# RECOMMENDATIONS & WORK PLAN 2024-25

## PROCEEDINGS

अखिल भारतीय समन्वित गेहूँ एवं जौ अनुसंधान परियोजना

**AICRP on Wheat and Barley**


भा.कृ.अनु.प.–भारतीय गेहूँ एवं जौ अनुसंधान संस्थान, करनाल (हरियाणा)

**ICAR-Indian Institute of Wheat & Barley Research, Karnal (Haryana)**

**Correct Citation:** Proceedings of the 63rd All India Wheat and Barley workers meet held at ANDUAT, Ayodhya during September 11-13, 2024. All India Coordinated Research Project on Wheat and Barley. Pages 105.

**Compiled and Edited by:** CN Mishra, Satish Kumar and BS Tyagi

**Prepared by:** OP Ahlawat, SC Gill, Pradeep Sharma, Sunil Kumar, Satyavir Singh, Om Vir Singh and Rapporteurs of various sessions.

**Issued by:**
The Director,
ICAR-Indian Institute of Wheat and Barley Research,
Karnal 132001 (Haryana)

***For official use only***

# PROCEEDINGS

**(Research Review, Recommendations & Plan of Work 2024-25)**

**63rd All India Wheat & Barley Research Workers' Meet**
**held at**
**Acharya Narendra Deva University of Agriculture & Technology,**
**Ayodhya (Uttar Pradesh)**
**(September 11-13, 2024)**

**Organized by**
**ANDUAT Ayodhya & ICAR-IIWBR, Karnal**

**Issued by**
**Dr. Ratan Tiwari**
**Director**
**ICAR-Indian Institute of Wheat and Barley Research**
**Karnal-132001, Haryana, India**

# Contents

# Foreword

The 63rd All India Wheat and Barley Research Workers' meet held at Acharya Narendra Deva University of Agriculture & Technology, Ayodhya (Uttar Pradesh) during 11-13 September, 2024 was jointly organized by the ICAR-Indian Institute of Wheat and Barley Research, Karnal and ANDUAT, Ayodhya. The meet was inaugurated by the Dr TR Sharma, DDG (Crop Sciences), Indian Council of Agricultural Research, Dr. SK Pradhan, ADG (FFC), ICAR, New Delhi was the guest of honour and Dr. PL Patil, Vice Chancellor of UAS, Dharwad was the special guest. Dr. Bijendra Singh Vice Chancellor, ANDUAT, Ayodhya graced the occasion as the chairman. Sh. Surya Pratap Shahi, Cabinet Minister Agriculture, Agriculture Education and Agriculture Research, Govt. of Uttar Pradesh was chief guest during the session on farmer and industry interaction.

The meeting reviewed the results of previous year experiments and based on the deliberations, the programme for ensuing crop season 2024-25 was finalized. Apart from this, emerging issues in wheat production were also discussed by eminent speakers during various special sessions.

On behalf of the wheat and barley fraternity, I express my sincere gratitude Sh. Surya Pratap Shahi, Cabinet Minister Agriculture, Agriculture Education and Agriculture Research, Govt. of Uttar Pradesh, for gracing the occasion as chief guest. I express my deep sense of gratitude to Dr T R Sharma DDG (CS), ICAR for guidance and continuous support. I also express gratitude to Dr SK Pradhan, ADG(FFC), ICAR for his dedicated support. I also place on record my sincere thanks to Prof Bijendra Singh, Vice Chancellor ANDUAT Ayodhya for his unfailing help and devoted support; Dr Dr. PL Patil VC, UAS, Dharwad for joining the discussions and sharing experiences. Suggestions provided by eminent personalities like Dr.PK Singh, Agriculture Commissioner, MoA&FW, Govt. of India, Dr AK Joshi and Velu from CIMMYT, Dr. Maricelis Acevedo from Cornell University, Dr. Hodson from Nepal and zonal coordinators for refining the programme are gratefully acknowledged.

I pay my sincere gratitude to Chairman, PAMC Dr RR Hanchinal and members Dr NS Bains, Dr SC Bhardwaj, ML Jat for critically reviewing the performance of all the centers in pre-workshop meeting.

