 2.4 kg/ha), while per-capita consumption rose by 35% (from 0.34 to 0.46 kg/person). Regionally, South America showed the highest increase, with total pesticide use surging by 1027% (from 0.11 MT to 1.24 MT), and sharp rises in both per-hectare (766%, from 1.03 to 8.92 kg/ha) and per-capita (613%, from 0.38 to 2.71 kg/person) applications. Asia, the second-largest user, saw a 76.1% increase in total consumption (from 0.60 MT to 1.05 MT), with per-hectare and per-capita usage up by 58% (from 1.2 to 1.9 kg/ha) and 21% (from 0.19 to 0.23 kg/person), respectively. Overall, the rapid rise in pesticide use across most regions, with Europe as the exception, underscores the need for tailored, region-specific strategies to minimize pesticide reliance.
- **Herbicide screening and agronomic optimisation for breaking the *weed* cycle through late-season control:** Glufosinate AM, Glyphosate and Bispyribac-Na exhibited superior efficacy in suppressing weed biomass, seed formation and, crucially, viable seed production of *E. colona*. All the tested herbicides namely Glufosinate AM, Glyphosate, Bispyribac-Na, Bentazon, and Almix 3G showed more than 85% suppression of seed production of *L. hyssopifolia*. Glufosinate AM and Glyphosate exhibited superior efficacy in suppressing both seed formation (>96%) and, crucially, viable seed production (>90%) of weedy rice.

SSP- Sustaining rice system productivity

SSP/CP/AG/15 (2016-2025): Sustainable intensification of conservation agriculture practices in rice-maize system to enhance system productivity in southern India

- Eight years (2018-26) data revealed that in rainy season total weed population and weed dry matter was higher in wet direct seeded rice. In winter season, higher total weed population and dry weight were recorded in minimum tilled plots.
- The higher system energy use efficiency was observed in *kharif* (rainy season) transplanted rice followed by conventional tilled *rabi* (winter season) maize.
- Higher bacteria (180×10^6) and actinomycetes (95×10^4) population were observed under transplanted plots compared to those under direct wet seeded plots.
- The higher system energy use efficiency (12.4) was observed in *kharif* (rainy season) transplanted rice followed by conventional tilled *rabi* (winter season) maize.
- The highest system productivity of transplanted rice was recorded in 2022-23 (12.63 t/ha). Conventional tilled maize based system was superior over minimum tilled maize in initial three years.
- The highest system productivity of the conventional tilled maize system was recorded in 2022-23 (12.54 t/ha). In later two years there was no significant difference between conventional tilled maize and minimum tilled maize system. Pooled analysis also reflected the same results as that of last two years.

Rice-maize productivity (t/ha) obtained under applied treatments during the 5-year period

Treatment	Rice-maize productivity (t/ha)					
	2020-21	2021-22	2022-23	2023-24	2024-25	Pooled
Sowing time						
1st July	11.76	11.67	12.06	11.43	11.24	11.63
15th July	13.27	12.76	12.62	11.58	11.23	12.29
30th July	11.67	11.43	11.95	11.36	11.06	11.49
LSD (p=0.05)	1.13	1.11	NS	NS	NS	NS
Establishment method						
Transplanting	12.37	12.39	12.63	11.90	11.61	12.18
Wet direct seeded	11.11	10.92	11.71	11.81	10.85	10.97
LSD (p=0.05)	1.16	1.13	0.98	1.03	1.06	1.10
Tillage (Winter season)						
Conventional	12.36	12.05	12.54	11.84	11.32	12.02
Minimum	11.29	11.04	11.31	10.97	10.90	11.10
LSD (p=0.05)	1.01	1.00	1.10	NS	NS	NS

SSP/CP/SS/18 (2017-2025): Studies on soil organic carbon status. Mapping and stocks in rice soils of India

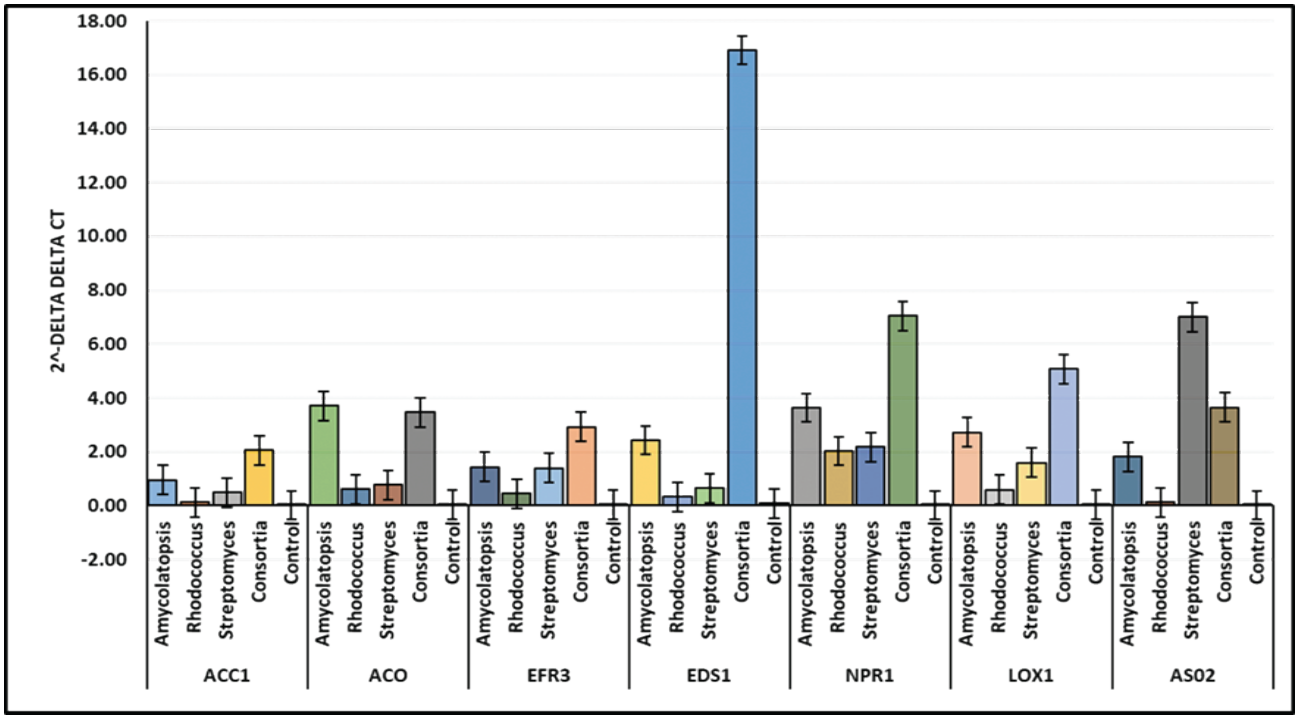
- **Spatial distribution of carbon stocks in soil profiles across different rice establishment methods:** The study revealed that soil organic carbon (SOC) content varied among rice establishment methods, with the highest SOC recorded under the System of Rice Intensification (SRI) (0.46%) and the lowest under the control treatment (0.42%). SOC stocks were highest in the 0–20 cm soil layer and declined with increasing depth (20–40 and 40–60 cm), indicating greater carbon accumulation in surface soils. On average, surface soils recorded 23% and 10% higher SOC stocks than the lower soil layers. Minimum

tillage practices also favored greater carbon sequestration by minimizing soil disturbance and reducing carbon losses through microbial decomposition and CO_2 emissions.

- Carbon fractions showed distinct depth-wise and management-induced variations. The contents of very labile, labile, less labile, and non-labile carbon fractions decreased with soil depth and were significantly influenced by rice establishment methods. Among the treatments, SRI consistently recorded higher very labile and labile carbon fractions, indicating improved soil biological activity and carbon turnover. Very labile carbon ranged from 0.03–0.76%, labile carbon from 0.02–0.20%, less labile carbon from 0.05–0.19%, and non-labile carbon from 0.07–0.56% across soil depths. The study confirmed that very labile and labile carbon fractions are highly sensitive indicators of changes in soil management practices and can effectively reflect improvements in soil quality.
- The Lability Index (LI), an indicator of carbon quality and turnover, ranged from 0.71 to 3.83 across treatments and soil depths. SRI recorded the highest lability index values (3.0, 2.0, and 3.83 at 0–20, 20–40, and 40–60 cm depths, respectively), indicating enhanced carbon dynamics and greater availability of active carbon pools compared to the control.
- Multiple regression analysis demonstrated strong relationships between rice yield and soil properties. Available nitrogen, phosphorus, bulk density, and SOC positively influenced grain yield, while phosphorus, potassium, SOC, and total SOC positively influenced straw yield. Among these variables, available phosphorus and SOC were the common factors contributing positively to both grain and straw yields, highlighting the importance of maintaining soil carbon for sustainable rice productivity.

SSP/CP/SS/19 (2018-2026): Prospecting endophytic actinobacteria of rice for sustainable rice production

- Actinobacteria are multifunctional plant growth-promoting bacteria with potential as rice bioinoculants. Pot and field experiments were conducted during Rabi 2024–25 on rice variety DRR Dhan 55 using five treatments: *Amycolatopsis sp*, *Rhodococcus sp*, *Streptomyces sp*, consortium, and uninoculated control. Actinobacterial cultures were applied as seedling root dip at transplanting. In the field trial, among the inoculants, *Rhodococcus sp*. consistently recorded the greatest improvement in plant growth traits, grain yield, and straw yield, followed by *Streptomyces* sp. and *Amycolatopsis sp*. The consortium improved growth and yield over the control but performed less effectively than single-culture inoculations. Overall, *Rhodococcus sp*. showed the highest potential as a rice growth- and yield-promoting inoculant.
- The induction of systemic resistance by actinobacteria and their consortium was assessed in pot culture through the expression of key genes associated with SA, JA, and ethylene signalling. The genes studied included ET biosynthesis/ signalling genes (OsACC1, OsACO, OsERF3), SA signalling genes (OsEDS1, OsNPR1), and JA biosynthesis genes (OsLOX and OsAOS2). Using the 2^-ΔΔCt method, the consortium showed the strongest defence activation, with marked upregulation of OsEDS1 and OsNPR1, along with OsACO, OsERF3, and OsLOX1. This indicates activation of both SA- and JA/ET-mediated pathways. In comparison, *Rhodococcus* sp induced the weakest defence response despite its superior growth-promoting effect.



Evaluation of actinobacterial treatments as induced systemic response (ISR) elicitors

SSP/CP/SS/20 (2021-2026): Development and evaluation of N-fixing and P-solubilizing microbial consortia for sustainable rice production

• Methanotrophic bacteria were enriched and isolated from rhizosphere soil samples using modified dNMS medium under methane-enriched conditions. Among all serum bottle samples tested, only two showed clear methanotrophic activity, evidenced by turbidity and pellicle/flakes formation at the air–liquid interface after 6–8 weeks of incubation. In parallel, 11 zinc-solubilising bacterial (ZnSB) isolates with multiple plant growth-promoting traits were obtained from the rhizosphere. These isolates effectively solubilised insoluble zinc compounds, including zinc oxide and zinc carbonate, through the production of organic acids and chelating agents, and soluble zinc was quantified using Atomic Absorption Spectrophotometry (AAS). Compatibility assays conducted by cross-streaking on nutrient agar at 28°C for 7 days revealed no antagonistic interactions among the isolates, indicating their suitability for consortium-based biofertilizer formulations. Among them, isolate IIRRZnSB-8, identified as *Acinetobacter bereziniae* based on morphological and biochemical characteristics, exhibited the highest zinc-solubilisation efficiency (216 mg/L), highlighting its potential as an effective bioinoculant for improving zinc nutrition and sustainable crop productivity in zinc-deficient soils.

• Fifteen phosphorus (P) and zinc (Zn) solubilizing bacterial cultures were screened for toxicity against *M. graminicola* in vitro bioassays. Among them, four culture isolates namely Bacillus cereus IIRRZnSB-17, Bacillus cereus IIRRZnSB-20, Bacillus proteolyticus IIRRZnSB-12, and *Acinetobacter* sp., were found nematicidal to second-stage juveniles (J2s) of *M. graminicola*, causing over 70% nematode mortality within 24 hours of exposure to cell-free culture filtrates at 50% concentrations. These effective cultures are being evaluated for their effect on rice plants in reducing nematode infection under in vivo conditions

New Research Project initiated in 2025

SSP/CP/AG/17 (2025-2031): Nitrogen management in direct seeded rice based cropping systems to maximize productivity and profitability improve soil health and reduce environmental risk

• In *rabi* 2025-26 dhaincha was grown in the experimental plot at Rajendranagar farm. Forty-

five days dhaincha crop was harvested and mixed in the soil

- Initial soil pH was 8.2, available N, P and K was 206.0, 12.7 and 210.0 kg/ha, respectively
- Initial soil carbon fractionation was done. The soil was found with very labile (33.5%) and labile (33.2%) carbon concentrations at a 0-5 cm depth of soil. However, in the deeper (5–15 cm) soil layer, none of the pools of carbon (very labile, labile, less labile and non-labile) differed significantly.
- *Echinochloa crusgalli* (L.) Beauv., *Echinochloa colona* (L.) Link., *Cyperus esculentus* L., *Cyperus rotundus* L., and *Parthenium hysterophorus* were the major weed flora found in the field.

SSP/CP/SS/21 (2025-2028): Studies on sulphur dynamism in different growing environments of rice

- The project "Studies on Sulphur Dynamics in Different Growing Environments of Rice" has been initiated to investigate sulphur dynamics in rice soils and develop efficient sulphur management strategies under diverse growing environments.
- The study addresses the emerging concern of sulphur deficiency resulting from the predominant use of sulphur-free fertilizers and the dynamic nature of sulphur transformations in flooded rice ecosystems.
- The project aims to estimate the sulphur requirement of genome-edited Kamala and Samba Mahsuri, determine the critical sulphur concentration using different soil extractants in relation to crop yield, and evaluate the relationships among soil sulphur fractions, extractable sulphur, native sulphur mineralization kinetics, and rice growth, nutrient uptake, and yield.
- The findings are expected to provide a scientific basis for improving sulphur-use efficiency, refining soil sulphur testing methods, and developing balanced nutrient management recommendations for sustainable rice production.

CCR-Assessing and managing crop response to climate change

CCR/CP/SS/17 (2017-2028): Studies on the emission of greenhouse gases (GHGs) from rice soils and their mitigation

- Greenhouse gas emissions from rice soils were significantly influenced by crop establishment methods. Conventional transplanted rice (TPR) recorded the highest methane flux (36 kg ha^{-1}), while AWD recorded the lowest (20 kg ha^{-1}), reducing methane emissions by 41% over TPR. Methane emissions also declined by 29% in SRI and 40% in DSR. However, N_2O emissions were comparatively higher in SRI, DSR, and AWD than in TPR.
- Carbon equivalent emissions (CEE) and global warming potential (GWP) were highest under TPR (339 kg C ha^{-1} and 1243 kg CO_2 eq. ha^{-1}, respectively) and lowest under AWD and DSR. SRI, DSR, and AWD reduced GWP by 15–22% compared to TPR, while DSR recorded the highest carbon efficiency ratio (CER), indicating lower emissions per unit carbon fixed.
- The Global Warming Potential varied significantly with the crop establishment methods. SRI and AWD methods lowered the GWP due to lower methane emissions as compared to the conventional TPR method. The highest GWP was recorded by TPR with 1243 kg CO_2 eq. $ha^{-1,}$ which reduced to 1054 kg CO_2 eq. ha^{-1} in SRI. It further reduced to 986 and 973 kg CO_2 eq. ha^{-1} in DSR and AWD, respectively. SRI, DSR and AWD methods lowered the GWP by 15 - 22 per cent over TPR.
- Grain yield and water productivity were significantly improved under alternative establishment methods. DSR recorded the highest grain yield (6425 kg ha^{-1}) and water productivity (4.72 kg ha mm^{-1}), whereas TPR required the highest irrigation water (1869 mm ha^{-1}). Water use was reduced by 24% in SRI and 41% in DSR compared to TPR.

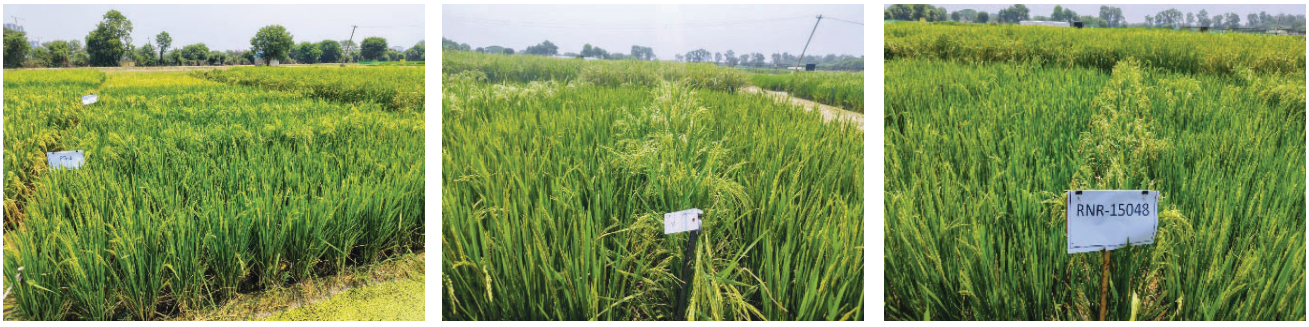
CCR/CP/PP/13 (2021-2026): Deciphering physiological basis of heat stress tolerance in rice

- With two years of phenotypic data on heat stress tolerance related traits of both 3K and 50K panel, GWAS was performed. With GWAS, few significant QTLs for these traits were identified. Some of those QTLs have been found to be overlap with the same genomic regions in both the sets. Exploring those genomic regions and others in databases such as RiceXPro, RAP-DB etc revealed that these genomic regions are associated with promotors, transcription factors, elicitors of genes involved on various plant processes such as in the regulation of plant hormone concentration, photosynthesis related genes etc. Similarly, meta-analysis of previously published studies also indicated the overlapping genomic regions.

HRI - Host plant resistance against insect pests and their management

HRI/CPT/ENT/31 (2021-2025): Understanding the interaction of internal feeders – stem borers and gall midge with rice for their management

- *Yellow stem borer:* Three rice varieties, DRR Dhan 65, BRRI 75, and RPBio 226, were evaluated with PB1 and RNR 15048 as trap crops and compared with sole cropping for yellow stem borer damage. Although dead heart and white ear damage did not differ significantly among the main crop varieties under treatments with or without trap crops, grain yield was significantly higher in treatments with trap crops (either PB1 or RNR 15048) compared to the sole crop ($F = 3.238$; $P \leq 0.050$).



PB1 and RNR 15048 as trap crops for yellow stem borer in the main crop varieties

- W1263, IET 21401, RP4919-NSR52, RP6166-M273, and RP6738-42-16-3 exhibited chronic antibiosis against neonate larvae of yellow stem borer in the cut stem assay, with larval mortality observed by the 8th day.
- Rice entries were screened against pink stem borer *Sesamia inferens* under greenhouse conditions. PB1 recorded the highest mean incidence of dead hearts (25.55%) and white ears (26.05%), whereas MTU 1061 (14.73% and 10.75%) and TKM 6 (16.44% and 10.41%) exhibited comparatively lower plant damage.
- *Rice gall midge:* Attempt was made to screen the rice entries through egg infestation with gall midge population. Two eggs per tiller were infested and plants were dissected and observed for maggot development on 6th – 8th day after release. Egg infestation can be a technique to screen the rice entries when the gall midge culture is not sufficient to screen the entries by releasing adults.
- ARC 6605, a donor in group 1 differential can be identified through two *Gm1* markers - RM23956 and RM55226. In RP 5922-21, another donor RM23956 has only amplified.

- Aganni, INRC17470, INRC3021, RP5924, INRC15888 and RP 6749-RMS7-17-27-41 were found promising for gall midge across locations in India. Sequencing of PRP and PRP del regions in all these resistant lines along with TN1was carried out to establish marker trait associations. The nucleotide sequences of PRP gene from INRC 3021(PZ246755), Aganni (PZ246756), INRC 15888 (PZ246758), INRC 17470(PZ246757), RP 5925-24 (PZ246759), RP 6749-RMS7-17-27-41 (PZ246751), were similar but significantly different from TN1 (PZ321373) and were deposited in GEN bank. PRP del plays a major role in conferring resistance to gall midge populations. PRP del sequences were similar in INRC 3021(PZ321374), AGANNI (PZ321375), INRC17470 (PZ321378), RP 5925-24(PZ321378) but PRP del sequence were different in INRC 15888 (PZ321377), and in RP 6749-RMS7-17-27-41(PZ321379) it was similar to TN1.

IPM - Integrated pest management

IPM/CPT/ENT/29 (2021-2029): Studies on plant nematode interactions in diverse rice phytobiomes

- Screening of rice germplasm for resistance to the rice root-knot nematode *Meloidogyne graminicola* revealed two land races (Aganni and K2419) and one elite cultivar DRR Dhan 45 resistant to the nematode. A novel soil baiting technique for detection of root-knot nematode infestation in soil is developed.
- Endophytic microbial isolates were isolated from the roots of rice cultivar TN1 grown in nematode-infested sick plot. Thirty-five cultures were purified, and their culture filtrates were screened for *in vitro* nematicidal activity (at 25% and 5% concentrations) against *M. graminicola* in laboratory bioassays. Four isolates were found highly nematicidal to the second-stage infective juveniles (J2s) of the nematode, with over 90% nematode mortality recorded within 24–48 hours.
- Effect of wet and dry Direct Seeded Rice (DSR) systems on nematode abundance in rice ecosystem was evaluated. No significant differences in population of rice root nematode *Hirshmanniella* spp. were observed between the Wet-DSR and Normal Transplanted Planting (NTP) systems. However, the population of rice root nematode which prefers flooded situation was significantly reduced in dry-DSR system compared to the NTP system. Soil samples from the farmers' DSR rice fields from *viz*., Gaddipally, Kampasagar, Kothagudem, and Wyra showed 20-45% incidence of *M. graminicola* as determined using a novel soil baiting method.
- Investigations on the effect of mulching on plant parasitic nematodes in DSR revealed that mulching with paddy straw, biodegradable films, and green manuring with *Sesbania* significantly reducing the nematode population over the control.
- A field sick plot facility for rice root-knot nematode *M. graminicola* is being developed at ICAR-IIRR farm. The highly susceptible rice cv. TN1 was grown under dry DSR system in this plot for rapid build-up of nematode population in soil.

IPM/CPT/ENT/30 (2021-2027): Enhancing biological control of rice pests through chemical ecology

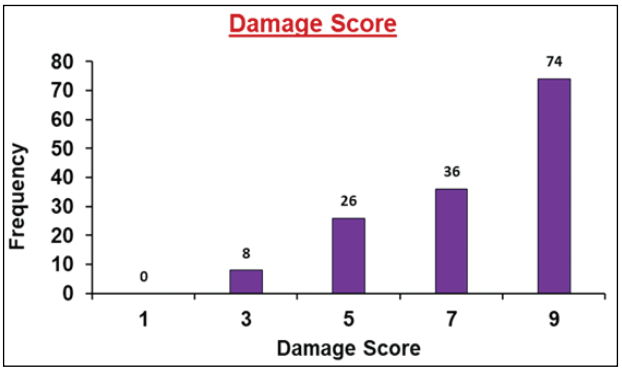
- Seven *Ocimum* species *viz O. basilicum, O. tenuiflorum, O. kilimandscharicum, O. citriodorum, O. gratissimum, O. tenuiflorum* morphotype and *O. africanum* were evaluated as bund plants for their potential in habitat management and conservation biological control.
- Parasitoids such as *Tetrastichus schoenobii* Ferrie, *Trichogramma sp, Telenomus sp, Apanteles sp, Gonatocerus sp, Oligosita sp* and several mymarid parasitoids and predators like green mirid bug and spiders were attracted to various *Ocimum sp. Ocimum basilicum* was found more attractive to stem borer parasitoids (8 nos/trap) while both *O. citriodorum* and *O. basilicum* attracted more hopper parasitoids (12 nos/trap). Baiting with

stem borer egg masses indicated 86.67% egg mass parasitisation in *O. basilicum* treatment while egg parasitisation was higher in egg masses placed near *O. tenuiflorum* with a maximum emergence of 53 individuals of *Telenomus sp.* from an egg mass. The highest parasitisation of Corcyra eggs (34.0%) was observed in *O. tenuiflorum* treatment as compared to 7% in control with no bund plants.

- In another experiment, a total of 23 different blends of synthetic herbivore-induced plant volatiles including Methyl salicylate (MeSA), Methyl jasmonate (MeJA) and green plant volatiles such as ocimene, 3-Hexenyl acetate, linalool, limonene, hexenal, farnesene and octanol were evaluated in two different fields for their efficacy in enhancing natural enemy populations against yellow stemborer of rice. The highest number of parasitoids (egg and larval)/traps were observed in treatment consisting of MeJA+ Octanol in ICAR-IIRR farm and MeSA+octanol in Nalgonda. The lowest number of parasitoid/ traps was observed in treatment with linalool and control.

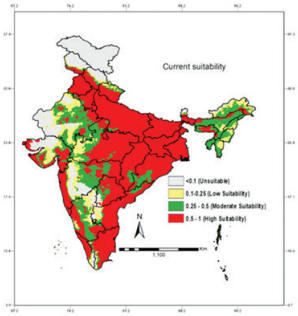
IPM/CPT/ENT/27 (2024-2029): Assessment of host plant resistance to leaf folder and semio-chemical approaches for the management of insect pests of rice–Phase II

- A C_3 population comprising 144 recombinant inbred lines (RILs), developed from two stable moderately resistant backcross alien introgression lines (166s and 148s) derived from *Swarna* × *O. nivara* IRGC81848, was phenotyped for rice leaf folder resistance using the rapid field screening method. Eight RILs were resistant with a damage score of 3.0 and 26 RILs were moderately resistant with a damage score of 5.0

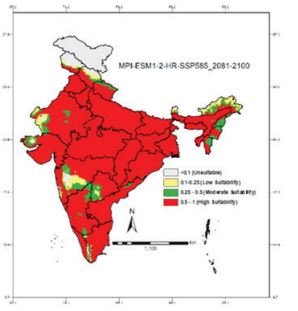


Field phenotyping of C3 population for resistance to rice leaf folder

- Mass trapping with yellow stem borer slow-release pheromone formulations was done at three farmers' fields in Rangareddy and Medak districts with five treatments replicated three times. The highest catches were found in T2 (slow-release pheromone formulation with 12 traps per acre) with 46.02% reduction in white ear damage over the control.
- Species distribution modelling using MaxEnt under CMIP6 climate scenarios predicted a substantial expansion of climatically suitable habitats for the rice leaf folder, *Cnaphalocrocis medinalis*, across India, with precipitation and temperature seasonality identified as the major determinants of habitat suitability. Future projections indicated stable suitability in the major rice-growing regions of southern and eastern India, accompanied by significant expansion into western, central, and north-western India, underscoring the need for climate-informed surveillance and adaptive integrated pest management strategies.



Habitat suitability of leaf folder under current climatic conditions



Habitat suitability of leaf folder under future (SSP585) climatic conditions

IPM/CPT/ENT/34 (2024-2028): Chemical control of insect pests of rice and identification of promising donors for resistance to brown plant hopper

- The brown planthopper (BPH), *Nilaparvata lugens* has developed 12.84-fold resistance to imidacloprid after continuous selection over 10 generations in glass house. The demographic and life history parameters of imidacloprid resistant (IMI-R) and susceptible (IMI-S) strains of *N. lugens*

were compared by age-stage, two-sex life table approach. Additionally, cytochrome P450 gene expression was analyzed using qRT-PCR. The relative fitness of IMI-R strain was 0.74, clearly indicating a trade-off between the imidacloprid resistance and its fitness in *N. lugens*. Gene expression study by qRT-PCR revealed that in IMI-R population *CYP6ER1* and *CYP6AY1* genes were significantly upregulated by 5.85 and 3.35-fold, respectively compared to IMI-S population.

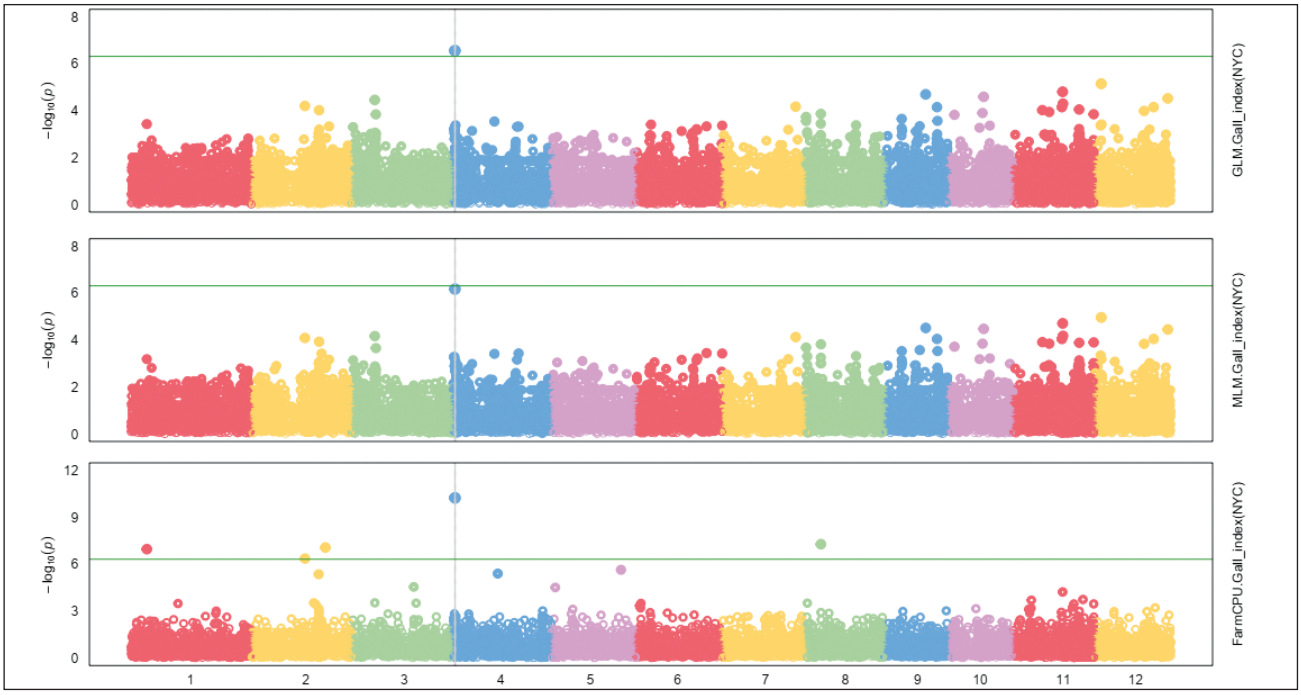
- Identified 13 bacterial isolates from the BPH gut, representing ten families from three phyla: Proteobacteria, Actinobacteria and Firmicutes. Screening for imidacloprid degradation identified four bacterial strains *viz., Paenibacillus amylolyticus*, *Serratia marcescens*, *Acinetobacter soli* and *Brucella* sp. associated with the IMI-R population were capable of growing in minimal salt medium supplemented with imidacloprid. Notably, *S. marcescens* and *P. amylolyticus* could utilize imidacloprid as a sole source of carbon and nitrogen, respectively. LC-MS/MS analysis revealed that *P. amylolyticus* and *S. marcescens* after 14 days of inoculation degraded 73.07 and 66.92% of imidacloprid (100 mg/L), respectively. These findings underscore a strong association between gut-microbial composition and insecticide resistance in *N. lugens* and highlight the potential of specific bacterial strains for microbiome-based pest and resistance management strategies.

IPM/CPT/ENT/32 (2024-2029): Assessment of host plant resistance to rice white-backed Plant hopper *Sogatella furcifera* (Horvath) and its management

- Field populations of White backed Planthopper (WBPH) *S. furcifera* exhibited reduced susceptibility to all tested insecticides, with notable regional variation across India. Imidacloprid showed the highest resistance (LC_{50}: 28.71–123.65 mg a.i./L; RR: 9.62–41.44). In contrast, triflumezopyrim remained highly effective, with low LC_{50} values (0.26–1.02 mg a.i./L) and RR (2.31–9.12).
- Field populations of *S. furcifera* showed significantly elevated detoxification enzyme activities compared to the susceptible strain, with glutathione-S-transferase (EST) ranging from 0.035–0.109 µmol/min/mg protein (up to 4.36-fold), glutathione-S-transferase (GST) from 1.98–5.83 µmol/min/mg protein (up to 6.77-fold), and P450 from 0.147–0.760 µmol/min/mg protein (up to 10.56-fold).
- Genetic analysis of 44 *S. furcifera* individuals from 16 locations across India revealed very low mitochondrial diversity, with only three haplotypes identified. A single dominant haplotype (H1) was widely distributed across all regions, while minor haplotypes were restricted to North & Central populations. Phylogenetic (ML and BI) and haplotype network analyses showed no clear geographic structuring, indicating high genetic similarity and shared maternal lineage among populations.
- Screening of 53 mutant lines of BPT 5204 against White-backed planthopper was conducted using Standard seedbox screening technique under controlled conditions of glasshouse. Among these 53 lines, three lines were identified as resistant, eleven lines as moderately resistant, twenty-eight lines as moderately susceptible and eleven lines as susceptible. The mechanisms of resistance against *S. furcifera* were studied in the selected highly resistant rice genotypes. Mutant lines TI-139 and TI-128 showed the highest number of probing marks by 3rd instar nymphs and female adults, respectively, indicating the presence of an antibiosis mechanism in the resistant lines.
- A mapping population consisting of 150 wild introgression lines (*Oryza rufipogon* x MTU10) along with standard checks was screened under glasshouse conditions to identify new sources of resistance against WBPH in rice. Entries M8, M9, M15, M28, M45, M61, M141, M161, and M171 were identified as highly resistant with damage scores below 1.5. MO1 (scores 1–3) and TN1 (scores 5–9) were used as resistant and susceptible checks, respectively.

IPM/CPT/ENT/33 (2023-2027): Investigations on genetics and mechanisms of resistance to rice root-knot nematode *Meloidogyne graminicola*

- The rice genotypes LD24, Aganni, and K2419 were consistently found to be resistant to the rice root-knot nematode *M. graminicola* in multiple seasons and under different screening platforms (Pluronic plates, Sap-tubes and big pots).
- The effect of the resistant genotype Aganni on *M. graminicola* was studied in detail. Aganni was significantly less attractive (repellent) to *M. graminicola* J2s compared to the susceptible check TN1. Similarly, nematode penetration, development, and reproduction were reduced in Aganni compared to TN1, indicating both pre- and post-penetration resistance. Biochemical analyses showed that the activities of antioxidant defense enzymes – ascorbate peroxidase (APX), catalase, and superoxide dismutase (SOD) were significantly higher in the root tissues of *M. graminicola*-infected Aganni plants compared to TN1, indicting their role in the plant defense.
- The resistant genotype Aganni was crossed with the susceptible genotype TN1. The resulting F_1 plants were grown in the field and selfed to produce F_2 seeds. The F_1 plants were successfully harvested, and the collected seeds constitute the F_2 population, which is being used for phenotyping *M. graminicola* resistance.
- Phenotyping of 220 rice genotypes constituting the 3K subset panel of *indica* rice led to the identification of five highly resistant lines, *viz.*, IRGC 41663, IRGC 53630, IRGC 6445, IRGC 35054, and IRGC 41047, against the rice root-knot nematode *M. graminicola*. Phenotyping was repeated twice for confirmation. Genome-wide association analysis was performed using the GAPIT package. Mixed Linear Model (MLM), General Linear Model (GLM), and FarmCPU approaches were employed. The analysis identified five significant SNPs associated with nematode resistance, located on chromosomes 1, 2, 4, and 8.

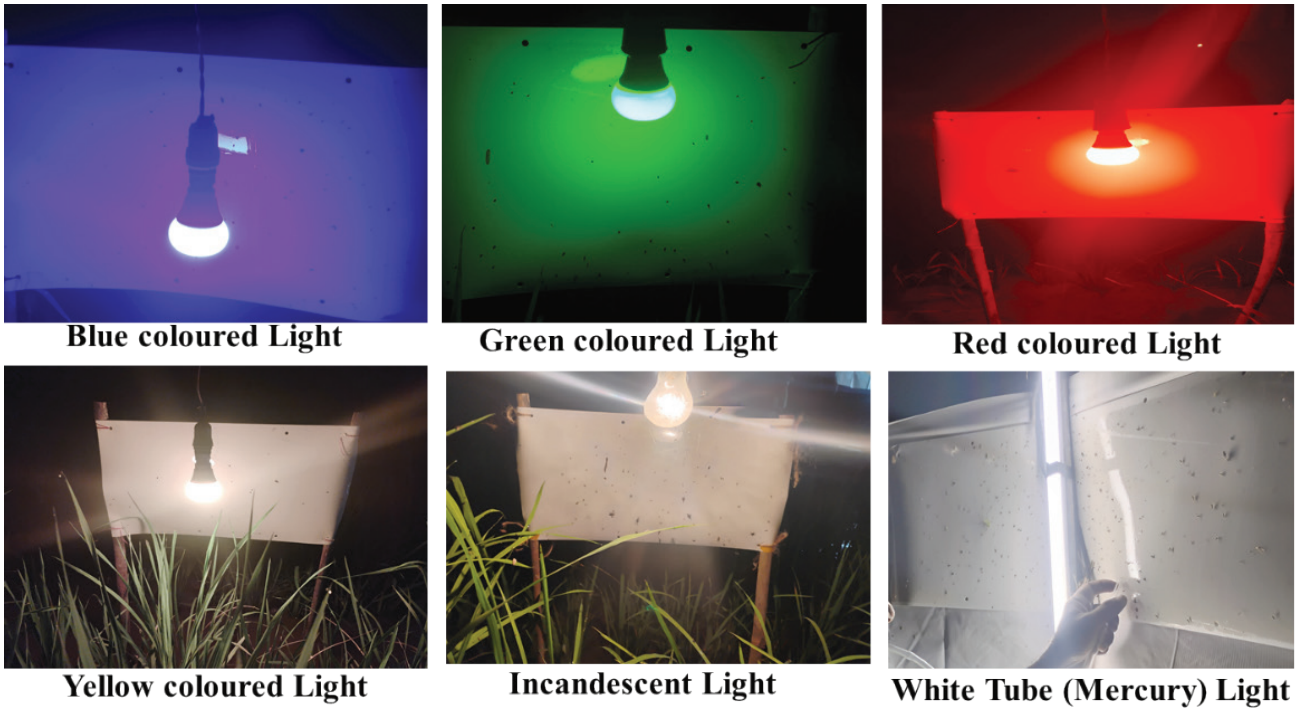


Genome-wide association analyses for rice root-knot nematode resistance in *indica* rice using GLM, MLM and FarmCPU Models

New Research Project initiated in 2025

IPM/CPT/ENT/35: (2025-2029) Designing and development of automated smart traps for monitoring & management of insect pests of rice (*Oryza sativa* L.)

- A preliminary field survey was carried out to assess gall midge infestation at vegetative phase of rice during *kharif* 2025 at different locations in Telangana. Gall midge infestation levels (silver shoot) ranging from 20–25% was observed across all surveyed districts.
- A field study at RARS, Jagitial assessed wavelength-specific phototaxis in rice-associated arthropods using six light sources (360–950 nm). Incandescent light (950 nm) elicited maximal total abundance, whereas yellow light (590 nm) maximized species evenness and richness. Hemipteran pests exhibited strongest attraction to incandescent, blue (460 nm), and white (360 nm) wavelengths; stem borers preferentially responded to yellow and incandescent; gall midge was captured exclusively under white light. Blue light optimized Natural Enemy: Pest ratio. Red light uniquely concentrated water beetles, while Diptera aggregated under blue and incandescent illumination. Spectral clustering revealed distinct assemblage structuring across wavelengths.
- A conceptual design of the "Integrated Smart Solar Insect Light Trap (ISSILT)" was developed for monitoring and management of rice insect pests under field conditions. A design patent application for the ISSILT was filed with the Indian Design Office (IDO). Fabrication of the proposed trap is presently in progress.



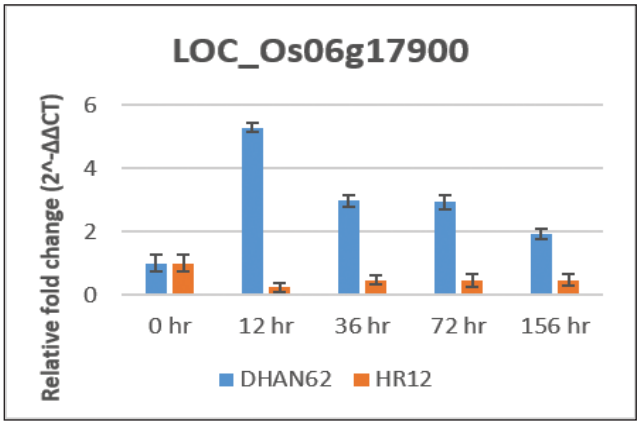
Evaluation of behavioral responses of rice-associated arthropods to different colored lights

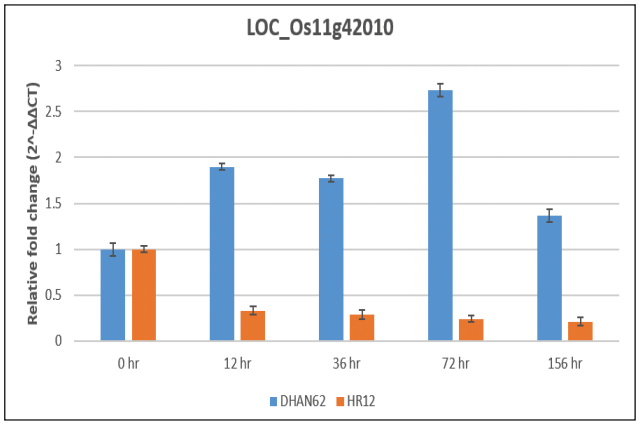
HRP - Host-plant resistance against pathogens and its management

HRP/CPT/PATH /15 (2019-2026): Assessment of host plant resistance for rice blast disease and its management

Host Plant Resistance: Advanced breeding lines, near isogenic lines (NILs), RILs and germplasm were evaluated against rice blast disease in Uniform Blast nursery under artificial inoculation with the virulent blast isolate. The data was recorded when the score on the susceptible line reached to 9 on SES scale. A total of 3,333 lines were evaluated in 2025 *kharif* season, out of that 1,212 lines were found resistant.

Gene expression studies in rice blast resistant entries: Expression profiles of eight selected genes involved in defence responses to blast disease in DRR Dhan 62 (resistant) and HR-12 (susceptible) rice cultivars were examined using real-time PCR (qRT-PCR). In DRR Dhan 62, *Pi2* showed upregulation with highest fold value of 5.2 at 12 hpi followed by *Pi1* with a fold value of 3.5 at 72 hpi and *Pi9* and *Pi54* genes showed upregulation with fold value of 2.7 at 12 and 72 hpi, respectively. *OsWRKY45 and OsWRKY67* showed upregulation with fold value of 1.9 and 1.4 at 36 hpi, respectively. The increasing transcript levels of these selected blast genes at 12, 36, 72 hpi highlight their importance in immunity against *P.oryzae*. Both *Pita* and *Pi68* genes were down regulated at 156 hpi. While in HR-12, these resistance genes are downregulated resulting in susceptibility reaction except for the *Pi1* gene which was upregulated up to 72 hpi. The *Pi9* gene was upregulated at 12 hpi and the *Pi68* gene was upregulated at 72 hpi. These results indicated that most of the resistant reactions activated at 12 to 72 hrs of active inoculation, as the high level of resistant gene expression was observed at that particular point of time. In resistant lines, after reaching the peak expression at 12 or 72 hrs, the expression is down regulated for all the resistant genes.





Relative expression of *Pi9* (LOC_Os06g05359) and *Pi54* (LOC_Os11g42010) in DRR DHAN 62 and HR-12 varieties

Standardization of inoculation techniques for induction of neck blast disease: A comparative study was conducted to evaluate the efficiency of inoculation techniques viz., injection, smearing, spraying, and tying of bits for disease establishment under controlled conditions. Disease progression was assessed at 5, 10, and 15 days after inoculation (DAI), and the area under disease progress curve (AUDPC) was calculated. Results revealed significant differences among methods, with injection producing the highest disease severity (PDI 68.89 at 15 DAI; AUDPC 439), while spraying resulted in the lowest AUDPC (153), indicating poor disease establishment. The findings highlight injection is the most effective inoculation method for producing severe and consistent disease symptoms, followed by tying of bits, smearing, and spraying.