I would also take this opportunity to thanks Dr Pratibha Singh, Dean CoA, ANDUAT and all the members of the organizing committee of university for all the hard work they have done in making this programme a grand success. I would also commend all the Principal Investigators and staff for timely preparation of Annual Progress reports and this proceeding. Thanks to the chairmen and rapporteurs of various technical sessions for smooth conduct and recording of proceedings. I appreciate the efforts made by scientific, technical and administrative staff for coming out with the summary proceedings during plenary session.

I wish all the best for the ensuing season.

**(Ratan Tiwari)**

## Session I: Inaugural Session

**September 11, 2024**
**9:00-11:15 A.M**

| | | |
|---|---|---|
| **Chief Guest** | : | Dr. T R Sharma, DDG (CS), ICAR, New Delhi |
| **Chairman** | : | Dr. Bijendra Singh, Vice Chancellor, ANDUAT, Ayodhya |
| **Guest of Honour** | : | Dr. SK Pradhan, ADG (FFC), ICAR, New Delhi |
| **Special Guests** | : | Dr. PL Patil, Vice Chancellor, UAS, Dharwad |
| **Rapporteurs** | : | Drs. BS Tyagi and Kiran Gaikwad |
| **Stage Convener** | : | Dr. Anuj Kumar |

The inaugural session of 63rd All India Wheat and Barley Research Worker's meet was held at ANDUAT, Ayodhya was held on September 11, 2024. Chief guest of the session was Dr. T.R. Sharma DDG (CS), ICAR, New Delhi. Dr. Bijendra Singh Vice Chancellor, ANDUAT, Ayodhya graced the occasion as the chairman. Dr. SK Pradhan, ADG (FFC), ICAR, New Delhi was the guest of honour and Dr. PL Patil, Vice Chancellor of UAS, Dharwad was the special guest. The session was graced with many dignitaries including Dr. AK Joshi MD, BISA, CIMMYT, Dr. SK Agrawal from ICARDA, Dr. Velu Govindan from CIMMYT Mexico, Dr. Mericelis Acevedo Cornel University USA, Dr. David Hodson CIMMYT, Nepal, Dr. RR Hanchinal, former chairperson PPVFRA, New Delhi, Dr. Sanjay Kumar, Director IISS, Mau and Dr. Laxmi Kant Director, VPKAS Almora. The PAMC members Dr NS Bains and Dr. SC Bhardwaj were also present during the session.

This important and first session was started with the lighting of lamp and with ICAR song and ANDUAT *Kulgeet.* Director Research, ANDAUT, Dr. AK Gangwar formally welcomed the dignitaries, guests and all the participants for their presence at workshop in Ayodhya.

Director, ICAR-Indian Institute of Wheat and Barley Research, Dr. Ratan Tiwari, presented the progress report of wheat and barley for the crop season 2023-24. At the outset, Dr. Tiwari informed the house that this season 112.9 mmt of wheat was produced which is an all-time high record. He also appraised the house about the release of 11 wheat and one barley varieties, evaluations of more than 2700 germplasm lines, developing heat and drought tolerant genotypes, pre-breeding for diversifying the gene pool, identification of *Sr*65 gene, commercialization of technologies developed, MoAs with two companies for Rotary Disc Drill, work on herbicide resistance, genome editing, addressing celiac disease and work on natural farming etc. Dr. Tiwari informed that one variety of barley DWRB 219 was dedicated to the growers by the Hon. Prime Minister during the last month. Frontline demonstrations have shown that barley has the potential to yield higher with the new technology available as now. He also informed the house that 1100 cluster demonstrations of wheat were planted at farmers' field in seven states to show the performance of new varieties. He told that during the pre- workshop meet on September 2-3, 2024, a total of 34 centers were reviewed as suggested by the ADG (FFC).

Dr. SK Pradhan ADG (FFC), ICAR, New Delhi expressed happiness on the progress made by wheat group. He said that complacency should not creep in as India will need around 142 mmt wheat by the year 2047 and that too under the regime of climate change. The production should increase but should also sustain the soil health and quality of grain. He emphasized to work on low gluten varieties of wheat. Dr. Pradhan suggested prioritizing AICRP activities based on the strength of the center and problems of that area. He felt satisfaction regarding the work on biofortification. He also emphasized to work on malt barley and hull less barley varieties.

Dr. PL Patil Vice Chancellor UAS, Dharwad congratulated the scientist to produce all time high production. He opined that the work on resource use efficiency is must to save natural resources for the future generations. He praised the previous wheat breeders who developed varieties like DWR 162 which not only performed better in India but also occupied a sizeable area in Indonesia. He thanked the authorities for re-initiation of the Dicoccum trial, which is a valuable food for diabetic persons. Dr. Bijendra Singh Vice Chancellor, ANDUAT, Ayodhya, was happy to inform that the seed replacement rate in wheat is the highest and varieties are liked and trusted by the farmers. He thanked ICAR for organizing the 63$^{rd}$ wheat and barley workers meet at ANDUAT, Ayodhya. Dr. Singh emphasized to develop varieties for late sowing under Rice/ Wheat system. He said that barley is a potential crop in eastern part of the country but need special attention in management and cultural practices as ecology is an important consideration in this area. He also opined that student exchange program be started with ICAR institutes to expose the students with new techniques.

The dignitaries then awarded the teams of scientist who developed 11 varieties (HD 3388, HD 3386, NWS 2194, DBW 377, DBW 359, GW 547, NIAW 4028, MP 1378, CG 1040, WH 1402 and UAS 1478) which were released during the last year by CVRC for different conditions. They also released the bulletins on wheat and barley.

Dr. TR Sharma (DDG), ICAR, New Delhi appreciated the efforts made by the wheat and barley group and congratulated for achieving targets of production and productivity. He said that we need to increase productivity as the area is not going to expand any more. There is a need to fill the yield gaps at farmers' fields. Dr. Sharma stressed upon working on genomics. He informed that only 5% of wheat genome and genes have been identified for their functionality and there is need to identify, validate and know the function of more genes. BNI is a classical effort of pre breeding where in short arm from chromosome 3 from Munal was substituted which inhibits the nitrification in the soil. He emphasized to develop indigenous material particularly through pre-breeding and sharing this material among cooperators. He emphatically asked the group for addressing cutting edge science, economics and re-orieningt the program accordingly. Similarly, in barley, he stressed upon to develop varieties for food, fodder and for saline soils. He advised to set the target for the traits to be improved and list the priorities that who will use what, where to use and how to use. He also emphasized developing a programme on reducing the segment of gluten protein causing celiac disease. He told that Anthocyanin content and fiber contents are also important. He felt satisfaction that work on resistant starch has been stated at PAU and one variety has been released. He

suggested that such type of genotypes be included in the AICRP trials. Programs on genome editing, plant architecture, resistant to cold, drought, heat, herbicide resistance, WUE, NUE be taken on priority. In pathology, he advised to take KB, nematode, powdery mildew, FHB diseases on priority. He stressed upon to avoid single variety cultivation at larger area. Dr. Sharma stressed to initiate the haplotype breeding and using wild species. These can be procured from NBPGR, IIWBR, PAU etc. At the end he again congratulated wheat and barley workers for significant achievements.

The inaugural session ended with the formal vote of thanks by Dr. Pratibha Singh, dean at ANDAUT, Ayodhya.

## Session II: Emerging Techniques for Improving Food and Nutritional Security with Climate Resilience

| | | | |
|---|---|---|---|
| **September 11, 2024** | **Chairman:** | : | Dr. TR Sharma, DDG (CS), ICAR, New Delhi |
| | **Co-Chairman** | : | Dr. Ratan Tiwari, Director, ICAR-IIWBR |
| | **Rapporteurs** | : | Dr. Hanif Khan and Dr. OP Gupta |
| | **Session Coordinator** | : | Dr. Mamrutha HM, ICAR-IIWBR, Karnal |

The session featured a series of lectures delivered by eight distinguished wheat researchers from India and abroad, beginning with opening remarks by Dr. T. R. Sharma, the session chairman.