DRR Dhan 51

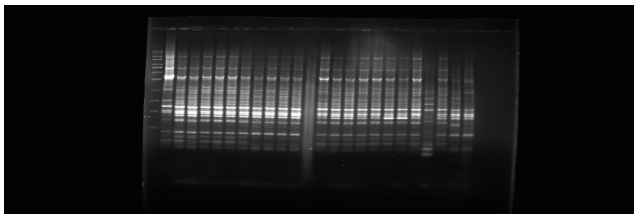


DRR Dhan 62

Maintenance breeding of the released blast resistance varieties: DRR Dhan 51 and DRR Dhan 62

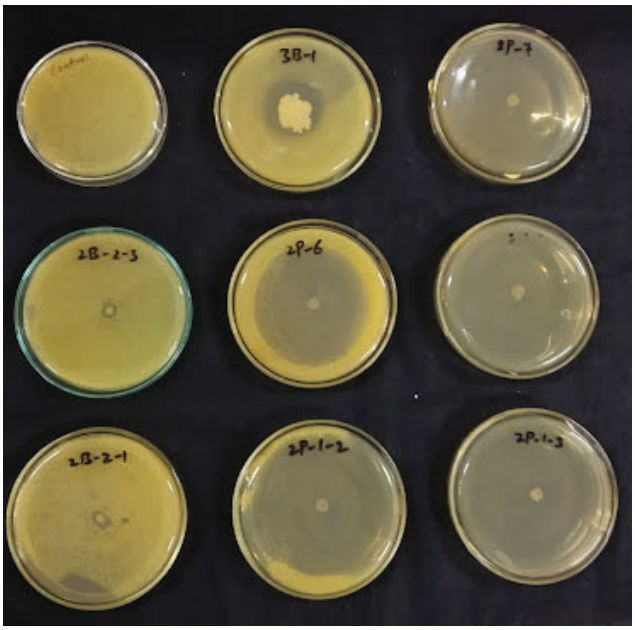
HRP/PATH-13 (2020-2026): Assessment of resistant sources and monitoring of pathogen virulence in bacterial leaf blight of rice

- Seventy-six F_4 breeding lines derived from bacterial blight (BB)-resistant parents DRR Dhan 53 or Improved Samba Mahsuri exhibited high BB resistance under field conditions. In the DRR Dhan 53 × HWR-36 NIL cross, all 300 BC_1F_3 plants were resistant, while 36 of 40 BPT 5204 × IRBB-23 BC_1F_3 lines and 264 of 300 BPT 5204 × HWR-36 NIL BC_2F_3 plants showed high resistance. Additionally, 245 lines from crosses involving Swarna, MTU 1010, DRR Dhan 53, and KR 57/158 were resistant under field conditions. Among 77 CSIR-CCMB lines, 39, 59, and 35 lines were resistant to BB races IX-020, IX-184, and IX-027, respectively.
- During 2024-26, 148 new *Xanthomonas oryzae* pv. *oryzae* (Xoo) isolates were collected from nine major rice-growing districts of Andhra Pradesh and Telangana. Virulence profiling of 80 isolates on 24 IRBB differentials classified them into eight pathotypes, of which pathotypes IXoPt #11, 14, 19, and 22 were highly virulent, producing large lesions on major BB resistance genes (*xa13* and/or *Xa21*). Genotyping of all 148 isolates using JEL primers grouped them into eight genetic clusters. An isolate from Eluru (MSXoo 105) and three from Khammam (MSXoo# 139, 140 and 141) were unique and formed distinct genetic group. However, pathotype and genetic clustering showed weak correlation, and an additional 30 newly isolated Xoo strains are under characterization.
- Field evaluation of commercially available antibiotic formulations and their combinations (viz., kasugamycin + copper oxychloride, kasugamycin + validamycin, validamycin + plantmycin, kasugamycin + plantomycin, chloramphenicol, Bactinash + kasugamycin and bactinash + plantomycin) against bacterial blight of rice identified the combination of kasugamycin + validamycin as the most effective treatment for reducing disease severity, followed by validamycin + plantomycin and chloramphenicol.



Banding pattern of selected *Xoo* isolates with Jel primers

- A total of 93 bacterial isolates belonging to *Bacillus* spp. and fluorescent *Pseudomonas* spp. were isolated from soils collected across different rice-growing regions of Tamil Nadu. The isolates were evaluated for their antagonistic activity against *X. oryzae* pv. *oryzae* (Xoo) under *in vitro* conditions using the double-layer assay. Among the isolates, 33 exhibited moderate to strong antagonistic activity against Xoo, while three isolates completely inhibited the growth of the pathogen, demonstrating the highest level of antagonistic potential.



In-vitro Antagonism of selected soil bacteria against Xoo

- A field survey was conducted during the *kharif* 2025 season in selected districts of Telangana, namely Kamareddy, Nizamabad, and Warangal. Widespread and severe incidence of bacterial blight was observed across many of the surveyed rice fields.



Severe bacterial blight incidence in Samba Mahsuri in Kamareddy district of Telangana in October, 2025.

HRP/CPT/PATH/14 (2011-2026): Assessment of host plant resistance and development of diagnostic tools for rice tungro disease

- A total of 1,791 breeding lines, germplasm accessions, and landraces were phenotyped for resistance to Rice Tungro Disease (RTD) using the artificial forced-feeding insect transmission method. Of these, 65 entries exhibited resistant reactions with a disease score of 3.
- Resistant entries identified from the National Screening Nurseries during 2016–2023 were re-evaluated to assess the stability and consistency of their resistance to RTD. Among the 189 lines screened, 85 lines consistently expressed resistance to Rice Tungro Disease across repeated evaluations.
- **Survey for the Occurrence of Rice Tungro Disease:** Surveys conducted in major rice-growing regions of Tamil Nadu and West Bengal revealed the occurrence of Rice Tungro Disease (RTD). In Tamil Nadu, green leafhopper (GLH) populations and tungro symptoms were observed in Coimbatore and Erode, with RTD confirmed in samples from Coimbatore. In West Bengal, severe RTD outbreaks during *kharif* 2025 were recorded in Purba Bardhaman district, particularly in early-sown Swarna fields, where high GLH populations (15–25 nymphs hill^{-1}) and favorable weather conditions resulted in disease incidence approaching 100% in some locations. PCR using RTBV-specific primers confirmed the presence of Rice Tungro Bacilliform Virus (RTBV) in samples from Rajendranagar, Coimbatore, Ramjibanpur, and Beninagar. In addition, *Paspalum distichum*, *Cyperus esculentus*, and *Digitaria sanguinalis* collected from Coimbatore tested positive for RTBV, indicating their potential role as alternate hosts and virus reservoirs.



Survey of Rice Tungro Disease in Tamil nadu and Bengal

- **Survey on Southern Rice Black-Streaked Dwarf Virus (SRBSDV):** A survey was conducted during July 2025 in major rice-growing areas of Haryana (Ambala and Kaithal districts) and Punjab (Fatehgarh Sahib and Rupnagar districts) to assess the incidence of Southern Rice Black-Streaked Dwarf Virus (SRBSDV) and its vector, the White-Backed Planthopper (WBPH). Typical SRBSDV symptoms, including severe dwarfing, dark green foliage, and reduced plant height, were observed in several rice fields. Disease incidence was generally low and sporadic, with isolated infected plants in most fields; however, localized hotspots showing 10–15% incidence were recorded in a few locations. The predominant rice cultivars surveyed were Savanna Hybrid 7822, PR 127, PR 128, and PR 132. WBPH populations ranged from 1–5 nymphs hill^{-1}, with comparatively higher populations observed in Punjab. In addition to SRBSDV, symptoms associated with zinc deficiency, waterlogging, and deep transplanting were also noticed. Occurrence of SRBSDV-like symptoms was further reported in certain Basmati rice fields. The survey confirmed the presence of SRBSDV in both states and emphasized the need for continued surveillance of disease and vector populations for effective management.

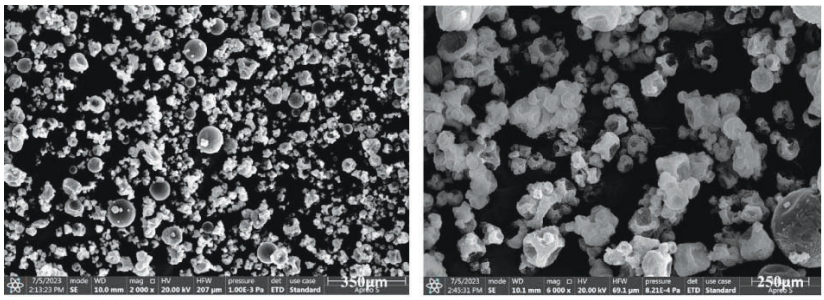






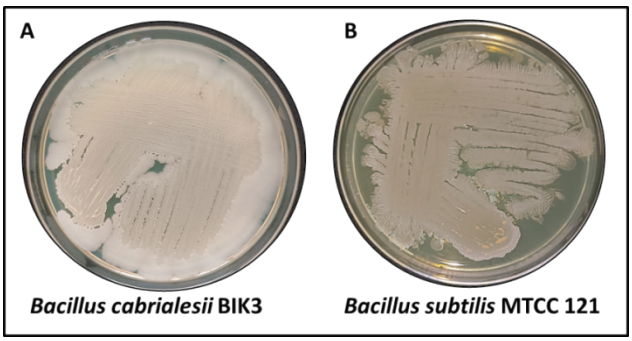
HRP/CPT/PATH/19 (2019-2026): Bioformulations of antagonistic microbes for disease management in rice

- Integration of seed treatment and foliar spraying offers a cost-effective strategy for managing bacterial leaf blight caused by *Xanthomonas oryzae* pv. *oryzae*. Field experiments during *kharif* and *Rabi* 2024–25 evaluated solid and liquid formulations of *Trichoderma asperellum* (TAIK1) and *Bacillus cabrialesii* (BIK3). Seeds were treated (5–10 g kg^{-1}), shade-dried, and sown, followed by foliar sprays applied before, after, or both before and after inoculation. Maximum lesion reduction (70% and 63%) was observed with liquid *Trichoderma* sprays applied before and after inoculation, while Pyrone showed the highest reduction (59%) under seed treatment alone.
- Spray drying–based encapsulation using maltodextrin and gelatin improved stability and controlled release of bioagents. Optimal release efficiency (96% for TAIK1; 94% for PIK1) was achieved at 130°C and 120°C, respectively. Capsule sizes ranged from 8–10 µm (TAIK1) and 5–18 µm (PIK1), indicating suitability for effective bioformulation development.



Microphotographs of micro-encapsulated TAIK1 and PIK1 formulation using emulsification method as maltodextrin wall material

- A panel of 200 diverse rice genotypes, comprising 180 accessions from the 3K SNP Seek indica panel and 20 released varieties from ICAR-IIRR, Hyderabad, was evaluated to capture broad genetic variation. Two bacterial bioagents, *Bacillus cabrialesii* BIK3 (NCBI accession no. MW180949), isolated from the rice rhizosphere at ICAR-IIRR, Hyderabad, and *Bacillus subtilis* MTCC 121 (IMTECH, Chandigarh), were mass-cultured in nutrient broth and evaluated on the 200 rice genotypes during the *Rabi* and *Kharif* seasons under field conditions. The bioagents were applied through seed biopriming and soil drenching, with untreated plants maintained as controls.



Panel A is showing *Bacillus cabrialesii* BIK3 strain and Panel B is showing *Bacillus subtilis* MTCC 121 strain.

- Comprehensive phenotypic data were recorded at nursery, maximum tillering, panicle initiation, reproductive, and harvest stages, encompassing growth, physiological, and yield traits. Soil samples collected before sowing and after harvest were analyzed for physicochemical properties (pH, EC, organic carbon, N, P, K, S, Zn, Mn, Cu, and Fe) and microbial populations (bacteria, fungi, and actinomycetes). Field experiments conducted during the Rabi and Kharif seasons demonstrated a positive effect of *Bacillus cabrialesii* BIK3 inoculation on rice growth and yield compared with the untreated control. Based on pooled phenotypic data, 4–5 contrasting rice genotypes exhibiting the highest and lowest responsiveness to BIK3 treatment were identified for subsequent evaluation under biotic (bacterial leaf blight) and abiotic (drought) stress conditions.

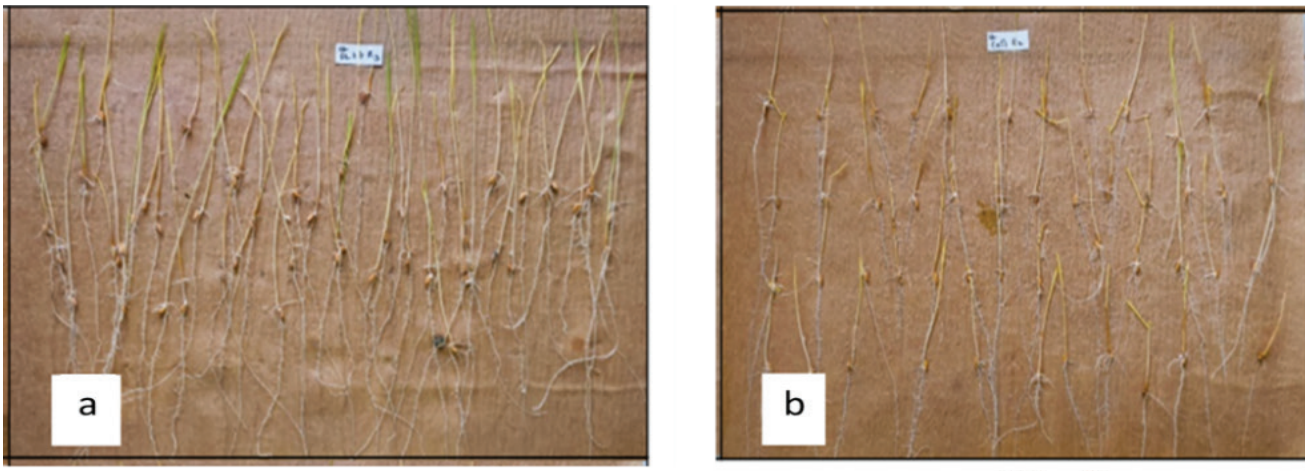
HRP/CPT/PATH/23 (2023-2026): Assessment of host plant resistance, virulence, and management of false smut disease

- Thirty cultures of *U. virens* were obtained from false smut infected samples collected from different rice growing areas. Around 350 isolates of *U. virens* cultures are being maintained at ICAR-IIRR. During *kharif* 2025, 750 genotypes were screened artificially in the false smut screening facility established at ICAR-IIRR, Hyderabad. Among the screened entries, around 400 lines recorded maximum smut balls 4 per panicle. Among the NSN-1 entries screened, the IET 29536 (R) & IET 29549 were recorded moderately resistant reaction with the disease score of 3. In *Rabi* 2025-26, 250 entries with early duration were screened artificially.
- The effect of false smut on seed quality parameters was studied on false smut tolerant and susceptible genotypes under artificial inoculation by treating the seeds with *U. virens* chlamydospores, conidia. Upon, both chlamydospore and conidial treatment, reduction in seed quality parameters of was more pronounced in susceptible genotypes than tolerant genotypes. In chlamydospore treatment, across the tolerant genotypes upon treatment the mean vigour Index I was reduced by 230 units, while in susceptible genotypes, it was reduced drastically by 829 units in comparison to their healthy control. Upon conidial treatment, both the mean vigour indices I & II showed greater reduction in susceptible genotypes as 595 units and 2.11 units as compared to the tolerant genotypes which recorded 359 and 1.81 units respectively.

Mean Difference in tolerant and susceptible genotypes with respect to *U. virens* Chlamydospore and Conidia infected and Healthy Seed

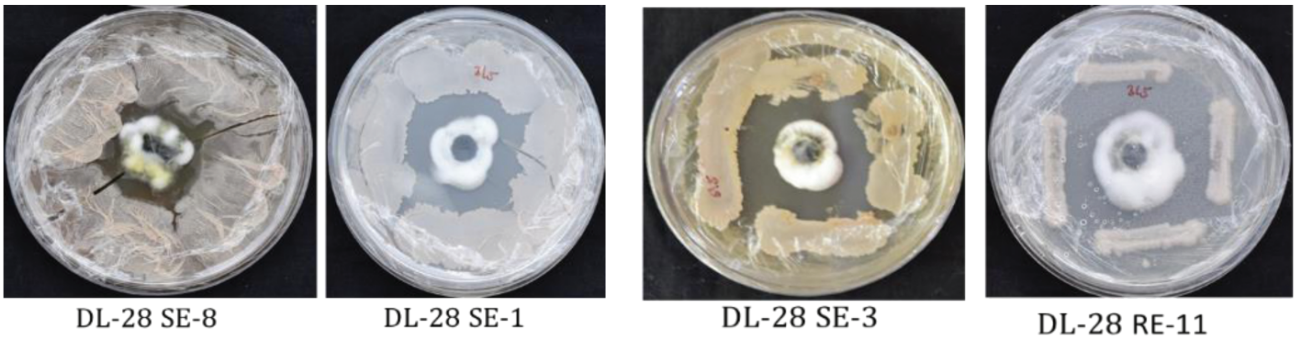
	Germination (%)	Root Length	Shoot Length	Seedling Length	SVI 1	Dry Weight	SVI 2
Chlamydospore treated Seeds							
TG + H	96.53	15.75	12.38	28.22	2724	0.17	16.74
TG + CH	96.00	14.61	11.32	25.92	2494	0.15	14.30
Mean Difference	**0.53**	**1.14**	**1.06**	**2.29**	**230**	**0.02**	**2.45**
SG + H	96.00	13.14	10.14	23.32	2236	0.14	13.53
SG + CH	90.17	10.19	8.41	15.46	1407	0.13	11.24
Mean Difference	**5.83**	**2.96**	**1.73**	**7.87**	**829**	**0.02**	**2.28**
Conidia treated seeds							
TG + H	96.53	15.75	12.38	28.22	2724	0.17	16.74
TG + CO	94.94	14.90	10.25	25.15	2366	0.16	14.93
Mean Difference	**1.60**	**0.85**	**2.13**	**3.07**	**359**	**0.01**	**1.81**
SG + H	96.00	13.14	10.14	23.32	2236	0.14	13.44
SG + CO	86.50	11.55	7.34	18.89	1642	0.13	11.33
Mean Difference	**9.50**	**1.59**	**2.80**	**4.44**	**595**	**0.01**	**2.11**

TG-Tolerant genotypes; SG – Susceptible genotypes; H - Healthy Seeds; CH – Chlamydospore treated seeds; CO – Conidia treated seeds



a. False smut tolerant genotype seeds treated with *U. virens* chlamydospores. b. False smut susceptible genotype seeds treated with *U. virens* chlamydospores

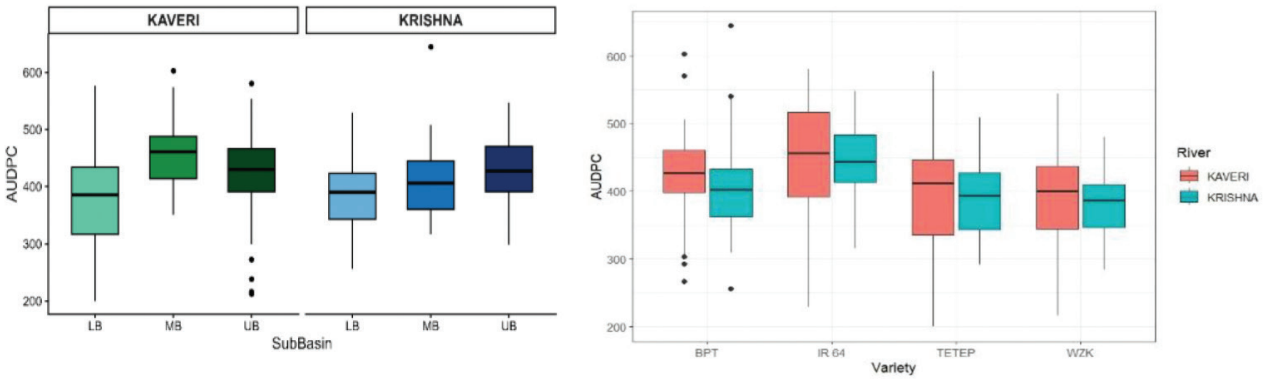
- The tolerant and susceptible genotypes were subjected to endophytes isolation. The endophytes isolated from tolerant genotypes *i.e.* DL-28, PAU2 have displayed greater antagonism to *U. virens* under *in-vitro* conditions. The total number of potential endophytes from both the tolerant genotype DL-28 and PAU2 was 14 and 12 respectively, but the potential endophytes from susceptible genotype was only six. The mean inhibition percentage exhibited by endophytes from tolerant genotypes DL-28 and PAU2 was ranged between 49.45% – 87.54% and 39.56% - 92.29% respectively. This combined effect of potential endophytes might have role in promoting tolerance.



Endophytes isolates from the tolerant genotype DL-28 (RL-1516) showed antagonistic activity against *U. virens*

HRP/CPT/PATH/27 (2023-2026): Sustainable rice sheath blight disease management under climate change

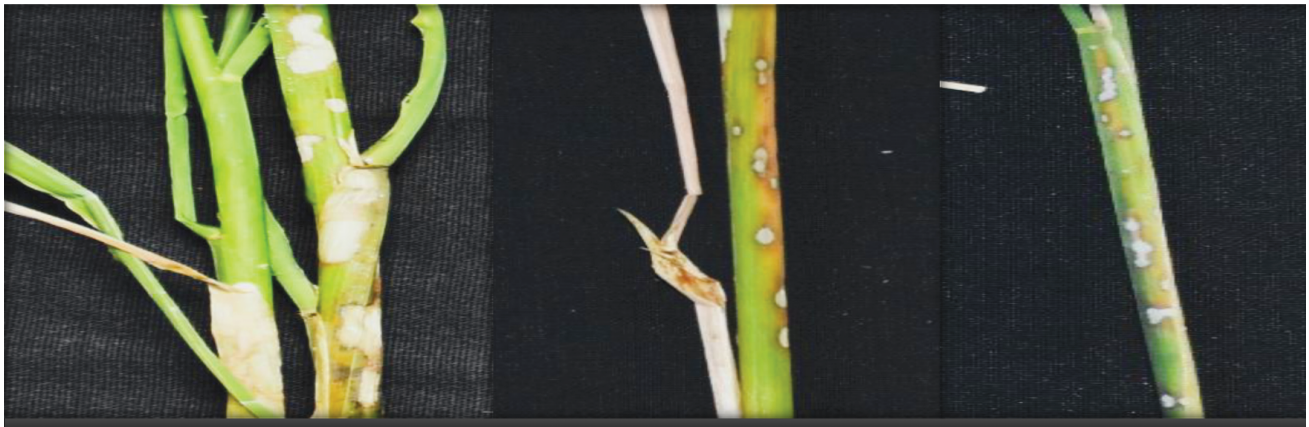
- **Disease survey, isolation and characterization:** In *kharif* 2025, survey was conducted in Kashmir, collected 20 disease samples, isolated, and characterized through cultural parameters. About 60 *Rhizoctonia* spp. isolates were isolated from the different rice based ecosystem (rice-rice, rice-maize, rice-pulses and rice-vegetable) from Telangana state during *kharif*-2025 and characterized.
- **Virulence Profiling of *R. solani* collected from Krishna and Kaveri River Basins:** Among the 100 isolates, characterized, considerable morphological diversity was observed, with 22 isolates producing microsclerotia, 71 macrosclerotia, 7 showing atypical orange pigmentation and 12 exhibiting honeydew secretion, while molecular analysis identified 96 isolates as *Rhizoctonia solani* and 4 as *Rhizoctonia oryzae-sativae*. Middle and upper sub-basins exhibited greater virulence with AUDPC value more than 400 compared to those from the lower sub-basins; higher AUDPC values were observed in the susceptible BPT5204 (403.7–417.8) and moderately susceptible IR64 (442.1–449.4) than in the tolerant Tetep and Wazuhophek (<400). Contrasting high field disease severity in lower basins and greater pathogen virulence in middle and upper basins under glasshouse conditions indicates that sheath blight dynamics are governed by interactions among climate, host resistance, and pathogen virulence.



AUDPC variation among 100 Rhizoctonia isolates across Krishna-Kaveri sub-basins and rice varieties

- **Sheath blight complex by *Rhizoctonia* species:** *R. solani* (RS) showed the highest radial growth (25.00 mm/day), virulence, and disease progression, followed by *R. oryzae* (RO) and *R. oryzae-sativae* (ROS). Analysis of the area under disease progression curve (AUDPC) from typha inoculation and vertical lesion height (cm) from S, M, and MS inoculation revealed RS (552.43, 5.77) as the most virulent, followed by RO (276.88, 4.85) and ROS (251.32, 3.17), showing the same trend as radial growth rate and disease dynamics. Distinct symptomological differences were observed, with

R. solani producing irregular coalescing lesions mainly on sheath margins, whereas *R. oryzae* and *R. oryzae-sativae* formed oval to elliptical lesions near the sheath centre, highlighting the importance of genomic characterization for developing location-specific sustainable disease management strategies. ITS sequencing and species-specific marker confirmation of 60 isolates identified three species: *Rhizoctonia solani* (35 isolates), *Waitea circinata* (11 isolates), and *Ceratorhiza oryzae-sativae* (14 isolates).



Symptoms exhibited by RS, RO, and ROS

- **Sheath blight host-plant resistance:** About 800 lines of F_8 and BC_1F_3 in the background of Dhan 53, Swarna and MTU1010 crossed with ISM/ WZK NILs were screened during *kharif*-2025 for sheath blight tolerance.
- **Promotion in AICRPR-2025:** IET 32980 (SY16) derived from the cross of ISM/WZK RIL X DRR Dhan53 promoted from AVT1 to AVT-2 under AICRPR NIL trial and it is performing well in yield and resistance to sheath blight compared to recurrent parent DRR Dhan 53. IET 33355 (VPSY30H) Swarna/2013NSNH-71(22272) promoted from IVT –M(H) to AVT 1 - M (H) under low southern hills.
- **Nomination in AICRPR-2025:** Eight new highly promising entries were nominated in AVT-NIL, IVT-LPT, and IVT-LNT in AICRPR multi-location testing during 2025 from different crosses of tolerant RILs (ISM / WZK) with Swarna, MTU100 and DRR-Dhan53.
- **Effects of elevated CO_2 and temperature on the rice–*Rhizoctonia solani* pathosystem**: Elevated CO_2 increased seed vigour in rice cv. IR 50 by enhancing germination (92%) and Seed Vigour Index-I (355.2) despite a lower mean seedling length, while long-term exposure of *Rhizoctonia* for 20 generations accelerated sclerotial maturation in 7 among 14 selected isolates and increased sclerotial production in 2 isolates, indicating differential pathogen responses to elevated CO_2 and temperature.

HRP/CPT/ PATH/28 (2023-2027): Studies on variability and management of brown spot disease of rice

- **Mapping of hot spots associated with brown spot disease in Jharkhand, Chhattisgarh, Bihar and Telangana states:** During 2023–2025, systematic roving surveys were conducted across 397 rice fields in Jharkhand (107), Chhattisgarh (99), Bihar (96), and Telangana (95) to assess brown spot disease severity. Disease severity (PDI) and GPS coordinates were recorded and analyzed using geostatistical tools. Mean PDI was highest in Jharkhand (35.12%), followed by Bihar (34.26%), Chhattisgarh (25.43%), and Telangana (12.04%), with significant differences among states (Kruskal–Wallis: $\chi^2 = 136.33$, df = 3, $p < 0.001$). Disease hotspots were identified in Buxar, Saran, and Patna (Bihar); West Singhbhum, Dumka, and Ranchi (Jharkhand); and Jagdalpur, Surajpur, and Korea (Chhattisgarh). Spatial interpolation revealed severe disease clusters in Jharkhand and Bihar, moderate severity in Chhattisgarh, and relatively low disease incidence in Telangana.

Descriptive Statistics & Visualizations

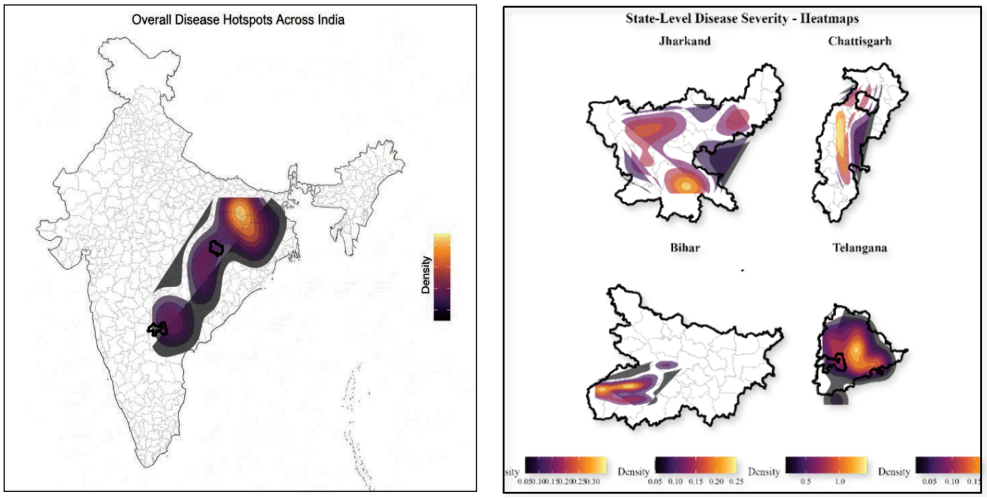
State	Observations	Mean PDI	Std. Dev.	Min PDI	Max PDI
Jharkhand	107	35.12	15.67	1.85	70.68
Bihar	96	34.26	12.07	9.88	65.73
Chhattisgarh	99	25.43	13.87	4.01	58.02
Telangana	95	12.04	10.46	0.78	55.00

Kruskal-Wallis Test

Method	Chi-Square	DF	p-value
Kruskal-Wallis Rank Sum Test	136.33	3	<0.001

- **Morphological variability in *Bipolaris oryzae*:** A total of 190 *B. oryzae* isolates were obtained using the standard tissue isolation method and evaluated for morphological variability on fresh PDA. Light brown colonies were predominant (54.73%), followed by light to dark brown (28.95%) and dark brown/black (16.02%). Most isolates produced aerial fluffy mycelium (74.21%), exhibited white island formation (71.15%), and had raised colonies (82.63%). White islands were abundant in 55.26% of isolates and sparse in 16.32%, while 28.43% showed no sector formation. Circular zonation was observed in only 26.32% of isolates, whereas 73.69% lacked concentric rings.

- **Pathogenic variability/Virulence profiling studies**: Pathogenic variability was carried out for 30 *B. oryzae* isolates collected from various states of India including Bihar, Punjab, Chhattisgarh, Punjab, Tamil Nadu and Maharashtra. The mean disease severity ranged from as low as 16.5% in Moongilkudi isolate (IIRR-BO-73) on BPT 5204 to as high as 57.4% in the ICAR-IIRR Hyderabad isolate (IIRR-BO-10) on Chittimutyalu, indicating clear differences in pathogenic aggressiveness. Among the isolates, those collected from ICAR-IIRR Hyderabad (IIRR-BO-10), Ambikapur (IIRR-BO-2), Dhantewada (IIRR-BO-12), and Korba (IIRR-BO-70) showed consistently high virulence. On the other hand, isolates such as IIRR-BO-73 (Moongilkudi, Tamil Nadu), IIRR-BO-25 (Jagdalpur), and IIRR-BO-23 (Medak) recorded relatively lower disease severity, suggesting mild to moderate virulence



Heat maps showing the density of high-severity disease within each state and different states of India

- **Molecular characterization of *B. oryzae* isolates:** Out of 190 fungal isolates associated with rice brown spot, 46 representative isolates from diverse geographical locations were selected for molecular characterization. All isolates were confirmed by ITS and *Bipolaris oryzae*-specific (BoRA_278) PCR, while 39 representative isolates were subjected to bidirectional ITS Sanger sequencing for phylogenetic analysis. The maximum likelihood phylogenetic tree resolved the isolates into two distinct clades, *Bipolaris* and *Curvularia*. Most isolates clustered within the *B. oryzae* clade with limited intraspecific variation, whereas *Curvularia verruculosa* (BO11) and *C. lunata* (BO32) formed separate, well-supported branches. These findings confirmed *B. oryzae* as the predominant brown spot pathogen of rice, with *Curvularia* spp. occurring at lower frequency.

HRP/CPT/ PATH/29 (2023-2026): Studies on host plant resistance and management of stem rot and sheath rot diseases of rice

- **Characterization of stem rot and sheath rot pathogenic isolates:** 70 isolates of sheath rot fungus and 30 isolates of stem rot fungus were collected from Telangana state and all isolates were culturally characterised on Potato Dextrose Agar medium. The pathogenicity of all the collected isolates were done on the susceptible cultivar BPT 5204 under *in-vitro* conditions. The sheath rot isolate SO4 from Rajavaram village of Khammam district and SO34 is Renuvathla village of Mahbubnagar district were identified as virulent.
- **Effect of crude toxin concentration on the symptom development of sheath rot disease:** Among the two isolates tested, SO34 was significantly more aggressive than SO4, as evidenced by higher lesion length and relative lesion length at all concentrations. At the highest inoculum level (400 ppm), SO34 produced 68.77% relative lesion length, compared with only 46.15% for SO4. This confirms the existence of pathogenic variability within *S. oryzae* populations, which has been widely reported in sheath rot epidemiology.

Effect of Crude toxin concentration on development of sheath rot disease

S. No.	Isolate No.	Concentration (ppm)	Flag leaf sheath length (cm)	Lesion length (cm)	Relative lesion length (%) *
1	SO4	400	9.97	4.60	46.15
		200	9.50	2.87	30.18
		100	8.77	1.43	16.35
		50	9.13	0.93	10.22
2	SO34	400	8.97	6.17	68.77
		200	8.83	3.03	34.34
		100	9.90	2.20	22.22
		50	9.60	1.40	14.58
			Factor A	**Factor B**	**Factor A×B**
C.D.			4.805	6.795	9.61
SE(d)			2.247	3.178	4.494
SE(m)			1.589	2.247	3.178

- **Efficacy of new fungicide molecules against sheath rot disease under *in vivo* conditions:** Nine fungicide molecules were evaluated in vitro against *Sarocladium oryzae* on potato dextrose agar (PDA). At 1000 ppm, complete inhibition (100%) of mycelial growth was recorded with Zineb 68% + Hexaconazole 50% WG, Trifloxystrobin 25% + Tebuconazole 50% WG, and Mancozeb 50% + Carbendazim 25% WS. High inhibition was also observed with Azoxystrobin + Difenoconazole (97.78%) and Tricyclazole 18% + Mancozeb 62% WP (93.70%).
- The same fungicides were evaluated under field conditions in a randomized block design with three replications. All treatments significantly reduced sheath rot severity compared with the untreated control ($p \leq 0.05$). Trifloxystrobin 25% + Tebuconazole 50% WG was the most effective, recording the lowest PDI (2.41%, 5.04%, and 8.66% at 5, 10, and 15 DAS, respectively) and the lowest AUDPC (59). This was followed by Mancozeb 50% + Carbendazim 25% WS (12.35% PDI at 15 DAS; AUDPC 79), Zineb 68% + Hexaconazole 50% WG (13.18%; AUDPC 80), and Tricyclazole 18% + Mancozeb 62% WP (13.88%; AUDPC 102), which were significantly superior to the remaining treatments.

TTI - Training, Transfer of Technology and Impact Analysis

TTT/EXT/14 (2025-2028): SMART farming interventions for accelerated and sustainable rice technology transfer behavioral insights into the adoption of smart farm solutions by smallholder farmers

- The behavioral intentions of farmers toward adopting Smart Farm Solutions (SFS) was analysed using the Decomposed Theory of Planned Behavior (DTPB). The highest-rated variables were Perceived Easiness (4.82), Intention (4.49), and Perceived Behavioral Control (4.47). Pearson correlation analysis revealed very strong positive associations ($r \geq 0.90$) between several behavioral constructs, while a few variable pairs showed strong negative correlations ($r \leq -0.60$), indicating potential gaps in training and resource allocation.
- The findings highlight the need for targeted investments in training and technical support to enhance farmers' self-efficacy. Strengthening access to extension services, media, and community-based networks can further promote adoption by leveraging social capital and peer influence.
- DRR Dhan 53 was demonstrated on the fields of farmers (48) in Deverakonda, Nalgonda. The farmers reported a yield of 3.5 q/acre and were very happy with the grain quality. DRR Dhan 64, the first Nitrogen Use Efficient, Early Transplanted Rice Variety was also demonstrated on farmers' fields in Deverakonda Nalgonda.
- Rapid soil testing kit developed by IIRR was demonstrated and hands-on training was provided to farmers and women farmers under nutrient smart interventions. Based on the soil parameters, recommendations were provided for judicious nutrient use.
- IIRR Rice IPM App is developed from the experiments and experiences of IIRR scientists to reach farmers with important information on major pests, diseases, weeds and nutrient deficiencies of rice crop and their integrated management. The app was successfully downloaded and demonstrated to farmers and farm women of Revanapally village, Yadadri District.
- An Attribute importance matrix (likert scale) was worked out for the farmers' evaluation of business models. The farmers' rating of attributes of business models were ranked in the following manner, with payment flexibility being ranked the first, proven yield/profit increase (2), technical support availability (3), low up-front cost (4) and trust in provider (5).
- It was observed that the rating is driven by cost/affordability, perceived value & risk reduction, trust in providers (and data governance), availability of local support/advice, and clear return on investment and business models that reduce up-front cost (pay-per-use, service contractors, cooperatives, community platforms) scored higher.

TTI/TTT/EXT17 (2019-2025): On-farm adoption of IPM technologies and impact analysis

- The evaluation of Bt strains were carried out both under laboratory as well as field in ICAR-IIRR as well as RARS, KAU, Pattambi. Laboratory studies of Bt strains against pink stem borer indicate that on 24 hours after exposure none of the larvae in all 6 Bt strains as well as untreated control were killed.
- Whereas in the standard check treatment using Chlorantraniliprole @ 0.3 ml/L, all the 5 larvae (each in 3 replications) were killed. However, the data on 72 hours as well as one week after exposure revealed that the Bt strains 5 and 6 are also effective against pink stem borer.
- The bioassay on fall armyworm revealed significant variation in larvicidal efficacy across different treatments. The standard treatment (STND) demonstrated the highest mortality rate of 63.33% (19 total deaths), followed by Bt3 with 56.67% (17 deaths) and Bt1 with 46.67% (14 deaths).

- Moderate mortality levels were observed in Bt6 (36.67%), Bt5 (30.00%), Bt2 (23.33%) and Bt4 (23.33%). These results suggest that the standard treatment and T3 strain are most effective for larval control, while T2 and T4 show the least efficacy among the tested Bt formulations.
- The field evaluation of Bt strains during *rabi* 2024-25 at RARS, KAU, Pattambi revealed that the Bt1, Bt3, Bt5 and Bt6 were more effective against dead heart incidence on 30 days after treatment (DAT), whereas Bt2, Bt3 and Bt6 were only effective based on dead heart incidence on 50 DAT as well as leaf folder.
- As for as leaf folder incidence is concerned, Bt5 and Bt6 were more effective on 50DAT. Based on the results of various laboratory studies on castor semilooper, fall armyworm and pink stem borer as well as the field bioassay against stem borer and leaf folder incidence, the strains viz., Bt3, Bt5 and Bt6 were found to be more effective.

TTT/ECON/5 (2022-2026): Competition and equity issues in Indian rice sector

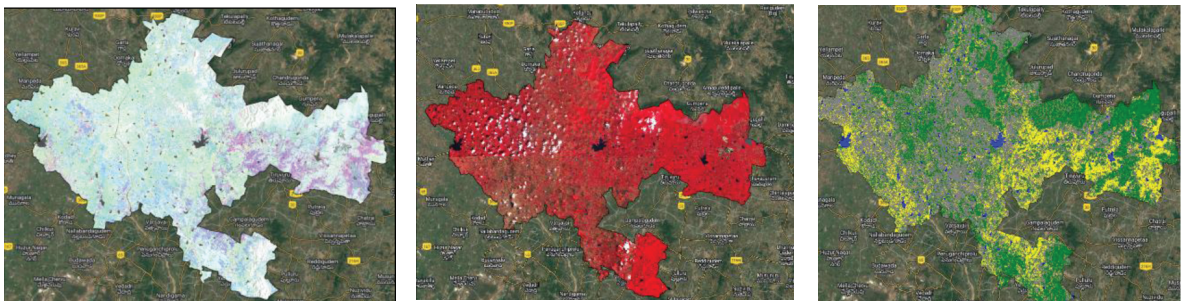
- An assessment of agricultural participation in the Voluntary Carbon Market showed that India accounted for 4.26 percent of global agricultural carbon credits issued by the end of 2025, though the share varied across registries due to different classification systems.
- An exploratory case study on GI-tagged rice varieties identified 31 registered rice GIs across 20 States and Union Territories as of 3 October 2025, highlighting their potential to contribute to multiple SDGs while underscoring the need for stronger governance, value-chain support, fraud prevention, and climate adaptation measures
- During the reporting period an attempt was made to examine status of Indian agriculture in Voluntary Carbon Market (VCM) by analyzing data from two registries viz; Verra and Gold Standard. It is observed that different registries categorize agricultural carbon credit projects under different categories. Accordingly, India's share in global level credit from agriculture varied with registry. On the whole India's share in global level agricultural carbon credits issued in VCM stood at 4.26 percent by the end of the year 2025.
- The nexus between GI tagged rice varieties and SDGs was examined using exploratory case study approach. As on October 3, 2025, 31 rice GIs were registered in India spreading across twenty States/Union Territories. Registered rice GIs are having diverse special characteristics and have potential in contributing towards different SDGs. However, checking food fraud through effective governance, value chain management for fair distribution of returns and adaptation to emerging climate change are the key issues to be handled. Accordingly based on the development stage of each rice GI, appropriate support from government is needed.

TTI/TTT/EXT/20 (2022-2026): Designing and development of innovative extension strategies for emerging rice technologies

- Genome-edited technologies have the potential to enhance yield, improve nutritional quality, and increase resistance to pests and diseases, making rice cultivation more sustainable and efficient.
- As emerging innovations, a preliminary attempt was made to collect information on Genome edited rice technologies from 60 stakeholders from KVK, SAU and state department of agriculture.
- The level of awareness among the respondents were nearly 97% and the source of awareness were mainly from Honorable Agricultural Minister meeting, ICAR, IIRR website, Research Institutions and Universities and through farmers.
- About 90% of the respondents were willing to undergo training on Genome edited technologies for effective extension strategies.
- Nearly 77% respondents felt that Extension professionals had very important role in bridging the gap and the preferred popularization means were field demonstrations (91.67%), field trials prior to technology dissemination (70%) and stakeholder training programs (56.67%). For the present study, an attempt was made for stakeholder identification and Power – Interest Matrix was developed

TTI/CP/CA/5 (2021-2026): Smart precision models and mobile apps for real time advisories on rice crop management

- ***Estimating climatic potential yield gap for popular varieties of Rice crop using Rice DSS:*** During this year, climatic potential yield and yield gap were calculated for popular varieties of major rice growing districts in Tamil Nadu (CO 51 -115 days) and Kerala (Uma -145 days) states. District level day wise weather data of 2019 were collected from NASA power project (https://power.larc.nasa.gov/). Secondary data on district wise Rice yield was collected from the Department of Economics and Statistics (https://data.desagri.gov.in/). District wise weather, crop and experimental files were created as per Rice DSS format. The observed climatic yield gap ranged from 1070–4000 kg/ha in Tamil Nadu and 3800–4500 kg/ha in Kerala. Further climatic potential yield gap will be estimated for other major rice growing districts.
- ***Estimating Rice Area through Google Earth Engine using Sentinel satellite data and Machine learning algorithms:*** Khammam district of Telangana was selected for this study. Ground truth data on rice area during the *kharif* season of 2021 were collected. Google Earth Engine was utilized to develop a workflow for rice area estimation using Sentinel satellite data. Sentinel-1 and Sentinel-2 images for the *kharif* season (July–December 2021) were processed, and a Random Forest machine learning algorithm was applied for rice area classification. The results showed a 17% variation between observed and estimated areas. The study demonstrates that Sentinel data, combined with machine learning models on Google Earth Engine, can be effectively used for rice area estimation.
- ***Detection of sensitive bands for Rice BLB using Sentinel 1 and 2 datasets with Multiple Linear Regression(MLR) model:*** A basic study was conducted with ground truth points of BLB affected areas during *kharif* 2021 in Tallada Mandal of Khammam district, Telangana. Sentinel-1 and Sentinel-2 datasets (July–November 2021) were utilized, and a multiple regression model was applied to identify sensitive bands for rice BLB detection. Band 8, NDVI, Ratio of VV (Vertical transmit/Vertical receive), and VH (Vertical transmit/Horizontal receive) were found to be the most sensitive indicators. Further AI-based modelling is currently in progress.



Rice area classification using Sentinel data and Machine Learning Algorithm

New Research Project initiated in 2025

TTI/TTT/EXT/21 (2025-2029): On-farm validation and dissemination of IIRR Technologies

- ICAR-IIRR, released number of varieties, hybrids and other technologies during the recent past. However, the penetration level of these varieties to farmers' field is comparatively less. Large scale evaluation of these varieties / hybrids in farmers' fields by arranging frequent visits of the local farmers as well as organizing melas at the full bloom stage will help in efficient spread of DRR Dhan varieties. The DRR-Dhan varieties viz. DRR Dhan – 60, 65, 74, 78, 80 and 87 were sown during *rabi* 2025-26, in the field of farmer, Mr. Mahipal Singh from Pidampally Village, Dhamargidda Mandal of Naranyanpet District of Telangana as part of varietal demonstration trial.

3c. Transferable Technologies and Commercialization

Transferable Technologies-Varieties and Hybrids

Release of Eleven Climate-Resilient and Improved Rice Varieties and One Hybrid: A major milestone achieved by ICAR-IIRR during 2025 was the release and notification of 11 rice varieties and a hybrid vide S.O.6123(E) dt 31st Dec 2025. They address key production constraints through improved tolerance to abiotic stresses, enhanced resistance to major diseases and insect pests, superior nutrient-use efficiency, bio-fortification, and improved grain quality. The newly released cultivars are expected to strengthen climate-resilient rice production across diverse agro-ecological regions of the country.