The first talk, presented by Prof. AK. Joshi, Director of BISA and CIMMYT's Country Representative for India, focused on "Advancing Global Food and Nutritional Security with Climate-Resilient Wheat Solutions." Dr. Joshi emphasized the urgent need for adequate financial investment and policy support to address the challenges of food and nutritional security over the next 30 years. He discussed key strategies for increasing genetic gains in wheat and addressed emerging threats like the transboundary disease *Magnaporthe oryzae* pathotype Triticum (MoT), commonly known as wheat blast. Dr. Joshi outlined several critical traits and challenges that need to be addressed to ensure long-term food security. These include:

1. Enhancing heat tolerance in wheat varieties.
2. Combating insect pests and Fusarium head blight.
3. Improving resilience to water stress.
4. Advancing research in Biological Nitrification Inhibition (BNI).
5. Managing herbicide resistance in wheat crop.
6. Applying gene-editing technologies to accelerate crop improvement.
7. Bridging the yield gap through accelerated genetic gains.

Dr. S. K. Agrawal, Regional Coordinator for South Asia at ICARDA, was the second to speak on the topic, "Delivering Genetic Gains in Wheat and Barley in the Context of Climate Change." He discussed the significant challenges posed by rising temperatures and increasing water stress on wheat and barley productivity. Dr. Agrawal underlined the importance of developing market-oriented breeding programs tailored to well-defined target production environments (TPEs). To accelerate genetic improvements, he advocated for the use of advanced techniques such as shuttle breeding, speed breeding, and the integration of genomic selection (GS) tools. Additionally, he highlighted the importance of efficiently mining novel genes from diverse genetic resources for enhancing crop resilience and yield. Dr. T. R. Sharma, DDG-CS of ICAR, recognized ICARDA's valuable contributions to durum wheat and barley breeding in India. He encouraged barley scientists to visit ICARDA's Amlaha center and explore its germplasm resources for varietal development programs.

Dr. Parveen Chhuneja, Director of SAB, Punjab Agricultural University, delivered an insightful talk on "A Journey from Wild Wheats to Farmers' Fields: Harnessing Genomic Technologies." She emphasized the immense genetic diversity present in wild wheat relatives, with over 1,500 accessions identified as valuable sources for traits such as disease resistance, agronomic performance, and enhanced nutritional quality. She discussed success stories where more than 40 genes have been successfully introgressed from wild relatives into elite wheat cultivars. Dr. Chhuneja further highlighted the potential of utilizing vast genomic resources and cutting-edge technologies to accelerate genetic gains in wheat breeding. She elaborated on a proposed strategy for resistance gene enrichment, combining mutagenesis with advanced genomic tools to facilitate rapid cloning of resistance genes. Dr. T. R. Sharma recommended that other SAUs should propagate PAU's rich collection of wild wheat accessions at their respective centers by establishing wild accession gardens. Additionally, Dr. Sharma suggested organizing a detailed lecture by Dr. Chhuneja to outline the methodologies for gene introgression from wild relatives into elite wheat backgrounds.

Dr. Velu Govindan, Senior Wheat Breeder at CIMMYT's Global Wheat Program in Mexico, delivered a key presentation on “Accelerated Breeding to Mainstream Grain Zinc in CIMMYT Wheat Germplasm.” He discussed both the challenges and opportunities in developing a distinct breeding pipeline within CIMMYT's wheat program, emphasizing the need for an optimized breeding scheme. Dr. Govindan highlighted advancements in the breeding cycle, detailing a refined three-year cycle that includes Stage 1 trials. He also underscored the critical role of genomic selection in enhancing predictive accuracy for trait selection. Furthermore, he outlined significant breakthroughs in disease resistance breeding and the successful integration of zinc biofortification into CIMMYT's global wheat breeding efforts.

Dr. Sandeep Kumar Sharma, Principal Scientist at ICAR-NBPGR, New Delhi, delivered a presentation on “Harnessing Gene Bank Germplasm Diversity for Stress Tolerance and Quality Enhancement through Genomics.” During his talk, Dr. Sharma emphasized the research focus of a DBT-funded mega-project, which encompasses 16 specific objectives. He discussed key findings in trait discovery related to disease resistance, particularly against wheat rusts, powdery mildew, and spot blotch. Additionally, he highlighted advancements in abiotic stress tolerance and quality traits through genome-wide association studies (GWAS) conducted on a large panel of wheat germplasm. Dr. T. R. Sharma, Deputy Director General (Crop Science), underscored the importance of sharing trait-specific germplasm with wheat breeders across the country to augment the breeding programs.

Dr. S.V. Sai Prasad, Principal Scientist at ICAR-IIRR, Hyderabad, delivered a presentation on "New Initiatives in the Rice AICRP for the Benefit of Wheat and Barley Researchers." In his talk, he outlined recent advancements in the rice breeding program, including speed breeding, genome editing, haplotype-based breeding, and the development of two-line hybrid systems. He also discussed trials involving coloured rice and the application of high-throughput phenotyping to improve nutrient use efficiency, particularly for

nitrogen and phosphorus. Additionally, Dr. Prasad addressed critical research challenges and emphasized the importance of pre-breeding strategies to accelerate genetic gains in rice.

Dr. Maricelis Acevedo from Cornell University, USA, delivered an insightful presentation titled "Cultivating Global Collaborations for Wheat Health." She highlighted significant achievements in programs such as the Borlaug Global Rust Initiative (BGRI), the Durable Rust Resistance in Wheat (DRRW) project, and the Delivering Genetic Gain in Wheat (DGGW) initiative, all aimed at enhancing wheat health and resilience. Dr. Acevedo emphasized the importance of fostering the next generation of dedicated scientists committed to addressing global food security challenges, with a special focus on promoting the contributions of women in wheat research through initiatives like Wheat In Triticum (WIT). She underlined the critical need for continued and expanded collaboration among international research institutions. Additionally, she discussed the Wheat Disease Early Warning Advisory System (DEWAS), an epidemiological model designed to monitor and predict the spread of the three major wheat rusts (stem, stripe, and leaf rust), enabling more effective management and mitigation strategies.

Dr. Dave Hodson from CIMMYT Nepal delivered a significant talk on "Mobile and Real-Time Plant Disease Diagnostic Approaches for Rapid Strain Identification of Rusts." He emphasized recent advancements in real-time diagnostic platforms for wheat yellow rust and stem rust, specifically highlighting technologies like MARPLE (Mobile And Real-time PLant disEase diagnostics). Dr. Hodson underscored the importance of continuous disease surveillance and the rapid detection of transboundary diseases to mitigate the potential threat to wheat production.

Dr. Ratan Tiwari, Director of ICAR-IIWBR Karnal, highlighted the dynamic and comprehensive efforts of the AICRP Wheat program and emphasized its strong global collaborations. He encouraged centers with advanced and specialized facilities to extend support to those with more limited resources. Additionally, Dr. T.R. Sharma, DDG (Crop Science), stressed the importance of sharing valuable genetic resources and research expertise among both national and international partners and researchers working in wheat and barley.

## Session III: Discipline Wise Presentation of Progress Report (2023-24)

| | | | |
|---|---|---|---|
| **Sept. 11, 2024** | **Chairman** | **:** | Dr.PK Singh, Agriculture Commissioner, MoA&FW, Govt. of India |
| | **Co-Chairman** | **:** | Dr. SK Pradhan, ADG (FFC), ICAR, New Delhi |
| | **Rapporteurs** | **:** | Drs. RS Chhokar and Vikas Gupta |

The session was chaired by Dr.PK Singh, Agriculture Commissioner, MoA & FW, Govt. of India and co-chaired by Dr. SK Pradhan, ADG (FFC), ICAR, New Delhi. The session was graced by Dr. TR Sharma DDG (CS), ICAR, New Delhi and Project Management Committee (PAMC) experts viz., Dr. RR Hanchinal, Ex-Chairman PPVFRA and VC, UAS Dharwad, Dr. NS Bains, Former Director Research, PAU, Ludhiana and Dr. SC Bhardwaj, Emeritus Scientist, ICAR-IIWBR- RS, Shimla. The chairman in his opening remarks welcomed the delegates and invited Dr. OP Ahlawat (PI, Crop Improvement) to present the progress report for the year 2023-24.