DRR Dhan 81 is a bio-fortified, medium-duration (135 days) irrigated rice variety with short bold (SB) grains and an average yield of 51.3 q/ha. It has an enhanced zinc content (22.3 ppm), a low glycaemic index (55.0), resistance to bacterial leaf blight, and tolerance to stem borer. The variety is also suitable for saline-prone irrigated ecosystems. DRR Dhan 81 is released and notified for Bihar, Uttar Pradesh, Assam, Maharashtra, Gujarat, Kerala and Karnataka under the "Seeds without Borders" initiative.



DRR Dhan 82 is a mid-early duration (125 days) transplanted rice variety derived from Swarna/MTU 1010 with medium slender (MS) grains and an average yield of 59.6 q/ha. It combines higher productivity with moderate resistance to bacterial leaf blight, making it suitable for irrigated production systems. DRR Dhan 82 is recommended for Odisha, West Bengal, Bihar, Jharkhand, and eastern Uttar Pradesh.

DRR Dhan 83 is a marker-assisted selection (MAS)-derived near-isogenic line developed in the background of Krishna Hamsa with mid-early duration (125 days), long slender (LS) grains. It combines high yield potential (60.68 q/ha) resistance to bacterial leaf blight and blast with reproductive-stage drought tolerance through the introgression of multiple resistance genes (*xa5*+*Xa21* for bacterial blight; *Pi9* for blast resistance) and drought tolerance QTLs (*qDTY12.1*+*qDTY3.1*). It also has favourable alleles of *Pi1, Pi20* and *Pi38* for blast resistance. It is recommended for Andhra Pradesh, Telangana, Kerala, Karnataka, Puducherry, Tamil Nadu, Tripura and Assam under transplanted conditions.

DRR Dhan 84 (Mahajaya) with short bold (SB) grains and medium duration (130 days). It is an improved version of Jaya developed through marker-assisted breeding. It is a NIL for high yield (*Gn1a*), BLB (*Xa21*) and Blast (*Pi54*) resistance. It combines higher yield potential (54.58q/ha) with durable resistance to bacterial leaf blight and blast, along with moderate resistance to plant hoppers. The variety is recommended for Odisha, Bihar, Jharkhand, Maharashtra, Tamil Nadu, Telangana and Andhra Pradesh under transplanted ecosystems.



DRR Dhan 85 is an improved Samba Mahsuri near-isogenic line possessing combined resistance to bacterial leaf blight (*Xa21, xa13*) and gall midge (*Gm4 and Gm8*) through pyramiding of multiple resistance genes. It has medium duration (130-135 days), medium slender (MS) grains and an average yield of 53.94 q/ha. It is suitable for transplanted conditions

across major rice-growing states of Telangana, Andhra Pradesh, Tamil Nadu, Karnataka, Chhattisgarh, Orissa, Jharkhand, Bihar, Gujarat and Maharashtra.



DRR Dhan 87 is a phosphorus-use-efficient variety developed through sub-species hybridisation in the background of Swarna with introgression of NPT traits from tropical *japonica* acc. IRGC4105. With a medium duration (135-140 days), a robust root system, and favourable alleles for anaerobic germination (*AG1* and *AG3*), it is suitable for both transplanting and aerobic cultivation. It performs well under phosphorus-deficient soils (54.6 q/ha at 50% of the recommended P fertiliser dosage). While exhibiting high grain number and biomass, improved photosynthetic efficiency, strong culm and lodging resistance, tolerance to anaerobic germination, and moderate resistance to leaf blast (*Pi54*), neck blast, bacterial blight (*xa4*), sheath blight and field tolerance to plant hoppers (*BPH32*), it possesses a superior haplotype for *Wx*, a desirable grain quality allele for intermediate amylose content and high HRR. With medium slender (MS) grains, recommended for Odisha, Jharkhand, Bihar, Karnataka, Telangana and Andhra Pradesh.



DRR Dhan 88 is a wild introgression line derived from *O. rufipogon* in the background of KMR3, combining phosphorus-use efficiency with improved productivity under low-phosphorus soils (57.45q/ha at 50% of the recommended P fertilizer dosage). With short bold (SB) grains and mid-early (125 days) duration, it offers moderate resistance to leaf blast and is recommended for Maharashtra, Karnataka, Telangana and Andhra Pradesh.



DRR Dhan 89 (Super Swarna) is an improved Swarna near-isogenic line incorporating resistance to bacterial leaf blight (*Xa21*) and blast (*Pi54*) along with the yield-enhancing gene *OsSPL14*. With medium slender (MS) grains and an average yield of 53.5q/ha, the variety is suitable for late-duration (135-140 days) transplanted ecosystems in Odisha, West Bengal, Jharkhand, Bihar and Uttar Pradesh. It also offers improved protection against leaf folder and stem borer.

DRR Dhan 90 is a nitrogen-use efficient variety capable of maintaining stable productivity under reduced nitrogen fertilizer application (45.9 q/ha at 50% of the recommended N fertilizer dosage). It has



short bold (SB) grains and medium duration (125-130 days). Recommended for Karnataka, Telangana, and Andhra Pradesh, it contributes to sustainable nutrient management while exhibiting moderate resistance to leaf blast, neck blast, plant hoppers, stem borer and WBPH.

DRR Dhan 91 is an improved Samba Mahsuri line combining bacterial leaf blight resistance (*xa13+Xa21*), blast resistance (*Pi54*), and submergence tolerance (*Sub1*) through marker-assisted breeding. It has medium slender (MS) grains, medium duration (135-140 days) and produces an average yield of 49.82 q/ha. The variety is suitable for flood-prone transplanted ecosystems and provides greater resilience against plant hoppers. DRR Dhan 91 is recommended for Telangana, Andhra Pradesh, Tamil Nadu, Karnataka, Chhattisgarh, Odisha, Jharkhand, Bihar, Gujarat and Maharashtra.

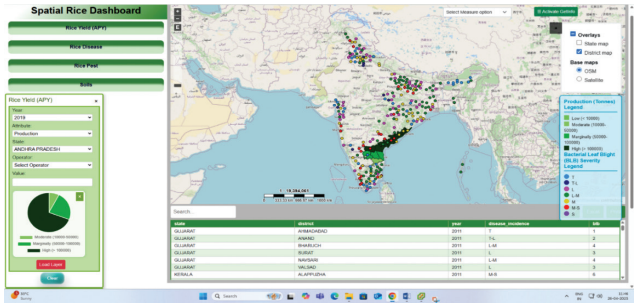
In addition to the varieties, **DRRH-7**, a climate-resilient rice hybrid, was recommended for alkaline and inland saline soils of Haryana, Uttar Pradesh, and Tamil Nadu. It has long slender (LS) grains, mid early (120 days) duration and produces an average yield of 35 q/ha under saline stress conditions. The hybrid combines tolerance to problem soils with stable productivity and moderate resistance to blast diseases, brown spot and plant hoppers, thereby expanding hybrid rice cultivation into stress-prone environments.



Collectively, these technologies represent significant advances in rice improvement through conventional and molecular breeding approaches. The portfolio includes bio-fortified cultivars, nutrient-use-efficient varieties, climate-resilient lines tolerant to drought, submergence, salinity, and low soil fertility, as well as varieties with pyramided resistance against major diseases and insect pests. These improved genetic resources are expected to enhance productivity, nutritional security, resource-use efficiency, and resilience of rice-based production systems across diverse agro-climatic regions of India.

Other Transferable Technologies

IIRR GeoSpatial Rice Dashboard (http://www.iirr-grid.in): The interactive dashboard interface enables visualization of Rice area, production, and productivity maps from the past 25 years along with disease distribution and severity maps from four decades, soil Carbon maps etc. as well as related data tables and Venn diagrams. It facilitates the selection of states, districts, diseases, and key parameters such as area, production, and productivity. Screenshot of the dashboard is given below.



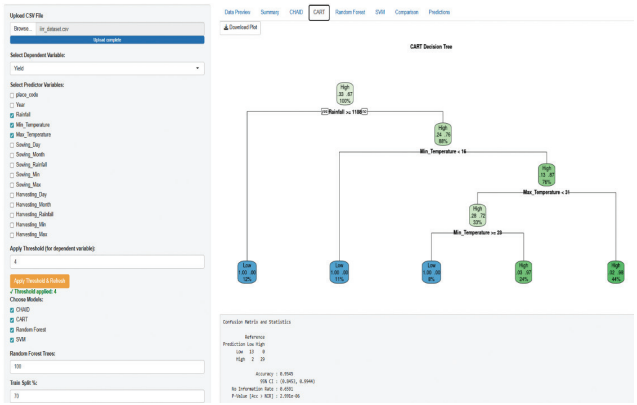
Home page of Spatial Rice Dashboard

Rice Clinic- Multilingual Mobile App: Rice clinic mobile apps have been developed in Telugu, English, Hindi, Tamil and Kannada languages covering 11 major insect pests, 10 diseases and 18 weed species as well as nutrient deficiencies for identification of pests with symptoms of damage (both text and image) and recommended management practices. It is deployed successfully on Google Play Store. First page of app prompts for language selection and in the next step, Rice clinic app pages will be displayed in the selected language.



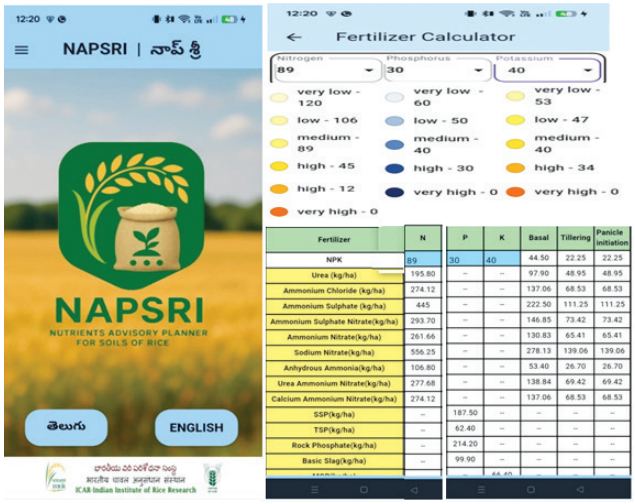
Screens of Rice Clinic Multilingual Mobile App

R-shiny Interface for AI Agri-Models (https://aiagri.shinyapps.io/iirraimodels/)**:** R shiny interface was developed to facilitate excel CSV upload, independent, dependent variable selection, choosing the machine learning models and interpreting the results along with graphs with performance of models. Users without R programming knowledge can also easily use this interface and execute machine learning models.



Screenshot of R-shiny Interface for AI Agri-Models

NAPSRI-Nutrients Advisory Planner for Soils of Rice Mobile App in Telugu, English and Hindi Languages: Soil testing is key to balanced fertilization and plant nutrition. ICAR-IIRR developed Rapid Soil Testing Kit for testing soil health. The kit provides rapid testing techniques for soil physical, chemical and biological parameters. The Soil quality testing kit offers simplified methods for determination of available nutrients from soils and is rapid, fairly accurate chemical tests. This NAPSRI App computes the requirement of nutrients based on soil test generated available nutrients and suggests the Fertiliser doses at important stages of Rice crop. This app will greatly benefit farmers by providing instant nutrient recommendations in the form of fertiliser doses at different stages based on soil test results from the soil kit.

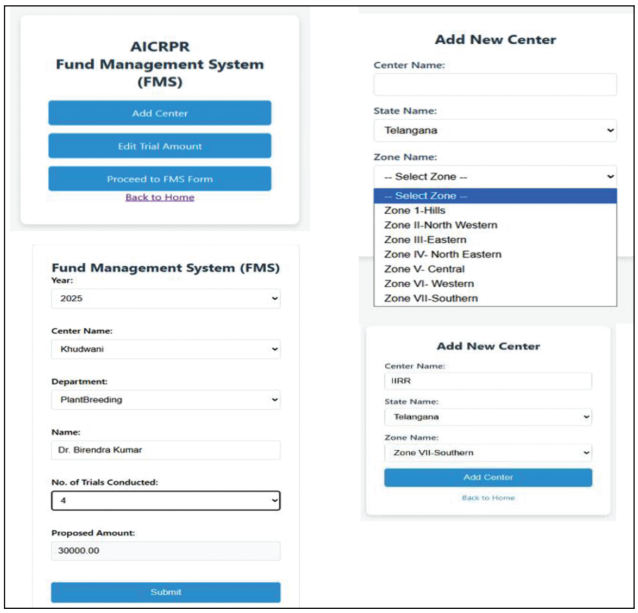


AICRPR- Fund management system(FMS) for Voluntary centres (https://icar-iirr.org/CentersForm/Home.php): All India Coordinated Research Project on Rice (AICRPR) is the largest research network across India on a single crop. There are 7 AICRPR zones, at 124 locations (41 funded, 83 voluntary centres) in 28 states and 5 union Territories across seven zones of the country. Managing data and fund allocation for 83 voluntary centers has been a challenging and time-consuming task due to frequent staff changes and manual verification processes. To address this, a Fund Management System (FMS) software was developed to streamline fund management activities, update center and staff details, record discipline-

Department wise AICRIP FMS Report

Department-wise Aicrip FMS Report - Year: 2024										
Zone	State	Location	Agronomy	Entomology	HybridRice	PlantBreeding	PlantPathology	PlantPhysiology	SoilScience	Total
Zone I-Hills	Himachal Pradesh	Bajaura	0	0	0	150000	0	0	0	150000
Zone I-Hills	Himachal Pradesh	Dhaulakuan	0	0	0	300000	0	0	0	300000
Zone I-Hills	Himachal Pradesh	Palampur	0	0	0	150000	0	0	0	150000
Zone I-Hills	Himachal Pradesh	Sundernagar	0	0	0	150000	0	0	0	150000
Zone I-Hills	Jammu & Kashmir	Lurnoo	0	0	0	300000	0	0	0	300000
Zone I-Hills	Jammu & Kashmir	Pombay (Khudvani)	0	0	0	300000	0	0	300000	600000
Zone I-Hills	Jammu & Kashmir	Rajouri	0	0	0	300000	0	0	0	300000
Zone I-Hills	Jammu & Kashmir	Vijaypur (Khudvani)	0	0	0	300000	0	0	0	300000
Zone I-Hills	Meghalaya	Umiam-CAU	0	0	0	300000	0	0	0	300000
Zone I-Hills	Nagaland	Medziphema -ICAR	0	0	0	150000	0	0	0	150000
Zone I-Hills	Uttarakhand	Bageshwar (Almora)	0	0	0	150000	0	0	0	150000
Zone II-Eastern	Bihar	Ranchi	0	0	0	0	400000	300000	0	700000
Zone II-Eastern	Bihar	Sabour	150000	0	300000	800000	500000	0	0	1750000
Zone II-Eastern	Odisha	Bhubaneswar	0	0	0	500000	0	0	0	500000
Zone II-Eastern	Uttar Pradesh	Faizabad	0	0	0	0	0	150000	300000	450000
Zone II-Eastern	Uttar Pradesh	Gorakhpur	0	0	0	300000	0	0	0	300000
Zone II-Eastern	West Bengal	Chinsura	0	0	0	0	0	150000	300000	450000
Zone II-Eastern	West Bengal	Gosaba	0	0	0	150000	0	0	0	150000
Zone II-Eastern	West Bengal	Hathwara	0	0	0	500000	0	0	0	500000
Zone II-Eastern	West Bengal	Malda	0	0	0	700000	0	0	0	700000
Zone II-Eastern	West Bengal	Purulbari	0	0	0	300000	0	0	0	300000
Zone IV- North Eastern	Tripura	Arundhatinagar	0	300000	0	0	0	0	0	300000
Zone V- Central	Chhattisgarh	Ambikapur	0	500000	0	400000	0	0	0	900000
Zone V- Central	Chhattisgarh	Bilaspur	0	0	0	400000	0	0	0	400000
Zone V- Central	Madhya Pradesh	Jabalpur	0	0	300000	700000	0	0	0	1000000
Zone V- Central	Madhya Pradesh	Varasseoni	0	0	300000	300000	0	0	0	600000
Zone V- Central	Maharashtra	Sindewahi	0	0	300000	800000	0	0	0	1100000
Zone VI- Western	Gujarat	Dabhoi	0	0	300000	150000	0	0	0	450000
Zone VI- Western	Gujarat	Gerdi	0	0	0	300000	0	0	0	300000
Zone VI- Western	Gujarat	Vyara	0	0	0	700000	0	0	0	700000
Zone VI- Western	Maharashtra	Karjatwala	0	0	0	0	300000	0	0	300000
Zone VI- Western	Maharashtra	Panvel	0	0	0	150000	0	0	0	150000
Zone VI- Western	Maharashtra	Parbhani	0	0	0	300000	0	0	0	300000
Zone VI- Western	Maharashtra	Phondaghat	0	0	150000	150000	0	0	0	300000
Zone VI- Western	Maharashtra	Radhanagari	0	0	150000	600000	0	0	0	750000
Zone VI- Western	Maharashtra	Rhigaon	0	0	150000	300000	0	0	0	450000
Zone VI- Western	Maharashtra	Vadagaon	300000	0	150000	400000	0	0	0	850000
Zone VII- Southern	Andhra Pradesh	Bapatla	0	0	150000	300000	0	0	0	450000
Zone VII- Southern	Andhra Pradesh	Nellore	0	500000	0	300000	500000	0	0	1300000
Zone VII- Southern	Andhra Pradesh	Ragolu	0	300000	0	500000	0	0	0	800000
Zone VII- Southern	Karnataka	Mahagi	0	0	0	400000	0	0	0	400000
Zone VII- Southern	Karnataka	Mugad	0	0	0	0	500000	0	0	500000
Zone VII- Southern	Karnataka	Sirsi	0	0	0	600000	0	0	0	600000
Zone VII- Southern	Kerala	Vvitla	150000	0	0	0	0	0	0	150000
Zone VII- Southern	Puducherry	Karaikal	300000	300000	150000	300000	300000	150000	0	2100000
Zone VII- Southern	Puducherry	Puducherry	0	0	0	300000	0	0	150000	450000
Zone VII- Southern	Tamil Nadu	Annamalainagar	0	0	0	300000	0	0	0	300000
Zone VII- Southern	Tamil Nadu	Gudalaru	0	0	0	300000	400000	0	0	700000
Zone VII- Southern	Tamil Nadu	Tirur	0	0	0	300000	0	0	0	300000
Zone VII- Southern	Telangana	Jagtial	0	500000	0	500000	300000	0	0	1300000
Zone VII- Southern	Telangana	Kampasagar	0	0	0	500000	0	0	0	500000
Zone VII- Southern	Telangana	Kunaram	0	0	0	400000	0	0	0	400000
Zone VII- Southern	Telangana	Rudrur	0	0	0	300000	0	0	0	300000
Discipline Totals			900000	2400000	2400000	11735000	3800000	750000	1050000	23650000

wise expenditures, and generate automated reports on trials and sanctioned amounts. This software significantly reduces manual effort, minimizes errors, and ensures efficient and transparent management of funds across voluntary centers.



Intellectual Property Rights of ICAR-IIRR

PPV & FRA registration of New Rice Varieties and Hybrids

ICAR-IIRR continued to strengthen the protection of its genetic resources through the registration of newly developed rice varieties and hybrids under the PPV&FR Act. During 2025, applications were filed for several notified varieties and hybrids, with registrations being granted for 9 varieties and 3 hybrids by the PPV&FR Authority. These registrations safeguard the intellectual property of the Institute's breeding innovations while facilitating their commercial utilization and ensuring recognition of the contributions of ICAR-IIRR's breeders. The details of the PPV&FR applications and registrations are presented below.

S. No	Variety	Registration No.	Date of filing app.	Date of grant	Lead breeder
1	DRR Dhan 63	PPV&FRA/REG/2024/0609/extant (notified)	08-10-2024		Dr G Padmavathi
2	DRR Dhan 64	PPV&FRA/REG/2024/1315/extant (notified)	20-12-2024		Dr P Senguttuvel
3	DRRH-5	PPV&FRA/REG/2024/1316/extant (notified)	20-12-2024	05-05-2025	
4	DRRH-4	PPV&FRA/REG/2024/1317/extant (notified)	20-12-2024		
5	DRR Dhan 70	PPV&FRA/REG/2025/0033/extant (notified)	01-01-2025	05-05-2025	
6	DRR Dhan 71	PPV&FRA/REG/2025/0039/extant (notified)	03-01-2025	05-05-2025	
7	DRR Dhan 65	PPV&FRA/REG/2025/0066/extant (notified)	13-01-2025	06-05-2025	Dr D Balakrishnan
8	DRR Dhan 74	PPV&FRA/REG/2025/0065/extant (notified)	13-01-2025	07-05-2025	
9	DRRH 6	PPV&FRA/REG/2025/0657/extant (notified)	04-06-2025	04-12-2025	Dr A S Hari Prasad
10	DRR Dhan 75	PPV&FRA/REG/2025/0838/extant (notified)	30-07-2025		Dr RM Sundaram
11	DRR Dhan 76	PPV&FRA/REG/2025/0840/extant (notified)	30-07-2025		
12	DRR Dhan 77	PPV&FRA/REG/2025/0839/extant (notified)	30-07-2025		Dr R Abdul Fiyaz
13	DRR Dhan 79	PPV&FRA/REG/2025/1252/extant (notified)	27-10-2025	Under process	Dr Jyothi Badri

Registration of Novel Genetic Resources

ICAR-IIRR continued to enrich the national genetic resource repository through the registration of novel rice genetic stocks with the National Bureau of Plant Genetic Resources (NBPGR). During 2025, the Institute secured registration of eight novel genetic resources (3 in 54th and 5 in 55th Plant Germplasm Registration Committee meetings) possessing unique and valuable traits, including resistance to major insect pests such as brown planthopper and white-backed planthopper, broad-spectrum blast resistance, and enhanced grain nutritional quality with high zinc and protein content. These registered donors represent important genetic resources for future rice improvement programmes and will facilitate the development of high-yielding, climate-resilient, pest-resistant, and nutritionally enriched rice varieties. The details of the registered genetic resources are presented below.

S. No	National identity	Donor identity	INGR No	Novel unique features	Lead Developer
1	IC654536	RP-GP-3000-179-3-9-1	INGR25002	Dual resistance. Brown planthopper (DS3.4) and White-backed planthopper insects in rice (DS 3.7). Stable resistance at 4 locations/environments.	Dr G Padmavathi
2	IC216735	IC216735 Introduction and Selection	INGR25003	Resistance to Brown planthopper (*Nilaparvata lugens*) in rice with a damage score of 2.7. Resistance to brown planthopper at vegetative stage in rice. Resistance to brown planthopper at the reproductive stage in rice.	Dr V Jhansilakshmi
3	IC76057	IC76057; IET-9926/ Swarnadan/ Veluthacheera	INGR25004	Resistance to brown planthopper (*Nilaparvata lugens*) in vegetative and reproductive stage. Damage score of 2.6.	
4	IC 658169	IR 73784-5-28-B-HWR-1	INGR25046	Resistance to Brown planthopper (BPH) Nilaparvata lugens with a damage score of 4.1 Resistance to brown planthopper at vegetative and reproductive stages	Dr RM Sundaram
5	IC 658170	GP SS RIL-86	INGR25047	Resistance (Damage score 3.1) against Brown planthopper in seedling stage. It possesses three known genes namely *bph2, Bph 21* and *Bph32* governing BPH resistance.	Dr G Padmavathi
6	IC 658172	RP 6619	INGR25049	Broad-spectrum blast resistance genes Pi9 and Pi54 in this male fertility restorer	Dr P Revathi
7	IC 658174	IET31956 (RP6615-MK/RIL-FBMI-45-1-5-1)	INGR25051	Possesses micronutrient (Zn) content (25.87ppm) in polished rice grain. Possesses a protein content of 7.69% in polished rice grain	Dr CN Neeraja
8	IC 658175	IET 31933 [RP6615-MK (RIL-FBMI-2-1)]	INGR25052	Possesses micronutrient (Zn) content (25.25 ppm) in polished rice grain Possesses Protein content of 8% in polished rice grain	

Public Deposition of Genomic and Transcriptomic Datasets

ICAR-IIRR continued to promote open science and facilitate global research by depositing high-quality genomic, transcriptomic, and molecular datasets in internationally recognized public repositories (NCBI) during 2025. The deposited datasets include whole-genome sequences, RNA-sequencing data, genotyping-by-sequencing datasets, transcriptome assemblies, molecular marker sequences, and insect mitochondrial gene sequences covering diverse research areas such as biofortification, stress tolerance, disease and insect resistance, grain quality, nutrient-use efficiency, and functional genomics.

These publicly accessible datasets constitute valuable resources for the scientific community and support advanced research in rice genetics, genomics, molecular breeding, and crop improvement. The details of the datasets deposited during the year are presented below.

NCBI Sequence Information Submissions

S. No	Project Information	Accession Number	Authors
1	Rice landrace Karuppunel Whole genome sequencing of Karuppunel, a high grain zinc rice landrace to elucidate the genomic basis underlying high grain zinc accumulation using a hybrid approach combining Oxford Nanopore long-read and Illumina short-read platforms	Biosample SAMN50279430 Bioproject SAMN49822061 SRA SUB15503118	Drs. CN Neeraja, Kalyani MB, Haritha Bollinedi, SK Mangrauthia, Dr. Sanjeeva Rao D, Aravind J, Sruthi K, K. Suman, Veerendra J, Keethi Issa & RM Sundaram
2	RNA-seq Developmental stage of inflorescence primordia from Samba Mahsuri and KAMALA	IBDC Study Accession: INRP000477; INSDC SRA Project Accession: PRJEB100853	Drs S K Mangrauthia, RM Sundaram & CN Neeraja
3	190 RILs along with two parents was subjected to genotyping by sequencing (GBS) using the next-generation sequencing (NGS) platform- ddRAD Seq (double digest Restriction Associated DNA Sequencing) on the Illumina HiSeq™ 6000 platform.		Drs Jyothi Badri, Akshay Mamidi, Sanjeeva Rao D, SV Sai Prasad, Kalyani MB & RM Sundaram
4	Development of Superior Haplotype based Near Isogenic Lines (Haplo-NILs) for Enhanced Genetic Gain in Rice. IRGC 10658 (Tropical japonica accession for strong culm)	PRJNA1148323	Dr Jyothi Badri & Kamala Datla
5	Molecular genetic analysis of resistance and tolerance to different stresses in rice	BioSample: SAMN43196437 SRA: SRS22350179 PRJNA1148335	Drs Jyothi Badri, V Prakasam, GS Laha, RM Sundaram and Srihari G
6	Transcriptome sequence Illumina NovaSeq 6000 Datasets Long non-coding RNA TI-128, CR Dhan 202, BPT 5204 and	PRJNA1302677	Drs Kalyani M Barbadikar, CN Neeraja, SK Mangrauthia, R M Sundaram, MS Madhav, Divya Balakrishnan & P Senguttuvel
7	Exploring Chromosomes segment substitution lines from inter-specific crosses to decipher the genetics of false smut resistance Resistant Bulk Susceptible bulk and NPS13 (resistant line)	PRJNA1218906	Drs Divya Balakrishnan, D Ladhalakshmi, Kalyani MB, MS Prasad, GS Laha, RM Sundaram & MS Madhav
8	Exploring Chromosomes segment substitution lines from inter-specific crosses to decipher the genetics of grain weight in rice	PRJNA1227721	Drs Divya Balakrishnan, N Sarala, D Ladhalakshmi, Kalyani M Barbadikar & RM Sundaram
9	Transcriptomic Insights into the Molecular Cross-Talk Between Nitrogen and Phosphorus Use Efficiency in Roots and Shoots of Rice Recombinant Inbred Lines (RILs) BV24 and BV148 (BPT 5204* Varadhan)	PRJNA1204572 SRA SUB14981487 and SUB15192962	Drs CN Neeraja, Kalyani M Barbadikar, SK Mangrauthia, RM Sundaram, MS Anantha, P Brajendra & K Surekha

S. No	Project Information	Accession Number	Authors
10	Marker- PRP for *Gm8* gene RPP-del conferring gall midge resistance	PZ321334, PZ321375, PZ321376, PZ321377, PZ321378, PZ321379, PZ321381	AP Padmakumari, K Elakkia, MB Kalyani, Y. Sridhar, RM Sundaram
11	*Heterorhabditis indica* isolate IIRRhi05 internal transcribed spacer 1, partial sequence; 5.8S ribosomal RNA gene and internal transcribed spacer 2, complete sequence; and large subunit ribosomal RNA gene, partial sequence.	PX775646	Drs Chavan S.N., Somasekhar N., Mangrauthia S.K. and Thiyagarajan, T.
12	63 Brown planthopper (BPH) *MtCOI* gene sequences	PV234125, PV24 2271, PV235281, PV242209	Dr Chinna Babu Naik
13	44 White backed plant hopper (WBPH) *MtCOI* gene sequences	PV300558, PV300 563, PV300608, PV251884	Dr Chinna Babu Naik

NGS Database-NCBI GenBank Submissions

A comprehensive centralized Next-Generation Sequencing (NGS) database has been developed under the DBT–National Network Project on Bioinformatics to systematically archive and manage sequencing data generated at ICAR–IIRR. The database integrates whole-genome sequencing, transcriptomics, Genotyping-by-Sequencing (GBS), and other published NGS datasets, providing a unified platform for efficient data storage, retrieval, and analysis to support rice genomics research (released on 60 ARGM, ICAR-IIRR Hyderabad).



Database ICAR-IIRR NGS Database (https://www.icar-iirr.org/index.php/en/services/databases?id=293) Contributors: Kalyani M Barbadikar, Satendra Kumar Mangrauthia CN Neeraja Divya Balakrishnan, Suneetha Kota, D Ladhalakshmi, Jyothi Badri, Papa Rao Vaikuntapu, PC Latha, C Kannan, Bandeppa, Santosha Rathod, GS Laha, P Ananda Kumar, M Sheshu Madhav, Shailesh Kumar, B Shailaja, R M Sundaram. Research Scholars: KM Kanika, Divya Kattupalli, Nakul Magar

S. No	Genotype	Accession Number	Authors
1	INRC 3021	PZ246755	A P Padmakumari, K Elakkiya, M B Kalyani, Y Sridhar, R M Sundaram
2	AGANNI	PZ246756	
3	INRC 15888	PZ246758	
4	INRC17470	PZ246757	
5	RP 5925-24	PZ246759	
6	TN1	PZ321373	
7	RP 6749-RMS7-17-27-41	PZ246751	A P Padmakumari, K Elakkiya, M B Kalyani, R Abdul Fiyaz, Y Sridhar, R M Sundaram

Copyright Filed

- Dairy No. SW-24013/2025-CO- Rice Clinic – Telugu Mobile App
- Dairy No. SW-23199/2025-CO- BREED AICRPR-Breeding Entries Evaluation Dashboard under All India Coordinated Research Project on Rice
- Copyright applied: Copyright Diary Number: SW-23284/2025-CO. Title: AI-based Rice Pest Pheno-Forecasting Portal (http://www.iirricepest.org/) . Developers: Ch Padmavathi, B Sailaja, Santosha Rathod, M Srinivas Prasad, R Meenakshi Sundaram

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S. No	Title of the work	Registration Number	Date
1.	Snake and Ladder Game for Dissemination of Good Agricultural Practices (gap)	SW-2025020765	17/06/2025
2.	Aavishkar-an AI based Mobile App for diagnosing Rice Pests	SW-20152/2025	04/02/2025
3	IIRR Seed Portal (http://www.iirr-seedportal.in)	SW-2025021609	16/09/2025

ICAR-IIRR patents filed and granted in 2025

S. No	Technology	Application No.	Date
	Patents filed		
1	Coating composition for fertilizer to improve crop yield and preparation method of coated fertilizer	202541088012	16.09.2025
2	Specific amorphous silica gels for effective control of stored grain pests and preparation thereof	202541102656	24.10.2025

Technology Commercialization

Technology License Agreements: In 2025, ICAR-IIRR signed seven Technology License Agreements on a non-exclusive basis with the following companies via Agrinnovate India Ltd. These agreements are intended for the large-scale production and popularization of the technologies mentioned below among the farming community and other end users. The details of these agreements are as follows

S. No	Varieties/ Technologies licensed/ under process	Date of Application*	Date of MoU signing/ Current Status	Licensing fee (Rs. Lakhs)	Name of Licensee
A	**Varieties**				
1	DRRH-4	04.03.2025	19.06.2025	7,50,000	Krishi Vikas Sahakari Samiti Ltd (KVSSL)
2	DRRH-6	17.11.2025	02.12.2025	7,50,000	Star Agrifarm Solutions Private Limited
3	DRR Dhan 48	05.11.2025	19.12.2025	3,75,000	Abhiram Naturals Pvt Ltd
B	**Other Technologies**				
1	Modified Leaf Colour Chart for Irrigated rice		16.07.2025	5,00,000	Parashar Agrotech Bio Pvt Ltd
2	IIRR Manual Soil Testing Kit	04.11.2025	02.12.2025	2,25,000	Novel gene Technologies Pvt Ltd
3	IIRR Manual Soil Testing Kit	04.11.2025	19.12.2025	2,25,000	Vagmi Enterprises
4	Rice Riche Pain Balm - Anhydrous Natural Pain Relief Composition for Topical Application		04.03.2025	221250	N2A Enterprises



TLA with Krishi Vikas Sahakari Samiti Ltd (KVSSL) for DRRH-4



TLA with Abhiram Naturals Pvt Ltd for DRR Dhan 48



TLA with N2A Enterprises for Rice Riche Pain Balm



TLA with Vagmi Enterprises for IIRR Manual Soil Testing Kit



TLA with Novelgene Pvt. Ltd. for IIRR Manual Soil Testing Kit

Material Transfer Agreements (MTAs): In 2025, ICAR-IIRR signed MTAs with 6 organizations/ firms. These agreements are executed to facilitate the transfer of ICAR-IIRR-developed genetic materials and technologies to public and private organizations for research, while ensuring protection of intellectual property rights and compliance with agreed terms of use. The details of these agreements are as follows

List of ICAR-IIRR signed Material Transfer Agreements during 2025-26

S. No	MTA Date	MTA Ref. No	Recipient Name & Address	Details of the accessions	Amount (Rs)	GST (18%) (Rs)	Total Amount (Rs)
1	17.07.2025	IIRR/ITMU/ MTA-121/2025	RRS, Madhopur, Bihar (Dr Rajendra Prasad Central Agricultural Univ, Pusa)	DRRH-2 **hybrid parental lines** [IR 68897A, IR 68897B, DR 714-1-2R]	-	-	-
2	17.07.2025	IIRR/ITMU/ MTA-122/2025	Eldorado Agritech Limited	**Genetic stocks:** (1) DRR-BL-31 (INGR 15002) (2) RP Bio Patho-2 (INGR 18001) and (3) RP 4621-1845 (INGR 9074)	2,25,000	40,500	2,65,500
3	17.07.2025	IIRR/ITMU/ MTA-123/2025	Kaveri Seed Company Limited	**Genetic stocks:** (1) NPK77-3 (INGR 24003) (2) IL-3, DRR-BL-295-2 (INGR 22105) (3) IL19273, 19273, FBL 19273 (INGR 23068) (4) RP 6837-RMS- ISMA 13 (INGR 24058) (5) IL 19471, IET 29834 (INGR 23071) and (6) IET29482 (RP6211- PR/RIL-Q181) (INGR 23074)	4,50,000	81,000	5,31,000
4	10.10.2025	IIRR/ITMU/ MTA-124/2025	Agri Biotech Foundation, Hyderabad	**Genetic stocks and varieties** (1) RP6290-21-22 (2) RP6290-22-68 (3) RP6290-22-57 (4) RP6290-22-69 (5) RP6290-22-56 (6) Rasi	12,000	2,160	14,160
5	10.10.2025	IIRR/ITMU/ MTA-125/2025	Agri Biotech Foundation,	**GMBT set:** (1) Kavya (2) W 1263 (3) ARC 6605 (4) Phalguna (5) ARC 5984 (6) Dukong 1 (7) RP 2333-156-8 (8) Madhuri L 9 (9) BG 380-2 (10) CRMR 1523 (11) RP 2068-18-3-5 (12) Abhaya (13) INRC 3021(14) Aganni (15) INRC 15888 (16) INRC17470 (17) TN1, (18) RP5922-21 (19) RP5923 (20) RP5925-24 *(21)* RP 6749-RMS7-17-27-41 (22) TN1	22,000	3,960	25,960

Memorandum of Agreements

ICAR-IIRR strengthened its collaborative research, technology development, and outreach activities by entering into strategic partnerships with national research organizations, universities, industry partners, and other stakeholders during 2025. The MoUs signed during the year focus on diverse areas including sustainable rice cultivation, direct-seeded rice promotion, digital agriculture, organic farming in tribal regions, postgraduate education and training,

crop protection, and research database management. These collaborations are expected to enhance research excellence, technology dissemination, capacity building, and the adoption of innovative solutions for sustainable rice production. The details of the MoUs signed during the year are presented below.

S. No	Collaborating Institute	Purpose of MoU	Date and Venue
1	Central Tribal University of Andhra Pradesh	Promotion of organic rice farming in the tribal areas of Andhra Pradesh.	30th August 2025, ICAR-IIRR, Hyderabad
2	Council on Energy, Environment and Water (CEEW), New Delhi.		15th October 2025, ICAR-IIRR, Hyderabad
3	Vaibhav Traders	Evaluation of a botanical nematicide against the rice root-knot nematode	16th October 2025, ICAR-IIRR, Hyderabad
4	ITC Limited	Promoting sustainable and efficient paddy cultivation practices across the four southern states—Telangana, AP, Karnataka, and Tamil Nadu.	21st October 2025, ICAR-IIRR, Hyderabad
5	PJTAU, Rajendranagar, Hyd.	Promotion of DSR in Telangana	PJTAU, Rajendranagar
6	Kaveri University, Gowraram, Telangana	Student training and postgraduate research	21st May 2025, Corporate Office of Kaveri Seeds, Hyderabad
7	Centre for Development of Advanced Computing (C-DAC)	To strengthen collaborative initiatives in digital agriculture and data-driven rice research	December 2025
8	AICRP on Sorghum and Small Millets	Adoption of IIRRSTAT for AICRPR Database Management System	5th December 2025 ICAR-IIRR, Hyderabad



MoU with Council on Energy, Environment Water (CEEW), New Delhi



MoU with Vaibhav Traders for Botanical nematicides



MoU with ITC Limited for promotion of paddy cultivation in Telangana, Andhra Pradesh, Karnataka, and Tamil Nadu.



MoU with PJTAU on the promotion of Direct Seeded Rice (DSR) in Telangana..



MoU with Kaveri University, Gowraram, Telangana for student training and PG studies



MoU with Development of Advanced Computing (C-DAC)

ICAR-IIRR Industry Meet 2025: 'Display of IIRR Technologies & Services'

The ICAR-IIRR industry meet was conducted on November 6, 2025, in a hybrid mode under the chairmanship of Dr. R.M. Sundaram, Director, ICAR-IIRR. Dr. S.K. Pradhan, ADG (FFC) emphasized the importance of healthier biofortified rice and microbial product development. He appreciated ICAR-IIRR's contributions to technology development and its proactive engagement with industry stakeholders. Dr. D.K. Yadava, DDG (Crop Science) commended Dr. Sundaram for successfully organizing the third consecutive industrial meet. He highlighted the significance of varietal licensing, including DRR Dhan 48 and DRR Dhan 75, and stressed the importance of translating research outputs into farmer-centric solutions. Dr. Shiv Datt, Principal Scientist, IPTM, ICAR discussed public-private partnerships, technology transfer mechanisms, and licensing protocols. He emphasized the role of Agrinnovate in facilitating commercialization and the need for confidentiality agreements. He also referenced the PPV&FRA framework and the Biological Diversity Act, underscoring the importance of legal compliance in technology sharing. Mr. Dhruva (Business Manager, Agrinnovate India Ltd) discussed the pathway from innovation to enterprise. He emphasized the importance of technology commercialization, market validation, and robust business models. He outlined the technology generation-to-commercialization cycle and addressed challenges in scaling innovations for industry adoption. Technology sharing was facilitated, with the support of Agrinnovate India Ltd, through the signing of Terms of Trade (ToTs) with multiple stakeholders on IIRR technologies, including DRR Dhan 48, DRRH-6, and the IIRR Manual Soil Testing Kit. The programme comprised a field visit to showcase promising ICAR-IIRR technologies and display of technologies at the meeting venue for interaction with participants from the Industry. A total of 50 experts, representing different firms/ companies attended the meeting.







4. Human Resource Development-Teaching and Training

Teaching

Role of ICAR-IIRR in IARI Mega University (IARI-MU), Hyderabad Hub

Scientists at ICAR-IIRR have been inducted into the PG Faculty as teaching members and have also been recognized as research guides for PG programmes, guiding MSc and PhD students in their respective disciplines. ICAR-IIRR is serving as nodal center for the Plant Breeding discipline, coordinating teaching activities for MSc and PhD students. It is also a major partner in teaching for the Entomology discipline, for which the nodal center is ICAR-IIMR. Several scientists from different disciplines are teaching courses offered as minor or supplementary/residual courses. Other faculty members are significantly contributing to the teaching of undergraduate (UG) courses organized by ICAR-CRIDA. Specifically, the UG courses, Agricultural Finance and Cooperation (UECON-102), Experimental Designs (STAT-511), Agricultural Microbiology (UMICRO101), Fundamentals of Plant Pathology (UPATH-101) and Fundamentals of Plant Biochemistry and Biotechnology (UBIOCHEM-101) were taught as led by scientists of ICAR-IIRR as Course Leaders. Scientists from IIRR are serving as overall Course Coordinators for the disciplines Plant Breeding, Plant Physiology, and Nematology. Also, scientists from IIRR are taking lead as a Course Leaders for PG/PhD courses such as Principles of Genetics, Principles of Plant Breeding, Principles of Cytogenetics, Molecular Breeding and Bioinformatics, Genetic enhancement for PGR utilization, Molecular Plant Breeding (MBB511), Advances in Biometrical Genetics (GPB 602), Plant Molecular Biology (MBB 601), Cropping System and Sustainable Agriculture (AGRON511), Current Trends in Agronomy (AGRON601), Soil Testing and Fertilizer Recommendation (SOL612), Soil Chemistry (SOL503), Integrated Disease Management (PATH 514), Nematode Management (Nema-510), etc. Additionally, many scientists are serving as associates for other courses in the MSc and PhD programmes of IARI - MU. Several scientists are currently guiding MSc and PhD students in various disciplines for their research from various SAUs and private Agricultural Universities across the country.

Research Guidance to Master's and PhD students, registered in various universities across the country

Scientists of ICAR-IIRR involved in teaching, research guidance and training activities of MSc and PhD students under IARI Mega university programme as well as from various state agriculture universities and private universities under the coordination of Academic committee, ICAR-IIRR. During 2025, IIRR is hosting 103 ongoing MSc / PhD students and facilitating their research activities and another 41 new students enrolled at ICAR-IIRR during this academic period from various universities. A total of 37 postgraduate students, doctoral scholars, trainees, and interns from 11 universities and institutions completed their research work across six academic disciplines, reflecting IIRR's strong commitment to capacity building and human resource development in Agriculture.

Among the students submitted thesis in 2025 majority of the students belonged to GPBR (25), Biotechnology (4), Microbiology (3), Entomology (3), Agronomy (2), and Plant Pathology (2). Six students submitted thesis under IARI–MU Hyderabad Hub, ICAR-CRIDA under Plant Breeding and Entomology disciplines. The students represented a wide network of collaborating institutions like PJTAU, ANGRAU, SHUATS, IGKV, Malla Reddy University, Osmania University, ANU, KIIT and Thapar Institute of Engineering and Technology based on MOU demonstrates the institute's extensive academic collaborations with agricultural universities and higher education institutions across India.