Dr. OP Ahlawat presented the list of varieties released during 2023-24 (CVRC: 11 and SVRC: 02) along with the notification of DBW327 for area extension. He also apprised the house about the PPVFR&A registration of two varieties and registration of 21 genetic stocks for various traits. Dr. Ahlawat also told the house about the finalization of Crop Improvement work plan in a pre-workshop meeting held on 2-3 September, 2024 for the ensuing crop season. During the reported year, trial conduction was 99.70% across the zones, however, the trial reporting was 85.16%. The major reason for less reporting was low site mean and also the trials rejection by the monitoring teams. Dr. PK Singh and Dr. SK Pradhan invited seriousness on low reporting of trials from some centres and asked the Director, IIWBR to communicate to the concerned authorities of the centres whose trials were rejected and to take corrective steps regarding that which was also supported by Dr. Bijendra Singh VC, ANDUAT, Ayodhya. Dr. Ahlawat also elaborated on the different activities undertaken like zonal monitoring, HRD activities, Filed Day and sharing of seed with the indenters. He also elaborated about the wheat blast evaluation carried out through CIMMYT collaboration. He appraised the house that surplus breeder seed is produced against the DAC indent so that new variety seeds be made available to the farmers and the recently released varieties DBW303 and DBW187 were the highest indented varieties. The NBPGR activities related to the import of different nurseries and trials were also presented. The chairman also emphasized that the diversity analysis should be done for the final year entries along with the varieties under cultivation in a particular zone. Deliberations were made on the border row effect and the appropriateness of the design discussed at length. At present border row effect is taken care off by the inclusion of multiple rows of non-trial wheat material on all the sides of the breeding trial block. Thus, gross plot should be harvested for capturing yield of the plot.

Dr. SC Gill (PI, Resource Management) presented the progress report of resource management experiments conducted during 2023-24. He presented the work done during 2023-24 in which wheat genotypes HD 3428 and DBW3386 were numerically superior than the best check varieties in the trials in NWPZ and NEPZ,

respectively. In intercropping of wheat/barley with oil seeds/pulses, the maximum wheat equivalent yield was recorded with wheat + linseed (4:2) in NWPZ whereas with wheat + lentil (4:2) in NEPZ. The application of halauxifen-methyl + fluroxypyr at 200.6 (6.1+194.5) g/ha was found better for broad leaved weed control in barley in NWPZ and CZ while metsulfuron + carfentrazone + S at 25 (5+20) g/ha + 0.2% S were found effective for broad leaved weed control in barley in NHZ and NEPZ. Chairman suggested that the agronomy experiments should be better planned to identify superior genotypes for climate resilience, bio-fortification and fertilizer use efficiency.

Dr. Pradeep Sharma (PI, Crop Protection) presented the progress report of crop protection. He outlined the total experiments and nurseries which were conducted across 32 centres. While emphasizing on the importance of the crop protection programme, he highlighted that > 1212 lines were screened against rusts and blights, >146 advanced wheat breeding lines were screened against rusts, powdery mildews, blight, bunts etc. and 378 lines were tested against wheat blast with the help of CIMMYT. He informed that first appearance of yellow rust of wheat was noticed on 24.01.2024 from RS Pura J&K. Dr Sharma highlighted two recommendations; first: Seed treatment with Difenoconazole 3% WS at 2.5 g/kg followed by Carboxin 37.5% + Thiram 37.5% WS at 3 g/kg which is particularly effective against Loose Smut. Second: Highest level of protection from Karnal Bunt was attained with Azoxystrobin 18.2% + Difenoconazole 11.4% w/w SC @0.1%. He also informed the house about soil application of fipronil 0.6% GR @ 8 kg/ha (0.86%) and foliar application of 18.5 SC of Coragen (chlorantraniliprole) @ 150 ml/ha (0.89%) were found effective against of lepidoterous pests (pink stem borer, army worm & cutworms).

Dr. OP Gangwar presented significant achievements made at IIWBR RS Flowerdale, Shimla. He informed the house that all three rusts of wheat appeared endemically in India. He discussed and presented the spatial distribution of different rusts and also the preparedness for Ug99 and no breakdown of Sr31 resistance till now. Dr. Sunil Kumar (PI, Wheat Quality) the significant achievements of wheat quality program. He briefly showed the status of product specific varieties available for industry as well as for domestic consumption. He also showed the zone wise and centre wise variability in different wheat quality parameters such as protein content, hectoliter weight, grain hardness, sedimentation value, gluten content, bread volume, biscuit spread factor, yellow pigment etc. He informed the house that the sedimentation value has increased in past 20 years particularly in NWPZ and yellow pigment content has increased in case of durum's in the last two decades. He requested all the centres to supply data on soil Fe, Zn and nitrogen status for further understanding the reasons behind the variations in quality parameters.

Dr. Om Vir Singh (PI, Barley Network) presented the achievement and progress of barley coordination including the trial conduction, reporting, monitoring etc. He informed the house about the registration of 8 genetic stocks for different agronomic traits. Foliar application of pymetrozine 50 WG at dosages of 100 g/ha and 120 g/ha demonstrated significant efficacy in reducing aphid. He emphasized the importance of barley crop in view of its high therapeutic value.

Dr. Satyavir Singh (Pr. Scientist, Social Sciences) presented the progress report on technology transfer through FLDs at the farmer fields. Barley FLDs (338) were conducted at 420 farmer fields and also

presented the returns per rupee of investments in barley FLDs. He also apprised the house about the cluster demonstrations of bio-fortified varieties. Whereas 520 wheat demonstrations under the SCSP programme of high yielding wheat varieties was undertaken in different states. He also discussed the monitoring of FLDs and outreach programs organized for the dissemination of new wheat and barley varieties.

After thorough deliberation by the Chairman, Co-Chairman and PAMC experts on various issues and following recommendations were made:

- In crop Improvement, inclusion/exclusion of border row effect and adoption of appropriate design should be discussed in consultation with IASRI scientists. Gross plot harvest was the consensus point.
- In Natural resource management programme, some innovative trials should be included in both wheat and barley crops.
- Considering new fertilizer formulations such as nano urea, an experiment should be planned.
- Centres should supply data on soil Fe, Zn and nitrogen status
- Cluster size in the cluster demonstrations should be increased so that bio-fortified varieties should reach to larger masses and if any company interested in bio-fortified wheat can buy from these clusters
- Efforts should be made to popularize barley among farmers.

The session ended with vote of thanks to the chair and co-chair.

## Session IV: Finalization of Work Plan (2024-25)

| | | |
|---|---|---|
| **September 12, 2024** | **Chairman** | Dr. SK Pradhan, ADG(FFC), ICAR, New Delhi |
| | **Co- chairman** | Dr. Ratan Tiwari, Director, ICAR-IIWBR, Karnal |
| **Rapporteurs** | | Drs. Satish Kumar and Harikrishna |

Discussions were held on various issues related to work plan for 2024-25, under different disciplines. Major technical points emerging from these discussions are presented below:

1. Focusing on yield gains in the Northeastern Plains Zone (NEPZ) through specialized trials is crucial for tailoring wheat varieties that are not only high-yielding but also adapted to the region's unique agro-climatic conditions since NEPZ is important strategic location for countries food security.
2. Conservation Agriculture (CA) is essential for sustainable agricultural systems, especially in regions like the Indo-Gangetic Plains (IGP), which includes the Northwestern and Northeastern Plains Zone (NEPZ). CA emphasizes minimal soil disturbance, permanent soil cover, and crop rotation, all of which are crucial for enhancing productivity and sustainability in wheat systems.
3. Diversification of indigenous materials is crucial for enhancing genetic diversity, promoting climate resilience, and improving the sustainability of agricultural systems. Many indigenous material including landraces have higher nutritional value than modern high-yielding varieties. They may be richer in micronutrients, protein, and other health-promoting compounds, which can contribute to addressing malnutrition and hidden hunger.
4. Ensuring that yield levels of breeding and agronomical trials are uniformly conducted and establishing common Standard Operating Procedures (SOPs) for breeders and agronomists is critical for achieving consistent and reliable data. Uniformity in trial protocols and management practices allows for better comparison of results across different regions and trial sites, improves the reliability of conclusions, and accelerates breeding progress
5. Maintaining the leaf rust and stem rust inoculum at Mahabaleswara Center like Shimla Center is crucial to ensure effective disease screening and more uniform results in rust resistance trials. Shimla has long been known for its excellent rust-screening environment, and replicating this at

Mahabaleswara would standardize the conditions for testing rust resistance across central and peninsular zones.