List of PG and PhD students completed research and awarded degrees in 2025

S. No	Name of the Student	University/ College	Dep	M.Sc/ Ph.D	Title of Research	Role of Scientist
1	Gorige Srihari	ANGRAU	GPBR	PhD	Single nucleotide polymorphism (SNP) based mapping of QTLs governing sheath blight resistance /tolerance in rice (*O. sativa* L.)	Chairperson: Dr. Jyothi Badri Members: Dr RM Sundarma & V. Prakasam
2	Akshay Mamidi	PJTAU	GPBR	PhD	Molecular mapping of novel genomic regions associated with strong culm in rice	Co-Chairperson: Dr. Jyothi Badri Dr. Sanjeeva Rao D and Kalyani M. Barbadikar
3	Prathyusha T	PJTAU	GPBR	MSc	Genome wide association studies for identification of marker trait associations for sheath blight tolerance in Rice (*Oryza sativa* L.)	Member: Dr. Jyothi Badri V. Prakasam
4	Vinnakota Vinutna	ANGRAU	GPBR	M.Sc	QTL mapping for salt tolerance in RIL population of rice (*Oryza sativa* L.)	Member: Dr. Suneetha Kota
5	Mude Karunakar Naik	PJTAU	GPBR	MSc	Molecular characterization of BADH2 gene and morphological diversity analysis in aromatic rice genotypes (*Oryza sativa* L.)	Chairperson: Dr. Suvarna Rani Ch Member: Dr. Satendra Kumar Mangrautia
6	Akhil D	PJTAU	GPBR	MSc	Assessing the genetic diversity of short and medium slender grain genotypes through morphological traits and molecular markers in rice (*O. sativa* L.)	Member: Dr. Suvarna Rani Ch Member: Dr. Satendra Kumar Mangrautia
7	Ms. Bokka Kiranmayee	IGKV	GPBR	Ph. D.	Genetic improvement of elite rice variety for anaerobic germination tolerance	Co Chairman: Dr Anantha M S
8	Mr Manoj A R	IARI-MU, Hyderabad Hub	GPBR	M. Sc.	Molecular and morphological evaluation of wild rice introgressed lines from *O. rufipogon* for low Phosphorus tolerance	Dr Anantha M S
9	Naresh Kumar Sahu	IGKV	GPBR	PhD	Mapping QTLs for biotic stress resistance in rice (*Oryza sativa* L.) using wild introgression lines for blast, bacterial leaf blight, and brown plant hopper	Co-Chairperson: Dr. Divya Balakrishnan
10	Michelle Shaji John	IARI-MU, Hyderabad Hub	GPBR	MSc	Phenotypic and genotypic characterization for blast and bacterial leaf blight resistance of interspecific chromosome segment substitution lines derived from MTU1010/ Oryza rufipogon	Chairperson: Dr. Divya Balakrishnan Member: Dr Suneetha K, Dr SV Sai Prasad, Dr M S Prasad, Dr GS Laha, Dr. KM. Barbadikar
11	Suriya S	IGKV	GPBR	MSc	Molecular characterization of wild accessions and landraces of rice for yield and biotic stresses	Co-Chairperson: Dr. Divya Balakrishnan
12	Talari Kishore Kumar	Malla Reddy University	GPBR	MSc	Genome wide association study in rice (*Oryza sativa* L.) for yield traits under limited nutrient conditions	Co-Chairperson: Dr. D Balakrishnan Member: Dr. KM. Barbadikar
13	Swetha P	PJTAU	GPBR	MSc	Molecular and morphological characterization of wild introgression lines derived from advanced intercross populations for yield traits in rice (*Oryza sativa* L.)	Member: Dr. Divya Balakrishnan
14	Blessina P	SHAUTS, Prayagraj	GPBR	MSc	Molecular breeding for Nematode resistance in rice (Six month Internship)	Mentors: Dr. Divya Balakrishnan Dr. Satish N. Chavan
15	V. Anuhya	ANGRAU,	GPBR	PhD	Morphological and molecular based heterotic grouping of hybrid rice parental lines (*Oryza sativa* L.)	Chairperson: Dr. A.S. Hari Prasad Members: Dr.RM.Sundaram Dr.K.Sruthi
16	Beulah. P	Acharya Nagarjuna University	Biotech.	PhD	Marker assisted introgression of restorer line of rice (*Oryza sativa* L.) for salinity tolerance	Co-Chairperson: Dr. P. Senguttuvel
17	K. R. Maruthi	PJTAU	GPBR	M.Sc	Characterization of advanced breeding lines for yield and nutritional properties in hybrid rice (*Oryza sativa* L.)	Co-Chairperson: Dr. K. Sruthi

S. No	Name of the Student	University/ College	Dep	M.Sc/ Ph.D	Title of Research	Role of Scientist
18	M. Bharath Kumar	PJTSAU	GPBR	Ph.D.	Molecular mapping of genomic regions associated with agronomic traits in Rice (*Oryza sativa* L.)	Co-Chairperson: Dr. R. Abdul Fiyaz
19	Gnyanambica Balina	Malla Reddy University	GPBR	MSC	Morphological and molecular characterization of Rice (*Oryza sativa* L.) landraces for grain and nutritional traits	Member: Dr. J. Aravind Kumar
20	Boddu Neelima	PJTAU Hyderabad	GPBR	M Sc	Identification of QTLs for anaerobic germination in rice (*Oryza sativa* L.)	Chairperson: Dr. S.L. Krishnamurthy
21	Manish Anand	UAS, Raichur	GPBR	M Sc	Evaluation of Rice (Oryza sativa L.) genotypes for yield and its attributing traits in Direct Seeded conditions	Co- Chairperson: Dr. S.L. Krishnamurthy
22	Faisal Yousuf	Osmania University	Biotech.	PhD	Multiplex genome editing for enhancing yield and disease resistance in rice	Chairperson: Dr. Satendra Kumar Mangrautia
23	Ms. S. Vaishnavi	Kalinga Institute of Industrial Technology	Biotech.		Hands-on training in basic molecular techniques (Three months)	Mentor: Dr. Satendra Kumar Mangrautia
24	Akhila Kore	SHUATS	GPBR	M.Sc Trainee	Hands-on training in basic molecular techniques (Six months)	Mentor: Dr. Kalyani M. Barbadikar
25	Sree Vency	SHUATS	GPBR	M.Sc Trainee	Hands-on training in basic molecular techniques (Six months)	Mentor: Dr. Kalyani M. Barbadikar
26	Mahalinga Swamy	SHUATS	GPBR	M.Sc Trainee	Hands-on training in basic molecular techniques (Six months)	Mentor: Dr. Kalyani M. Barbadikar
27	Madiha Atiqa	Osmania University	GPBR	M.Sc Trainee	Hands-on training in basic molecular techniques (Six months)	Mentor: Dr. Kalyani M. Barbadikar
28	Himani Saini	Thapar Institue of Engineering and Technology,	Biotech.	B. Tech	Six-Month comprehensive hands-on training in molecular and computational Biology	Mentor: Dr. Kalyani M. Barbadikar
29	Yalamareddy Kiranmai	ANGRAU, Guntur, AP	Agronomy	PhD	Sustainable intensification of rice-rice system to enhance system productivity, nitrogen use efficiency and reduce global warming potential	Chairperson: Dr. Mangal Deep Tuti
30	Umatara Barman	IARI-MU, Hyderabad Hub	Agronomy	MSc	Effect of biochar application on productivity and soil properties in wet direct seeded rice (WDSR)	Chairperson: Dr. Mangal Deep Tuti Member: Dr. Bandeppa
31	B. Venkatanna	Osmania University	Microbiol.	Phd	Root and soil microbe interactions in system of rice intensification: Effect on nutrient uptake and yields	Chairperson: Dr. P. C. Latha
32	Nayani Hari Sathwika	PJTAU	Microbiol.	M.Sc	Isolation and charachterisation of native rhizospheric zinc solubilizing bacteria and their evaluation for the biofortification in rice (*Oryza Sativa*)	Chairperson: Dr. Bandeppa Member: Dr. V. Manasa
33	Tenzimit Lepcha	IARI-MU, Hyderabad Hub	Microbiol.	M.Sc	Effect of sewage sludge and sewage sludge-derived biochar on plant growth, nutrient uptake, and soil properties of rice crop grown under typic pellustert	Member: Dr. Bandeppa
31	K. Lokesh	IARI-MU, Hyderabad Hub	Entomol.	MSc	Behavioural responses of lepidopteran pests of rice to green leaf volatiles	Chairperson: Dr. Ch Padmavathi Member: Dr KM. Barbadikar
32	Shaik Mahammad Sameer	ANGRAU	Plant Pathology	MSc	Elucidation of mechanisms of resistance against rice root-knot nematode *Meloidogyne graminicola*	Chairperson: Dr. N. Somasekhar Member: Dr. Satish N. Chavan
33	B. Pranavi	PJTAU	Entomol.	MSc	Efficacy of insecticide seed dressing and seedling root treatment against insect pests of rice	Chairperson: Dr. Y. Sridhar
34	Hari Krishna	PJTAU	Entomol.	MSc	Studies on genetic diversity and insecticide resistance of rice white-backed plant hopper, *Sogatella furcifera* (Hovarth) (Hemiptera: Delphacidae) in rice ecosystem of south India	Chairperson: Dr. V. Chinna Babu naik Member: Dr. Jesudasu G.
35	Madhukumar H	UAS, Raichur	Entomol.	MSc	Studies on genetic diversity and host plant interaction of rice brown plant hopper, *Nilaparvata lugens* (Stal)	Co-Chairperson: Dr. V. Chinna Babu naik
36	M. Sathvika	PJTAU	Plant Pathology	MSc	Characterisation of antagonistic endophytes against false smut (*Ustilaginoidea virens*) TAKASHAKI	Chairperson: Dr. D. Ladhalakshmi

Training Attended by IIRR Staff

S. No	Personnel	Name of the training programme	Organized by	Duration
1	Drs Bandeppa and V Manasa	GHG Emissions in Rice Systems: Basics of Mechanisms and Standards for Measurements	IRRI South Asia Regional Centre (ISARC), Varanasi, Uttar Pradesh	17–21 November 2025
2	Dr. Bandeppa S	Meta-Analysis	ICAR-NAARM	08-12 December 2025
3	Dr. Papa Rao Vaikuntapu	Speed Breeding: Addressing the Needs of Agri-Business Today	IRRI South Asia Regional Centre (ISARC), Varanasi, Uttar Pradesh	10-12, Dec 2025
4	Amtul Waris	Kisan Sarathi Workshop for Nodal Officers of Kisan Sarathi at IARI New Delhi	Jointly organized by IASRI and IARI, New Delhi	September 23,2025
5	Amtul Waris	International Workshop IRRI-IIRR collaborative program ST ICAR-IIRR	Jointly organized by IRRI&IIRR	October 25
6	Amtul Waris	Women's Leadership Summit at FTCCI, Hyderabad	The federation of Telangana chambers of commerce and industry	November 28,2025
7	P.A.Lakshmi Prasanna	33rd Annual Conference of Agricultural Economics Research Association (India	at NAARM, Hyderabad	1-3 December 2025
8	Jagriti Rohit	International Workshop IRRI-IIRR collaborative program ST ICAR-IIRR	Jointly organized by IRRI&IIRR	October 25
9	Dr V Prakasam	Two month training programme on Genotyping/Molecular characterization of wild rice germplasm against sheath blight disease	International Rice Research Institute (IRRI) Headquarters, Los Banos, Laguna, Philippines	1st March - 26th April 2025
10	Dr V Prakasam	Fundamentals of Genomic Predictions and Data-Driven Crop Breeding Training Course	ICAR–Indian Institute of Rice Research (ICAR-IIRR), Rajendranagar, Hyderabad, Telangana	November 24 - 28, 2025
12	Dr. A. P. Padmakumari	Brainstorming Session on "Semiochemicals-Driven Strategies for Sustainable Pest Management in Indian Agriculture"	National Academy of Agricultural Sciences	21 November 2025
13	Dr. N. Somasekhar and Dr. Satish N. Chavan	National Symposium on Nematode Management in Agriculture, organized by Syngenta, India	Panaji, Goa	4th February 2025
14	Dr. N. Somasekhar and Dr. Satish N. Chavan	One Health Perspectives in Global Plant Protection Research 2025	TNAU, Coimbatore, Tamil Nadu	19-21 February 2025.
15	Dr. N. Somasekhar and Dr. Satish N. Chavan	Smart Nematode Management for Climate-Resilient Agriculture: Protecting Soils, Ensuring Food Security	ICAR-IIOR, Hyderabad	Nov. 26–28, 2025
16	Dr. N. Somasekhar	AICRP on Nematodes Annual Review Meeting	SKUAST, Jammu	Nov 19-20, 2025
18	Dr. Chitra Shanker	Master Trainer Programme under the Capacity Building Commission's Rashtriya Karmayogi Large Scale Jan Seva Program phase II	ICAR, NAARM, Hyderabad.	15-17 December 2025
19	Dr. K. Sruthi	Advanced Statistical and Machine Learning Techniques for Data Analysis Using Open-Source Software for Abiotic Stress Management in Agriculture (Online)	ICAR–National Institute of Abiotic Stress Management (NIASM), Baramati, Pune, Maharashtra.	16 July – 05 August 2025

5. Capacity Building and Extension Activities

Capacity Building

Genomic Predictions and Data-Driven Crop Breeding

Building on the successful training programme conducted in 2024, ICAR-IIRR, in collaboration with IRRI, organised the second edition of the five-day training programme on "Fundamentals of Genomic Predictions and Data-Driven Crop Breeding" from 24–28 November 2025 at ICAR-IIRR, Hyderabad. The programme aimed to strengthen the capacity of researchers and students in applying genomic prediction, high-throughput phenomics, statistical modelling, and data-driven approaches for modern crop improvement. The programme featured lectures and hands-on practical sessions conducted by Drs Waseem Hussain and Mahender Anumalla from IRRI. Drs Suneetha Kota, Divya Balakrishnan, and Kalyani M. Barbadikar from IIRR coordinated the training programme. A total of 37 participants attended the programme, comprising 25 faculty members, Assistant Professors, and AICRP/NARES partners, along with 12 postgraduate students and research scholars (M.Sc. and Ph.D.) representing diverse crop improvement programmes across India. The training strengthened participants' competencies in genomic prediction and data-driven breeding, reinforcing collaborative efforts between IRRI and ICAR-IIRR to accelerate the development of climate-resilient and high-yielding crop varieties.



Extension Activities

ICAR-IIRR continued to strengthen its extension and technology transfer mandate through a comprehensive programme of farmer centric outreach, capacity building and stakeholder engagement during 2025. Major extension activities included the observance of ICAR-IIRR Farmers' Day, implementation of Scheduled Caste Sub Plan (SCSP) and Tribal Sub Plan (TSP) has been actively implementing a strong extension outreach program for inclusive technology dissemination among scheduled caste and scheduled tribe communities, and a wide range of need-based training and awareness programmes conducted in collaboration with State Departments of Agriculture, KVKs, ICAR institutes, and other partner organizations. In line with Vision 2047, the Indian Council of Agricultural Research (ICAR), under the dynamic leadership of Hon'ble Union Minister of Agriculture and Farmers' Welfare Shri Shivraj Singh Chouhan, in collaboration with the Ministry of Agriculture & Farmers' Welfare, had launched the "Viksit Krishi Sankalp Abhiyan" (VKSA), a massive nationwide campaign aimed at bridging the gap between agricultural research and technology transfer to farmers' fields during 29 May to 12 June 2025. ICAR-IIRR also organized VKSA programmes to take cutting edge research and innovations directly to farmers.

ICAR–IIRR Leads Extensive Farmer Outreach under Viksit Krishi Sankalp Abhiyan (VKSA)

The ICAR–Indian Institute of Rice Research (ICAR-IIRR), Hyderabad, actively participated in the Viksit Krishi Sankalp Abhiyan (VKSA) from 29 May to 12 June 2025, reaching farmers across Telangana, Andhra Pradesh, and Tamil Nadu. Multidisciplinary teams of scientists conducted village-level interactions, demonstrations, and trainings aimed at strengthening scientific farming practices and enhancing farmers' knowledge. During the 15-day campaign, ICAR-IIRR teams visited more than 100 villages covering districts such as Karimnagar, Medak, Suryapet, Siricilla, Nellore, Nalgonda, Coimbatore, and others. Activities included farmer-scientist interactions, pre- Kharif crop advisories, and field-level demonstrations tailored to local needs. The programme was inaugurated at KVK, Jammikunta on 29th may, 2025 and concluded at KVK, Tuniki on 12th June, 2025.







Farmer's Day 2025

ICAR-IIRR organized Farmers' Day on November 7, 2025, attracting a large number of farmers from several states across India. The event provided a platform to showcase the latest technologies developed by IIRR. The best IIRR varietal and hybrid rice technologies, along with crop production, protection technologies, Mobile apps and IIRR Seed portal were demonstrated at the Rajendranagar farm and the main campus, allowing farmers to explore and interact with the innovations. Progressive farmers were felicitated in recognition of their contributions and achievements in agriculture. The event was successfully coordinated by Dr. R. Mahendra Kumar, Dr. M. Srinivas Prasad, and Dr. Amtul Waris, hosted by Drs CH Padmavathi and Jyothi Badri with active participation from all IIRR staff, making the conduct of Farmers' Day programme a grand and impactful success.









ICAR-IIRR-Scheduled Caste Sub Plan Activities

- ICAR- Indian Institute of Rice Research coordinated 4725 demonstrations under the Scheduled Castes Sub Plan (SCSP), in collaboration with Gandigram Rural Institute (100), ICAR-KVKs (100), MSSRF (200), MYRADA (100), PAJANCOA & RI (200), ICAR-IIRR (4000).
- Under the ICAR-IIRR-SCSP, paddy seed was distributed to 2000 SC rice farmers of Telangana, Soil testing kits to 500 SC rice farmers of Palnadu and West Godavari districts in Andhra Pradesh, Siddipet, Narayana pet, Wanaparthy and Nagarkurnool districts of Telangana.
- Raichur and Gudimitkal districts of Karnataka, Pune district of Maharashtra and Coimbatore district of Tamil Nadu. Paddy seed, Tarpaulin sheets, sprayers, pheromone traps and lures, herbicide, insecticide and fungicide were distributed to the SC beneficiaries of six states (Andhra Pradesh, Karnataka, Kerala, Odisha, Tamil Nadu and Telangana) and two Union Territories (Puducherry and Jammu & Kashmir) of India.
- Fifteen training programs were organized by ICAR-IIRR in collaboration with the implementing agencies across the country. Skill training programs have been organized on the use and production of quality seed, appropriate herbicide use, water management and waste management through setting up vermicomposting unit and adoption of appropriate post-harvest management practices.

Scheduled Caste Sub-Plan (Rice) Activities of ICAR-IIRR in 2025

S.No.	Organization	State /UT	No. of Beneficiaries
1	ICAR-IIRR (Seed distribution) DRR DHAN -75 (4000 kg), DRR DHAN- 60 (500 kg)	Telangana	2000
2	ICAR-IIRR (Inputs distribution like sprayers 1000 and Tarpaulin sheets 500)	AP and Telangana	1500
3	ICAR-IIRR (Soil testing kits)	AP , Karnataka, RN and Telangana	500
4	M. S. Swaminathan Research Foundation (MSSRF), Koraput	Odisha	200
5	ICAR-KVK Gobbichettipalam, Erode	TN	100
6	ICAR-KVK Idukki	Kerala	100
7	SKUAST, Khudwani	JK	25
8	PAJANCOA & RI, Karaikal	TN	200
9	Gandigram Rural Institute	TN	100
		Total	**4,725**





Activities carried out under SCSP in 2025

ICAR-IIRR-Tribal Sub-Plan Activities

- ICAR-Indian Institute of Rice Research coordinated 1930 demonstrations under the Tribal Sub Plan (TSP), in collaborations with MSSRF, PAJANCOA & RI, ICAR-KVKs, TNAU, AICRIP center.
- The total allotted budget of Rs.52 lakhs was effectively spent. Under ICAR-IIRR-TSP soil testing kits, tarpaulin sheets, and battery-operated sprayers were distributed to Tribal Farmers of Andhra Pradesh, Kerala, Maharashtra, Tamil Nadu and Telangana.
- Paddy seed, tarpaulin sheets, sprayers, fertilizers, soil testing kits, pesticides and herbicides, water storage barrel, neem oil, zinc sulfate, pheromone traps, Mycorrhiza (VAM), Trichoderma etc., were distributed to the Scheduled Tribes beneficiaries of six states (Andhra Pradesh, Kerala, Maharashtra, Odisha, Tamil Nadu and Telangana and one Union territory of Puducherry).

Scheduled Tribes Sub-Plan (Rice) Details of the implementation sites and number of beneficiaries 2025

S.No.	Organization	State /UT	No. of Beneficiaries
1	ICAR-IIRR (Paddy seed) 1.DRR Dhan -56 (375 kg) 2.DRR Dhan -75 (540 kg) 3.DRR Dhan -79 (175 kg) 4.DRR Dhan - 53 (400 kg)	Telangana	100
2	ICAR-IIRR (Soil testing Kits)	Andhra Pradesh, Kerala, Maharashtra, Tamil Nadu and Telangana	500
3	ICAR-IIRR Inputs distribution (Battery operated sprayers 100 and tarpaulin sheets 100)	Telangana	200
4	Annamalai University	Tamil Nadu	100
5	MSSRF-Koraput	Odisha	100
6	PAJANCOA & RI	Puducherry	250
7	ICAR-KVK, IDUKKI	Kerala	100
8	Macherla	Andhra Pradesh	400
9	PAJANCOA & RI Kolli hills and Thiruvanamalai	Puducherry	180
		Total	**1930**





Activities carried outer under TSP in 2025

Need based Outreach and capacity building activities

S.No.	Date	Event	Place	Team
1	8–9 Jan 2025	Survey of Gall Midge Affected Areas	Raichur, Koppal and Bellary districts of Karnataka (Tungabhadra Command Area)	Drs A.P. Padma Kumari, Abdul Fiyaz R., Chinna Babu Naik and Jesudas (ICAR-IIRR) in collaboration with ARS Gangavathi and Karnataka State Agriculture Department officials.
2	26 Jan 2025	RSTK Demonstration – Republic Day	Paderu, Alluri Sitarama Raju District, Andhra Pradesh	Dr. Brajendra
3	12–13 Feb 2025	Training on Rapid Soil Testing Kit (RSTK) and Nutrient Management	ICAR-IIRR	Dr. Brajendra
4	8–22 April 2025	Poshan Pakhwada – Nutrition Awareness Programmes	Anganwadi and school	Drs CN Neeraja, Amtul Waris, Jyothi Badri, Kalyani MB
5	25 June 2025	SBI Krishi Darshan Initiative	KVK Kampasagar, Nalgonda	Drs Mahendra Kunar, Sai Prasad
6	2 August 2025	PM-KISAN Samman Nidhi Programme (20th Installment)	ICAR-IIRR	Drs Amtul Waris, JeyaKumar, S Arun Kumar, B Sailaja,
7	9 September 2025	Digital Green Stakeholders Meet	New Delhi	Drs Brajendra and Dr. Bandeppa
15	9 September 2025	Awareness Programme on Slow-Release Pheromone Lures	Neelayagudem village (Telangana)	Dr CH Padmavathi (ICAR-IIRR) and extension experts from KVK,
Dr	20 September, 2025	Awareness Programme on Slow-Release Pheromone Lures	Gaddipally village (Telangana)	Dr CH Padmavathi (ICAR-IIRR) and extension experts from KVK
8	23–27 September 2025	Visit to Rice Farming Areas of Kerala	Kuttanadu, Thrissur and Palakkad	Drs Divya Balakrishnan, V Manasa, Gobinath & Vijay Kumar (ICAR-IIRR) & officials from the Ministry of Agriculture
9	8 October 2025	RSTK Demonstration at Telangana Secretariat	BRKR Bhavan, Hyderabad	Drs Brajendra and V Manasa
10	11 October 2025	PM Dhan Dhanya Krishi Vikas Yojana Launch	ICAR-IIRR	Drs Amtul Waris, JeyaKumar, Sailaja, Jagriti Rohit, Brajendra
11	4 November 2025	Field demonstrations of IIRR varieties	Thallapoosapalli, Mehabubabad, Telangana	Drs SV Sai Prasad, CN Neeraja and Jyothi Badri
12	15 & 20 November 2025	RSTK Training	RSTL, Rajendranagar, ICAR-IIRR	Drs Brajendra and V Manasa
13	19 November 2025	PM-KISAN Samman Nidhi Programme (21st Instalment)	ICAR-IIRR	All Scientists
14	3–5 December 2025	Participation in Maha Kisan Mela	Kanha Shanti Vanam, Hyderabad,	Drs R Mahender Kumar, C N Neeraja, Amtul Waris, Sai Prasad, Jeya Kumar, Brajendra, Chinnababu Naik, MS Anantha, Kalyani B, Jagriti Rohit, Jesudas G, K Sruthi, Manasa, Satish Chavan, Raghavendra K and Mr. Sadanandam,
17	22 December 2025	Joint Kisan Mela,	ICAR-IIAB, Ranchi, Jharkhand	Drs CN Neeraja, Padmavathi, Brajendra, & IIAB
	23–24 December 2025	Kisan diwas was organised jointly by IIRR and KVK Jamui, Bihar	Dhanbad, Jharkhand	Dr Brajendra, Dr R M Kumar, Dr K Surekha, Dr Ch Padmavathi, Dr B Sailaja and Dr C N Neeraja from ICAR-IIRR and Dr Sudheer Kumar, PC, KVK Jamui.




(a) Survey of Gall midge affected areas (b) Awareness Programme on the Importance of Balanced Nutrition and Zinc-Rich Rice




(a) ICAR-IIRR Showcases Scalable Diagnostic Solutions at Digital Green Stakeholders Meet; (b) IIRR Scientists visited Rice farming areas of Kuttanadu (Alleppey), Thrissur and Palakkad of Kerala




IIRR's Rapid Soil Testing Kit Draws Attention at Telangana Secretariat





Awareness Programme on Slow-Release Pheromone Lures in DSR Fields at Gaddipally village (Telangana) (b) Awareness Programme on Slow-Release Pheromone Lures in DSR Fields at Neelayagudem village (Telangana) (c) Awareness Programme on RAISE – Rice AI Stress Evaluator during Kisan Diwas at Dhanbad, Jharkhand

Capacity Building Programs to Various Stakeholders

S. No.	Date	Name of the Training Program	Place	Team	Key highlights
1	29 Jan 2025	RSTK Demonstration to State-level Land Development Officers	NIRD, Rajendranagar	Dr. Brajendra	Demonstration of the RSTK to state-level land development officers.
2	29 Jan 2025	RSTK Demonstration to Farmers from Kalahandi	IIMR, Rajendranagar	Dr. Brajendra	Demonstration of RSTK to 30 farmers from Kalahandi district, Odisha.
3	16 Apr 2025	One-Day Training Programme for Maharashtra Farmers under SMART Project	IACR-IIRR	Drs Amtul Waris, P Muthuraman, S Arun Kumar	Programme focused on improved rice production technologies, climate-resilient practices, nutrient and water management, and recent research advancements in rice cultivation.
4	18 May 2025	Training on Soil Health Management under Natural Farming Practices	WALAMTARI, Hyderabad	Dr. Brajendra	Training attended by more than 100 WALAMTARI officers, KVK officers, FPOs, and progressive farmers.
5	18 June 2025	Training-cum-Seed Distribution Programme on Zinc-Biofortified Paddy	Marrigudem village, Nalgonda district	Dr. R Mahender Kumar, Dr. S V Saiprasad, Dr. Amtul Waris, Dr. Aravind Kumar, and Dr. Anantha M S	Scientists highlighted nutritional benefits and cultivation practices of zinc-biofortified rice, with active participation from progressive farmers.
6	01 July 2025	Student Training on the Indigenous Soil Diagnostics Kit	ICAR-IIRR, Hyderabad	Dr. Brajendra	Interactive training for more than 100 students from Maharashtra, with hands-on exposure to RSTK.
7	27 July 2025	Training of Karnataka Horticultural Officers on RSTK	Extension Education Institute, Rajendranagar	Dr. Brajendra	Training for more than 20 senior-level horticultural officers on demonstration and application of RSTK.
8	02 Aug 2025	Farmer Training on RSTK under PM-KISAN Samman	Chowdepally village, Yadadri district, Telangana	Dr. Brajendra	Over 50 farmers were trained on the use of RSTK and were also provided kits under the PM-KISAN Samman initiative.
9	07 Aug 2025	Mock Field Evaluation Training for 114th FOCARS	Sidhapur village, Kothur Mandal, Mahbubnagar district, Telangana	ICAR-IIRR, NAARM; Dr. Brajendra	One-day hands-on programme that trained 150 participants, including ARS probationers and local farmers, in field evaluation techniques, varietal assessment, agronomic trials, observation, and data recording.
10	19 Aug 2025	Training on Soil Testing Kits for NIRDPR Functionaries	Hyderabad	Dr. Brajendra	Specialized hands-on session on RSTK, nutrient assessment, interpretation of results, sampling techniques, and field-level recommendations for sustainable farming.
11	20 Aug 2025	Training on Soil Testing Kits to State Officials	Hyderabad	Dr. Brajendra	Specialized training for 15 senior officers from State Departments of Agriculture, KVKs, and Agricultural Universities on RSTK and their applications.
12	12 Sep 2025	Mock Field Experience Training (FET)	Shilampally village, Medak district, Telangana	ICAR-NAARM; Dr. Brajendra	Hands-on exposure to Participatory Rural Appraisal techniques under field conditions for more than 110 ARS probationers and over 200 local farmers.

S. No.	Date	Name of the Training Program	Place	Team	Key highlights
13	15 Sep 2025	Soil Health Assessment Training for Farmers of Kanti Village	ICAR-IIRR	Dr. Brajendra	More than a dozen farmers from Kanti village, Madhya Pradesh, were trained in rapid soil health assessment using the RSTK.
14	20 Sep 2025	Hands-on Training on Rapid Soil Health Diagnosis for Farmers under SCSP Programme	Kistampet village, Siddipet district, Telangana	Dr. Brajendra and Dr. Jeya Kumar	Over 200 farmers participated in practical training on using RSTK for quick field assessment of soil nutrients, pH, and fertility status.
15	22 Sep 2025	Training of Kerala Agricultural Officers and NIPHM Students on RSTK	Hyderabad	Dr. Brajendra	More than 25 agricultural officers from Kerala and PG Diploma students from NIPHM were trained on rapid soil testing kits.
16	08–09 Dec 2025	Training on the IIRR RSTK	HARI, ATARI, and NIPHM, Hyderabad	Dr. Brajendra	Demonstration of the RSTK to around 800 participants across multiple training programmes.
17	08–09 Dec 2025	Two-Day Workshop Agenda ITC - IIRR -2025	ICAR-IIRR, Hyderabad	Drs Amtul Waris, Jeya Kumar, Jagriti Rohit	Training provided to 40 officials on various aspect of DSR





(a) Mock Field Experience Training for ARS Probationers and Farmers at Shilampally, Medak, Telangana; (b) Mock Field Evaluation Training for 114th FOCARS Batch at Sidhapur, Telangana

6. Institutional Meetings

Hill Rice Workshop

The 12th Rice Research Group Meeting for the Hill Region (AICRPR) was conducted online on March 3, 2025, under the guidance of the Director of IIRR, Dr. R.M. Sundaram. The meeting was chaired by Dr. D.K. Yadava, DDG (Crop Science), ICAR, and co-chaired by Dr. S.K. Pradhan, ADG (FFC), ICAR. It was also attended by Dr. A.K. Naik, Director, ICAR-CRRI; Dr. Gopala Krishnan, Head of the Division of Genetics, IARI; and scientists from IIRR, Hyderabad, and CRRI, Cuttack. AICRP and research highlights from each center were presented by the respective Principal Investigators, followed by comprehensive discussions and deliberations.

The Workshop emphasized strengthening rice breeding and evaluation through genome-assisted breeding, improved disease and pest screening, and validation of promising research results at hill ecology. Centres were advised to reconfirm exceptionally high iron (Fe) content in selected lines, accelerate research on phosphorus-use efficiency and blast resistance, and utilize national facilities for biofortification trait analysis. Artificial inoculation for blast and enhanced insect pest populations were recommended to ensure reliable screening of breeding materials. The meeting also recommended optimizing trial locations by discontinuing unsuitable trials, promoting trait- and location-specific variety development, increasing crossing programmes and the nomination of superior entries for national trials, and encouraging the development of export-quality *japonica* rice. Additional priorities included continued use of winter nursery facilities, registration of valuable germplasm with NBPGR, filling vacant scientific positions, and strengthening monitoring of outstanding breeding lines before their advancement.





60th Annual Rice Group Meeting (ARGM)

The 60th ARGM, commemorating the Diamond Jubilee of India's flagship rice research platform under the AICRP on Rice, was successfully conducted from 26-28 April 2025.The inaugural session was graced by several distinguished dignitaries, including Dr. M.L. Jat (Secretary DARE and DG, ICAR), Dr. D.K. Yadava (DDG, Crop Sciences), Dr. R.C. Agarwal (DDG, Education), Dr. R.S. Paroda, Former Secretary (DARE) and DG (ICAR), Dr. S.K. Pradhan (ADG, FFC), Dr. Aldas Janaih (VC, PJTSAU), Dr. S. Jayalakshmi Devi (VC, ANGRAU), and Dr. A.K. Singh (Emeritus Scientist, ICAR-IARI.

The scientific sessions spanned critical themes including varietal evaluation, grain quality enhancement, biotic and abiotic stress resilience, resource-use efficiency, and digital integration in precision farming. The meeting featured rigorous technical sessions on breeding for yield stability, climate-resilient traits, grain quality, disease-pest resistance, resource-use efficiency, and integrated crop management. Key outcomes included finalization of multi-location testing protocols, identification of promising genotypes for pre-release trials, and strategic recommendations to enhance varietal deployment and outreach under different agro-ecologies. The 60th ARGM not only celebrated the

legacy of coordinated rice research in India but also charted a visionary roadmap for leveraging genomics, digital technologies, and policy alignment to meet future food system challenges.

Among the key recommendations, of the ARGM included strengthening grain quality evaluation by involving additional satellite laboratories; recommended soil nutrient analysis for NUE trials before advancing entries. Future research should focus on water-saving rice production, including IoT-based water management, nutrient dynamics under low-input conditions, seedling vigour in DSR, soil microbiome analysis through metagenomics, and assessing the long-term impact of nano-urea on productivity and soil health. New collaborative trials were proposed on DSR with Agronomy and Soil Science, emphasizing physiological mechanisms, while entomology studies should include untreated checks in drone-based pesticide application trials and screen breeding materials for grain moth resistance. Plant pathology recommendations included recording natural disease incidence in organic and natural farming trials, using staggered sowing to screen for false smut, developing screening protocols for Bakanae disease in non-Basmati rice.

During 60th ARGM, around 35 rice varieties were evaluated under VIC, of which 26 varieties were identified for release across different ecosystems and production conditions. Of the 16 proposals on hybrids, two hybrids from ICAR–CRRI and ICAR–IIRR were recommended along with 10 private sector hybrids. This highlights the continued contribution of national public research institutions in developing and recommending improved rice technologies and varieties. The best performing centres were awarded and superannuating scientists were facilitated during 60th ARGM.



Institute Research Council (IRC) Meeting 2025

The IRC Meeting 2025 was held over six days from 22, 25, 26, and 28 August, and 1 and 2 September 2025 at ICAR-IIRR, Hyderabad. During 2025, ICAR–IIRR implemented 56 research projects, comprising of 50 ongoing projects and six completed projects. In addition, nine new projects were approved in IRC 2025. Each of the projects were presented and thoroughly discussed in the presence of Director, external experts and IRC members and recommendations were made for further improvement and approval.

The research programme spans Crop Improvement, Crop Production, Crop Protection, and Technology Transfer, addressing key challenges in rice research. Plant Breeding (9 projects), Plant Pathology (8), Entomology (7), and Soil Science (6) constitute the major research thrust areas followed by Hybrid Rice (5), Biotechnology (5), Transfer of Technology & Training (4), Agronomy (3), Plant Physiology (2) and Computer Applications (1), supported by multidisciplinary collaborations. The newly approved projects further strengthen research on climate resilience, prebreeding, genomics, hybrid rice, sustainable production systems, digital agriculture, and technology dissemination, reinforcing the institute's commitment to enhancing rice productivity, sustainability, and farmer impact.



Research Advisory Committee (RAC) meeting

The Research Advisory Committee (RAC) meeting was held at ICAR-IIRR under the chairmanship of Dr. K.K. Jena, Professor Emeritus, KIIT University, with the participation of RAC members Dr. S.K. Pradhan, ADG (Crop Science), ICAR; Dr. P. Ananda Kumar, Emeritus Professor, ICAR; Dr. Padmini

Swain, Former Principal Scientist, ICAR–CRRI; Dr. Sridhar Ranganathan, Former Principal Scientist; Dr. S. Suresh, Retired Professor, TNAU; Dr. Saravana Raj, Director (Agricultural Extension), MANAGE; and Dr. G.A.K. Kumar, Director, ICAR-IIRR, Cuttack. Dr. M.B.B. Prasad Babu, Member Secretary, welcomed the dignitaries, and Dr. R.M. Sundaram, Director, ICAR-IIRR, presented an overview of the Institute's in-house, externally funded, and collaborative research programmes. This was followed by presentations from the Heads of Divisions and Principal Investigators highlighting major research achievements and ongoing projects. The RAC members also interacted with the scientists, reviewed the progress of research activities, and visited the Institute's research farms, experimental fields, and laboratories to assess ongoing experiments and research infrastructure. The RAC recommended accelerating the development of high-yielding, climate-resilient, and nutritionally enriched rice varieties using advanced breeding and genomic tools, strengthening nutrient-use efficiency and mechanized direct-seeded rice (DSR) research, promoting microbial-based nutrient management, and enhancing the utilization of wild rice genetic resources and research infrastructure for future rice improvement.





Institute Management Committee (IMC)

The Institute Management Committee Meeting was conducted on 11th September 2025. The committee deliberated and prioritized the works and infrastructure to be developed during 2025-26.

Project Advisory Committee Meeting

The Project Advisory Committee Meeting for the NASF project titled "*Identification and Characterization of Fungal Effectors and Host Factors in the Rice-False Smut Pathosystem*" was held at ICAR-IIRR on January 7, 2025, under the chairmanship of Dr. M. K. Naik, Former VC, KSN UAHS, Karnataka. The meeting was attended by committee members, including Dr. Kuldeep Singh (Principal Scientist II - Genebank Head, ICRISAT, Hyderabad), Dr. R. M. Sundaram (Director, IIRR), and Dr. Jitendra Kumar Singh (ADG NASF, ICAR-IIRR), and provided valuable suggestions for the project. Recommendations focused on standardizing disease assessment through a uniform disease evaluation,



resistance scoring system, nomenclature for pathogen isolates, and standardized protocols for isolate exchange, characterization, documentation, and deposition in national repositories. The committee also recommended comprehensive characterization of pathogen isolates, including virulence profiling, ecological classification, toxin analysis, correlation of virulence with morphological traits, and multivariate analyses such as PCA. Priority should be given to sequencing It was recommended that a tolerant line (e.g., NPS 13) should be sequenced and registered after, validating candidate resistance genes through expression studies before genome editing, and advancing eGWAS and QTL mapping to better understand the genetic basis of false smut resistance

and facilitate the development of durable resistant rice varieties. The committee emphasized that the increasing incidence of false smut under changing climatic conditions necessitates continuation of research beyond the current project.

Meeting on Mainstreaming Zinc in Rice Varietal Development

A discussion meeting was held to deliberate on strategies for mainstreaming zinc in rice varietal development programs. The meeting was attended by Dr. Mahalingam Govindaraj, Senior Scientist, Harvest Plus (CGIAR); Dr. R. M. Sundaram, Director ICAR-IIRR; Dr. C. N. Neeraja, Principal Scientist; Dr. S. V. Sai Prasad, Principal Scientist; and Dr. Aravind Jukanti, Principal Scientist. The need for integrating zinc nutrition as a key trait in breeding pipelines was emphasized for addressing nutritional security through bio-fortified rice varieties. It was deliberated that genome editing in crops should be accelerated through coordinated consortium efforts, prioritizing traits for which suitable germplasm is unavailable or cannot be effectively targeted through conventional breeding.

Brainstorming Session on Agri-Tech Commercialization

A Brainstorming Session on Agri-Tech Commercialization was held on 25 June 2025, highlighting the key role of Agri Innovate India Ltd in scaling innovations and empowering farmers. Dr. C. Kannan, PS & Chairman, ITMU, ICAR-IIRR, inaugurated the session and emphasized the importance of strengthening collaborations between scientists and commercialization partners. Dr. Praveen Malik, CEO, Agrinnovate India Ltd., delivered an expert talk on "Innovation and Technology Transfer in Agriculture," highlighting strategies to enhance Technology Readiness Levels (TRL), technology commercialization, licensing procedures, Technology Disclosure Forms (TDF), industry partnerships, and revenue generation. Dr. R.M. Sundaram, Former Director, ICAR-IIRR, noted that the institute has successfully executed five technology licensing agreements through Agrinnovate India Ltd. The session also covered market opportunities in agri-inputs, post-harvest technologies, climate-resilient innovations, and digital agriculture, followed by interactive discussions on licensing, public-private partnerships, and institutional readiness for technology transfer.



Review Meeting of the ICAR-EFC Genome Editing Project

The Review Meeting of the ICAR-EFC Genome Editing Project was held at ICAR–Indian Institute of Rice Research (ICAR-IIRR) on 26th December 2025. The meeting was chaired by Dr. Ch. Srinivasa Rao, Director, ICAR–Indian Agricultural Research Institute (IARI), New Delhi. It was deliberated that genome editing in crops should be accelerated through coordinated consortium efforts, prioritizing traits for which suitable germplasm is unavailable or cannot be effectively targeted through conventional breeding.



World Intellectual Property Day

As part of the ICAR initiative, IIRR organized a programme on Intellectual Property Rights (IPR) on World Intellectual Property Day on 1st May 2025 at 10.30 AM in Seminar Hall -I, ICAR-Indian Institute of Rice Research, Hyderabad. The theme for this year was "IP AND MUSIC: FEEL THE BEAT OF IP." About 80 participants, including Scientists, Project Staff and Research Scholars of ICAR-IIRR, attended the programme. Mr. Ranjith Reddy, IP Attorney & Co-Founder, Velosity Research was the guest speaker.

7. Peer Recognition

Awards and Honours

The year 2025 saw several prestigious recognitions awarded to ICAR-IIRR scientists and staff for their outstanding contributions to agricultural research, innovation, and institutional excellence. These awards, conferred by the Indian Council of Agricultural Research (ICAR) and ICAR-IIRR, acknowledge achievements in interdisciplinary research, crop improvement, scientific publications, soil science, and dedicated service. The recognitions reflect the institute's continued commitment to excellence in research, technology development, and support services, while highlighting the collaborative efforts of its multidisciplinary teams.

(a) Team Awards

Rashtriya Krishi Vigyan Puraskar (RKVP)-2025:

An interdisciplinary research team led by Dr. R. M. Sundaram, comprising Drs. M. Sheshu Madhav, C. N. Neeraja, M. Srinivas Prasad, A. P. Padma Kumari, G. S. Laha, Satendra K. M., Jyothi Badri, Kalyani M. B., and Papa Rao V., was conferred the Rashtriya Krishi Vigyan Puraskar (RKVP)-2025 **for** Outstanding Inter-Disciplinary Team Research in Agriculture, Agricultural Education, Extension and Allied Sciences (Shared)**.** The award was presented during the 97th ICAR Foundation Day celebrations held at the NAAS Complex, New Delhi, on 16 July 2025**.**



Team Awards: Best Research paper/Oral Presentation/Poster Presentation

S. No	Name (s)	Title	Name of the event	Sponsoring Institution	Date
1.	Chavan SN*, Somasekhar N. and Kyndt T	Best Oral Presentation Award, Dehydroascorbate Vaccination Mediates the Activation of Induced and Intergenerational Nematode Resistance in Rice	International Conference on One Health Perspectives in Global Plant Protection Research,	TNAU, Coimbatore	19-21 Feb 2025
2.	Chinna Babu Naik*	Best Rapid Virtual Oral Presentation Award for the presentation on "Characterization of Intra-Specific Interactions of White-backed Planthopper, Sogatella furcifera (Horvath) and Analysis of Gene Expression in Selected Rice Genotypes"	Entomology Students Conclave-2025	AAU, Assam	15-17, Mar 2025
3.	A.P. Padmakumari*, B Sailaja and D Krishnaveni	Best rapid oral presentation Award for the presentation on topic - Role of domain expert in digital applications-Crop Protection in rice-a case study	National Symposium on Technology Advancements: Emerging trends in Entomology (ESI-ETE-2025)	ESI and SKUAST-k	8-9th Oct 2025
4.	Chavan SN*, Somasekhar N., Kanika, K.M., Divya K., Barbadikar K.M., Papa Rao V., Neeraja C.N. and Sundaram R.M.	Best Oral Presentation Award for "Genome-wide association study identifies novel SNPs for resistance to root-knot nematode *Meloidogyne graminicola* in *indica* rice."	National Symposium on "Smart Nematode Management for Climate-Resilient Agriculture: Protecting Soils, Ensuring Food Security"	ICAR-IIOR, Hyderabad	26–28 Nov 2025
5.	Jyothi Badri*, Akshay Mamidi, Krishna Lavuri, Kalyani M. B., D. Sanjeeva Rao, S. V. Sai Prasad, and R. M. Sundaram	Best Research Paper Award in Crop Improvement- Navigating Rice Culm Resilience: High-throughput Quantitative Trait Locus Mapping in indica and Tropical japonica Derived Population- Plant Science (Article 112756)	ICAR-IIRR Foundation Day	ICAR-IIRR	14th Dec 2025
6.	K. Sruthi, K.B. Eswari, Ch. Damodar Raju, MS Madhav, A. Dhandapani, M. Bala Satya Sree, K Srikrishna Latha, P Koteswararao, M. Sadath Ali, Divya Balakrishnan, P.Senguttuvel, Revathi P, K.B. Kemparaju, Ch. Suvarna Rani, M.B. Kalyani, R.M. Sundaram and A.S. Hari Prasad*	Best Research Paper Award-Harnessing Inter-Subspecific Genetic Variability for Hybrid Rice Improvement: Analysis of Genetic Diversity, Heterosis, and Combining Ability	ICAR-IIRR Foundation Day	ICAR-IIRR	14th Dec 2025
7.	Rajendran Gobinath*, Shanmugam Vijay*, Lakshminarayanan A, Aabid Hussain L, Joseph B, Kumar V, Pant A K, Ajith S, Prasad Babu MBB, Kumar RM, and Sundaram RM	Best Research Paper Award in Soil Science-Rice Crop Residue as Fertiliser Substitute for Enhancing Yield and Soil Health: Identifying the Optimum Level from Multi-location Trials in India- Frontiers in Soil Science *(Vol. 5, Article 1649105)*	ICAR-IIRR Foundation Day	ICAR-IIRR	14th Dec 2025
8.	Y. Sridhar*, D Dhyan Chowdary, G Ramachandra Rao, N Anusha, SM Rahman, B Sravanthi, SK Mangrauthia & GK Srividya.	Best Research Paper Award -Fitness cost and molecular basis of imidacloprid resistance in brown planthopper, Nilaparvata lugens (Stål) in India. Ecotoxicology.	ICAR-IIRR Foundation Day	ICAR-IIRR	14th Dec 2025
9.	Chavan SN, Degroote E, De Kock K, Demeestere K and Kyndt	Best Research Paper Award- ARGONAUTE4 and the DNA Demethylase REPRESSOR OF SILENCING 1C Mediate Dehydroascorbate-Induced *Intergenerational Nematode Resistance in Rice*"- Plant Physiology (197(1): kiae598)	ICAR-IIRR Foundation Day	ICAR-IIRR	14th Dec 2025
10.	Amtul Waris*, T. Maneesha, Geeta Reddy R and Anila Kumari B.	Best Research paper in Social Sciences award-Assessing Food Expenditure Patterns and Nutritional Status of Rural Women: Evidence from Mulugu District, Telangana, India- European Journal of Nutrition & Food Safety 17 (8):15-32.	ICAR-IIRR Foundation day	ICAR-IIRR	14th Dec 2025

(b) Individual Awards and Recognitions

During 2025, scientists and staff of ICAR-IIRR received numerous individual honours in recognition of their excellence in research, scientific leadership, professional service, extension, natural resource management, and institutional contributions. These accolades included the Best Researcher Award 2025, Best Worker Award 2025, prestigious national and international fellowships, editorial and professional appointments, and several awards for outstanding research papers, oral and poster presentations, and lifetime achievements. The awards reflect the diverse accomplishments of ICAR-IIRR personnel and their continued contributions to advancing agricultural research and innovation.

Rashtriya Vigyan Puruskar:

Dr. Satendra Kumar Mangrauthia was conferred the Vigyan Yuva–Shanti Swarup Bhatnagar Award 2025 under the Rashtriya Vigyan Puraskar by the Government of India. The award was presented at a ceremony held in New Delhi on 23rd December 2025, in recognition of his outstanding contributions to scientific research.



Other Professional Recognitions and Appointments (2025)

- Dr. R. M. Sundaram served as a panel member in the World Food Prize Foundation DialogueNEXT – *Take it to the Farmer*, organized by the World Food Prize Foundation, CIMMYT, BISA, and ICAR, New Delhi, during 8–9 September 2025.
- Dr. Satendra K. Mangrauthia was appointed as a Member of the Editorial Board of the journal *Rice* (Springer) and as a Founder Member of NAAS-YUVA constituted by the National Academy of Agricultural Sciences (NAAS). He also received the FABA Excellence Award in recognition of his scientific contributions.
- Dr. R. Mahender Kumar received the Rythu Nestham Award from the Swarna Bharath Trust, Muchintal, Telangana, and was also elected as a Life Fellow of the Progressive Biochar Society.
- Dr. Jagriti Rohit received the Young Scientist Award for outstanding and enduring contributions to academics, research, and extension management during the 2nd International Extension Education Congress–2025.
- Dr. V. Chinna Babu Naik received the Dr. B. Vasantharaj David Award during the 19th AZRA International Conference and also served as a subject expert for monitoring confined field and BRL-I biosafety trials of genetically engineered cotton in association with RCGM, DBT, New Delhi.
- Dr. B. Sreedevi was recognised for her distinguished contributions to natural resource management and conservation and was featured in the coffee table book "Luminaries of Vasundhara" during the International Women's Day 2026 celebrations organized by ICAR–Indian Institute of Soil Science.
- Dr Amtul Waris received the Outstanding Researcher Award in Social Science during the 2nd International Extension Education Congress–2025.

- Dr. S. L. Krishnamurthy served as an Advisor to the Union Public Service Commission (UPSC) in Agricultural Science and was appointed as a Member of the Subject Expert Committees for Life Sciences under the Anusandhan National Research Foundation (ANRF) for both the National Post-Doctoral Fellowship (N-PDF) and the Prime Minister Early Career Research Grant (PMECRG) programmes.
- Dr. V. Prakasam was appointed as a Member of the Board of Studies of Mohan Babu University, Tirupati, Andhra Pradesh.

ICAR-IIRR Foundation Day Awards

Drs CH Padmavathi, V Prakasam, Kalyani MB, Bandeppa S and Lakshmi Prasanna PA were individually honoured with the Best Researcher Award 2025 in recognition of their outstanding research contributions. Smt. M. Govindamma, Smt. D. Padmamma, Smt. Aparna Das, Shri S. A. Hussain, Smt. K. Padmaj, Shri P. Chandrakanth, and Shri D. Srinivas Rao were individually conferred the Best Worker Award 2025 in recognition of their dedicated service and exemplary contributions to the institute. The awards were presented during the ICAR-IIRR Foundation Day 2025 celebrations held on 14 December 2025.

Invited/Contributed Presentations on Various National and International Scientific Platforms

During 2025–26, scientists of ICAR–IIRR actively disseminated their research through invited lectures, keynote addresses, resource person engagements, panel discussions, and contributed oral and poster presentations at national and international conferences, symposia, workshops, and training programmes. Their presentations covered diverse areas including genomics-assisted breeding, genome editing, biofortification, climate-resilient rice, plant biotechnology, soil and crop health, nematology, omics, and digital agriculture, reflecting the institute's strong scientific leadership and global engagement. The details of the presentations are given in the following table.

Presentations on Various National and International Scientific Platforms

S. No.	Name(s)	Role	Invited/Contributed	Title	Event	Institution	Date / Duration
1	V. Prakasam*, V. M. Manoj, K. Swaroopa, S. Srijisha, Mamta Sharma, Ramana Gouda, Raju Ghosh, C. Priyanka, G. S. Laha, M. Srinivas Prasad, Akshay Sakhare, C. H. Padmavathi, Chitra Shanker, P. Raghuveer Rao and R. M. Sundaram	Oral	Contributed	*Impact of Climate Change on Rice Sheath Blight: Dynamics of Host-Pathogen Interactions Under CO_2 and Temperature Gradient Tunnel Conditions*	32nd Plant and Animal Genome (PAG) Conference	San Diego, California, USA	10–15 Jan 2025
2	Dr. R. M. Sundaram	Lead Speaker	Invited	–	National Symposium on Nematode Management	Goa	4 Feb 2025
3	Dr. Satendra Kumar Mangrauthia	Lead Speaker	Invited	Genome Editing in Rice	New Breeding Techniques and Biotech Crops	UAS, Raichur	11 Feb 2025
4	Dr. C. N. Neeraja	Lead Speaker	Invited	Cereal Biofortification in India: Progress and Update in HarvestPlus	Empowering Odisha	Bhubaneswar	19 Feb 2025
5	N. Somasekhar	Lead Speaker	Invited	Management of Parasitic Nematodes: Insights from One Health Approach	International Conference on One Health Perspectives in Global Plant Protection Research	TNAU, Coimbatore	19–21 Feb 2025
6	Dr. Jyothi Badri	Lead Speaker	Invited	Designing Climate Resilient Rice through Genomics-Assisted Breeding	Frontiers in Genetics and Genomics	Centurion University, Odisha	20–21 Feb 2025
7	D. V. K. Nageswara Rao*, R. M. Sundaram and K. Pundarikakshudu	Oral	Contributed	Towards the Development of Agro-geo-informatics at the Village Level to Help Decision-making	XVII Agricultural Science Congress	GBPUAT, Pantnagar	20–22 Feb 2025
8	Dr. Satendra Kumar Mangrauthia	Lead Speaker	Invited	Current Trends and Challenges in Plant Biotechnology	PTCAI Annual Meeting	BITS, Goa	24–26 Feb 2025
9	Dr. Kalyani M. Barbadikar	Resource Person	Invited	Genomics of Root Traits: Unraveling the Hidden Half of Plants	Refresher Course on Crop Improvement	FABA	3 Mar 2025
10	Dr. Kalyani M. Barbadikar	Lead Speaker	Invited	Unravelling Pathogenicity and Host Interaction	PAG Asia 2025	PAG Asia	18 Mar 2025
11	Dr. Kalyani M. Barbadikar	Lead Speaker	Invited	Integrative Omics for Root Traits in Rice	National Symposium on Omics Research	ICAR-IISR, Kozhikode	21 May 2025
12	Dr. Kalyani M. Barbadikar	Lead Speaker	Invited	Unveiling Adaptive Traits for Stress Resilience	Bioingene International Webinar	–	11 Jun 2025
13	D. V. K. Nageswara Rao* and R. Mahender Kumar	Oral	Invited	Stable Health for Sustainable Health for All under Changing Climate	One Water, One Soil and One Health	CDAC & IEEE, Bengaluru	4 Jul 2025
14	Dr. R. M. Sundaram	Lead Speaker	Invited	Global Advancements in Genome Editing	APSA Regional PBI Consultation	Kuala Lumpur	8–9 Jul 2025
15	Dr. S. L. Krishnamurthy	Lead Speaker	Invited	Advancing Salt-Tolerant Rice Breeding	NSRTC 2025	MITWPU, Pune	18–20 Jul 2025

S. No.	Name(s)	Role	Invited/Contributed	Title	Event	Institution	Date / Duration
16	Latha PC*, Rajani G, Prasad Babu KV, Kalyani MB,Bandeppa S, Prasad Babu MBB, Mandal PK, and SundaramRM	Poster	Contributed	–	Genomics India Conference	IISc, Bengaluru	12–14 Aug 2025
17	Dr. R. M. Sundaram	Lead Speaker	Invited	Academic Network for Nurturing Agricultural Development	ANNADATA-2025	Agrimeet	16 Aug 2025
18	Dr. Satendra Kumar Mangrauthia	Lead Speaker	Invited	Genome Editing in Rice	Telangana Science Congress	Kakatiya University	20 Aug 2025
19	Dr. Satendra Kumar Mangrauthia	Lead Speaker	Invited	DialogueNEXT: Take it to the Farmer	World Food Prize Foundation	New Delhi	8–9 Sep 2025
20	Bandeppa	Oral	Contributed	Multi-trait Plant Growth Promoting *Priestia flexa* IIRRPSB14 for Enhancing Growth and Development of Rice Cultivar	SKUAST-Jammu	SKUAST	15–17 Sep 2025
21	Dr. Brajendra P.	Lead Speaker	Invited	Healthy Soils, Secure Futures	GIZ & WORT	Mumbai	14 Oct 2025
22	Dr. C. N. Neeraja	Lead Speaker	Invited	Role of Genomics in Enhancing Grain Quality and Productivity in Rice	–	DDU Gorakhpur University	27 Oct 2025
23	V. Chinna Babu Naik	Oral	Contributed	Biology, Development and Reproductive Potential of White-backed Planthopper on Rice	XIX AZRA International Conference	Bhubaneswar	11–13 Nov 2025
24	Dr. C. N. Neeraja	Lead Speaker	Invited	Preparing for Future: Climate Resilient Rice	Asian Seed Congress	Mumbai	17–21 Nov 2025
25	Dr. R. M. Sundaram	Lead Speaker	Invited	Genomics-Assisted Breeding for Climate-Resilient Rice	International Workshop	IRRI, Philippines	18 Nov 2025
26	DVK Nageswara Rao	Oral	Contributed	–	89th ISSS Annual Convention	TNAU, Coimbatore	18–21 Nov 2025
27	Dr. Kalyani M. Barbadikar	Resource Person	Invited	Genome-Wide Association Studies	GWAS Training Programme	ICAR-IISR	19–20 Nov 2025
28	A. P. Padmakumari*, Sreedhar Y. and Kalyani M. B.	Lead Speaker	Invited	Emerging Problems of Mites on Paddy	National Symposium on Mites	UAS, Bengaluru	20–21 Nov 2025
29	Dr. Satendra Kumar Mangrauthia	Lead Speaker	Invited	Genome Editing for Indian Agriculture	KK Biotech	21 Nov 2025	
30	Jagriti Rohit	Oral	Contributed	–	2nd International Extension Education Congress	SOA	24–26 Nov 2025
31	D.V.K. Nageswara Rao* and R.M. Sundaram	Oral	Contributed	–	ISG-ISRS National Symposium	IIT Research Park	25–27 Nov 2025
32	Dr. R. M. Sundaram	Lead Speaker	Invited	Inaugural Talk	National Symposium on Smart Nematode Management	Hyderabad	26–28 Nov 2025
33	Dr. Satendra Kumar Mangrauthia	Lead Speaker	Invited	Current Status of Genome Editing Technology	National Symposium on Smart Nematode Management	ICAR-IIOR	26–28 Nov 2025
34	N. Somasekhar	Oral	Contributed	Biorational Approaches for Management of Phytonematodes	National Symposium on Smart Nematode Management	ICAR-IIOR	26–28 Nov 2025

Peer Recognition

Peer Recognition

S. No.	Name(s)	Role	Invited/Contributed	Title	Event	Institution	Date / Duration
35	N. Somasekhar	Lead Speaker	Invited	Nematodes in the Soil, Plant, Animal and Human Health Continuum	National Symposium on Smart Nematode Management	ICAR-IIOR	26–28 Nov 2025
36	Dr. B. Sailaja	Oral	Contributed	—	Supercomputing India Conference	Manipal Institute of Technology	9–13 Dec 2025
37	V. Prakasam*, C. Priyanka, K. Swaroopa, S. Srijisha, A. S. Thanuja, E. Praveen Kumar, E. Punniakotti, G. S. Laha, D. Ladhalakshmi, Jyothi Badri, C. Kannan, K. Basavaraj, G. Jesudas, D. Krishnaveni, M. Srinivas Prasad and R. M. Sundaram	Oral	Contributed	Population Dynamics and Evolution of the Rice Sheath Blight Pathogen across Diverse Ecologies in India	National Conference on Novel Strategies for Biotic Stress Management	ICAR-NIBSM, Raipur	11–12 Dec 2025
38	J. S. Sudharani, B. Sreedevi, K. P. Vani, P. C. Latha and M. Yakadri	Oral	Contributed	Vermicompost-based Integrated Nutrient Management for Sustainable Productivity in Aerobic Rice–Zero Till Maize System	VII ICAAAS 2025	UOU, Haldwani	15–16 Dec 2025
39	V. Chinna Babu Naik	Lead Speaker	Invited	Integrating Crop Care for Sustainable Plant Health	IPS West Zone Symposium	VNMKV	16–17 Dec 2025
40	Dr. P. Senguttuvel	Lead Speaker	Invited	Endowment Lecture: Hybrid Rice in India—Public Sector Perspectives	TNAU	TNAU	18 Feb 2026
41	B. Sailaja*, C. H. Padmavathi, G. S. Laha, B. Sreedevi, Brajendra, A. P. Padmakumari, N. Somasekhar, D. Krishnaveni, V. Manasa, R. Mounika, Raja Rajeswari, Sampath Chary, Sai Gayatri, Vijay Ramaraju A., M. Prasada Rao, M. Srinivas Prasad, R. Nagarjuna Kumar and R. M. Sundaram	Oral	Contributed	Smart Mobile Applications for Sustainable Rice Farming	National Conference on Innovations in Plant Health Management	NIPHM, Hyderabad	26–28 Feb 2026

8. Other Institutional Activities

Other Institutional Activities

ICAR-IIRR organized and actively participated in a wide range of institutional events, national commemorative days, awareness campaigns, health and wellness programmes, scientific celebrations, sports activities, and outreach initiatives during 2025. These events promoted scientific temper, institutional excellence, employee well-being, environmental sustainability, cleanliness, constitutional values, intellectual property awareness, national integration, and stakeholder engagement. The Institute also commemorated important national and international occasions while strengthening collaboration with partner organizations and encouraging active participation of staff, students, farmers, and the local community. In addition to the celebration of New year eve (1st Jan) and flag hoisting on Independence day (15th Aug) and Republic Day (26th Jan) every year, the major institutional events and activities organized during the year are presented below.

S. No.	Activity	Brief Description
1.	National Science Day	ICAR-IIRR celebrated National Science Day on February 28, with NAAS (Hyderabad Chapter); ~200 school students participated in lectures, quizzes, poster competitions, and innovation talks.
2.	ICAR South Zone Sports Meet	ICAR-IIRR participated in the South Zone Sports Meet at Coimbatore during April 8 to 11 and won medals in Table Tennis and Carrom bringing laurels to the institute.
3.	International Women's Day	ICAR-IIRR conducted off-campus training as part of the International Women's Day celebrations in Revanapalli village, Bhongir district for women farmers on improved rice cultivation, pest and disease management, soil health, and Rice Clinic application.
4.	World Intellectual Property Day	ICAR-IIRR celebrated World Intellectual Property Day on May 1, 2025, organised lecture by Dr. Ranjith Reddy, IP Attorney and Co-Founder, Velocity Research on Intellectual Property Rights in Agriculture under the theme "IP and Music: Feel the Beat of IP."
5.	International Day of Yoga	ICAR-IIRR observed International Day of Yoga on June 21, 2025 with institute-wide yoga session promoting physical and mental well-being under the theme "Yoga for One Earth, One Health."
6.	SBI-CSR Project Launch	Launched the DSR promotion project on July 21, 2025; inaugurated rainout shelter and farmer outreach vehicles under SBI-CSR support. The activity was organized in collaboration with KVKs under ATARI and PJTAU, Hyderabad.
7.	Diabetic Screening & Awareness Camp	ICAR-IIRR organized free health screening, medical consultations, and diabetes awareness programme on August 7, 2025. The event was organized in collaboration with Dr. Mohan's Diabetes Specialities Centre. A health awareness talk on diabetes prevention and management was delivered by Dr. Chandrakanta Jha, Senior Diabetologist, with participation from staff of nearby ICAR institutes such as IIMR, IIOR, DPR, and NAARM.
8.	Parthenium Awareness Week	ICAR-IIRR successfully organized Parthenium Awareness Week to educate staff, farmers, and the local community about the harmful invasive weed *Parthenium hysterophorus* from August 16 to 22, 2025.
9.	Free Eye Check-up Camp	As part of the Preventive Health Check-up campaign under Safaimitra Suraksha Shivir, a Free Eye Check-up Camp was successfully organized at the ICAR-Indian Institute of Rice Research (ICAR-IIRR), Rajendranagar, Hyderabad, on September 18, 2025, in collaboration with IRIS Eye Hospital.
10.	Swachhta Pledge	As part of the nationwide Swachhta Hi Seva Campaign 2025 (with the theme Swachhotsav), a Swachhta Pledge was successfully organized at the ICAR-Indian Institute of Rice Research (ICAR-IIRR), Rajendranagar, Hyderabad, on 17 September 2025. The pledge was administered centrally by the Secretary, DARE & Director General, ICAR, from the DG's Committee Room, Krishi Bhawan, New Delhi, through video conferencing.
11.	Swachh Bharat Abhiyan	Conducted campus-wide cleanliness drives involving permanent and contractual staff to promote hygiene and sanitation on 2nd October, 2025.
12.	Rashtriya Ekta Divas	ICAR- IIRR celebrated Rashtriya Ekta Divas on October 31, 2025 with great enthusiasm. The event was observed with Unity Pledge, Unity Run, awareness lectures, and activities promoting national integration.
13.	Vigilance Awareness Week	Vigilance Awareness Week was observed at ICAR–IIRR from October 27 to November 2, 2025 to promote integrity, transparency, and ethical practices among staff and students.

S. No.	Activity	Brief Description
14.	Constitution Day 2025	ICAR- IIRR observed Constitution Day 2025 by organizing a series of activities from November 26-28, 2025 to promote awareness of constitutional values and citizen responsibilities. The celebrations included reading of the Preamble, pledge ceremony, awareness lectures, quizzes, essays, and discussions on constitutional ideals.
15.	Foundation Day 2025	The ICAR-IIRR, celebrated its Foundation Day on December 14, 2025, at the Dr. SVS Shastry Auditorium with great enthusiasm and academic fervour. Celebrated Foundation Day with distinguished guests, institute achievements presentation, and Dr. SVS Shastry Memorial Lecture.
16.	Swachhata Pakhwada	Swachhata Pakhwada was organized at IIRR from December 16-31, 2025. Conducted cleanliness drives, awareness campaigns, sanitation, recycling, plastic waste management, and community outreach programmes.
17.	Swachh Bharat Programme at Bharatiya Vidya Bhavan School	As part of Swachhata Pakhwada, ICAR–IIRR, organized a Swachh Bharat Mission programme at Bharatiya Vidya Bhavan's School, NIRD Campus. Organized awareness programme with essay and slogan competitions promoting cleanliness and sustainable practices among school children.
18.	World Soil Day	ICAR--IIRR celebrated World Soil Day on December 5, 2025. Lectures were organized for groups of farmers to create awareness about sustainable soil management practices and the importance of soil health for enhanced crop productivity.



National Science Day



ICAR–IIRR Participation in ICAR South Zone Sports



International Women's Day



11th International Day of Yoga





(a) Republic Day celebrations (b) Independence day



Parthenium Awareness Week; Swachhta Pledge at ICAR-IIRR under Swachhta Hi Seva Campaign 2025



(a) Nation in Swachhata Bharat Abhiyan (b) Rashtriya Ektha Diwas



Vigilance Awareness Week



Constitution Day 2025





IIRR Foundation Day 2025





World Soil Day 2025

Important visitors

S. No.	Date	Visitor/Organization	Purpose/Highlights
1	08 Jan 2025	Dr. Nitin Marathe, 3 faculty members and 45 M.Sc. Biotechnology students, ICLES' Motilal Jhunjhunwala College of Science, Navi Mumbai	Visited ICAR-IIRR research facilities and received an overview of rice biotechnology research.
2	22 Apr 2025	Dr. Kuldeep Singh (Head, Gene Bank) and Dr. W. Tyagi Principal Scientist and Cluster Leader (CMB & Trait Engineering), ICRISAT	Visited genome editing programme and appreciated the performance of genome-edited Samba Mahsuri.
3	05 May 2025	Dr. G. Taru Sharma, Director, National Institute of Animal Biotechnology (NIAB)	Visited ICAR-IIRR and interacted with scientists.
4	06 May 2025	Dr. Viraktamath, Former Director, ICAR-IIRR	Visited the IIRR farm and seen important breeding lines.
5	10 May 2025	Dr. Ch. Srinivas Rao, Director, IARI, along with IARI team	Visited ICAR-IIRR to strengthen collaboration and review institute activities.
6	01 Aug 2025	Dr. Suresh Babu, IFPRI	Delivered a lecture on "Methane Reduction in Rice Farming Systems: Opportunities for Scaling-Up and Impact."
7	23 Sept 2025	Telangana Agriculture and Farmers Welfare Commission led by Shri Kodanda Reddy	Visited ICAR-IIRR and interacted on agricultural development initiatives.
8	11 Oct 2025	School Children Visit	Students visited ICAR-IIRR to learn about rice research, modern agriculture, and food security.
9	18 Dec 2025	Shri Sanjay Kumar Agarwal, IAS, Joint Secretary, Ministry of Agriculture & Farmers Welfare	Visited ICAR-IIRR and reviewed institute activities and administrative issues.



(a) Visit of Dr. Nitin Marathe and team



(b) Visit of Dr. Kuldeep Singh and Dr. W. Tyagi, ICRISAT



Visit of Telangana Agriculture and Farmers Welfare Commission to ICAR-IIRR

9. Personnel and Staff

Scientific Staff

Name	Designation
Dr. R.M. Sundaram	Director
Plant Breeding	
Dr. S.V. Sai Prasad	Principal Scientist
Dr. G. Padmavathi	Principal Scientist Superannuated in March 2025
Dr. J. Aravind Kumar	Principal Scientist
Dr. Suneetha Kota	Senior Scientist
Dr. S. L. Krishnamurthy	Senior Scientist
Dr. Jyothi Badri	Senior Scientist
Dr. M.S. Anantha	Senior Scientist
Dr. R. Abdul Fiyaz	Senior Scientist
Dr. Divya Balakrishnan	Senior Scientist
Dr. Suvarna Rani Ch	Scientist
Hybrid Rice	
Dr. A.S. Hari Prasad	Principal Scientist
Dr. P. Senguttuvel	Senior Scientist
Dr. P. Revathi	Senior Scientist
Dr. Kemparaju K.B	Senior Scientist
Dr. K. Shruti	Scientist
Biotechnology	
Dr. C.N. Neeraja	Principal Scientist
Dr. S.K. Mangrauthia	Senior Scientist
Dr. Kalyani Kulkarni	Scientist
Dr. V Papa Rao	Scientist
Agronomy	
Dr. R. Mahendra Kumar	Principal Scientist
Dr. B. Sreedevi	Principal Scientist
Dr. Mangaldeep Tuti	Senior Scientist
Dr. S. Vijaya Kumar	Scientist
Soil Science	
Dr. K. Surekha	Principal Scientist Superannuated in July 2025
Dr. M.B.B. Prasad Babu	Principal Scientist
Dr. DVK Nageswara Rao	Principal Scientist
Dr. Brajendra	Principal Scientist
Dr. P.C. Latha	Principal Scientist
Dr. Bandeppa	Scientist

Name	Designation
Dr. R. Gobinath	Scientist
Dr. V. Manasa	Scientist
Plant Physiology & Biochemistry	
Dr. P. Raghuveer Rao	Principal Scientist Superannuated in July 2025
Dr. Akshay Sakhare	Senior Scientist
Dr. D. Sanjeeva Rao	Senior Scientist
Computer Applications	
Dr. B. Sailaja	Principal Scientist
Entomology	
Dr. A.P. Padma Kumari	Principal Scientist
Dr. N. Somashekar	Principal Scientist
Dr. Chitra Shanker	Principal Scientist
Dr. Ch. Padmavathi	Principal Scientist
Dr. Y. Sridhar	Principal Scientist
Dr. V. Chinna Babu Naik	Senior Scientist
Dr. Satish N. Chavan	Senior Scientist
Dr. K.V. Raghavendra	Scientist
Plant Pathology	
Dr. M. Sreenivas Prasad	Principal Scientist
Dr. G.S. Laha	Principal Scientist
Dr. D. Krishnaveni	Principal Scientist
Dr. C. Kannan	Principal Scientist
Dr. Ladha Lakshmi	Senior Scientist
Dr.V. Prakasam	Senior Scientist
Dr. K. Basavaraj	Scientist
Dr. S. Jasudas Gompa	Scientist
Transfer of Technology & Training	
Dr. P. Muthuraman	Principal Scientist Superannuated in July 2025
Dr. Amtul Waris	Principal Scientist
Dr. P. Jeya Kumar	Principal Scientist
Dr. PA Lakshmi Prasanna	Senior Scientist
Dr. S. Arun Kumar	Senior Scientist
Dr. Jagriti Rohit	Scientist

Technical Staff

C. Sadanandam	Assistant Chief Technical Officer
Srinivasan Amudhan	Assistant Chief Technical Officer
Chirutkar Prakash	Assistant Chief Technical Officer
Uddaraju Chaitanya	Assistant Chief Technical Officer
M. Ezra	Assistant Chief Technical Officer

U. Pullaiah	Assistant Chief Technical Officer
K. Padmaja	Senior Technical Officer
M. Vijay Kumar	Senior Technical Officer
Mohd. Tahseen	Technical Officer
Mohd. Sadath Ali	Technical Officer

K. Ramulu	*Technical Officer*
Dr. Y. Roseswara Rao	*Technical Officer*
Kova Shravan Kumar	*Technical Officer*
Tupakula Venkaiah	*Technical Officer*
C. Muralidhar Reddy	*Technical Officer*
K. Janardhan	*Technical Officer (Driver)*
P. Chandrakanth	*Senior Technical Assistant*
K.H. Devadas	*Senior Technical Assistant*
Koteswara Rao Potla	*Senior Technical Assistant*
K. Narasimha	*Senior Tech. Assistant (Driver)*
M. Chandrakumar	*Senior Technician*
S. Vijay Kumar	*Senior Technician*
A. Ramesh	*Senior Technician (Driver)*
D. Srinivasa Rao	*Technician*
V. Srinivas	*Technician*
R. Sathamaiah	*Technician*
S. Yadaiah	*Technician*
Amul Kumar	*Technician (T1)*
Rohan Shukla	*Technician (T1)*
Vivek Kumar Tiwary	*Technician (T1)*
Raj S. Wankhede	*Technician (T1)*
Abhijeet Raj	*Technician (T1)*
Ritesh	*Technician (T1)*
Sayanta Parui	*Technician (T1)*

Administrative Staff

Shitanshu Kumar	*Chief Administrative Officer*
Sudarshan Rampe	*Finance & Accounts Officer*
O. Suneeta	*Principal Private Secretary*
Aparna Das	*Private Secretary*
Bommakanti Ramesh	*Private Secretary*
S. Hemalatha	*Private Secretary*
Ashfaq Ali	*Personal Assistant*
Shaik Ahmed Hussain	*Assistant*
Bharath Raju	*Assistant*
K. Mallikarjunudu	*Assistant*
Vanitha	*UDC (Upper Division Clerk)*
Kota Jashwanth	*UDC (Upper Division Clerk)*
S. Rekha Rani	*UDC (Upper Division Clerk)*
Chander	*Skilled Supporting Staff (SSS)*
M. Anthamma	*Skilled Supporting Staff (SSS)*
B. Susheela	*Skilled Supporting Staff (SSS)*
Ahmed Ullah Khan	*Skilled Supporting Staff (SSS)*

Casual Labour regularised to Skilled Support staff

Name
Smt. V. Sukrutha
Smt. G. Sivamma
Smt. G. Vajramani
Smt. B. Balamma
Smt. B. Sugunamma
Smt. R. Kistamma
Smt. Ch. Swaroopa
Smt. K. Durgamma
Sri. M. Ramesh
Smt. K. Yadamma

Name
Smt. P. Pushpa
Sri. G. Venkatesh
Smt. M. Govindamma
Smt. D. Padmamma
Smt. D. Laxmamma
Smt. M. Laxmamma
Smt. R. Parvathamma
Smt. D. Balamani
Sri. M. Yadaiah
Smt. R. Channamma

10. Publications

ICAR-IIRR maintained a strong research publication record during 2025, with scientists publishing 90 peer-reviewed research articles in national and international journals, reflecting the institute's leadership in rice science and technology. The publications span diverse disciplines including genomics-assisted breeding, crop improvement, plant pathology, entomology, abiotic stress physiology, soil and nutrient management, molecular biology, biofortification, crop protection, remote sensing, agricultural engineering and climate-smart agriculture

A significant proportion of the publications appeared in high-impact international journals such as *Plant Physiology, Journal of Experimental Botany, Plant Science, Smart Agricultural Technology, International Journal of Molecular Sciences, Scientific Reports, iScience, Frontiers in Soil Science, Frontiers in Agronomy, The Plant Genome, Molecular Breeding, Rice Science* and *BMC Plant Biology*, demonstrating the global relevance and scientific excellence of research carried out at ICAR-IIRR. Several papers were published in journals with NAAS ratings above 10, highlighting the quality and visibility of the institute's research outputs.

The publications generated important advances in rice improvement, including identification of genomic regions and candidate genes governing yield, culm strength, nutrient-use efficiency, heat tolerance, drought tolerance, flooding tolerance, bacterial blight, blast, sheath blight and nematode resistance. Significant contributions were also made in genome-wide association studies, QTL mapping, genomics-assisted breeding, marker-assisted breeding, genome editing, biofortification, physiological characterization, and utilization of wild rice germplasm for crop improvement. Research also addressed emerging challenges in sustainable rice production through studies on nutrient management, soil health, crop residue utilization, direct-seeded rice, perennial rice, precision agriculture, remote sensing, artificial intelligence-based pest forecasting, integrated pest and disease management, biological control, and climate resilience. These studies provide valuable scientific evidence for developing environmentally sustainable and resource-efficient rice production systems.

The publication portfolio further included comprehensive review articles, reports on novel germplasm and genetic resources, development of improved breeding methodologies, and validation of advanced phenotyping and molecular tools. Collectively, these research outputs have strengthened ICAR-IIRR's contributions towards developing climate-resilient, nutritionally enriched, high-yielding rice varieties and sustainable production technologies, while enhancing the institute's national and international scientific visibility.

Research Articles (in the order of high NAAS rating)

1. Prabhakar M*, Padmavathi Ch, Thirupathi M, Golla SK, Sai Sravan U, Ramachandra Rao G, Kalpana M, Sailaja V, Chandana P, Prasad YG, Srinivasa Rao M, Singh VK, Singh R. 2025. Remote sensing of rice leaf folder damage using ground-based hyperspectral radiometry. *Smart Agricultural Technology* 10:100757. https://doi.org/10.1016/j.atech.2024.100757. (IF-7.1) (NAAS Score-13.1)
2. Reddy BNK, Rathod S*, Sridhar Y*, Kallakuri S, Pandit P, Jyostna B, Malathi S, Shravan Kumar R, Sharma S, Karthikeyan K, Varma NRG, Chatterjee S, Padmakumari AP, Somasekhar N, Banda S, Padmavathi C, Shanker C, Jeyakumar P, Sundaram RM. 2025. An innovative two-stage, zero-inflated, hybrid count time series model for predicting rice yellow stem borer using weather parameters in hotspot locations of India. *Smart Agricultural Technology* 12:101381. https://doi.org/10.1016/j.atech.2025.101381. (IF-7.1) (NAAS Score-13.1)
3. Chavan SN*, Degroote E, De Kock K, Demeestere K, Kyndt T. 2025. ARGONAUTE4 and the DNA demethylase repressor of silencing 1C mediate dehydroascorbate-induced intergenerational nematode resistance in rice. *Plant Physiology* 197(1):kiae598. https://doi.org/10.1093/plphys/kiae598. (NAAS Score-12.90)
4. Snehi S, Ravi Kiran KT, Rathi S, Upadhyay S, Suneetha K, Sanwal SK, Lokeshkumar BM, Balasubramaniam A, Prakash NR*, Singh PK*. 2025. Discerning genes to deliver varieties: Enhancing vegetative and reproductive stage flooding tolerance in rice. *Rice Science* 32(2):160–176. https://doi.org/10.1016/j.rsci.2025.01.002. (NAAS Score-12.10).
5. Rajendran G*, Shanmugam V*, Lakshminarayanan A, Aabid Hussain L, Joseph B, Kumar V, Pant AK, S A, MBB PB, Rapolu MK and Raman Meenakshi S (2025) Rice crop residue as fertiliser substitute for enhancing yield and soil health: Identifying the optimum level from multilocation trials in India. *Frontiers in Soil Science* 5:1649105. https://doi: 10.3389/fsoil.2025.1649105. (IF-6.0) (NAAS Score-12.0)
6. Kohli PS, Donde R, Sirohi U, Singh B, Anantha MS, Bhadana VP, Sundaram RM, Mangrauthia SK*, Giri J*. 2025. Physiological and genetic basis of superior phosphate uptake and utilization efficiency in the rice landrace Wazuhophek. *Journal of Experimental Botany* 76(20):6145–6165. https://doi.org/10.1093/jxb/eraf286. (NAAS Score-11.70)
7. Jukanti AK, Karapati D, Bharali V, Gudla M, Thati S, Yadla S, Kumar M, Sundaram RM. 2025. From gene to plate: molecular insights into and health implications of rice (*Oryza sativa* L.) grain protein. *International Journal of Molecular Sciences* 26(7):3163. https://doi.org/10.3390/ijms26073163. (NAAS Score-10.90)
8. Das PP, Kumar A, Mohammed M, Bhati K, Babu KR, Bhandari KP, Sundaram RM, Ghazi IA*. 2025. Comparative metabolites analysis of resistant, susceptible and wild rice species in response to bacterial blight disease. *BMC Plant Biology* 25(1):178. https://doi.org/10.1186/s12870-025-06114-0. (NAAS Score-10.80)
9. Snehi S, Singh PK, Beena R, Suneetha K, Sanwal SK, Kiran KR, Anilkumar C, Chattopadhyay K, Prakash NR*, Sah RP*. 2025. QTL meta-analysis and candidate gene(s) for anaerobic germination potential in rice. *Journal of Plant Growth Regulation* 44:3304–3317. https://doi.org/10.1007/s00344-024-11618-y. (NAAS Score-10.40)
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13. Shanmugam V*, Kumar V, Sundaram RM, Kumar RM, Peramaiyan P, Murugaiyan V, and Nayak AK. 2025. Quantifying India's nitrogen, phosphorus, and potassium generation potential from agricultural and animal waste for sustainable nutrient management. Frontiers in Agronomy 7:1689121. https://doi.org/10.3389/fagro.2025.1689121. (IF: 4.2)(10.2)
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Communications 53(2):807–820. https://doi.org/10.1007/s42976-024-00593-5 (NAAS Score-7.90)

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11. Externally Funded Projects

Brief Summary of Ongoing Externally Funded Projects

S. No.	Title	Investigators	Funding source	Duration	Budget in lakh Rs.	Brief Progress of work
1.	CRISPR Crop Network: Targeted improvement of stress tolerance, nutritional quality and yield of crops by using genome editing	Satendra K Mangrauthia R.M. Sundaram, V. Prakasam	ICAR	2022-2025	48.63	The *OsCKX2* edited Samba Mahsuri line has been released as variety named DRR Dhan 100 (Kalama) after two years of AICRPR testing and evaluation. The patent (at Indian Patent Office) of a new allele of OsCKX2 was submitted (Application No.202311030876 A). The PCT (PCT international application No. : PCT/IB2024/054133) was also filed.
2.	Scheme- Enhancing climate resilience and ensuring food security with genome editing tools	Satendra Kumar Mangrauthia R.M. Sundaram, C.N. Neeraja, Kalyani Barbadikar, M. Barbadikar, V. Papa Rao	ICAR	2024-2027	1633.12	Target genes (*TMS5, OPR7, SERF1, DEP1, TB1, OsCKX2, sd1*) were sequenced in Samba Mahsuri, DRR Dhan 100, and Chittimuthyalu, and gene-specific gRNAs were designed and synthesized. Five CRISPR/Cas constructs were developed, and transformation-regeneration protocols were standardized for the target cultivars. The constructs were successfully introduced into the rice varieties, and primary transformants have been generated and are currently being evaluated for targeted edits and associated phenotypic improvements.
3.	ICAR- Plan Scheme network project entitled "Incentivizing Research in Agriculture": Project III-Genetic modifications to improve biological nitrogen fixation for augmenting nitrogen needs of rice	P. C. Latha, Kalyani Barbadikar, Bandeppa S, M. B. B Prasad Babu, and R. M. Sundaram	ICAR	2021-2026	153.60	Significant progress was achieved in developing beneficial nitrogen-fixing microbial inoculants for sustainable rice production. A *Paenibacillus sonchi*-based rhizospheric biofertilizer and a novel endophytic *Bradyrhizobium* sp. are being developed as plant growth-promoting nitrogen-fixing bacteria for rice. The whole-genome sequences of *Paenibacillus sonchi* IIRRBNF1 (PRJNA753291) and the novel *Bradyrhizobium* sp. (PRJNA1371714), along with RNA-Seq datasets (PRJNA490050 and PRJNA776419) generated from rice–diazotroph interactions, were submitted to the NCBI public repository. Transcriptomic and metabolomic analyses revealed genus-specific regulation of SWEET sugar transporter genes and distinct metabolic responses during plant–microbe interactions. Field evaluation identified the novel *Bradyrhizobium* sp. as the most effective inoculant, with its application along with 75% of the recommended nitrogen dose producing higher yields in DRR Dhan 55 than 100% recommended nitrogen alone, demonstrating the potential to reduce nitrogen fertilizer use by 25% without compromising productivity.
4.	Elucidation of biochemical basis of resistance to major insecticides in populations of Brown Plant Hopper, *Nilaparvata lugens* (Stal) in India	Chinna Babu Naik (PI) Papa Rao Vaikuntapu	DST-SERB	2023-2027	30.27	Field populations were collected from major rice-growing regions across India and tested against key insecticides such as imidacloprid, dinotefuran, pymetrozine, buprofezin, and triflumezopyrim. Genetic analysis of 63 populations using mtCOI markers showed low haplotype and nucleotide diversity, with only two haplotypes identified.
5.	Genomics Assisted Identification of Loci Associated with Rice (*Oryza sativa* L.) Grain Protein in a Novel Donor	J. Aravind Kumar	DST-SERB	2023-2026	47.31	A mapping population derived from BPT-5204 (low GPC: 7–8%) / JAK-686-1 (high GPC: 12–13%) was developed to identify genomic regions associated with grain protein content (GPC) in rice. Initial QTL mapping in the F_2 population detected four putative QTLs on chromosomes 1 and 5. QTL-seq analysis using contrasting BC_2F_3 bulks (7.78–15.94% GPC) identified candidate regions on chromosomes 2, 5, 10, 11, and 12. The BC_2F_4 population was advanced during *rabi* 2025–26 for seed multiplication and further validation of candidate loci for high-protein rice breeding.

S. No.	Title	Investigators	Funding source	Duration	Budget in lakh Rs.	Brief Progress of work
6.	Centrally sponsored scheme of PPVFRA under sub-mission on seeds and planting material-DUS Tests in Rice	J Aravind Kumar, Jyothi Badri	PPV&FRA	2008 Long term	13.00	Completed DUS testing of 162 rice entries during *kharif* 2025 with characterisation for 62 DUS traits and disease screening of selected entries. As the national nodal centre, the Rice DUS Testing Guidelines were revised by incorporating nutritional, disease resistance, and molecular descriptors, and submitted the final draft to PPV&FRA for approval. During *rabi* 2025–26, maintenance breeding of 114 reference and example varieties was completed.
7.	SBI-CSR Fund- Sustainable rice production – Large Scale Promotion of DSR in Telangana to increase yield, income and resilience to the climate change	RM Kumar, MBB Prasad Babu, B. Sreedevi, Mangal Deep Tuti, S. Vijayakumar, Brajendra, Manasa V, Bandeppa, M.S. Prasad, Basavaraj K, Ch. Padmavathi, Y Sridhar, P. Muthuraman, S Arun Kumar, B. Nirmala, S.V. Sai Prasad, Krishnamurthy SL, N Somasekhar, P Senguttuvel, Santosha Rathod, B. Sailaja, R.M. Sundaram, U. Chaitanya	SBI Foundation, Mumbai	2023-26	4,50,00,000	The project was implemented in four clusters—KVK Kampasagar, KVK Gaddipally, KVK Wyra, and KVK Kothagudem-in the erstwhile Nalgonda and Khammam districts of Telangana. 1,000 farmers (500 DSR and 500 TPR) were covered, with equal representation from each cluster. A multi-tier implementation framework involving ICAR–IIRR scientists, KVK teams, and field staff ensured systematic monitoring and technical backstopping. Farmers received high-quality DSR seed, drum seeders, weedicides, sprayers, rapid soil testing kits, IoT-based AWD irrigation sensors, CV pipes for water monitoring, and satellite-based crop stress advisories. Capacity building formed a core component, with extensive field trainings, demonstrations, and technology exposure programs conducted across clusters. Impact assessment results demonstrate clear biological, economic, environmental, and social gains. DSR recorded a yield advantage of 8.3 percent during *rabi* 2024–25 and 12.7 percent during *kharif* 2025 over TPR. The total cost of cultivation declined by 23.1 percent in *rabi* and 21.1 percent in *kharif*. Net returns improved significantly by ₹13,022 per acre (53.5 percent) in *rabi* and ₹15,639 per acre (67.7 percent) in kharif.
8.	Evaluating the impact of CleanRise on yield and grain quality improvement in Paddy	S Vijayakumar	String Bio Pvt Ltd, Bangalore		9,91,200	During *kharif* 2025, CleanRise™ was evaluated across 12 Indian locations under different establishment methods and nitrogen levels. In transplanted rice, applying 100% Recommended Dose of Fertilizers (RDF) plus three CleanRise™ treatments (seedling treatment, max tillering, and panicle initiation) recorded the highest grain yields.
9.	Efficacy evaluation of iptriazopyrid 40 G/L+ triafamone 25 G/L SC in direct seeded rice transplanted crop and succeeding crop in kharif and *rabi* seasons 2025-26	B. Sreedevi	Bayer Crop Science Limited	2024	12.27 Lakh	Among herbicidal treatments, application of Iptriazopyrid + Triafamone 1250 ml/ha and 1500 ml/ha, used as EPE recorded the lowest weed index, higher Weed Control Efficiency thereby minimizing yield loss compared to other herbicidal treatments
10.	ICAR-Consortia Research Platform on Molecular Breeding in crops	R. Abdul Fiyaz, R.M. Sundaram, P Senguttuvel, M.S. Anantha, M.S. Prasad G.S. Laha, A.P. Padmakumari, V. Jhansi Lakshmi	ICAR	2017-2026	68.32	During *kharif* 2024–25, BC_1F_1 plants were confirmed using gene-specific or closely linked molecular markers, and the true BC_1F_1 plants were backcrossed with their respective recurrent parents DRR Dhan 53, DRR Dhan 60, DRR Dhan 44, and MTU 1121 to generate the BC_2F_1 generation. During Kharif 2025, the BC_2F_1 plants were again screened using gene-specific or linked markers to identify true BC_2F_1 individuals, which were subsequently advanced to develop BC_2F_2 populations. The BC_2F_2 lines were transplanted in the main field and evaluated for herbicide tolerance through both molecular and phenotypic approaches. Molecular confirmation was carried out using the gene-specific marker RM 6844, while phenotypic evaluation involved spraying Pursuit herbicide at 25 days after transplanting under field conditions. Several promising lines exhibited

Externally Funded Projects

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						strong survival and herbicide tolerance across the DRR Dhan 44, DRR Dhan 60, and MTU 1121 genetic backgrounds. Based on the combined genotypic and phenotypic performance, the best - performing lines were advanced to Rabi 2026 for further evaluation. From each genetic background, two superior lines were selected and transplanted on a larger scale for submission to the AICRPR trials during 2026 to assess their herbicide tolerance.
11.	AICRP on Seed Project	Abdul Fiyaz R. (Nodal Officer)	ICAR	2008 Long term	6.50	Breeder seed production of rice varieties and parental lines of rice hybrids as per the DAC indents was organized at 42 centres across the country, involving 565 varieties and parental lines of 5 rice hybrids 9130 quintals for a target of 3491.0 quintals at national level. At IIRR centre, 30 varieties and 3 hybrid parental lines were included in breeder seed production with a total production of 176.6 quintals against the target of 157.15 quintals.
12.	ICAR Plan - Sub-project IV: Molecular genetic analysis of resistance/tolerance to different stresses in rice, wheat, chickpea and mustard including sheath blight complex genomics	G S Laha, R M Sundaram, V Prakasam, Jyothi Badri, D Ladhalakshmi Divya Balakrishnan	ICAR	2022-2017	125.00	Sheath blight disease complex pathogens viz., *R. solani* (RS), *R. oryzae* (RO), and *R. oryzae sativae* (ROS) were confirmed through species-specific markers and ITS sequence and through cultural and morphological characters. AUDPC revealed RS as most virulent (552.43, 5.77), followed by RO (276.88, 4.85) and ROS (251.32, 3.17). About 800 lines were screened during *kharif*-2025 for sheath blight tolerance in background of Dhan 53, Swarna and MTU1010 crossed with ISM/WZK NILs. IET 32980 from cross of ISM/WZK RIL // Dhan 53 promoted from AVT1 to AVT-2. IET 33355 (VPSY30H) Swarna / 2013NSNH-71 (22272) promoted to AVT 1-M (H). Eight entries were nominated in AICRPR 2025. In *kharif* 2025, 31 entries based on their reaction of *kharif* 2024 and 185 mapping population of HWR36 (NPT x *O. longistaminata* Acc. 110404)/Samba Mahsuri were screened and 29 entries were found promising. Detection of *U. virens* based on Recombinase Polymerase assay coupled CRISPR- Cas12a assay was standardized.
13.	Mainstreaming rice landraces diversity in varietal development through genome wide association studies: A model for large-scale utilization of gene bank collections of rice	C N Neeraja, C Gireesh M S Anantha, Ladha Lakshmi, R. Abdul Fiyaz	DBT Net work	2020-2025	143.36	In *kharif* 2025, 426 genotypes (250 L6 set + 82 selected genotypes of L4 set + 88 selected genotypes of L5 set + 6 selected genotypes of L2 set and L3 set) genotypes were screened artificially. In *rabi*, early duration lines (150 numbers) of L4, L5 and L6 set were selected and screened artificially. Four genotypes were nominated (based on the four season screening results at IIRR) in the AICRPR Plant Pathology trials to test under the false smut hotspot locations, under the trial on special screening trial for false smut. Among the tested entries, the entries viz., IC514979 (RL- 4), IC98857 (RL-479), IC462064 (RL- 1516) and IC214453 (RL-4609) recorded as a moderate resistance with 5 score (with maximum of 4 smut balls per panicle) to false smut disease.
14.	CRP- Biofortification in selected crops for nutritional security	C N Neeraja, R.M. Sundaram, Satendra K Mangrauthia, Kalyani M Barbadikar, LV Subba Rao, Amtul Waris K Surekha, K Sruthi, J Aravind kumar, U Chaitanya, Papa Rao Vaikuntapu	ICAR	2021-2026	94.0 (for 2025)	Whole-genome sequencing of the high grain zinc rice landrace Karuppunel was performed using a hybrid assembly approach integrating Oxford Nanopore long reads and Illumina short reads (BioProject: PRJNA1298585) and it's the first comprehensive genomic resource for Karuppunel for identifying candidate genes and molecular markers associated with grain zinc accumulation, facilitating future biofortification and genomics-assisted rice breeding efforts.Over 112 promising high-zinc breeding lines were identified from 28 populations during *kharif* 2024. Multi-environment evaluation of RIL populations led to the identification of several high-yielding lines with grain zinc content exceeding

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						28 mg kg^{-1}. Consistent QTLs for grain zinc were identified across locations, while genetic, molecular, and transcriptomic analyses revealed key genes and genomic regions associated with zinc, iron, protein, and phytate accumulation, accelerating the development of nutrient-dense rice varieties.
15.	ICAR-Plan Scheme: "Incentivizing Research in Agriculture" Project: Genetic modifications to improve biological nitrogen fixation for augmenting nitrogen needs of cereals.	R.M. Sundaram, P C Latha Kalyani M Barbadikar, Bandeppa	ICAR	2021-2026	153.6	Field evaluation of microbial inoculants under varying nitrogen levels identified *Bradyrhizobium* sp. as the most effective treatment, significantly improving growth and yield in DRR Dhan 55, particularly with 75% of the recommended nitrogen, indicating enhanced nitrogen-use efficiency. To elucidate the underlying molecular mechanisms, a comparative transcriptome study was initiated in BPT 5204 following inoculation with *Bradyrhizobium* and Glucoacetobacter at 240 hpi to identify key genes and pathways involved in beneficial plant–microbe interactions, nutrient acquisition, and defense regulation.
16.	CRP on Hybrid Technology (Rice)	A. S. Hari Prasad, P. Senguttuvel, P. Revathi K.B. Kemparaju, K Sruthi	ICAR	2015-2026	23.00	Advanced F_7–F_8 populations carrying the early morning flowering (EMF) trait were phenotyped for heat tolerance and genotyped using 1K RiCA SNP markers to identify superior introgression lines. Conversion of APMS6B into a novel CMS line with *Xa21, Xa38*, and *Pup1* is in the BC_1F_1 stage, with test crosses evaluated for fertility restoration and adaptation to stress-prone environments. In parallel, 150 parental lines (restorers, maintainers, and checks) were characterized using SSR and SNP markers and phenotypic data, enabling the development of 13 heterotic groups. Representative parental lines were test-crossed in a line × tester design, and the resulting hybrids were evaluated across two environments to identify promising heterotic combinations for hybrid rice breeding.
17.	Screening Bacterial Isolates for Nitrogen Fixation and *In Vivo* Evaluation of Selected Isolates	P. C. Latha, Bandeppa Sonth, MBB Prasad Babu and R.M. Sundaram	Valagro Biosciences Private Limited, Hyderabad	2021-2026	7.96	A total of 37 bacterial isolates were screened for nitrogenase activity using the acetylene reduction assay (ARA), revealing significant variability in biological nitrogen fixation potential. Five elite isolates (vmc 30/340, vmc 30/943, vmc 30/371, vmc 30/391, and vmc 30/370) exhibited superior nitrogenase activity and were identified as promising candidates for further evaluation as bioin enchmarked against standard diazotrophic reference strains for the ARA, *Paenibacillus sonchi* (810.86 ηmol $C_2H_4h^{-1}mg^{-1}$), *Gluconoacetobacter*
						oculants, with performance b*diazotrophicus* PAL_5 (1062.92 ηmol $C_2H_4h^{-1}mg^{-1}$), and *Azospirillum* (404.045 ηmol $C_2H_4h^{-1}mg^{-1}$).
18.	Evaluation of Urea Mixed Biochar on Irrigated Rice	V. Manasa, R. Gobinath, MBB Prasad Babu, Bandeppa Sonth, R M Kumar, MD Tuti	Shri A M.M Murugappa Chettiar Research Centre (MCRC)	2023-2026	10. 08	The field experiments conducted during *rabi* 2023-24, *kharif* 2024 and *rabi* 2024-25 clearly demonstrate that integrating biochar with urea fertilizer offers promising results for sustainable rice production in Vertisols. While the application of 100% recommended dose of nitrogen (RDN) through urea consistently produced the highest grain and straw yields, treatments involving partial substitution of urea nitrogen with rice straw biochar (RSB) and coconut husk biochar (CHB), particularly at 25% biochar incorporation levels recorded comparable growth, yield attributes, grain yields, and nutrient uptake. Post-harvest Soil properties, especially soil organic carbon and available nitrogen, showed marginal improvement with biochar application, supporting soil fertility enhancement.

Externally Funded Projects

S. No.	Title	Investigators	Funding source	Duration	Budget in lakh Rs.	Brief Progress of work
19.	Tackling Emerging Diseases and insect pest Problems in rice through innovative genomic approaches	Divya Balakrishnan, Y Sridhar associates: SV Saiprasad, Chinna Babu Naik and V Paparao	DBT	2023-2028	109.072	During 2025-2026, BPH populations were collected from Western and Central states of India and were cultured, maintained and sequenced. A set of 33 differentials developed using various germplasm was used for screening against this population to identify resistance pattern as well as for virulence analysis. Based on virulence analysis four superior differentials- IC 75975, IC 76013, IC 216735 and IC 76057 were genotyped using markers and found to exhibit broad-spectrum resistance for inte Dgration into BPH resistance breeding programs. Resistant donors were crossed among each other and high yielding lines to generate 120 new crosses. Hybridity was confirmed using polymorphic markers and F_1's were intercrossed to generate populations with multiple donors. Mapping population (Swarna/*O. rufipogon* IC309814) was phenotyped, genotyped (SSRs/SNPs), followed by QTL mapping.
20.	Genomic selection for development of rice genotypes tolerant to low soil Phosphorus	MS Anantha	DST SERB	2021-2026	38.75	Established a training population for genomic prediction of low phosphorus tolerance in rice by estimating GEBVs from phenotypic data (two seasons) and 885 SNP markers across 245 genotypes. A genomic prediction model is being developed for estimating GEBVs of new germplasm using genotypic data alone. A validation population of 100 BC_1 lines (IR64 / *O. glaberrima*) has been phenotyped under low-phosphorus and control conditions, with genotyping currently underway.
21.	CRP on Hybrid Technology (Rice)	A. S. Hari Prasad & P. Senguttuvel, P. Revathi, K.B. Kemparaju, K Sruthi	ICAR	2015-2026	19.28	Five new hybrids viz., IIRRH 188 and IIRRH 189 (IHRT E); IIRRH 190 and IIRRH 191 (IHRT ME); and IIRRH 192 (IHRT M) were nominated to the AICRPR trials during *kharif* 2025. Efforts were initiated to improve the maintainer line IR68897B for resistance to bacterial blight (BB) and blast diseases in hybrid rice through a genomics-assisted breeding strategy. The breeding programme was initiated during Wet Season 2023 by crossing IR68897B (recurrent parent) with DRR Dhan 62 (donor parent carrying *Xa21* for bacterial blight resistance and *Pi54* for blast resistance). During *rabi* 2024–25, foreground and background selection in the BC_2F_1 generation was carried out to identify plants possessing the target genes along with maximum recurrent parent genome recovery. The identified double gene-positive plants with highest genome recovery were advanced during *kharif* 2025 for the development of the BC_2F_2 population.
22.	Trials for hybrids and HYVs in Eastern India-INVO74107	P Senguttuvel; Prakash Singh, BAU; Baudh Bharathi, ANDUAT; Ram Lakan Verma, CRRI	BMGF	2025-2027	2.65 Crores	Climate resilient rice hybrids and varieties (released in last 5 years) were evaluated at 15-20 centres of Bihar and Uttar Pradesh. During *kharif* 2025, 19 early- and medium-duration rice hybrids and varieties were evaluated for yield, grain quality, and stress tolerance through a collaborative initiative supported by the Bill & Melinda Gates Foundation involving ICAR-Indian Institute of Rice Research, Bihar Agricultural University, RPCAU, KVKs, and farmer groups across Bihar and ANDUAT, Masodha, UP. Hybrids such as ADV 8283, Arize 6555DT, US 380, and DRRH4, along with varieties including DRR Dhan 64
						and DRR Dhan 70, showed superior performance and were identified for large-scale demonstrations and varietal replacement programs. DRR Dhan 60, DRR Dhan 53, DRR Dhan 55, DRR Dhan 75 of IIRR were identified for minikit trials at farmer's field for further upscaling.

S. No.	Title	Investigators	Funding source	Duration	Budget in lakh Rs.	Brief Progress of work
23.	Genome engineering of host genes for yellow stem Borer and Brown Plant Hopper resistance using CRISPR/Cas technology	Kalyani M Barbadikar, A P Padmakumari, Y Sridhar, Jhansi Lakshmi, Satendra Kumar Mangrauthia, Papa Rao Vaikuntapu	DBT	2023-2026	35.0	Agrobacterium-mediated transformation of rice using immature embryos and mature seed-derived calli is progressing successfully. Hygromycin-resistant calli and regenerated shoots have been obtained, with immature embryos showing superior transformation efficiency. The regenerated events are currently being advanced for molecular validation and evaluation of targeted genetic modifications.
24.	Development of Climate Resilient high yielding trait improved varieties of Swarna: A Mega Rice Variety of India.	Abdul Fiyaz R, R M Sundaram, P Senguttuvel	CSIR	2024-2027	170,00000	Developed climate-resilient, high-yielding improved Swarna rice lines through marker-assisted breeding. The project successfully pyramided genes for bacterial blight resistance (*Xa21*), blast resistance (*Pi54*), submergence tolerance (*SUB1*), lodging tolerance (*SCM2*), and enhanced yield (*OsSPL14*) into the mega rice variety Swarna. Ten homozygous F_3 lines carrying the target gene combinations were identified using gene-specific markers and advanced for evaluation. A major milestone of the project was the development and release of DRR Dhan 89 (Super Swarna), a marker-assisted breeding-derived variety combining bacterial blight and blast resistance with improved yield, which has been officially notified for cultivation. In addition, several improved Swarna lines with multiple stress tolerance and enhanced yield have been developed and are undergoing advanced multi-location evaluation, providing valuable genetic resources for developing next-generation climate-resilient rice cultivars.
25.	Deciphering and deploying low phosphorus tolerance and nitrogen use efficiency in rice using targeted genomics approach	C N Neeraja, M S Anantha, P Brajendra	NASF	2022-2026	69.44	NUE QTLs identified on chromosomes 3, 5, and 10. F_2 seeds generated from 5 different crosses were received from NRRI, and F2 seeds generated from 9 different crosses received from CAU, Barapani were grown 48 F5:6 were evaluated in N50, N100 and P20 during Rb'2025. Single plant yield (SPY) has association with the marker RM6378 in N-low condition and phosphorous applied at 40 kg / hectare. Haplotype analysis was performed on rice accessions from the 3K panel under three nitrogen regimes (N0, N50, N100) to identify trait-associated haplotypes using t-test comparisons. A total of 42 significant haplotype–trait associations were identified across ten candidate genes. Characterization of DUF1677 *Os07g0209700* gene through sequencing in four rice genotypes, viz., Rasi, ISM, BPT5204, and Varadhan, has identified nine single nucleotide polymorphisms (SNPs) and one 1-bp deletion.
26.	Precise Gene Editing in Potassium Uptake /Distribution Machinery to Develop Mineral Nutrient Deficiency Tolerant Rice [Hi"K"E]	Satendra K Mangrauthia	DBT	2023 - 2026	23.55	An efficient tissue culture and *Agrobacterium*-mediated transformation protocol was standardized for the *indica* rice cultivar MTU1010. Optimized callus induction was achieved using 2,4-D, proline, and glutamine, followed by successful Agrobacterium infection, selection, and plant regeneration. Efficient regeneration was obtained using cytokinin-supplemented media providing a robust platform for genetic transformation and genome editing studies.
27.	Network Project on Crop Bioinformatics: Decoding Agronomically Important Metabolic Pathways in Rice, Chickpea, and Ginger"	Kalyani M Barbadikar C. N. Neeraja, R. M. Sundaram, Divya Balakrishnan, Satendra Kumar Mangrauthia, Santosha Rathod	DBT	2023-2026	15	Developed ICAR-IIRR NGS Database for systematic storage and access to NGS data, including WGS, transcriptomics, GBS, small RNA, lncRNA, and microbial data. For rice root-knot nematode (*Meloidogyne graminicola*) resistance, GWAS using GLM, MLM, and FarmCPU models in GAPIT identified five highly significant SNPs distributed across chromosomes 1, 2, 4, and 8. In addition, haplotype–phenotype analyses were carried out for root architecture and aerobic adaptation traits, facilitating the identification of superior haplotypes associated with stress resilience..

Externally Funded Projects

S. No.	Title	Investigators	Funding source	Duration	Budget in lakh Rs.	Brief Progress of work
						Genotype and phenotype associations have been done by identifying genomic loci, SNPs associated with biotic, abiotic, agronomic, traits. Mining and integrative analysis of diverse genomic datasets, including transcriptome, lncRNA, mRNA, QTL-seq, whole-genome resequencing datasets, were undertaken to identify genetic factors governing important rice traits. GWAS were performed for multiple biotic stress and adaptive traits. For yellow stem borer tolerance, significant MTAs were identified, including SNPs linked to candidate genes
28.	Haplotype-assisted mapping of salinity tolerance at seedling and reproductive stages using MAGIC RILs for climate resilient rice	Suneetha Kota, Kalyani Kulkarni, Akshay S. Sakhare, R.M. Sundaram		2023-2026	40.10	Development of Multi-parent Advance Generation Inter-cross (MAGIC) populations was initiated with parents including elite lines with desirable traits such as heat tolerance, seedling and reproductive salinity tolerance, nutrient use efficiency, flood tolerance and yield enhancing genes Gn1, SCM2 and OsSPL14. The two-way inter-crosses generated are being raised for four-way intercross generation.
29.	To improve the efficiency of genome editing with CRISPRCas9 and to create novel sources of epigenetic variation in plants	R M Sundaram, Satendra K Mangrauthia	DBT	2024-2026	23.93	Epigenetic variants of Improved Samba Mahsuri (ISM) were developed using HDAC treatment of seeds. The variants have been grown for two generations which showed variations for flag leaf length, flowering date and grain type. Single seed descent method is being used to develop epiRILs. Additionally, ddm1 gene is being targeted through genome editing to develop epiRILs. The CRISPR/Cas9 construct targeting rice ddm1 gene has been developed and is being transformed into ISM.
30.	Dissecting plant responses to growth promoting microbes	C Kannan, R M Sundaram, PC Latha	DBT	2024-2027	36.62146	A panel of 200 genetically diverse Indian rice accessions (subset of the 3K Rice SNP-Seek panel and released ICAR-IIRR varieties) was established for field evaluation of growth promotion using the native BIK3 (Bacillus cabrialesii) strain and Bacillus subtilis MTCC 121 as a standard check. *rabi* season field evaluation was completed, and *kharif* 2025 trials are in progress to assess genotype-specific responses to microbial inoculation.
31.	The RAISE – Rice AI Stress Evaluator	B. Sailaja, Ch. Padmavathi, G. S. Laha, B. Sreedevi, A.P. Padma Kumari, N. Somasekhar, .Krishnaveni, M.S. Prasad, Brajendra, V. Manasa, R. M. Sundaram, RM Kumar & Santosha Rathod	Sree PVF (Sree Padmavathi Venkateswara Foundation)	2024-2026	49.96	A comprehensive image dataset covering major rice insect pests, diseases, nutrient deficiencies, weeds, and nematode damage was generated and uploaded to the ICAR-IIRR server. Image annotation and classification are currently in progress to develop high-quality datasets for training AI and deep learning models. A prototype Android application, RAISE, has been developed with image capture and diagnosis modules supporting both online and offline modes. The project has established the foundation for an AI-enabled, real-time decision support system to facilitate rapid diagnosis of rice biotic and abiotic stresses and provide timely advisories to farmers.
32.	Molecular mapping of novel brown spot resistance in *Oryza rufipogon* derived introgression line and pathogen diversity analysis of *Bipolaris oryzae*	Basavaraj	DST-SERB	2023-2026	32.81	A BC_1F_2 mapping population (232 plants) derived from BPT 5204 / *O. rufipogon* was successfully developed and genotyped using the 1K RiCA SNP panel. The derived BC_1F_3 population was established and phenotyped for brown spot resistance under artificial inoculation to facilitate QTL mapping. In parallel, ~150 *Bipolaris oryzae* isolates were collected and characterized for morphological, cultural, and virulence diversity, with molecular identification confirming B. oryzae as the predominant pathogen along with cryptic *Bipolaris* and *Curvularia* species, providing a well-characterized pathogen resource for resistance screening and genetic analysis.

S. No.	Title	Investigators	Funding source	Duration	Budget in lakh Rs.	Brief Progress of work
33.	Evaluation of Nano Bio Tech Capsule in irrigated rice	Latha P.C, Bandeppa K. Surekha, V. Manasa	Krishna Agro-Bio Products	2021-22	3. 54	Nano biotech capsule is a special formulation developed using bacterial consortium with a long shelf life of 2 years, this formulation can reproduce and grow in the soil by utilizing carbon sources available near the root zone and convert insoluble major nutrients into easily available form to the plants and improve the utilization of fertilizer effectively. Combined soil application of nano-biotech capsule along with 100% RDF and 100% RDF + FYM significantly improved several rice plant (DRR Dhan 42) and soil parameters when compared to similar treatments without culture treatments. Application of nano-biotech capsule to rice crop resulted in (i) Increased tiller number, panicle number, grain yield straw yield (ii) Increased total NPK uptake by crop and (iii) Increased fluorescein diacetate hydrolase and dehydrogenase and was also found to enhance soil organic carbon content, indicating that the formulation could significantly impacted both soil and plant fitness and crop productivity.
34.	Baseline study of Isopyrazam against Rice Sheath Blight (*Rhizoctonia solani*).	V. Prakasam, D. rishnaveni, C. Kannan; G.S. Laha, S. Arun Kumar; MS Prasad,	Syngenta India Ltd	2024-2026	23.9 lakhs	A total of 90 isolates were characterised based on the cultural parameters and sequenced with ITS region from the states Punjab, Haryana, Uttarakhand, West Bengal and Karnataka sheath blight pathogen collection. Based on ITS sequence analysis, the isolates were identified as 9 isolates of *Waitea circinate* (teleomorphs *R. oryzae*), 19 of *Ceratorhiza oryzae-sativae* (teleomorphs *R. oryzae-sativae*), and 30 of *Rhizoctonia solani*.
35.	Studies on *Paraburkholderia bengalensis* Sp. Nov. and Microbacterium sp. Strain GB16_BI for developing rice-specific nitrogen fixing system	Papri Nag under Dr PC Latha	DST/WISE-PDF/LS-4/2023	2024-2027	42.77	Predicted the DNRA pathway in the Microbacterium bengalense GB16_1_BI sp. nov. Predicted multiple antimicrobial peptides and secondary metabolites produced by GB16_1_BI. Established the potential of GB16_1_BI as a biofertilizer in rice by demonstrating its ability to manipulate the rhizosphere microbiome for plant growth.
36.	Enhancing Productivity and nutritional quality in DSR through integrated Fe management IRRI – ICAR collaborative project (Thematic Area 4)	S Vijayakumar	IRRI	2023-2026	11 lakh	Field experiments were conducted at the Rajendranagar farm with seven treatments involving different combinations of timing, application rate, and iron fertilizer sources. The crop was sown in January and harvested in May. Plant samples are currently being analysed for nutritional enrichment.
37.	Promotion of iron coating for DSR – Network trial	S Vijayakumar	JFE steel India Pvt Ltd.	2024-25	7 lakh	The technology significantly enhanced seed density, preventing floating and bird predation in Wet-DSR. It also boosted early seedling vigour, improved weed competitiveness during the critical first 20 days. Data showed a 92–95% germination rate, elevated early-stage SPAD values (32–35), and a 15–20% increase in seedling dry weight, culminating in a 5–8% grain yield advantage in iron-deficient soils.

Externally Funded Projects

Externally Funded Projects Sanctioned During 2025

S. No	Title	Investigators	Funding Agency	Duration	Budget (Lakhs)
1	Evaluation of XDE120 30%WG for bio-efficacy against planthoppers, its phytotoxicity and effect on natural enemies in rice.	A.P. Padmakumari (PI) Y. Sridhar (Co -PI)	M/s. Corteva Agri-science India Pvt. Limited	2025-26	Rs 30.18
2	Optimising the efficacy of insecticides against the rice yellow stem borer, *Scirpophaga incertulas* (Walker) by timing the application using population monitoring as decision support tool	Y. Sridhar (PI) A. P. Padma Kumari (Co-PI)	M/s. Corteva Agri-science India Pvt. Limited	2025-2027	25
3	''Evaluation of product VT-T-01 from Vaibhav Traders against the rice root-knot nematode Meloidogyne graminicola	Dr Satish Chavan	"Vaibhav Traders"	2025-26	5.25
4	Trials for hybrids and HYVs in Eastern India-INV074107"	Dr Hari Prasad & Dr Senguttuvel	Bill & Millinda Gates Foundation	2025-27	226.12

Brief Report of Completed Externally Funded Projects

Identification and characterization of fungal effectors and host factors in rice- false smut pathosystem (2022-2025) [PI: D Ladhalakshmi, Co-PIs: Kalyani Barbadikar, Divya Balakrishnan] Funding Agency: ICAR-NASF

The project generated significant genomic and breeding resources for rice false smut management through a comprehensive nationwide investigation of the pathogen and host response. A total of 206 Ustilaginoidea virens isolates collected from 17 rice-growing states were systematically characterized using morphological, phenotypic, molecular, and mating-type analyses and conserved as a national pathogen repository. Developed chromosome-level reference genome assemblies for two representative U. virens isolates (IIRR and PAU) using PacBio, Illumina, and Hi-C sequencing, achieving >98% BUSCO completeness, superior assembly quality, identification of specific highly virulent effectors. Whole-genome resequencing of 12 diverse isolates provided insights into pathogen diversity, virulence, and phylogenetic relationships. Integrated dual transcriptome analysis (Iso-Seq and Illumina RNA-seq), supported by SEM, elucidated the molecular basis of rice false smut tolerance by revealing coordinated activation of host immune signaling pathways, identifying key resistance-associated genes and fungal effectors, and defining contrasting host–pathogen interactions between tolerant and susceptible genotypes. Multi-location evaluation of 187 indica lines of the 3K SNP-Seek panel identified several promising sources of false smut tolerance, including the traditional landraces Lakha Kuar (NASF-139), Pokkali (NASF-21), Bhut Muri (NASF-112), ARC18092 (NASF-36), NCS 237 (NASF-47), and NCS 771A (NASF-155), along with PAU-2 (Vary Lava) and IIRR10 (NPS13) as elite donor lines for resistance breeding. Furthermore, GWAS identified five significant SNPs, while QTL mapping and QTL-seq consistently identified a major stable resistance locus on chromosome 11, providing robust molecular markers, candidate genes, and validated donor germplasm for accelerating marker-assisted breeding of rice varieties resistant to false smut.

Evaluation of NATCO Pharma Ltd coded Pheromone Product against Lepidopteran pests (YSB & RLF) of Rice (2024-2025) (PI: Ch. Padmavathi, Co-PI: Chinna Babu Naik).

A field experiment was conducted to evaluate NATCO products in G Block at the ICAR–IIRR farm located at the ICRISAT campus. The experiment comprised 13 treatments laid out in a Randomized Block Design (RBD) with three replications. The products were sprayed twice, at 45 and 60 days after transplanting (DAT). Observations on insect pest incidence were recorded at weekly intervals. In addition, pheromone traps were installed in each plot to monitor moth catches, and grain yield was recorded at harvest. The salient findings are given below

- Dead heart (DH) damage caused by stem borer was very low across all treatments, ranging from 0 to 1.70%.
- White ear (WE) damage ranged from 4.50 to 11.43%, with the highest damage observed in T13 (untreated control) and the lowest in T12 (Chlorantraniliprole SC).
- The differences among the remaining treatments were statistically non-significant. Among the tested product treatments, T1 (PM03-01 6.25+12) recorded 5.25% WE damage, followed by T7 (PM03-01 6.25+37.5) with 6.02% WE damage.
- Leaf folder damage varied from 4.60 to 10.14% damaged leaves (DL), with the minimum damage recorded in T2 (PM03-01 6.25+15) and the maximum in the untreated control. However, the damage levels were statistically at par with the other treatments.
- The cumulative pheromone trap catches ranged from 4 to 17 moths. The lowest trap catches were recorded in T4 (PM03-01 6.25+30), while the highest catches were observed in T13 (untreated control) and T11 (PM03 6.25).
- Yield per acre was significantly high in T12 (Chlorantraniliprole SC) followed by T4 (PM03-01 6.25 +30) which was at par with T8 (PM03 – 02 6.25 +60). The lowest yield was observed in T13 (control) followed by T11 (PM03 6.25).

Evaluation of Rice lines against brown planthopper, *Nilaparvata lugens* (Stal). (2024-2025) [PI: A.P. Padmakumari; Co -PIs: Y. Sridhar & PM Chirutkar] Funding agency: Mahindra Agri solutions Ltd.

Two hundred entries, consisting of B-lines, R-lines and checks were screened for brown planthopper resistance under glasshouse conditions following Standard Seed Box Screening Technique. Results identified two entries as resistant (Damage Score: 1.1 to 3.0) and seven entries as moderately resistant (Damage Score: 3.1 to 5.0) and all the other entries were susceptible.

Marker-assisted introgression of genes associated with yield enhancement and resistance against bacterial blight and blast diseases into an elite rice variety, 'Jaya' (2021-2025) [PI: R. Abdul Fiyaz; CO-PIs: R.M. Sundaram, G.S. Laha, J Aravind Kumar, L.V. Subba Rao and Basavaraj K] Funding Agency: DST-SERB; Budget: Rs 36.96 Lakhs

This project involved introgression of one yield enhancing gene '*Gna1*' (grain number per panicle) and two biotic stress resistant genes *Xa21* (Bacterial leaf blight resistance) and *Pi54* (Blast resistance). The recurrent parent used is 'Jaya' and donor parent is an 'Isogenic line of MTU 1010 containing genes '*Xa21+Pi54+Gn1a*'. Of the total 50 F_1 plants, 15 true F_1 plants were confirmed using the functional marker PTA248. All the true F_1 hybrids were used in crossing programmes to produce BC_1F_1 seeds. A total of 34 BC_1F_1 seeds were produced. Foreground and background selection were done and promising introgression lines were selected to cross with recurrent parent to generate BC_2F_1 Seeds. Two lines from the above project nominated to AICRP and of which one line found promising from the AICRP testing.

Effect of Flupyrimin 106 g/L SC on the feeding behaviour of brown planthopper (2024) [PI: Y Sridhar] Funding agency: ARYSTA Lifescience India Ltd; Budget: Rs 47. 738 Lakhs

The number of probing marks were higher and amount of honeydew excretion was lower in flupyrimin treatments indicating the feeding deterrence by flupyrimin. In flupyrimin treatments, oviposition marks were significantly lower as compared to dinoterfuran and untreated control, across the observation periods indicating a strong oviposition deterrence effect by flupyrimin. The effect was pronounced at higher dose.

Artificial Screening of Genotypes against False smut disease resistance/ tolerance (2024) [PI: Ladha Lakshmi] Funding agency: Bayer Crop Science Ltd.; Budget: Rs. 75.7796 Lakhs

Artificial screening of forty-Eight genotypes was given from Bayer Bio-Science Private Limited, Hyderabad was done in *kharif* 2023. Sowing was done in the month of July, 2023 and one month old seedlings were transplanted. In each genotype, three replications were maintained and a minimum of four panicles were inoculated. False smut pathogen *Ustilaginoidea virens* was mass multiplied and conidial inoculum of 2 to 3 ml was inoculated by adopting injection method of inoculation. The data was recorded as the number of smut balls per plant and maximum number of smut balls were used for the selection of genotypes. The genotypes were categorized with the based on the smut balls viz., (0 smut Ball – Score 0 – Highly resistant; 1 smut Ball – Score 1 –Resistant; 2 smut Ball – Score 3 – Moderately resistant; 3to 6 smut Ball – Score 5 – Moderately susceptible; 7-10 smut Ball – Score 7 – Susceptible; >11 smut Ball – Score 9 – Highly Susceptible, Huang et al., 2019). I *kharif* 2023- forty-eight lines were artificially screened and based on the score, twenty-six lines were further artificially screened during *kharif* 2024. Most of the screened genotypes were long duration in nature and the results revealed that the genotypes viz., BBPL 27, BBPL 36, BBPL 37 showed moderate resistance against false smut disease. However, the results have to be validated further.

Mapping Genomic Regions Associated with Bacterial Leaf Blight Resistance Derived from *Oryza glaberrima* (2021-2025) [PI: Dr C. Gireesh; Co-PIs: R.M. Sundaram, G. S. Laha and M.S. Anantha] Funding Agency: DST SERB; Budget: Rs. 27.57 Lakhs

Identified a major QTL conferring bacterial blight resistance from *Oryza glaberrima*. A BC_1F_5 mapping population derived from IR64 × *O. glaberrima* was evaluated against the virulent *Xanthomonas oryzae* pv. *oryzae* strain IX-020 using the leaf-clipping inoculation method. QTL analysis integrating phenotypic data from three seasons with genotypic

data generated using 2,089 SNP markers (GBS and 1K RiCA) identified a stable major QTL on chromosome 9 through both Single Marker Analysis (SMA) and Inclusive Composite Interval Mapping (ICIM). The QTL exhibited a LOD score of 4.0 and explained 29.46% of the phenotypic variation, demonstrating consistent expression across all three seasons. In addition, several minor QTLs associated with bacterial blight resistance were identified, indicating their potential contribution to the resistance observed in *O. glaberrima*.

Resistance monitoring study for rice sheath blight pathogen (*Rhizoctonia solani*) against azoxystrobin fungicide. (2022-2024) [PI: V Prakasam; Co-PIs: Drs M S Prasad, G S Laha, D Krishnaveni, C Kannan and S Arun Kumar] Funding Agency: XXX ; Budget: Rs 23.91 Lakhs

A comprehensive sheath blight survey covering five major rice-growing states (Punjab, Haryana, Uttarakhand, West Bengal, and Karnataka) resulted in the collection of 250 disease samples and isolation of 233 pathogen isolates. Detailed cultural and morphological characterization revealed substantial variability among the isolates, including 35 micro-sclerotial isolates resembling *Rhizoctonia oryzae-sativae/R. oryzae*, with the highest occurrence recorded in West Bengal. All isolates were evaluated for in vitro sensitivity to azoxystrobin across six fungicide concentrations, generating baseline information for monitoring fungicide resistance and supporting effective sheath blight disease management strategies.

Evaluation of Penflufen 240 g/l fs (Emesto Prime) against sheath blight of rice. (2022-2024) [PI: Dr V Prakasam; Co-PIs: Drs M S Prasad, G S Laha, G Jesudasu, K Basavaraj and D Ladhalakshmi] Funding Agency: Bayer Crop Science; Budget: Rs. 12.74 lakh

Experiment (wet and dry seed treatments) revealed that all doses of penflufen 240 g/L FS and carbendazim 50% WP reduced sheath blight severity effectively compared to untreated control when applied with through wet and dry seed treatments. All the doses of penflufen 240 g/L FS performed significantly better than the positive control molecule carbendazim 50% WP in reducing the sheath blight severity. The result revealed that seed treatment with Penflufen 240 g/L FS @ 2.40 g a.i/kg seed found lowest PDI of sheath blight in both wet and dry method. Penflufen 240 g/L FS @ 2.40 g a.i/kg maximum reduced the sheath blight disease when compared to the control during both the seasons (K-2022 and K-2023). It was found that seed treatment (wet and dry) with penflufen 240 g/L FS @ 2.40 significantly increased total grain yield (t/ha) when compared to other treatments in both the seasons of testing.

Evaluation of Nano DAP in irrigated rice (2023 -2025) [PI: Dr. V. Manasa, Co- PIs: Dr. K. Surekha, Dr. R. Gobinath, Dr. Brajendra, Dr R Mahender kumar, Dr. Bandeppa] **Funding Agency:** Coromandel International, Ltd,; **Budget:** Rs. 11.8 lakh

A two-season field study demonstrated that combined application of 100% recommended dose of phosphorus and two sprays of nano DAP @ 5 ml/L has the potential to enhance growth, yield attributes, nutrient uptake and nutrient use efficiency of rice crop. Application of 75% RDP combined with two foliar sprays of nano DAP @ 5 ml /L also resulted statistically at par results with 100% RDP supplemented with two sprays of nano DAP for most of the parameters indicating the possibility of reducing the recommended dose of phosphorus up to 25% with two foliar sprays of nano DAP in the irrigated rice in Vertisols. Further comprehensive physiological and biological research, along with multi-location studies, are necessary to support the findings.

Annexure - 1

Details of Ongoing Institutional Projects in 2025

Project Code	Project Title	Principal Investigator	Co-Investigators
		Plant Breeding	
GEY/CI/BR/31 (2022-2026)	Breeding for high yielding, medium to late maturing rice varieties with tolerance to biotic stresses and good grain quality	**Dr. S.V. Sai Prasad**	Dr. Jyothi Badri, Dr. J Arvind Kumar, Dr. M. Srinivas Prasad, Dr. Y Sreedhar **Collaborators** Dr. PV Ramana Rao, Dr.Y Suneetha, Dr. B Srinivas, Dr. CA Deepak **Associates:** Dr. Divya B, Dr. MS Ananta, Dr. R Abdul Fiyaz, Dr. R Mahender Kumar, Dr. CN Neeraja, Dr. Hari Prasad, Dr. P Raghuveer Rao
GEQ/CI/ BR/35 (2024-2029)	Developing nutritionally-enriched high yielding rice cultivars	**Dr. J. Aravind Kumar**	Dr CN Neeraja, Dr D Sanjeeva Rao, Dr J Badri, Dr S Rathod, Dr Ch Suvarna Rani
GEY/CI/ BR/27 (2020-2025)	Novel genetic approaches for development of climate smart rice varieties	**Dr. Suneetha Kota**	Dr. G. Padamavathi, Dr. P. Senguttuvel, Dr. C. Gireesh, Dr. R M Sundaram, Dr. Santosh Rathod, Dr. Akshay S. Sakhare, Dr. Brajendra, Dr. Mangal Deep Tuti, Dr. Satender K. Mangrautia **Collaborators** Dr.Viswanathan C, Dr. Girija Rani, Dr. Krishnamurthy SL, Dr. Manohar K K, Dr. Ravi Kiran, Dr. Nitish R. Prakash
GEY/CI/ BR/29 (2021-2026)	Genetic improvement of direct seeded rice traits using elite varieties and wild species	**Dr Krishnamurthy S L**	Dr. R.M. Sundaram, Dr. M.S. Anantha, Dr. B. Divya, Dr. P. Senguttuvel, Dr. R. Mahendra Kumar, Dr. B. Sreedevi, Dr. K. Basavaraj, Dr. Akhay S Sakhare, Dr. Satish Chavan, Dr. Kalyani **Associates** Dr. Suneetha K, Dr. G Padmavati, Dr. Jyothi Badri, Dr. Kemparaju K B, Dr. Prakasam V, Dr. Y Sridhar, Dr. Raghuveer Rao
GEY/CI/BR/34 (2023-2028)	Conventional and haplotype based breeding for new plant type architecture in rice	**Dr Jyothi Badri**	Dr. Divya Balakrishnan, Dr. J. Aravind Kumar, Dr. CN Neeraja, Dr. D Sanjeeva Rao, Dr. V Prakasam
GEY/CI/ BR/24 (2022-2026)	Genomic assisted breeding for development of low phosphorous and nitrogen stress tolerant rice varieties	**Dr Anantha M S**	Dr S L Krishnamurthy, Dr. R M Sundaram, Dr. R Mahender Kumar, Dr. C N Neeraja, Dr. P Senguttuvel, **Associates** Dr Brajendra, Dr. S K Mangrauthia, Dr. Suneetha K, Dr. Ch. Suvarna Rani, Dr. Akshay Sakhare, Dr. P C Latha
GEY/CI/BR/32 (2023-2026)	Target 1000: Towards revolutionizing rice yields through increasing number of grains per panicle	**Dr. R. Abdul Fiyaz**	Dr. R. M. Sundaram, Dr. SV Sai Prasad, Dr. S.K. Mangrauthia, Dr. Geetha Govind
GEY/CI/BR/30 (2021-2025)	Breeding high yielding rice varieties using interspecific wild introgression lines derived from *Oryza nivara* and *Oryza rufupogon*	**Dr. Divya Balakrishnan**	Dr. G Padmavathi, Dr. Jyothi Badri, Dr. C. Gireesh, Dr. Ladha Lakshmi, Dr. B. Kalyani

Project Code	Project Title	Principal Investigator	Co-Investigators
GEY/CI/ BR/33 (2023-2027)	Molecular breeding approach to improve special aromatic rice through pheno genomic trait interventions	**Dr. Suvarna Rani Chimmili**	Drs. Dr. S.V. Sai Prasad, Dr. J Aravind Kumar, Dr. Jyothi Badri, Dr. Krishna Murthy S.L., Dr. Anantha M.S., Dr. Abdul Fiyaz R. , Dr. S.K. Mangrauthia, Dr. Chinna Babu Naik V, Dr. Satyawara Jasudasu Gompa
		Hybrid Rice	
GEY/CI/HY/13 (2016-2028)	Development and evaluation of three line hybrids with better grain quality and resistance to major pests and diseases.	**Dr. A. S. Hari Prasad**	Dr. P Senguttuvel, Dr. P Revathi, Dr. KB Kemparaju, Dr. K Sruthi, Dr. RM Sundaram
GEY/CI/ HY/15 (2018-2025)	Genetic enhancement of hybrid rice parental lines suitable for aerobic and tolerance to salinity conditions through conventional and molecular approaches	**Dr. P. Senguttuvel**	Dr. AS HariPrasad, Dr. RM Sundaram, Dr. P Revathi, Dr. KB Kemparaju, Dr. K Sruthi, Dr. SV Sai Prasad, Dr. B. Sreedevi, Dr. K Suneetha, Dr. MS Anantha, Dr. G. Padmavathi, Dr. Mahender Kumar, Dr. R Gobinath and Dr. N. Somasekhar
GEY/CI/HY/17 (2022-2027)	Development and evaluation of biotic stress- resistant restorers and their hybrids for yield and grain quality traits by conventional and molecular approaches in rice	**Dr P Revathi**	Dr. Senguttuvel P, Dr. K. Sruthi, Dr. A.S. Hari Prasad, Dr. Aravind Kumar Jukanti, Dr. C.N. Neeraja Dr. SK Mangrauthia, Dr. M. Srinivas Prasad, Dr. G.S. Laha, Dr. V. Prakasam, Dr. Mangal Deep Tuti & RM Sundaram
GEY/CI/HY/16 (2021-2025-2027)	Genetic improvement of maintainer lines for biotic stress and yield enhancing genes.	**Dr. K. B. Kemparaju**	Dr. K Sruthi, Dr. AS Hari Prasad, Dr. R. Abdul Fiyaz
GEY/CI/HY/18 (2023-2028)	Development and validation of heterotic groups in rice and Improvement of maintainer lines for major biotic stresses	**Dr K. Sruthi**	Dr.A.S. Hari Prasad, Dr. P. Senguttuvel, Dr. P. Revathi, Dr. B. Kemparaju and Dr. R.M. Sundaram
Biotechnology			
ABR/CI/BT/17 (2021-2026)	Application of genomic, transcriptomic and proteomic tools for understanding and improvement of yield heterosis in rice hybrids	**Dr. R. M. Sundaram**	Dr. C.N. Neeraja, Dr. A.S. Hariprasad, Dr. K. Sruthi, Dr. P. Senguttuvel, Dr. SK. Mangrauthia Dr. Kalyani K Barbadikar, Mr. P. Koteshwara Rao & Dr. T.M. Gireesha
ABR/CI/BT/21 (2024-2027)	Characterization of candidate genes associated with grain zinc in rice	**Dr.CN Neeraja**	Dr. J Aravind Kumar, Dr. D Sanjeeva Rao, Dr. Kalyani Kulkarni, Dr. K Sruthi, Dr. S K Mangrauthia, Dr. R M Sundaram
ABR/CI/BT/18 (2021-2025-2029)	Genomics and genome editing approaches for abiotic stress tolerance (low P and heat), biotic stress tolerance (sheath blight and bacterial blight), and yield improvement of rice	**Dr. S. K. Mangrauthia**	Dr.R.M.Sundaram, Dr.C.N.Neeraja, Dr. S.V. Sai Prasad, Dr. G.S. Laha, Dr. Brajendra, Dr. P. Revathi Dr. Akshay Sakhare, Dr. V. Prakasam **Associates** Dr. P. Senguttuvel, Dr. M.S. Anantha, Dr. M.D. Tuti, Dr. Sunitha Kota, Dr. D. Subrahmanyam, Dr. P.C. Latha

Project Code	Project Title	Principal Investigator	Co-Investigators
ABR/CI/BT/19 (2021-2025)	Elucidation of long non-coding RNAs and association of molecular markers for important root traits under aerobic condition	**Dr. Kalyani M. Barbadikar**	Dr. S K Mangrauthia, Dr. C. N. Neeraja, Dr. R. M. Sundaram, Dr. P. Senguttuvel
ABR/CI/BT/20 (2023-2028)	Genetic improvement of brown plant hopper (BPH) tolerance in rice through novel breeding technologies	**Dr. Papa Rao Vaikuntapu**	Dr. RM Sundaram, Dr. China Babu Naik, Dr. Divya Balakrishnan, Dr. Y Sridhar **Associates** Dr. CN Neeraja, Dr. Satendra KM, Dr. Kalyani MB, Dr. JS Bentur, Dr Preetinder Singh Sarao
		Agronomy	
RUE/CP/AG/ 14 (2020-2026)	Strategic research on enhancing water Use efficiency and productivity in irrigated rice system	**Dr. R.Mahender Kumar**	Drs. K. Surekha, Dr. B. Sreedevi, Dr. S Vijay Kumar, Dr. Ch Padmavthi, Dr. M. Srinivas Prasad, Dr. V Prakasham, Dr. N. Somashekhar, Dr. B. Nirmala, Dr. Amtul Waris, Dr. S L Krishnamurthy
RUE/CP/AG/18 (2020-2025-2028)	Development of Climate smart and economic weed management technologies for changing rice establishment systems	**Dr. B. Sreedevi**	Dr. Mahender Kumar, Dr. N. Somasekhar, Dr. P. Senguttuvel, Dr. Mangal Deep Tuti
SSP/CP/AG/15 (2016-2025)	Sustainable intensification of conservation agriculture practices in rice- maize system to enhance system productivity in Southern India	**Dr. Mangal Deep Tuti**	Dr. R. M Kumar, Dr. B. Sreedevi, Dr. S.Vijayakumar, Dr. B. Nirmala, Dr. Bandeppa, Dr. V Manasa
		Soil Science	
CCR/CP/ SS/17 (2017-2025-2028)	Studies on emission of green house gases (GHGs) from rice soils and their mitigation	**Dr. M.B.B. Prasad Babu**	Dr. RM Kumar, Dr. P.C. Latha, Dr. Brajendra, Dr S Vijay Kumar, Dr Manasa, Dr Bandeppa
RUE/CP/SS/16 (2016-2026)	Study of rice vegetation in terms of crop stress to model the yield using NDVI	**Dr. D.V.K. Nageswara Rao**	Dr. Santosha Rathod, Dr.V. Manasa, Dr.R. Gobinath **Associates** R.M. Kumar
SSP/CP/SS/18 (2017-2025)	Studies on soil organic carbon status, mapping and stocks in rice soils of India	**Dr. Brajendra P**	Dr. B Sailaja, Dr. MBB Prasad Babu, Dr. P Muthuraman
SSP/CP/SS/19 (2018-2025-2026)	Prospecting endophytic actinobacteria of rice for sustainable rice production	**Dr. PC Latha**	Dr. Bandeppa Dr. MBB Prasad Babu
SSP/CP/SS/20 (2021-2025-2026)	Development and Evaluation of N fixing and P solubilizing Microbial Consortia for Sustainable Rice Production	**Dr. Bandeppa**	Dr. P. C Latha, Dr. V. Manasa, Dr.R Gobinath, Dr. Kalyani. M Barbadikar, Dr. M D Tuti, Dr Satish Chavan
RUE/CP/SS/22 (2022-2025-2026)	Study on releasing pattern, kinetics and impact of nanoparticles in soils	**Dr. R. Gobinath**	Dr Manasa, Dr Bandeppa, Dr Brajendra

Project Code	Project Title	Principal Investigator	Co-Investigators
RUE/CP/SS/20 (2021-2025-2026)	Exploiting legacy phosphorus and enhancing phosphorus use efficiency in irrigated rice	**Dr. V. Manasa**	Dr. R. Gobinath, Dr. P.C. Latha, Dr. Bandeppa, Dr. M.D. Tuti
		Plant Physiology	
CCR/CP/PP/13 (2021-2025-2026)	Deciphering physiological basis of heat stress tolerance in rice	**Dr. Akshay S. Sakhare**	Dr.Sanjeev Rao, Dr. Suneetha Kota, Dr. Kalyani M. Barbadikar, Dr. Brajendra, Dr. Mangal Deep Tuti **Associates** Dr. S K. Mangrauthia, Dr. P. Senguttuvel, Dr. Santosha Rathod
GEQ/CP/PP/1 (2021-2025)	Selective biochemical and molecular analysis of natural and accelerated ageing in rice	**Dr. D. Sanjeeva Rao**	Dr. J. Arvind Kumar **Associates** Dr. P. Senguttuvel
COMPUTER APPLICATIONS			
TTI/CP/CA/4 (2021-2025-2026)	Smart precision models and mobile apps for real time advisories on rice crop management	**Dr. B Sailaja**	Dr. Santosha Rathod, Dr. Ch. Padmavathi, Dr. Brajendra, Dr. APK Padma Kumari, Dr. D. Krishnaveni, Dr. B. Sreedevi, Dr. R.M. Kumar, Dr. G.S. Laha, Dr. Vijay Kumar
Entomology			
HRI/ CPT/ ENT/31 (2021-2025)	Understanding the interaction of internal feeders – stem borers and gall midge with rice for their management	**Dr. A. P. Padmakumari**	Dr Y Sridhar, Dr K Suneetha, Dr B Sailaja, Dr Chinna Babu Naik **Associates** Dr Kalyani MB, Dr D Sanjeeva Rao, Dr Santosha Rathod, Dr RM Sundaram,
IPM/ CPT/ ENT/29 (2021-2025-2029)	Studies on plant nematode interactions in diverse rice phytobiomes	**Dr. N. Somasekhar**	Dr. S.N. Chavan, Dr. P.C. Latha, Dr. Sanjeeva Rao
IPM/CPT/ ENT/30 (2021-2025-2027)	Enhancing biological control of rice pests through Chemical ecology	**Dr. Chitra Shanker**	Dr Ch Padmavathi, Dr N. Somasekhar, Dr C. Kannan
HRI/CPT/ EN/27 (2024-2029)	HPR to rice leaf folder and Semiochemical approaches for the management of insect pests of rice - phase-II	**Dr. Ch. Padmavathi**	Dr Chinna Babu Naik, Dr Divya Balakrishnan, Dr D Sanjeeva Rao, Dr Kalyani M. Barbadikar
IPM/CPT/ ENT/34 (2024-2028)	Chemical control of insect pests of rice and identification of novel donors for resistance to brown planthopper	**Dr. Y. Sridhar**	Dr A. P. Padma Kumari, Dr Chitra Shanker, Dr Ch. Padmavathi, Dr Chinna babu Naik
IPM/CPT/ ENT/32 (2024-2029)	Assessment of host plant resistance to rice white backed Plant hopper *Sogatella furcifera* (Horvath) and **its management**	**Dr V. Chinna Babu Naik**	Dr Ch Padamavathi, Dr Y. Sridhar, Dr Divya Balakrishnan, Dr Papa Rao, Dr D. Sanjeeva Rao

Project Code	Project Title	Principal Investigator	Co-Investigators
IPM/CPT/ ENT/33 (2023-2027)	Investigations on genetics and mechanisms of resistance to rice root-knot nematode *Meloidogyne graminicola*	**Dr Satish N. Chavan**	Dr N. Somasekhar, Dr P. Senguttuvel, Dr Papa Rao Vaikuntapu
Plant Pathology			
HRP/CPT/ PATH/15 (2019-2026)	Assessment of host plant resistance to rice blast disease and its management	**Dr M.S. Prasad**	Dr V. Prakasam, Dr Divya Balakrishnan, Dr K. Basavaraj, Dr G.S. Jasudasu, Dr S.V. Sai Prasad, Dr V. Papa Rao
HRP/CPT/ PATH/13 (2020-2026)	Assessment of resistant sources and monitoring of pathogen virulence in bacterial leaf blight of rice	**Dr G.S. Laha**	Dr D. Krishnaveni, Dr D. Ladha Lakshmi, Dr R.M. Sundaram, Dr. S.K. Mangrauthia, Dr. R. Abdul Fiyaz
HRP/CPT/ PATH/14 (2011-continuing)	Assessment of host plant resistance and development of diagnostic tools for rice tungro virus disease	**Dr D. Krishnaveni**	Dr G.S. Laha, Dr C.N. Neeraja, Dr Chitra Shanker, Dr S.K Mangrauthia, Dr D. Ladhalakshmi
HRP/CPT/ PATH/19 (2019-2025-2026)	Bioformulations of antagonistic microbes for disease management in rice	**Dr C. Kannan**	Dr V. Prakasam, Dr Chitra Shanker, Dr P. C. Latha, Dr P. Senguttuvel
HRP/CPT/ PATH/26 (2023-2026)	Assessment of host plant resistance, virulence, and management of false smut disease	**Dr D. Ladhalakshmi**	Dr G.S. Laha, Dr C. Kannan, Dr K. Basavaraj, Dr Divya Balakrishnan, Dr Sanjeeva Rao
HRP/CPT/ PATH/27 (2023-2026)	Sustainable rice sheath blight disease management under Climate Change	**Dr V. Prakasam**	Dr MS Prasad, Dr G S Laha, Dr Jyothi Badri, Dr SK Mangruthia
HRP/CPT/ PATH/28 (2023-2027)	Studies on Variability and Management of brown spot disease of rice	**Dr K. Basavaraj**	Dr M.S. Prasad, Dr G.S. Laha, Dr D. Ladhalakshmi, Dr G.S. Jasudasu, Dr Krishnamurthy SL, Dr Divya Balakrishnan, Dr Kalyani B Kulkarni
HRP/CPT/ PATH/29 (2023-2026)	Studies on host plant resistance and management of stem rot and sheath rot diseases of rice	**Dr G.S. Jasudasu**	Dr G.S. Laha, Dr M.S. Prasad, Dr K. Basavaraj, Dr V. Prakasam, Dr D. Ladhalakshmi, Dr D Krishnaveni Dr Ch. Suvarna Rani
Transfer of Technology and Training			
TTT/EXT/12 (2025-2028)	SMART Farming Interventions for Accelerated and Sustainable Rice Technology Transfer	**Dr. Amtul Waris**	Dr. P. Jeykumar, Dr. PA Lakshmi Prasanna, Dr. S. Arun Kumar, Dr. C.N Neeraja, Dr. Chitra Shanker, Dr. Jyothi Badri, Dr. B Sreedevi, Dr. Jagriti Rohit
TTI/TTT/EXT/ 13 (2019-2025)	On-Farm Adoption of IPM Technologies and impact analysis	**Dr. P. Jeyakumar**	Dr. P. Muthuraman, Dr. Amtul Waris, Dr. B. Nirmala, Dr. S. Arunkumar, Dr. Jagriti Rohit **Associates** Dr. P.C. Latha, Dr. Y. Sridhar, Dr. Brajedra, Dr. Santosha Rathod, Dr. Durai Murugan
TTI/TTT/ ECON/5 (2022-2026)	Competition and equity issues in Indian rice sector	**Dr P. A. Lakshmi Prasanna**	Dr Amtul Waris, Dr S Arun Kumar, Dr Santosha Rathod
TTI/TTT/EXT/ 20 (2024-2027)	Designing and Development of Innovative Extension Strategies for Emerging Rice Technologies	**Dr. S. Arun Kumar**	Dr Santosha Rathod, Dr Amtul Waris, Dr PA Lakshmi Prasanna, Dr P Jeyakumar, Dr. P. Muthuraman, Dr S K Mangrauthia

Closed Projects on Account of PI Retirement/Transfer

Project Code	Project Title	Principal Investigator	Co-Investigators
	Plant Breeding		
GEY/CI/BR/16 (2020-2025)	Traditional and molecular approaches for breeding improved rice varieties with resistance to planthoppers	**Dr. G. Padmavathi (Retired)**	Dr. Divya Balakrishnan Dr. V. Jhansilakshmi Dr. Y. Sridhar Dr. Chinna Babu Naik Dr. V. Papa Rao
	Soil Science		
SSP/CP/SS/11 (2010-2025)	Assessment of Genotypic variability in nitrogen use efficiency and improving NUE in irrigated rice	**Dr. K. Surekha (Retired)**	Dr. D. V. K. Nageswara Rao Dr. V. Manasa Dr. R. Gobinath Dr. R.M. Kumar Dr. C.N. Neeraja and Dr. MM Azam
	Plant Physiology		
GEY/CP/PP (2019-2025)	Role of Silicon in inducing biotic and abiotic stress tolerance in rice	**Dr P. Raghuveer Rao (Retired)**	Dr M Azam Dr D Sanjeeva Rao Dr Mangaldeep Tuti Dr Akshay S Sakhare
	Transfer of Technology and Training		
TTI/TTT/EXT/19 (2022-2025)	Small holder Rice Production in India: Problems and Prospects	**Dr P. Muthuraman (Retired)**	Dr. Amtul Waris Dr P Jeya Kumar Dr S. Arun Kumar Dr Brajendra
TTI/TTT/STAT/5 (2023-2025)	Development of statistical and machine learning models for genomic prediction disease and insect pest surveillance in Rice crop under climate change scenarios	**Dr. Santosha Rathod (Transferred)**	Dr. Sailaja Banda Dr. CN Neeraja Dr. G S Laha Dr. Y Sridhar Dr. Anantha M S

New Institutional Projects Approved in Institutional Research Committee Meeting 2025

Project Code	Project Title	Principal Investigator	Co-Investigators
	Crop Improvement		
GEY/CI/BR/36 (2025-2030)	Smart Traits for Climate Resilience: Breeding for Salt tolerance and its associated stress tolerance in Rice	**Dr. Suneetha Kota**	Dr. SV Sai Prasad, Dr. Divya Balakirshnan Dr. P. Senguttuvel, Dr. Akshay S. Sakhare Dr. SK. Mangrauthia, Dr. M.B.B. Prasad Babu, Dr. Mangal Deep Tuti, Dr. P.C. Latha, **Associates** Dr. Aravind J, Dr. S.L. Krishnamurthy, Dr. M.S. Ananta, Dr. Suvarna Rani C. Dr. Fiyaz, Dr. Jyothi Badri, Dr. Bandeppa S, Dr. Gobinath, **Collaborators** Dr. Nitish R. Prakash, Scientist (SS), CSSRI- Karnal, Dr. Nagendra Rao, Head, ARS, Machilipatnam, Dr. Shiva Prasad, Scientist, ARS, Kampasagar

Project Code	Project Title	Principal Investigator	Co-Investigators
GEY/CI/ BR/37 (2025-2029)	Bridging the biodiversity and breeding using unexplored wild species to detect novel sources for yield & stress tolerance	**Dr. Divya Balakrishnan**	Dr Suneetha K, Dr Anantha MS, Dr Sridhar Y, Dr Ladhalakshmi D, Dr Gowthami R (NBPGR, Hyderabad)
GEY/CI/ HY/19 (2025-2029)	Development of Climate-Resilient Rice Hybrids for DSR and abiotic stresses through Conventional and Genomic-Assisted Breeding	**Dr. P. Senguttuvel**	Dr. Sundaram RM, Dr. HariPrasad AS Dr. Krishnamurthy SL, Dr. Kalyani M B Dr. Vijay K, Dr Gobinath R, Dr. Satish Chavan, Dr. Sai Prasad SV Associates Dr. Revathi P, Dr. Kemparaju KB, Dr. Sruthi K, Dr Anantha MS, Dr Sreedevi B Dr Arvind J, Dr Prasad MS, Dr. N. Somasekhhar, Dr P. Jeya Kumar,
ABR/CI/ BT/22 (2025-2028)	Epigenetic Mechanisms of Aerobic Adaptation in Rice Roots through DNA Methylation	**Dr. Kalyani M. Barbadikar**	Dr. Papa Rao Vaikuntapu, Dr. S. K. Mangrauthia, Dr. C. N. Neeraja Dr. R. M. Sundaram Associates Dr. Divya Balakrishnan, Dr. Suneetha Kota Dr. P. Senguttuvel
		Crop Production	
SSP/CP/ AG/17 (2025-2031)	Nitrogen management in direct seeded rice based cropping systems to maximize productivity and profitability improve soil health and reduce environmental risk	**Dr. Mangal Deep Tuti**	Dr. R. Mahender Kumar, Dr. B. Sreedevi Dr. Brajendra, Dr. V. Manasa, Dr. Bandeppa, Dr. Akshay S Sakhare
RUE/CP/ AG/19 (2025-2029)	Enhancing yield input use efficiency and economics of dry-DSR through best agronomic practices	**Dr. S. Vijayakumar**	Dr. R Gobinath, Dr. P Senguttuvel, Dr. R M Kumar, Dr. B. Sreedevi, Dr. Mangal Deep Tuti, Dr. B. Sailaja
SSP/CP/SS/21 (2025-2028)	Studies on sulphur dynamism in different growing environments of rice	**Dr. Brajendra**	Dr. V.Manasa, Dr. Bandeppa, Dr. B Sreedevi **Associates** SK. Mangrauthia
GEQ/CP/ BC/1 (2025-2029)	Identification of methods and biochemical markers for assessing age cooking and nutrition quality of rice grain	**Dr. D. Sanjeeva Rao**	Dr. J. Aravind Kumar, Dr. C. N. Neeraja Dr. Akshay S. Sakhare
		Crop Protection	
IPM/CPT/ ENT/35 (2025-2029)	Designing and development of automated smart traps for monitoring & management of insect pests of rice (*Oryza sativa* L.)	**Dr Raghavendra K.V**	Dr A. P. Padmakumari, Dr B Sailaja Dr Chitra Shanker, Dr Y. Sridhar Dr V. Chinna Babu Naik, Dr Papa Rao Vaikuntapu
		Transfer of Technology and Training	
TTI/TTT/ EXT/21 (2025-2029)	On-Farm Validation and Dissemination of IIRR Technologies	**Dr. P. Jeyakumar**	Dr.S.Arun Kumar, Dr.Lakshmi Prasanna, Dr.Amtul Waris, Dr.J.Aravind Kumar, Dr.P.Senguttuvel, Dr.Mangal Deep Tuti, Dr.Brajendra, Dr.Chinna Babu Naik, Dr.V.Prakasam

Annexure - 2

Centre Wise Breeder Seed Production During *Kharif*, 2025 (As Per Dac Indent)

(Quantity in Quintals)

S. No.	Centre	Variety	Notif. Year	Indent (q)	Production (q)			Surplus/ Deficit (q)
					Kharif 2025	*Rabi* / Summ*er	Total	
1	AAU, Anand	Gujarat Anand Rice 14 (GAR 14) (IET 24619)	2018	2.30	3.00	0.00	3.00	0.70
		Gujarat Rice 21 (GR 21: Vatrak)	2022	0.30	1.00	0.00	1.00	0.70
		Numali (IET 27405)	2020	11.30	0.00	0.00	0.00	-11.30
		GR 18 (DEVLI KOLAM)	2021	0.30	0.00	0.00	0.00	-0.30
		Gujarat Aerobic Rice 201 (GAR 201: Anand Akshat)	2024	0.30	1.00	0.00	1.00	0.70
		GR-12	2007	0.30	0.40	0.00	0.40	0.10
		GAR - 1 (IET- 21276)	2013	0.30	0.40	0.00	0.40	0.10
		DANDI (IET 14906)	2003	0.30	0.40	0.00	0.40	0.10
		Ranjit SUB -1	2018	14.37	0.00	0.00	0.00	-14.37
		Ketekijoha (IET-18669)	2006	3.30	0.00	0.00	0.00	-3.30
		RANJEET	1994	5.45	0.00	0.00	0.00	-5.45
		GR-101	1986	0.30	0.50	0.00	0.50	0.20
		Gujarat Anand Rice-3 (GAR-3) (NWGR-4005)	2017	0.30	0.30	0.00	0.30	0.00
		GAR-13 (IET-20930)	2010	0.30	1.00	0.00	1.00	0.70
		Total		**39.42**	**8.00**	**0.00**	**8.00**	**-31.42**
2	AAU, Jorhat	Rongkhang (AAUDR 9312-13-1) IET 18242 IC 574472	2017	8.00	0.15	0.00	0.15	-7.85
		AAU-TTB-Dhan-44 (TTB 1041-204-1) (Prachur)	2023	4.30	22.00	0.00	22.00	17.70
		AAU-TTB-Dhan-42 (TTB238) (Patkai)	2023	0.30	8.00	0.00	8.00	7.70
		AAU-TTB-Dhan-43 (TTB 1048-60-1) (Shatabdi)	2023	6.00	18.00	0.00	18.00	12.00
		Inglongkiri (AAUDR 9301-14-1) IET 17452 IC-559417	2017	8.00	0.23	0.00	0.23	-7.77
	ARRI, Titabar	AAU-TTB-Dhan-40 (Dholi)	2022	11.00	0.00	0.00	0.00	-11.00
		Kanaklata (TTB 103-3-1)	2017	1.00	0.00	20.00	20.00	19.00
		LUCHAI SELECTION 1	2023	0.30	0.00	0.00	0.00	-0.30
		Bahadur Sub-1	2018	11.45	12.59	0.00	12.59	1.14
		Ranjit Sub 1	2020	8.15	22.84	0.00	22.84	14.69
		Ranjit	2020	11.20	36.00	0.00	36.00	24.80
		Keteki Joha (IET-18669)	2017	2.00	3.30	0.00	3.30	1.30
		Bahadur		8.00	9.60	0.00	9.60	1.60
		Gitesh (TTB 283-1-26)	2024	1.90	2.60	0.00	2.60	0.70
		Swarna Sub 1 (CR 2539-1) IET -20266	2009	2.00	4.40	0.00	4.40	2.40
		Numali (IET 27405)	2026	2.00	5.70	0.00	5.70	3.70
		Mahsuri	1986	0.10	0.47	0.00	0.47	0.37
		Dehangi		0.10	0.44	0.00	0.44	0.34
		Luit	2024	0.00	0.60	0.00	0.60	0.60
		Disang		0.00	0.45	0.00	0.45	0.45
		Haccha (AAU DPU Dhan 04)	2026	1.00	1.90	0.00	1.90	0.90
		Amreng (AAU TPU Dhan 07) IET 29271		1.00	3.29	0.00	3.29	2.29
		Total		**87.80**	**152.56**	**20.00**	**172.56**	**84.76**

S. No.	Centre	Variety	Notif. Year	Indent (q)	Production (q)			Surplus/ Deficit (q)
					Kharif 2025	*Rabi* / Summ*er	Total	
3	ANGRAU, Guntur	Prabhat	1978	0.90	52.00	24.00	76.00	75.10
		BPT Rice 2846 (IET 28737)	2024	0.20	0.50	0.00	0.50	0.30
		SAMBA MAHSURI (BPT-5204)	1989	59.05	70.00	0.00	70.00	10.95
		Teja (BPT 2595) 0ET 25486)	2020	0.80	1.00	0.00	1.00	0.20
		Bhavathi (BPT-2782) (IET 27124)	2020	0.20	0.50	0.00	0.50	0.30
		Sasya (BPT-2411) (IET 23081)	2020	0.80	1.00	0.00	1.00	0.20
		BPT-3291 (Sonamasuri)	2005	2.80	3.20	0.00	3.20	0.40
		BPT Rice 3050 (IET 29256)	2024	0.45	1.00	0.00	1.00	0.55
		Bapatla Mahsuri (BPT 2295) (IET 22188)	2019	2.20	3.00	0.00	3.00	0.80
	ANGRAU, ARS Machil-ipatnam	Pandu Ranga (MCM 100) (IET 22611)	2019	0.30	0.50	0.00	0.50	0.20
		MCM RICE 103	2023	0.50	1.00	0.00	1.00	0.50
	ANGRAU ARS, Nellore	SRAVANI (NLR-33359)	2001	0.30	0.00	0.30	0.30	0.00
		NLR 3041	2021	0.50	0.00	1.00	1.00	0.50
		NLR 40024	2021	0.30	0.00	0.30	0.30	0.00
		Pardhiva (NLR - 33892)	2007	0.60	8.00	0.00	8.00	7.40
		Nandyala Sona (NDLR 7) (IET No.23715)	2018	0.35	0.00	20.00	20.00	19.65
		Nellore Mahsuri (NLR-34449)	2010	11.95	0.00	60.00	60.00	48.05
		Nellore Dhanyarasi (NLR3354) (ET 26226)	2020	0.25	0.00	8.00	8.00	7.75
		Nellore Sugandha (NLR 40054) (IET 23194)	2020	0.50	0.00	5.00	5.00	4.50
		TIKKANA (NLR-27999)	1989	0.30	0.30	0.00	0.30	0.00
		KOTHA MALAGOLUKULU-72	1978	0.30	0.30	0.00	0.30	0.00
		KOTHA MALAGOLUKULU-74	1978	0.30	0.30	0.00	0.30	0.00
		NLR 3354	2020	0.50	0.00	8.00	8.00	7.50
		NLR-145	1993	0.30	0.00	3.00	3.00	2.70
		SOMASILA (NLR-33358)	2000	0.80	0.00	1.00	1.00	0.20
		Nellore Siri (NLR 4001) (IET 25273)	2020	0.30	0.00	5.00	5.00	4.70
		SRIKAKULAM SANNALU (RGL-2537)	2000	4.30	30.00	0.00	30.00	25.70
	ANGRAU RARS, Maruteru	MTU Rice 1271 (IET 27416)	2024	0.55	15.00	15.00	30.00	29.45
		MTU 1223 (IET 25856)	2021	1.20	2.00	2.00	4.00	2.80
		MTU-1121(SRI DHRUTHI)	2016	5.60	60.00	35.00	95.00	89.40
		SWARNA (MTU-7020)	1980	3.80	10.00	0.00	10.00	6.20
		Ksheera (IET 24495) (MTU 1172)	2019	0.45	3.00	3.00	6.00	5.55
		KRISHNAVENI (MTU-2077)	1990	0.80	7.00	7.00	14.00	13.20
		Chandra (IET 23409)(MTU 1153)	2016	57.62	80.00	40.00	120.00	62.38
		TARANGINI (MTU 1156)	2017	49.85	180.00	0.00	180.00	130.15
		MTU RICE 1232 (IET 26422)	2023	0.20	15.00	0.00	15.00	14.80
		MTU Rice 1273	2022	0.30	0.00	5.00	5.00	4.70
		MTU Rice 1321	2022	0.30	0.00	5.00	5.00	4.70

S. No.	Centre	Variety	Notif. Year	Indent (q)	Production (q)			Surplus/ Deficit (q)
					Kharif 2025	*Rabi* / Summ*er	Total	
		MTU Rice 1310	2022	0.20	2.00	10.00	12.00	11.80
		MTU Rice 1239 (IET 26263)	2021	0.20	0.00	3.00	3.00	2.80
		MTU RICE 1318 (IET 28527)	2023	39.47	75.00	100.00	175.00	135.53
		Amara (MTU-1064)	2010	7.90	20.00	40.00	60.00	52.10
		Maruteru Mahsuri MTU 1262 (IET 27151)	2020	8.55	30.00	40.00	70.00	61.45
		Maruteru Samba MTU 1224 (IET 26225)	2020	13.50	18.00	90.00	108.00	94.50
		BHEEMA/DHEERA (MTU 1140)	2017	0.60	7.50	5.00	12.50	11.90
		MTU 1280	2021	1.10	0.00	6.00	6.00	4.90
		MTU-7029	1985	274.21	280.00	0.00	280.00	5.79
		MTU-1210 (Maruteru Sujatha)	2020	0.35	5.00	5.00	10.00	9.65
		MTU-5182	1993	0.50	0.00	0.00	0.00	-0.50
		MTU-9993	1995	0.50	0.00	0.00	0.00	-0.50
		Vijetha (MTU 1001)	1997	117.90	64.00	80.00	144.00	26.10
		MTU 1075 (IET 18482)	2008	14.10	15.00	20.00	35.00	20.90
		VIJETHA (MTU-1001)	1997	10.35	0.00	0.00	0.00	-10.35
		COTTONDORA SANNALU (MTU-1010)	2000	151.92	252.00	75.00	327.00	175.08
		MTU 1156	2017	66.37	180.00	0.00	180.00	113.63
		MTU 1140 (BHEEMA)	2017	0.10	0.00	0.00	0.00	-0.10
		MTU1140(TARANGINI)	2017	0.60	0.00	0.00	0.00	-0.60
		MTU Rice 1275 (IET 27908)	2024	0.45	2.00	5.00	7.00	6.55
		Indra(MTV - 1061)	2007	8.60	15.00	60.00	75.00	66.40
		Total		**928.19**	**1510.10**	**786.60**	**2296.70**	**1368.51**
5	BAU, Sabour	Birsa Vikas Dhan-203 (IET 19896)	2015	3.00	0.00	0.00	0.00	-3.00
		Birsa Vikas Sugandha-1 (IET 18941)	2015	8.00	0.00	0.00	0.00	-8.00
		Birsa Vikas Dhan-111 (PY-84) (IET 19848)	2015	1.00	0.00	0.00	0.00	-1.00
		Sabour Harshit Dhan (IET 25342)	2020	10.30	37.50	0.00	37.50	27.20
		Sabour Sampanna Dhan (IET 25960)	2021	20.30	87.50	0.00	87.50	67.20
		KANAK (BIET-1009)	1989	0.10	0.00	0.00	0.00	-0.10
		SITA	1978	0.01	0.00	0.00	0.00	-0.01
		Badshabhog Selection 1	2016	1.82	0.00	0.00	0.00	-1.82
		Sabour Deep (RAU 3055)	2017	15.00	80.00	0.00	80.00	65.00
		Sabour Heera Dhan (IET-27538) (BRR 2110)	2022	0.10	35.00	0.00	35.00	34.90
		HEERA (IET-10973)	1989	0.90	0.00	0.00	0.00	-0.90
		Sabour Shree (RAU 724-48-33) (IET 18878)	2015	0.40	22.50	0.00	22.50	22.10
		Sabour Pratap Dhan (BRR2152) (IET-30083)	2024	2.60	10.00	0.00	10.00	7.40
		Sabour Shriram Dhan (BRR210) (IET-30367)	2024	0.30	10.00	0.00	10.00	9.70
		Sabour Narendra Dhan (BRR2184)	2024	0.60	10.00	0.00	10.00	9.40
		Total		**64.43**	**292.50**	**0.00**	**292.50**	**228.07**
6	BCKV, Nadia	Bidhan Suruchi (IET 25701)	2019	2.10	4.00	1.00	5.00	2.90
		Gontra Bidhan-1 (IET 17430)	2008	15.25	11.50	2.50	14.00	-1.25
		Gontra Bindhan-3 (IET 22752)	2014	6.30	8.40	2.00	10.40	4.10
		Total		**23.65**	**23.90**	**5.50**	**29.40**	**5.75**

S. No.	Centre	Variety	Notif. Year	Indent (q)	Production (q)			Surplus/ Deficit (q)
					Kharif 2025	*Rabi* / Summ*er	Total	
7	BEDF, Meerut	PUSA BASMATI-1 (IET-10364)	1989	9.10	12.08	0.00	12.08	2.98
		Pusa Basmati 1121	2008	29.53	35.57	0.00	35.57	6.04
		PUSA BASMATI-6 (IET 18005)	2010	7.02	18.65	0.00	18.65	11.63
		Sugandha-4 (PB-1121)	2015	4.30	8.00	0.00	8.00	3.70
		Total		**49.95**	**74.30**	**0.00**	**74.30**	**24.35**
8	BHU, Varanasi	Malviya Dhan-2 (HUR-3022)	2005	0.30	0.35	0.00	0.35	0.05
		Malviya Sugandh Dhan- 156 (HUR156)	2023	1.20	2.10	0.00	2.10	0.90
		MALAVIYA SUGANDH 4-3 (HUR-4-3)	2009	0.30	0.40	0.00	0.40	0.10
		HUR-917	2017	4.50	4.60	0.00	4.60	0.10
		Malaviya Basmati Dhan 10-9 (HUBR 10-9)	2013	0.30	0.35	0.00	0.35	0.05
		HUR-1309 (Malviya Sugandh Dhan-1309) (IET 23873)	2019	0.60	0.70	0.00	0.70	0.10
		HUR-105Sub-1	2025	0.00	2.50	0.00	2.50	2.50
		Malaviya Manila Sinchit Dhan-1(MMSD-1)	2023	0.00	0.95	0.00	0.95	0.95
		Total		**7.20**	**11.95**	**0.00**	**11.95**	**4.75**
9	BSKKV, Dapoli	RATNAGIRI-1	1990	0.20	6.50	2.00	8.50	8.30
		Ratnagiri-6 (RTN 65-1-2-2-2) (IET 25529)	2019	0.20	4.30	2.00	6.30	6.10
		Ratnagiri -8 (RTN 28-1-5-3-2) (IET 25493)	2019	4.50	5.60	5.00	10.60	6.10
		Karjat-7	2009	0.60	0.60	0.00	0.60	0.00
		Trombay Karjat Kolam (BARCKKV 13) (IET 27000)	2020	0.20	0.20	0.00	0.20	0.00
		Karjat-5	2007	0.40	0.40	2.00	2.40	2.00
		Karjat 8	2017	0.20	0.20	0.00	0.20	0.00
		Karjat 9	2017	0.20	0.20	0.00	0.20	0.00
		KARJAT-3	1996	3.00	3.00	0.00	3.00	0.00
		Total		**9.50**	**21.00**	**11.00**	**32.00**	**22.50**
10	CCS HAU, Hisar	BASMATI-370	1973	72.00	20.00	0.00	20.00	-52.00
		TARAORI BASMATI (HBC-19)	1996	1.00	1.00	0.00	1.00	0.00
		HKR-127 (HKR-95-222)	2010	0.30	3.00	0.00	3.00	2.70
		HKR-47	2005	4.00	5.00	0.00	5.00	1.00
		Total		**77.30**	**29.00**	**0.00**	**29.00**	**-48.30**
11	CSKHPKV, Palampur	Him Palam Dhan 3 (IET 27472) (HPR 2865)	2024	0.43	4.10	0.00	4.10	3.67
		Him Palam Lal Dhan-1 (HPR-2795)	2018	0.70	0.15	0.00	0.15	-0.55
		HPR-1068	2006	6.87	9.00	0.00	9.00	2.13
		HPR-2143	2006	0.80	0.80	0.00	0.80	0.00
		BASMATI KASTURI (IET-8580)	1989	1.45	4.03	0.00	4.03	2.58
		Total		**10.25**	**18.08**	**0.00**	**18.08**	**7.83**
12	GBPUAT, Pantnagar	Pant Dhan 28 (UPR 3667-2-1-2)	2020	0.20	11.60	0.00	11.60	11.40
		Pant Dhan 18 (IET 17920) (UPRI 99-1)	2007	0.80	10.09	0.00	10.09	9.29
		Pant Dhan 26 (UPR 3425-14-3-1)	2017	2.30	43.18	0.00	43.18	40.88
		PANT SUGANDH DHAN 27	2023	0.30	3.70	0.00	3.70	3.40
		Total		**3.60**	**68.57**	**0.00**	**68.57**	**64.97**

S. No.	Centre	Variety	Notif. Year	Indent (q)	Production (q)			Surplus/ Deficit (q)
					Kharif 2025	*Rabi* / Summ*er	Total	
13	TNAU, Coim-batore	ASD 21 (AS 15024)	2023	9.60	9.60	0.00	9.60	0.00
	TNAU ARS, Vaigaidam	VGD 1 (VG 09006) (IET 24606)	2019	0.30	0.30	0.00	0.30	0.00
	TNAU Dept. of Rice	Co (R)48	2009	0.50	0.00	0.00	0.00	-0.50
		CO 54 (CB 12588)	2021	2.40	0.00	2.40	2.40	0.00
		CO 55 (CB 15714) 4	2022	24.90	24.90	0.00	24.90	0.00
		TKM-9	1982	0.30	0.00	0.00	0.00	-0.30
		CO(R) 50 (IET 19321) (CB 01001)	2009	3.50	4.00	0.00	4.00	0.50
		CO 56 (CB12132)	2023	15.00	0.00	18.00	18.00	3.00
		TKM 15 (TM 12077)	2022	1.20	0.00	1.50	1.50	0.30
		Rice CR 1009 Sub1	2016	37.90	37.90	0.00	37.90	0.00
		CO52	2018	6.60	0.00	6.60	6.60	0.00
		TM 07278	2016	0.30	0.00	0.30	0.30	0.00
		TKM 13	2016	2.10	0.00	6.10	6.10	4.00
		TPS-5	2015	18.50	19.00	0.00	19.00	0.50
		TPS-3	1997	4.20	0.00	4.20	4.20	0.00
		CO 51	2015	26.15	0.00	27.00	27.00	0.85
		CO 57 (IET 31924)	2024	2.10	0.00	2.10	2.10	0.00
		CO 58 (IET-25577)	2024	1.20	0.00	1.20	1.20	0.00
	TNAU IOA Kumulur	IMPROVED WHITE PONNI	1989	7.50	0.00	7.50	7.50	0.00
	TNAU PBG Adacri Trichy	TRY 5 [TR 09030]	2022	0.60	0.00	1.00	1.00	0.40
		RICE TRY 4 (TR 05031)	2021	0.60	0.60	0.00	0.60	0.00
		TRY 3	2012	5.10	0.00	6.00	6.00	0.90
	TNAU TRRI Aduthurai	ADT-37	1989	12.30	14.00	0.00	14.00	1.70
		ADT 55	2021	1.20	0.00	1.20	1.20	0.00
		Rice ADT 57 (AD 09219)	2022	1.80	2.00	0.00	2.00	0.20
		ADT-39	1989	0.90	0.00	2.90	2.90	2.00
		ADT-38	1989	3.00	0.00	3.00	3.00	0.00
		ADT 51 (AD 09367) (IET 23617)	2018	13.50	0.00	13.50	13.50	0.00
		ADT 58 (AD 12132)	2023	17.70	18.70	0.00	18.70	1.00
		ADT 54 (AD 09493) (IET 24249)	2020	18.20	0.00	18.20	18.20	0.00
		ADT (R) 45 (IET-15924)	2001	4.50	0.00	6.00	6.00	1.50
		ADT 53 (IET 23955)-AD 07073	2019	5.45	0.00	6.45	6.45	1.00
		ADT 56 (IET27920)	2022	10.00	10.00	0.00	10.00	0.00
		ADT-44	2000	0.30	0.00	0.00	0.00	-0.30
		ADTRH-1 (ADRH-4)	1999	0.50	0.00	0.00	0.00	-0.50
		ADT 59 (IET-29154)	2024	9.90	0.00	9.90	9.90	0.00
		Total		**269.80**	**141.00**	**145.05**	**286.05**	**16.25**
14	CRRI, Cuttack	SWARANA-SUB 1 (CR 2539-1) IET-20266	2009	96.80	119.40	0.00	119.40	22.60
		Naveen (CR-749-20-2) (IET-14461)	2006	0.75	0.00	2.00	2.00	1.25

S. No.	Centre	Variety	Notif. Year	Indent (q)	Production (q)			Surplus/ Deficit (q)
					Kharif 2025	*Rabi* / Summ*er	Total	
		Geetanjali (CRM-2007-1) (IET-17276)	2006	0.90	7.00	23.30	30.30	29.40
		CR Dhan 410 (IET 24471)	2020	0.50	0.50	0.00	0.50	0.00
		ANJALI (IET-16430, RR-347-166)	2002	0.60	0.60	0.00	0.60	0.00
		GAYATRI (IET-8022)	1989	1.40	24.10	0.00	24.10	22.70
		CR Dhan 103 (Pramod)	2022	1.05	0.00	0.50	0.50	-0.55
		CR DHAN-318 (IET 27803)	2021	0.40	0.45	0.00	0.45	0.05
		CR Dhan 800 (Swarna – MAS) (CRMAS 2232- 85 (IET 20	2018	6.22	7.50	3.40	10.90	4.68
		CR Dhan 806 (Varsa dhan Sub1)	2023	2.65	0.00	0.00	0.00	-2.65
		MUKUL (CR Dhan 311) (IET 24772) (CR 2829-PLN-100)	2019	11.25	0.00	16.40	16.40	5.15
		LUNISREE	1992	0.60	2.50	0.00	2.50	1.90
		CR DHAN 701 (IET 20852) (CRHR 32)	2012	0.02	0.60	0.90	1.50	1.48
		LUNA SUVARNA (IET 18697)	2011	0.05	2.80	0.00	2.80	2.75
		CR Dhan107 (Unnat Vandana)	2022	1.65	2.50	3.00	5.50	3.85
		CR Dhan 306 (IET 22084)	2019	0.60	0.50	0.00	0.50	-0.10
		CR Dhan 310	2022	22.10	0.00	23.50	23.50	1.40
		CR Dhan 323 (Jyotsna)	2023	0.50	0.60	0.00	0.60	0.10
		CR Dhan 326 (Panchatatva)	2023	0.55	0.00	0.20	0.20	-0.35
		CR Dhan 324 (Abhaya Paushtik)	2023	0.50	0.00	3.20	3.20	2.70
		CR Dhan 328	2023	0.65	0.00	1.40	1.40	0.75
		CR Dhan 805 (Naveen Shakti)	2023	0.50	0.00	3.30	3.30	2.80
		CR Dhan 911(Basudev)	2023	1.00	7.00	36.10	43.10	42.10
		LUNASAMPAD (IET 19470)	2011	0.35	1.00	0.00	1.00	0.65
		CR Dhan 309 (IET 25345)(IR95797-CR3847-2-1-1-1-1)	2019	11.30	4.00	0.00	4.00	-7.30
		CR Dhan 802 (SUBHAS) (IET 25673) (CR 3925-22-7)	2019	43.45	27.90	0.00	27.90	-15.55
		Pradhan Dhan (CR 409) IET 23110 (CR 2690-2- 2-1-1-1)	2018	0.30	6.90	0.00	6.90	6.60
		CR Dhan 321 (IET 28354)	2022	18.82		14.90	14.90	-3.92
		Improved Lalat (CRMAS 2621-7-1)	2013	4.45	1.50	0.00	1.50	-2.95
		Improved Tapaswini (CRMAS 2622-7-6)	2013	0.05		0.00	0.00	-0.05
		CR Dhan 414 (IET 27051)	2022	1.00	1.00	0.00	1.00	0.00
		CR Dhan 314 (IET 27263)	2022	11.05	10.20	0.00	10.20	-0.85
		CR Dhan 300 (CR2301-5) (IET 19816)	2014	0.30	0.90	0.00	0.90	0.60
		CR Dhan 602 (IET 26692)	2020	0.30	0.80	0.00	0.80	0.50
		CR Dhan 308 (IET 25523)	2020	0.30	0.50	0.00	0.50	0.20
		CR DHAN-320 (IET 27914)	2021	0.40	0.30	0.00	0.30	-0.10
		CR DHAN-319	2021	0.40	0.30	0.00	0.30	-0.10
		SARLA CR-260-77 (IET-10279)	2002	2.70	14.30	0.00	14.30	11.60
		CR Dhan 801 (IET 25667) (IR96322-34-223-B-1-1-1-CR3955-2)	2019	9.80	12.90	0.00	12.90	3.10
		DHARITRI (IET-6272)	1989	2.50	19.10	0.00	19.10	16.60
		SAVITRI (IET - 5897)(CR 1009)	1983	0.90	12.50	0.00	12.50	11.60
		Sambha Sub - 1 (IET 21248)	2015	2.70			0.00	-2.70
		CR DHAN 601(IET 18558)	2011	0.60	0.00	0.50	0.50	-0.10

S. No.	Centre	Variety	Notif. Year	Indent (q)	Production (q)			Surplus/ Deficit (q)
					Kharif 2025	*Rabi* / Summ*er	Total	
		CR Dhan 408 (Chakaakhi) (IET 20265) (CR491-1590- 330-2-1)	2018	0.30	0.20	0.00	0.20	-0.10
		CR Dhan 803 (Trilochan, IET 26398)	2021	0.20	13.70	0.00	13.70	13.50
		CR DHAN 702 (IET 25231)	2021	0.02	0.60	1.80	2.40	2.38
		Varshadhan (CRLC-899)(IET-16481)	2006	1.70	4.50	0.00	4.50	2.80
		CR Dhan 411 (Swaranjali, IET 27852)	2021	1.10	1.10	0.00	1.10	0.00
		CR Dhan 316 (CRRI Gaurav-1)	2021	1.25	0.00	0.50	0.50	-0.75
		CR Dhan 703 (IET 25278)	2021	0.02	0.30	1.80	2.10	2.08
		POOJA (IET-12241)	1999	12.10	35.50	0.00	35.50	23.40
		CR Dhan 312 (CR 3808-13) (IET 25997)	2020	0.30	4.20	0.00	4.20	3.90
		CR Dhan 203 (Sachala lET- 2717-10-IR 84899-B-185) (IET 22731)	2015	0.50	0.00	1.30	1.30	0.80
		CR Sugandh Dhan 908 (IET 23189) (CR 2713-35)	2017	0.30	8.00	0.00	8.00	7.70
		CR-1014	1989	0.90	1.00	0.00	1.00	0.10
		CR Dhan 212 (IET 29424)	2024	1.00	0.00	1.20	1.20	0.20
		CR Dhan -332 (IET-28506)	2024	0.30	0.00	1.40	1.40	1.10
		CR Dhan- 810 (IET- 30409)	2024	7.35	6.00	0.00	6.00	-1.35
		CR Dhan-108 (IET -29052)	2024	1.10	0.00	2.40	2.40	1.30
		CR Dhan- 337 (IET-29939)	2024	0.80	0.00	1.20	1.20	0.40
		CR Dhan-809 (IET- 30282)	2024	1.15	0.50	0.00	0.50	-0.65
		CR Dhan- 416 (IET-30201)	2024	1.00	8.00	0.00	8.00	7.00
		CR Dhan 811	2024	2.15	0.00	0.00	0.00	-2.15
		CR Dhan 329 (IET 29236) ((CR 3580 - 3-1-1-1-1-1-2)	2023	0.50	0.00	2.30	2.30	1.80
		CR Dhan 804 (IET 28032) (CRR 751-1-7-B-B)	2024	6.20	50.00		50.00	43.80
		CR Dhan 807 (CR 4333- 35-2-2-1) (IET 30438)	2024	3.00	0.00	1.40	1.40	-1.60
		CR Dhan 214 (IET 29436) (CRR 821-21-2- 1-3)	2024	0.50	0.00	0.90	0.90	0.40
		CR Dhan 808 (IET 28834) (CRR 809-11-1-9-B)	2024	20.00	25.00		25.00	5.00
		Labanga Dhan (CR Dhan 603)	2024	0.75	0.00	0.50	0.50	-0.25
		CR Dhan 211 (IET 29411)	2024	0.50	0.00	3.70	3.70	3.20
		CR Dhan 305 (IET 21287)	2014	0.20	0.40		0.40	0.20
		CR DHAN-307 (Maudamani) (CR 2599) IET 20925)	2015	11.45	0.00	13.50	13.50	2.05
		Sahbhagidhan (IET 19576) (IR74371-70-1-1-CRR-1)	2011	3.45	0.00	0.00	0.00	-3.45
		CR Sugandhdhan 3		0.00	0.00	3.50	3.50	3.50
		CR Dhan 909		0.00	0.00	11.00	11.00	11.00
		Kalachampa		0.00	0.00	9.00	9.00	9.00
		Ketekijoha		0.00	0.00	5.20	5.20	5.20
		Nua Chinikamini		0.00	0.00	19.00	19.00	19.00
		Nua Kalajeera		0.00	0.00	12.00	12.00	12.00
		Poorna Bhog		0.00	0.00	10.00	10.00	10.00

S. No.	Centre	Variety	Notif. Year	Indent (q)	Production (q)			Surplus/ Deficit (q)
					Kharif 2025	*Rabi* / Summ*er	Total	
		Ratna		0.00	0.00	2.70	2.70	2.70
		CR 1009 sub1		0.00	0.00	14.10	14.10	14.10
		Phalguni		0.00	0.00		0.00	0.00
		Ajay		0.00	0.00	0.60	0.60	0.60
		Rajalaxmi		0.00	0.00	0.30	0.30	0.30
		CR Dhan 704		0.00	0.00	1.00	1.00	1.00
		Total		**343.00**	**449.15**	**254.90**	**704.05**	**361.05**
15	ICAR-CSSRI, Karnal	CSR 101 (CSR-389-16-22) (IET-30827)	2024	2.60	4.00	0.00	4.00	1.40
		CSR 30 (88-H5-1-1-2 IET-14720, YA-MANI)	2001	0.16	4.50	0.00	4.50	4.34
		CSR 76 (IET 27070)	2021	0.90	1.50	0.00	1.50	0.60
		CSR 105 (CSR PET- 27) (IET-30004)	2024	0.08	2.50	0.00	2.50	2.42
		CSR 104 (CSR YET- 59) (IET-29354)	2024	0.28	1.50	0.00	1.50	1.22
		Total		**4.02**	**14.00**	**0.00**	**14.00**	**9.98**
16	ICAR IARI-SPU, New Delhi	PUSA SUGANDH-2 (IET-16310,PUSA-204-1-126)	2001	0.10	1.70	0.00	1.70	1.60
		PNR-381 (IET - 9208)	1992	0.50		0.00	0.00	-0.50
		Pusa Sugandh-5(IET-17021)	2005	2.12	13.30	0.00	13.30	11.18
		Pusa CRD KN2 (Pusa1638-07-171-1-81-1-2)	2023	0.90	1.50	0.00	1.50	0.60
		Pusa Narendra KN1 (Pusa1638-07-130-2-67-1-1)	2023	1.80	2.00	0.00	2.00	0.20
		Pusa Samba 1853 (IET 28014)	2022	2.00	11.00	0.00	11.00	9.00
		Pusa Samba 1850 (Pusa 1850-27) (IET 25480)	2018	2.00	35.70	0.00	35.70	33.70
		PNR-162	1995	0.50	0.00	0.00	0.00	-0.50
		PUSA-44	1994	6.80	0.00	0.00	0.00	-6.80
		PNR-519	2000	0.50	0.00	0.00	0.00	-0.50
		Pusa 2090 (IET-29217)	2024	9.90	23.40	0.00	23.40	13.50
		Pusa 1824 (IET-28442)	2024	6.30	19.50	0.00	19.50	13.20
	ICAR IARI RS, Karnal	PB-1509	2013	15.42	13.56	0.00	13.56	-1.86
		PB-1718	2017	33.83	0.00	0.00	0.00	-33.83
		Pusa Basmati 1637 (IET 24570)	2016	3.00	2.52	0.00	2.52	-0.48
		Pusa Basmati 1692 (IET 26995)	2020	20.43	13.44	0.00	13.44	-6.99
		Pusa Basmati 1882 (IET 28788)	2022	18.60	12.86	0.00	12.86	-5.74
		Pusa Basmati 1718 (IET 24565 Pusa 1718-14-2- 150)	2017	12.46	0.76	0.00	0.76	-11.70
		Improved Pusa Basmati-1 (IET - 18990) (Pusa 1460-01-32-6-7-67)	2007	0.50	0.00	0.00	0.00	-0.50
		Pusa Basmati-1509 (Pusa 1509-03-3-9-5)	2013	1.36		0.00	0.00	-1.36
		Pusa Basmati-1985	2021	12.80	17.12	0.00	17.12	4.32
		PUSA BASMATI 1847	2021	20.34	23.52	0.00	23.52	3.18
		PUSA BASMATI 1886	2021	9.74	3.48	0.00	3.48	-6.26
		PUSA BASMATI 1885	2021	17.20	5.16	0.00	5.16	-12.04

S. No.	Centre	Variety	Notif. Year	Indent (q)	Production (q)			Surplus/ Deficit (q)
					Kharif 2025	*Rabi* / Summ*er	Total	
		PUSA BASMATI 1979	2021	6.28	2.00	0.00	2.00	-4.28
		Pusa Basmati 1121 (Pusa Sugandh 4)	2005	9.92	3.36	0.00	3.36	-6.56
		Total		**215.30**	**205.88**	**0.00**	**205.88**	**-9.42**
17	IIRR, Hyder-abad	Jaya	1978	9.30	0.00	10.00	10.00	0.70
		Masuri	1978	0.90	0.00	0.90	0.90	0.00
		DRR Dhan 54 (IET 25653) (RP 5943-421-16-1-1-B)	2021	15.00	0.00	15.00	15.00	0.00
		DRR Dhan 64 (IET 28358)	2022	15.30	0.00	16.00	16.00	0.70
		DRR Dhan 65 (IET 27641)	2022	0.10	0.10	0.00	0.10	0.00
		DRR DHAN 63 (IET 26596)	2021	0.90	0.90	0.00	0.90	0.00
		DRR Dhan 53 {RP-6113-Partho-BB9,(IET 27294)	2021	16.65	0.00	20.00	20.00	3.35
		Bina Dhan 11	2015	27.05	0.00	28.00	28.00	0.95
		Bina Dhan 17 GSR (SAGC7) (IET 24460)	2018	16.20	20.00	0.00	20.00	3.80
		DRR Dhan 43 (IET 22080)	2015	10.00	0.00	10.00	10.00	0.00
		BRRI Dhan 69 (WTR 1) (IET 24461)	2018	0.60	0.00	0.60	0.60	0.00
		Akshayadhan (IET 19367)	2008	2.00	2.00	0.00	2.00	0.00
		Sampada (IET 19424)	2008	2.10	2.10	0.00	2.10	0.00
		Improved Samba Mahsuri	2008	0.30	0.00	2.00	2.00	1.70
		DRR Dhan 50 (IET 25671)	2018	10.70	4.00	7.00	11.00	0.30
		DRR Dhan 51 (IET 25484)	2018	0.60	0.00	0.60	0.60	0.00
		DRR Dhan 48 (IET 24555)	2018	3.10	3.50	0.00	3.50	0.40
		DRR Dhan 46 (IET 23420)	2016	0.75	0.00	0.75	0.75	0.00
		DRR DHAN 59	2021	0.10	0.10	0.00	0.10	0.00
		DRR DHAN 60	2021	0.70	2.00	0.00	2.00	1.30
		BINA DHAN 10	2015	8.00	0.00	10.00	10.00	2.00
		DRR DHAN 45 (IET 23832) (rp 5886-HP 3-IR80463-B39-	2016	2.35	0.00	2.50	2.50	0.15
		DRR DHAN 44 (IET 22081)	2015	0.10	0.00	0.10	0.10	0.00
		DRR Dhan- 78 (IET- 30240)	2024	0.50	0.50	0.00	0.50	0.00
		DRR Dhan- 79 (IET- 29859)	2024	5.50	4.50	3.00	7.50	2.00
		DRR Dhan- 74 (IET- 30252)	2024	0.50	0.50	0.00	0.50	0.00
		DRR Dhan- 73 (IET- 30242)	2024	0.50	0.00	0.50	0.50	0.00
		DRR Dhan- 75 (IET-30107)	2024	3.70	5.00	0.00	5.00	1.30
		DRR Dhan- 76 (IET-29808)	2024	2.30	0.00	3.00	3.00	0.70
		IR-64 Drt I (IR 87707-44-5-B-B-B)	2015	1.35	0.00	1.50	1.50	0.15
		Total		**157.15**	**45.20**	**131.45**	**176.65**	**19.50**
18	ICAR RC NEH-Region Manipur	TRC 2015-5 (IET 26178) Aerobic Dhan-1	2021	0.15	1.00	1.50	2.50	2.35
		Tripura Chikan Dhan	2018	0.15	1.00	0.00	1.00	0.85
		GOMATI DHAN TRC-2005-1 (TRC-05-8-4-42-8-3-7) IET 21512	2018	0.25	2.50	0.00	2.50	2.25
		Kali Khasa	2004	0.25	0.25	0.00	0.25	0.00
		Tripura Hakuchuk-2	2018	0.15	3.50	2.50	6.00	5.85

S. No.	Centre	Variety	Notif. Year	Indent (q)	Production (q)			Surplus/ Deficit (q)
					Kharif 2025	*Rabi* / Summ*er	Total	
		RC Maniphou 16	2022	3.10	8.00	0.00	8.00	4.90
		RC Maniphou 15	2022	3.10	8.40	0.00	8.40	5.30
		RC Maniphou 13	2018	3.10	7.60	0.00	7.60	4.50
		RC Manichakhao-1	2025	0.60	2.50	0.00	2.50	1.90
		Sikkim Dhan-1 (IET 22984)	2020	0.00	0.17	0.00	0.17	0.17
		Sikkim Dhan-2 (IET 26579)	2020	0.00	0.17	0.00	0.17	0.17
		Sikkim Dhan-3 (IET 25539)	2020	0.00	0.04	0.00	0.04	0.04
		Sikkim Dhan-4 (IET 26596)	2020	0.00	0.00	0.00	0.00	0.00
		Sikkim Organic chirakey selection 1	2024	0.00	0.17	0.00	0.17	0.17
		Total		**10.85**	**35.31**	**4.00**	**39.31**	**28.46**
19	ICAR-RCER, Patna	Swarna Shreya (IET 24003)	2018	5.50	9.50	0.00	9.50	4.00
		Swarna Smriddhi Dhan (IET 24306)	2021	20.05	25.00	0.00	25.00	4.95
		Swarna Shusk Dhan	2023	0.90	3.00	0.00	3.00	2.10
		Swarna Purvi Dhan 1	2023	0.30	2.00	0.00	2.00	1.70
		Swarna Purvi Dhan 2	2023	0.30	3.00	0.00	3.00	2.70
		Swarna Purvi Dhan 3 (IET 28329)	2022	15.90	25.00	0.00	25.00	9.10
		Swarna Shakti Dhan (IET 25640)(RCPF-22-IR84899-B-183-20-1-1-1)	2020	15.30	17.75	0.00	17.75	2.45
		SWARNA UNNAT DHAN (IET 27892)	2021	15.10	19.75	0.00	19.75	4.65
		SWARNA SUKHA DHAN (IET 24692)	2021	0.30	1.00	0.00	1.00	0.70
		Swarna Purvi Dhan-5 (IET- 29036)	2024	0.20	4.75	0.00	4.75	4.55
		SAMARIDHI (R-2384)	1982	0.10	25.00	0.00	25.00	24.90
		Total		**73.95**	**135.75**	**0.00**	**135.75**	**61.80**
20	VPKAS, Al-mora	VL Dhan 88 (IET 25819) (VL 32224)	2021	0.60	1.00	0.00	1.00	0.40
		VL Dhan 70	2022	2.60	3.00	0.00	3.00	0.40
		VL DHAN 69 (IET 26596)	2021	1.60	1.60	0.00	1.60	0.00
		VL Bosi Dhan (VL-32585) (IET- 28883)	2024	0.60	0.00	0.00	0.00	-0.60
		VL Barik Dhan (VL Dhan 89, VL 32560, IET 28895))	2024	0.60	1.00	0.00	1.00	0.40
		Total		**6.00**	**6.60**	**0.00**	**6.60**	**0.60**
21	IGKV, Raipur	IR-20	1978	6.60	0.00	0.00	0.00	-6.60
		Chhattisgarh Madhuraj Dhaan-55	2016	2.30	15.90	0.00	15.90	13.60
		Bastar Dhan- 1 (IET 26624)	2020	0.60	3.60	0.00	3.60	3.00
		Dubraj Selection -1	2016	5.30	19.50	0.00	19.50	14.20
		Vishnubhog Selection-1	2016	5.30	13.80	0.00	13.80	8.50
		Badshabhog Selection-1		1.82	24.90	0.00	24.90	23.08
		IGRKVR-1244 (R1244-1246-1-605-1)(IET 19796)	2012	0.30	7.80	0.00	7.80	7.50
		Chhattisgarh Zinc rice-1 (CGZR-1) (IET No.23824, R-RHZ-2) (R- 1033-968-2-1)	2016	0.60	6.60	0.00	6.60	6.00
		CG Barani Dhan-2 (R-RF-105, IET No. 24690)	2021	5.60	5.70	0.00	5.70	0.10

S. No.	Centre	Variety	Notif. Year	Indent (q)	Production (q)			Surplus/ Deficit (q)
					Kharif 2025	*Rabi* / Summ*er	Total	
		TROMBAY CHHATTISGARH SONAGATHI MUTANT (TCSM)	2021	1.00	24.70	0.00	24.70	23.70
		TROMBAY CHHATTISGARH VISH-NUBHOG MUTANT (TCVM)	2021	1.00	9.60	0.00	9.60	8.60
		Chhattisgarh Zinc Rice- 2 (CGZR-2) (IET 23829)	2019	0.60	9.20	0.00	9.20	8.60
		IR-36	1982	3.25	18.30	0.00	18.30	15.05
		IR-8	1978	0.00	0.00	0.00	0.00	0.00
		Trombay Chhattisgarh Dubraj Mutant-1 (TCDM-1)	2019	3.00	12.60	0.00	12.60	9.60
		ZincoRice-MS (IET 25477) (R-RHZ-LI-23)	2019	0.60	11.10	0.00	11.10	10.50
		Tarunbhog Selection-1	2016	5.30	9.30	0.00	9.30	4.00
		Protezin (IET 25470) (R-RHZ-R-56)	2020	5.00	15.00	0.00	15.00	10.00
		INDIRA BARANI DHAN-1 (RF-17-38-70)(IET 21205)	2012	1.00	9.00	0.00	9.00	8.00
		CG Jawaphool Trombay (RTR-31)	2021	2.00	9.30	0.00	9.30	7.30
		MAHAMAYA	1996	108.60	216.00	0.00	216.00	107.40
		CG Tejaswi Dhan (IGKV DH Rice-1)	2021	7.30	13.20	0.00	13.20	5.90
		VIKRAM-TCR (Vikram-Trombay Chat-tisgarh Rice)	2021	8.00	51.00	0.00	51.00	43.00
		Chhattisgarh Devbhog (IET 23879) (R-1656-1146-5-513-1)	2019	14.50	45.60	0.00	45.60	31.10
		CHHATTISGARH DHAN 1919	2021	13.00	39.00	0.00	39.00	26.00
		Indira Aerobic-1 (R1570-2649-1-1546-1) (IET 21686)	2015	6.00	29.10	0.00	29.10	23.10
		IR-64	1991	42.15	76.50	0.00	76.50	34.35
		IGKVR-1 (IET 19569)	2011	37.00	43.50	0.00	43.50	6.50
		Shyamala	1997	3.00	9.00	0.00	9.00	6.00
		Total		**290.72**	**748.80**	**0.00**	**748.80**	**458.08**
22	JNKVV, Jabal-pur	JR 206 (IET 26079)	2019	136.75	1203.31	0.00	1203.31	1066.56
		Improved Jeera Shankar	2018	1.25	4.59	0.00	4.59	3.34
		JR-81	2018	0.10	133.87	0.00	133.87	133.77
		JR 21 (JR 81-01)	2023	118.80	506.56	0.00	506.56	387.76
		KRANTI (R-2022)	1982	7.70	1304.27	0.00	1304.27	1296.57
		JR 10	2021	92.50	210.47	0.00	210.47	117.97
		JR 767	2016	5.00	0.77	0.00	0.77	-4.23
		SHYAMALA (IET-12561, R 259-WR-37-2)	1997	3.00	0.00	0.00	0.00	-3.00
		Total		**365.10**	**3363.84**	**0.00**	**3363.84**	**2998.74**
23	KAU, Pat-tambi	Kau Manu Rathna (HS-16)	2021	0.10	0.00	1.00	1.00	0.90
		PTB-51 (AATHIRA)	2006	0.80	0.00	2.00	2.00	1.20
		JYOTHI	1977	5.90	10.00	9.00	19.00	13.10

S. No.	Centre	Variety	Notif. Year	Indent (q)	Production (q)			Surplus/ Deficit (q)
					Kharif 2025	*Rabi* / Summ*er	Total	
		KUMBHAM (KTR-3)	2002	0.30	0.00	0.00	0.00	-0.30
		BHADRA (MO-4)	1980	1.75	0.00	1.75	1.75	0.00
		MO 21 (PRATHEEKSHA)	2010	0.20	0.00	1.00	1.00	0.80
		KAUM 42-6-3 (D1) (MO 16-UMA, IET-14758)	2002	9.35	0.00	9.35	9.35	0.00
		Kau Pournami (MO 23)	2021	2.05	0.00	2.50	2.50	0.45
		Kau VTL 11 (Jyotsna) (KAU. BIL4)	2021	0.30	0.10	0.00	0.10	-0.20
		Total		**20.75**	**10.10**	**26.60**	**36.70**	**15.95**
24	UAHS, Shiva-mogga	Tunga (IET-13901)	2006	0.95	2.00	0.00	2.00	1.05
		Sahyadrikempumukthi	2022	1.25	2.00	0.00	2.00	0.75
		KHP-13 (Bharath) (IET 21479)	2018	0.25	1.00	0.00	1.00	0.75
		KKP-5 (IET 24250)	2018	0.60	1.00	0.00	1.00	0.40
		Sahyadri-2 (KJTRH-3) (IET-17661)	2007	5.00	0.00	0.00	0.00	-5.00
		Sahyadri-3 (KJTRH-12) (IET-18829)	2007	5.00	0.00	0.00	0.00	-5.00
		Sahyadri Panchmukhi	2021	0.25	2.00	0.00	2.00	1.75
		Sahyadri Siri	2024	0.25	2.00	0.00	2.00	1.75
		Sahyadri Jalmukthi (KHP14/IET- 30872)	2024	0.20	2.00	0.00	2.00	1.80
		Sahyadri Sapthami (BMR-US-1-24-2)	2024	0.25	2.00	0.00	2.00	1.75
		Total		**14.00**	**14.00**	**0.00**	**14.00**	**0.00**
25	MPKV, Rahuri	Bhogavati	2007	0.40	2.00	0.00	2.00	1.60
		Phule Samruddhi (VDN-99-29)	2010	0.80	4.00	0.00	4.00	3.20
		INDRAYANI (IET - 12897)	1993	16.50	100.00	0.00	100.00	83.50
		Total		**17.70**	**106.00**	**0.00**	**106.00**	**88.30**
26	NDUAT, Ayodhya	IR 64- Sub 1 (IET 21247)	2020	14.40	12.60	0.00	12.60	-1.80
		SARJOO-52	1982	1.00	37.05	0.00	37.05	36.05
		NDR 9930111 (IET-19117)	2021	9.60	3.00	0.00	3.00	-6.60
		NDR 2065 (IET 17476)	2011	2.00	22.75	0.00	22.75	20.75
		NARENDRA DHAN-359 (NDR-359)	1994	1.80	30.54	0.00	30.54	28.74
		NARENDRA DHAN-97	1992	0.10	15.00	0.00	15.00	14.90
		Total		**28.90**	**120.94**	**0.00**	**120.94**	**92.04**
27	OUAT, Bhu-baneshwar	Rani Dhan (IET-19148)	2009	0.40	0.60	0.00	0.60	0.20
		Pratikshya (ORS 201-5)(IET-15191)	2006	13.70	30.00	0.00	30.00	16.30
		KALINGA DHAN 1301	2021	0.30	5.00	0.00	5.00	4.70
		Hasanta (OR 2328-5) (IET 21477)	2018	1.20	5.00	0.00	5.00	3.80
		MRUNALINI (OR 1898-18) IET 18649	2011	0.25	3.00	0.00	3.00	2.75
		TEJASWANI (OR 1912-22)	2011	0.20	0.20	0.00	0.20	0.00
		OUAT Kalinga Rice 6 (Bhargavi)	2023	0.50	0.80	0.00	0.80	0.30
		OUAT Kalinga Rice 1 (Kolab)	2023	0.50	1.60	0.00	1.60	1.10
		OUAT Kalinga Rice 2 (Salandi)	2023	0.50	1.00	0.00	1.00	0.50
		OUAT Kalinga Rice 8 (Surya Shree)	2023	0.50	0.00	0.00	0.00	-0.50
		OUAT Kalinga Rice 7 (Barunei)	2023	0.50	1.20	0.00	1.20	0.70
		OUAT Kalinga Rice 5 (Nabanna)	2023	4.00	0.00	4.00	4.00	0.00
		Manaswini (IET 19005)	2008	0.30	0.50	0.00	0.50	0.20

S. No.	Centre	Variety	Notif. Year	Indent (q)	Production (q)			Surplus/ Deficit (q)
					Kharif 2025	*Rabi* / Summ*er	Total	
		Gobinda (OR 2324-8) (IET 21009)	2018	0.02	0.02	0.00	0.02	0.00
		PRATIBHA (OR 2172-7) IET 21582	2018	0.20	0.20	0.00	0.20	0.00
		KALACHAMPA	2015	37.65	90.00	0.00	90.00	52.35
		KALINGA DHAN 1203 (IET 27117)	2021	1.00	5.00	0.00	5.00	4.00
		JAGABANDHU (OR 1206-25-1)(IET-14100)	2002	0.30	2.00	0.00	2.00	1.70
		Kalinga Dhan-1205 (IET 22579)	2021	1.00	1.20	0.00	1.20	0.20
		Kalinga Dhan-1501	2021	1.10	1.40	0.00	1.40	0.30
		LALAT (IET-9947)	1989	8.38	5.20	10.00	15.20	6.82
		PARIJAT (IET-2684)	1985	2.58	0.00	2.60	2.60	0.02
		Upahar(OR 1234-12-1) (IET 17318)	2006	0.30	1.20	0.00	1.20	0.90
		Kalinga Dhan 1401	2021	0.50	1.20	0.00	1.20	0.70
		SATYA	1988	0.90	0.00	0.90	0.90	0.00
		KHANDAGIRI	1994	3.15	5.90	8.10	14.00	10.85
		UDAYAGIRI (IET-12316)	1999	0.30	6.60	0.00	6.60	6.30
		SURENDRA (IET-12815)	1999	0.60	0.60	0.00	0.60	0.00
		Kalinga Dhan-1204	2021	0.50	4.20	0.00	4.20	3.70
		Kalinga Dhan-1502	2021	0.50	7.20	0.00	7.20	6.70
		Total		**81.83**	**180.82**	**25.60**	**206.42**	**124.59**
28	PAJANCOA & RI, Karikal	PY-4	1991	0.30	0.30	0.00	0.30	0.00
		KKL (R) 4 (IET-30697) (KR- 19011)	2024	1.40	1.40	0.00	1.40	0.00
		Total		**1.70**	**1.70**	**0.00**	**1.70**	**0.00**
29	PAU, Ludhiana	PR 127 (RYT 13316)	2020	2.50	12.30	0.00	12.30	9.80
		PR 121 (RYT 3240)	2015	1.52	40.95	0.00	40.95	39.43
		PR 118	2007	1.48	20.50	0.00	20.50	19.02
		PR-113	2001	19.58	73.70	0.00	73.70	54.12
		PR 130 (PRYT 3797)	2023	5.92	13.35	0.00	13.35	7.43
		PR 122 (RYT 3129)	2015	0.86	28.80	0.00	28.80	27.94
		PR-114	2001	3.58	114.35	0.00	114.35	110.77
		Punjab Basmati 7	2022	0.46	42.50	0.00	42.50	42.04
		PR-126 (RYT 3379)(IET-24721)	2018	16.23	87.88	0.00	87.88	71.65
		PR 128 (RYT 3437)	2021	1.52	42.50	0.00	42.50	40.98
		PR 129 (RYT 3468)	2021	3.50	12.50	0.00	12.50	9.00
		PR-131 (RYT 3888)	2024	7.68	91.35	0.00	91.35	83.67
		Total		**64.83**	**580.68**	**0.00**	**580.68**	**515.85**
30	PDKV, Akola	PKV Makarand	2005	2.00	7.10	0.00	7.10	5.10
		PDKV TILAK (SYE-503-78-34-2)	2019	2.20	42.50	0.00	42.50	40.30
		Sakoli-9 (SKL-2-50-56-45-30-60)	2019	0.20	1.40	0.00	1.40	1.20
		PKV HMT	2008	11.70	67.00	0.00	67.00	55.30
		PDKV SADHANA	2023	1.00	34.20	0.00	34.20	33.20
		PDKV Sakoli Red Rice 1	2021	0.06	0.90	0.00	0.90	0.84
		PDKV Kisan (SKL-22-39-31-25-31-34)	2018	0.20	2.40	0.00	2.40	2.20
		Total		**17.36**	**155.50**	**0.00**	**155.50**	**138.14**

S. No.	Centre	Variety	Notif. Year	Indent (q)	Production (q)			Surplus/ Deficit (q)
					Kharif 2025	*Rabi* / Summ*er	Total	
31	PJTSAU, Hyderabad	Telangana Rice 6 (KNM 7048 (IET 28332)	2022	0.25	1.50	5.00	6.50	6.25
		Telangana Rice 7037 (IET 28356) (KNM 7037)	2024	3.50	2.00	5.00	7.00	3.50
		Kunaram Rice-1 (KNM 733) (IET 27405)	2020	0.20	10.50	25.00	35.50	35.30
		Telangana Rice 7 (KNM6 6965 (IET 28343)	2022	2.20	0.75	5.00	5.75	3.55
		Kunaram Vari-2 (KNM 1638)	2021	7.16	82.20	100.00	182.20	175.04
		Kunaram Sannalu (KNM 118)(IET No.23748)	2016	6.16	50.75	80.00	130.75	124.59
		JGL-1798	2004	5.00	22.00	18.00	40.00	35.00
		JGL 18047 (Bathukamma)	2016	1.15	11.57	0.00	11.57	10.42
		Telangana Vari 3 (IET 26125-JGL 21078)	2021	0.20	0.00	1.75	1.75	1.55
		JAGTIALA VARI 2 (JGL 28545)	2023	0.50	9.30	0.00	9.30	8.80
		Jagtiala Rice-1 (JGL24423) (IET 25310)	2020	7.60	0.00	110.00	110.00	102.40
		JGL-384	2004	0.10	16.00	20.00	36.00	35.90
		Jagtiala Vari-3 (JGL 27356 (IET 30064)	2023	2.70	11.75	18.00	29.75	27.05
		Warangal Rice - 1 WGL-915 (IET 25284)	2020	0.20	0.20	0.00	0.20	0.00
		Warangal vari 1119 (WGL 1119) (IET-27868)	2024	0.50	0.50	0.00	0.50	0.00
		WGL-1487 (Telangana Vari-8) (IET 28818)	2022	0.20	0.20	0.00	0.20	0.00
		Telangana Vari-2 IET 26027(WGL 697)	2021	0.20	0.20	0.00	0.20	0.00
		Telangana Vari-1 (IET 25330) (WGL-739)	2020	1.90	1.90	0.00	1.90	0.00
		ERRA MALLELU (WGL-20471)	1993	2.64	2.64	0.00	2.64	0.00
		KAVYA (WGL-48684)	1993	0.60	0.60	0.00	0.60	0.00
		Warangal Vari-2 (IET 26094)	2021	0.20	0.20	0.00	0.20	0.00
		Telangana Rice-1355 (WGL1355)	2024	2.00	2.00	0.00	2.00	0.00
		Telangana Rice- 1289 (IET 29351) (WGL 1289)	2024	0.20	0.20	0.00	0.20	0.00
		Rajendranagar Vari – 28361 (RNR 28361) (IET 28416)	2024	1.20	1.20	0.00	1.20	0.00
		Sugandha Samba (RNR-2465)	2011	2.15	2.15	0.00	2.15	0.00
		RAJENDRANAGAR VARI-3 (RNR 15459)	2023	0.30	0.30	0.00	0.30	0.00
		Rajendranagar Vari-1 (RNR-11718)	2022	0.30	0.30	0.00	0.30	0.00
		RNR 15048	2021	36.37	36.37	50.00	86.37	50.00
		TELLAHAMSA	1975	0.50	0.50	0.00	0.50	0.00
		Telangana Sona (RNR- 15048)(IET23746)	2016	2.00	2.00	10.00	12.00	10.00
		RAJENDRANAGAR VARI-5 (RNR 29325)	2023	1.30	1.30	0.00	1.30	0.00
		RAJENDRANAGAR VARI-4 (RNR 21278)	2023	0.50	0.50	0.00	0.50	0.00
		Shobhini (RNR-2354) (IET- 21260)	2014	5.00	5.00	0.00	5.00	0.00
		Total		**94.98**	**276.58**	**447.75**	**724.33**	**629.35**
32	PRDF, Gora-khpur	Kalanamak Kiran (PRDF-2-14-10) (IET 24753)	2019	2.00	7.40	0.00	7.40	5.40
		Bauna Kalanamak-101	2016	0.30	3.20	0.00	3.20	2.90
		Total		**2.30**	**10.60**	**0.00**	**10.60**	**8.30**

S. No.	Centre	Variety	Notif. Year	Indent (q)	Production (q)			Surplus/ Deficit (q)
					Kharif 2025	*Rabi* / Summ*er	Total	
33	Rice Research Station, Bankura	BNKR-3(SAMPRITI) IET-21987	2016	0.10	0.40	0.00	0.40	0.30
		Dhruba (BNKR-2)	2017	0.50	0.80	0.00	0.80	0.30
		BNKR-1 (Dhiren) (IET 20760)	2015	1.55	2.02	0.00	2.02	0.47
		Pushpa (IET 17509)	2015	0.10	0.12	0.00	0.12	0.02
		Total		**2.25**	**3.34**	**0.00**	**3.34**	**1.09**
34	Rice Research Station, Chin-surah	Gosaba-5 (Chinsurah Nona-1) (IET-23403)	2016	0.30	0.10	0.00	0.10	-0.20
		Bhupesh (IET 23324) (CN 1752-18-1-9-MLD19)	2019	0.30	0.40	0.00	0.40	0.10
		Manisha (IET-23770) (CN-2015-5-4)	2019	0.50	0.50	0.00	0.50	0.00
		Ajit (IET 22066)	2016	0.70	0.20	0.00	0.20	-0.50
		Chinsurah Nona-2 (Gosaba-6) (IET-21943)	2019	0.40	0.10	0.00	0.10	-0.30
		Rajdeep CN 1039-9	2017	0.30	0.70	0.00	0.70	0.40
		KHITISH (IET-4094)	1984	4.00	6.00	0.00	6.00	2.00
		Muktashree (IET 21845)	2019	0.30	0.30	0.00	0.30	0.00
		Sukumar (IET 21261)	2020	0.32	1.00	0.00	1.00	0.68
		KALIMPONG	1978	1.00	0.00	0.00	0.00	-1.00
		CN 1272-55-105 (IET-19886)	2018	0.10	0.90	0.00	0.90	0.80
		SABITA (IET-8970)	1987	1.20	0.90	0.00	0.90	-0.30
		SHATABDI (IET-4786)	2000	17.75	23.10	0.00	23.10	5.35
		Total		**27.17**	**34.20**	**0.00**	**34.20**	**7.03**
35	RPCAU, Pusa	RAJSHREE (TCA-80-4) (IET-7970)	1989	0.90	25.00	0.00	25.00	24.10
		RAJENDRA BHAGVATI	2010	0.30	6.00	0.00	6.00	5.70
		Rajendra Nilam (RAU-1484-Aer- 04) (IET 24010)	2017	15.10	106.97	0.00	106.97	91.87
		Rajendra Sweta	2007	6.50	15.00	0.00	15.00	8.50
		Rajendra Suwasini	2007	0.90	6.00	0.00	6.00	5.10
		Rajendra Mahsuri-1	2007	8.00	32.23	0.00	32.23	24.23
		Total		**31.70**	**191.20**	**0.00**	**191.20**	**159.50**
36	SKUAST, Jammu	Jammu Basmati 118 (SJBR 118)	2021	10.00	10.00	0.00	10.00	0.00
		GIZA-14	1978	10.00	12.00	0.00	12.00	2.00
		Basmati 564 (IET 17269)	2015	0.05	0.05	0.00	0.05	0.00
		Total		**20.05**	**22.05**	**0.00**	**22.05**	**2.00**
37	SKUAST K, Srinagar	Shalimar Rice-3	2015	0.32	1.00	0.00	1.00	0.68
		Shalimar Rice-5 (SKUA-402)	2019	1.00	2.00	0.00	2.00	1.00
		Shalimar Rice-4 (SKUA-408)	2019	11.00	15.00	0.00	15.00	4.00
		Shalimar Rice-2	2015	1.00	1.50	0.00	1.50	0.50
		Shalimar Rice-7	2024	0.50	0.50	0.00	0.50	0.00
		Shalimar Rice-8	2024	0.50	0.50	0.00	0.50	0.00
		Shalimar Rice-9	2024	1.00	1.00	0.00	1.00	0.00
		Total		**15.32**	**21.50**	**0.00**	**21.50**	**6.18**

S. No.	Centre	Variety	Notif. Year	Indent (q)	Production (q)			Surplus/ Deficit (q)
					Kharif 2025	*Rabi* / Summ*er	Total	
38	UAS, Mandya	RM-1 (IET-14083, MANGALA MANS-URI)	2002	0.20	0.00	0.00	0.00	-0.20
		Thanu	2008	0.25	0.25	0.00	0.25	0.00
		SAMRUDDHI (MSN 99)Samruddhi (Mandya Source Nursery	2023	0.55	0.55	0.00	0.55	0.00
		MANDYA JYOTHI (KMP-220)	2023	0.80	0.80	0.00	0.80	0.00
		BR-2655	2006	1.25	1.25	0.00	1.25	0.00
		KMP-225	2024	0.25	0.25	0.00	0.25	0.00
		Total		**3.30**	**3.10**	**0.00**	**3.10**	**-0.20**
39	UAS, Dharwad	KMD-2 (ABHILASH)	1987	1.75	3.60	0.00	3.60	1.85
		INTAN	1992	1.00	2.00	0.00	2.00	1.00
		KPR-1 (IET-23077)	2016	0.25	0.00	0.00	0.00	-0.25
		MUGAD SUGANDHA-1 (IET-13549)	2002	2.00	2.00	0.00	2.00	0.00
		Total		**5.00**	**7.60**	**0.00**	**7.60**	**2.60**
40	UBKV, Pundibari	Uttar Lakshmi (IET 24173) UBKVR-15	2020	0.40	3.00	1.20	4.20	3.80
		Uttar Sona (UBKVR -1) (IET 24171)	2019	1.40	6.00	5.50	11.50	10.10
		Uttar Sugandhi (UBKVRA-2) (IET 24616)	2022	0.10	2.50	0.00	2.50	2.40
		Uttar Samir (PUR-B-36) (IET 26453)	2022	0.10	5.00	4.30	9.30	9.20
		Uttar Ganga (PUR-B-190 (IET 28840)	2024	0.65	6.00	5.50	11.50	10.85
		Total		**2.65**	**22.50**	**16.50**	**39.00**	**36.35**
41	VNMKVV, Parbhani	PBNR-93-1(Parbhani Avishkar)	2005	2.00	0.00	0.00	0.00	-2.00
		Total		**2.00**	**0.00**	**0.00**	**0.00**	**-2.00**
42	CAU, Imphal	CAU-R1 (Tamphaphou)	2018	0.00	5.10	0.00	5.10	5.10
		CAU-R2 (Tomthinphou)	2020	0.00	1.20	0.00	1.20	1.20
		CAU-R3 (Mangalphou)	2020	0.00	0.75	0.00	0.75	0.75
		CAU-R4 (Eenotphou)	2020	0.00	0.60	0.00	0.60	0.60
		CAU-R5 (Emoinu phou)	2025	0.00	5.20	0.00	5.20	5.20
		Total		**0.00**	**12.85**	**0.00**	**12.85**	**12.85**
		Grand Total		**3490.97**	**9130.74**	**1874.95**	**11005.69**	**7514.72**

Annexure - 3

Contributions of Scientists retired in 2025

ICAR–IIRR acknowledges with deep appreciation the dedicated services and invaluable contributions of four distinguished scientists who superannuated during 2025 after decades of exemplary service to rice research, education, technology development, and institutional strengthening.

Dr. G. Padmavathi



Dr. G. Padmavathi, born on 7 June 1964 in Tenali, Guntur district, Andhra Pradesh, completed her B.Sc. (Agriculture) in 1984 and M.Sc. (Agriculture) in Genetics and Plant Breeding in 1986 from Acharya N.G. Ranga Agricultural University, Hyderabad. She later obtained her Ph.D. in Botany from Utkal University, Bhubaneswar, in 2005. She was a recipient of the National Merit Scholarship, the Acharya N.G. Ranga Agricultural University Merit Fellowship, and the CSIR Senior Research Fellowship during her academic career.

She joined ICAR–Indian Institute of Rice Research, Hyderabad, in 1992 as a Scientist in Plant Breeding through the Agricultural Scientists Recruitment Board and served the institute for 33 years and 7 months until her retirement on 31 March 2025. Her research career focused on rice genetics, breeding, molecular breeding, and the All India Coordinated Research Project on Rice, with special emphasis on resistance to planthoppers, salinity and drought tolerance, and biofortification. She received training in marker-assisted selection at IRRI, Philippines, which strengthened her expertise in precision breeding.

Dr. Padmavathi contributed to the development of 26 rice cultivars, including DRR Dhan 45, India's first zinc-rich rice variety, and DRR Dhan 63, a zinc-rich variety developed under the HarvestPlus programme. She also contributed to the development of 10 novel rice genetic stocks registered with NBPGR and identified six novel genes governing planthopper resistance. Her scholarly output includes 71 peer-reviewed papers, along with several popular articles, technical articles, book chapters, technical bulletins, and conference presentations. She received the Crop Research Award in 2004, several best paper and poster awards, and a DBT international travel grant in 2012.

As Principal Investigator, she led 10 externally funded projects and established a molecular breeding laboratory at ICAR-IIRR. She guided 12 postgraduate and 8 doctoral students, served as a reviewer and member of several scientific bodies, and was elected Fellow of the ISGPB in 2024. After superannuation, she is presently serving as Professor in the Department of Genetics and Plant Breeding at the Heartfulness Academy of Research and Innovation (HARI), Hyderabad.

Dr. K. Surekha



Dr. K. Surekha, born in Amalapuram, East Godavari district, Andhra Pradesh, obtained her B.Sc. (Agriculture) in 1984, M.Sc. (Agriculture) in Soil Science and Agricultural Chemistry in 1986 from Agricultural College, Bapatla, and Ph.D. in the same discipline in 1992 from Acharya N.G. Ranga Agricultural University, Hyderabad. She secured the highest OGPA in both her M.Sc. and Ph.D. programmes. She joined ICAR–NAARM as Scientist (Probation) in 1992 and was posted to the Directorate of Rice Research, Hyderabad, in 1993. She served the Institute for 32 years and 7 months and retired as Principal Scientist on 31 July 2025.

Dr. Surekha made significant contributions to soil fertility and nutrient management, site-specific nutrient management, rice-based cropping systems,

hybrid rice, the System of Rice Intensification, crop residue management, organic farming, and nutrient use efficiency. Her work helped identify promising rice genotypes for nitrogen use efficiency and promoted SSNM and green manuring technologies for improving rice productivity and soil health. From her recent project on nitrogen use efficiency, she evaluated 1,209 rice genotypes, identified more than 30 high-NUE varieties and breeding lines, demonstrated 25% nitrogen fertilizer savings through efficient genotypes, and developed four nitrogen-efficient genetic stocks registered with NBPGR. She has authored 162 research papers and contributed 160 conference presentations, 25 technical bulletins, 52 popular articles, 14 book chapters, 6 edited books, 4 training manuals, and 60 training lectures.

As a collaborator, she contributed to the development of 16 rice varieties, 6 genetic stocks, one patent, four copyrights, and eight crop production technologies. She received 17 national and international awards, including the National Merit Scholarship, ICAR Senior Research Fellowship, and the NEWS India–UK Fellowship at the University of Aberdeen, Scotland. She guided 20 postgraduate students, served as PI/Co-PI in 12 externally funded projects, and held several academic and administrative responsibilities, including Head, Soil Science Section, PI of AICRPR, editor of institute publications, and member of national committees. She also represented India in scientific programmes in China, the Philippines, Vietnam, Thailand, Malaysia, Sri Lanka, and Scotland, and is an accomplished table-tennis player with multiple gold medals.

Dr P Raghuveer Rao



Dr. P. Raghuveer Rao, born on 3 July 1963, headed the Plant Physiology Division at the ICAR-Indian Institute of Rice Research, Hyderabad, and has made distinguished contributions to rice physiology and crop improvement. He completed his B.Sc. (Agriculture) from APAU, Rajendranagar, Hyderabad, and his M.Sc. and Ph.D. in Plant Physiology from IARI, Pusa, New Delhi. He has built a distinguished career in rice physiology with major research contributions in seed physiology, climate change impacts on crops, direct seeded rice, source-sink relations, system of rice intensification, nitrogen use efficiency, and the role of silicon in imparting tolerance to biotic and abiotic stresses in rice.

He has provided strong scientific and institutional leadership by serving as Head of the Department of Plant Physiology and Biochemistry for four years and as Principal Investigator of the AICRIP-Rice Plant Physiology programme during 2019-2025. He has also contributed to institute governance as a member of the Research Advisory Committee, Institute Management Committee, and Project Monitoring and Evaluation Cell, and rendered long-term institutional service in organizing Farmers' Day activities, annual reporting, and administrative coordination at ICAR-IIRR. Dr. Rao played an important role in nationally significant research programmes, particularly NICRA and AICRIP, where he helped coordinate work on heat tolerance, drought tolerance, low-light stress, radiation use efficiency, photoperiod response, and nitrogen-use efficiency in rice. His work has been especially valuable in identifying physiological traits and donor lines for breeding climate-resilient and resource-efficient rice varieties, while also advancing understanding of stress physiology and crop improvement strategies

A notable achievement of Dr. Rao is his contribution as co-developer in the release of important rice varieties, including DRR Dhan-51, DRR Dhan-62, DRR Dhan-75, and DRR Dhan-79, which are recognised for high yield, resistance to major diseases, lodging tolerance, and multiple-stress tolerance across diverse rice ecologies. These varietal contributions have strengthened efforts toward resilient, productive, and farmer-relevant rice cultivation in several Indian states. He has published more than 60 research papers in national and international journals and contributed extensively to scientific reporting through authorship and co-authorship of around 12 AICRIP progress reports between 2013 and 2025. His scholarly work spans nitrogen-use efficiency, physiological traits

associated with yield, heat tolerance, grain filling, and marker-trait associations, reflecting sustained impact on rice physiology research and breeding support. In addition to research, Dr. Rao has made major contributions to teaching, mentorship, and capacity building. He has served as adjunct faculty to several agricultural universities, guided M.Sc. and Ph.D. students, examined theses across universities, reviewed scientific journals, delivered guest lectures, and conducted training and field-level capacity-building programmes for farmers, extension personnel, students, and researchers on rice physiology and abiotic stress management. His contributions have been recognized through research and presentation awards, including recognition for outstanding publication work and innovation in rice production management. Overall, Dr. P. Raghuveer Rao's career reflects a strong blend of scientific excellence, varietal development, academic mentorship, institutional leadership, and service to the rice research and farming community.

Dr. P. Muthuraman



Dr. P. Muthuraman was born on 2 July 1963 in Sendamaram village, in the erstwhile Tirunelveli district of Tamil Nadu. He completed his undergraduate and postgraduate studies at Gandhigram Rural University, Tamil Nadu. He joined CRIDA on 16 October 1988 as a T-4 Rural Sociology Technician and later entered the Agricultural Research Service, being posted as Scientist (Agricultural Extension) at the Directorate of Rice Research, Hyderabad, in 1990. He has completed more than 37 years of distinguished research service in ICAR.

To his credit, he has published more than 30 research articles, 100 popular articles, and seven books. He has organized more than 300 rice-related training programmes and has trained more than 7,000 line department officials. During his academic career, he received the Kasturi Rangan Gold Medal during graduation and the Syndicate Bank Gold Medal during postgraduation for securing first rank at the university level. He also earned his doctoral degree from the University of Hyderabad.

During his research career, he received two prestigious team awards from the Hon'ble President of India and the Hon'ble Prime Minister of India for technology development related to the rice variety Improved Samba Mahsuri and for technology popularization. At present, he is engaged in tree planting and water conservation initiatives aimed at rural transformation and eco-restoration in fragile ecosystems of Tamil Nadu, with the support of Gandhigram Rural University. He has been associated with PJTAU, ANGRAU, IARI, and Gandhigram Rural University, and has visited Japan,Philippines, and Mauritius.

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