6. Exploring the Udaipur Center for nematode screening could significantly enhance wheat breeding programs by introducing a reliable platform for assessing nematode resistance, a growing concern in several wheat-growing regions.
7. Restoring summer sown trials for the Northern Hills Zone (NHZ) is an essential step in maximizing wheat production and resilience in this region. Summer sowing, particularly for wheat in high-altitude and cooler climates like those in NHZ, plays a critical role in testing varieties for adaptability, disease resistance, and stress tolerance apart from recommending newer varieties for this region.
8. Starting nutrient use efficiency (NUE) trials within the resource management division is a critical step toward optimizing agricultural productivity while minimizing environmental impacts. In wheat production, efficient use of nutrients, particularly nitrogen (N), phosphorus (P), and potassium (K), is crucial for improving yields, reducing input costs, and maintaining soil health.
9. A dedicated team of breeders and plant pathologists should be formed to monitor the PPSN trials. This joint monitoring will provide valuable data for selecting wheat varieties with superior resistance to biotic stresses such as diseases, which is critical for long-term crop productivity and sustainability.
10. For head scab screening IARI RS Wellington Center should be included. Wellington has a humid and warm climate, which makes it conducive for the natural development of Fusarium head scab, providing realistic conditions for screening wheat lines.
11. Gene postulation along with confirmation of specific rust-resistant genes with known molecular markers should be initiated.
12. Incorporating soil profile analysis for major and micronutrients alongside the collection of quality data of genotypes at all trial centers is a critical step for improving wheat breeding programs.
13. In social sciences latest recommended varieties from each zone should be taken Wheat varieties developed by various partners should be included.

The work plan 2024-25, as per suggestions arising out of these discussions were modified and are presented below, discipline wise:

# Work Plan - Crop Improvement

**National Initial Varietal Trial**
**NIVT-1A-IR-TS-TAS, 2024-25**

**Conducting centres**

| Zone | No. | Centres |
|---|---|---|
| NWPZ | 9 | Delhi, Ludhiana, Gurdaspur, Hisar, Karnal, Pantnagar, Modipuram, Sriganganagar, Durgapura |
| NEPZ | 6 | Kanpur, Ayodhya, Varanasi, Sabour, Ranchi, Coochbehar |
| **Total** | **15** | |

**Details of trial entries**

| SN | Contributing Centres | No. of Entries | Name of entries |
|---|---|---|---|
| 1. | IARI, Delhi | 5 | HD3499, HD3500, HD3501, HP1984, HD3502 |
| 2. | IIWBR, Karnal | 5 | DBW478, DBW479, DBW480, DBW481, DBW482 |
| 3. | Ludhiana | 5 | PBW965, PBW966, PBW967, PBW968, PBW969 |
| 4. | Pantnagar | 3 | UP3151, UP3152, UP3153 |
| 5. | Durgapura | 3 | RAJ4592, RAJ4593, RAJ4594 |
| 6. | Hisar | 2 | WH1346, WH1347 |
| 7. | Ayodhya | 1 | NW8108 |
| 8. | Kanpur | 1 | K2401 |
| 9. | Varanasi | 1 | HUW862 |
| 10. | CSSRI, Karnal | 1 | KRL2214 |
| 11. | Jammu | 1 | JAUW725 |
| 12. | Kalyani | 1 | BCW46 |
| 13. | Coochbehar | 1 | UBW23 |
| 14. | Modipuram | 1 | SVPWL23-02 |
| 15. | Nuziveedu Seeds | 2 | NWS2247, NWS2218 |
| | **Checks** | **3** | **DBW187, DBW222, HD3086** |
| | **Total** | **36(33+3)** | |

**Experimental details**

| | | |
|---|---|---|
| Design | : | Simple Lattice |
| Replication | : | Two |
| Plot size | : | 6 x 1.20m (6 rows) |
| Fertilizer dose (kg/ha) | : | 150:60:40 (N:P:K) |
| Time of sowing | : | November 1-15 |
| Seed requirement | : | 7.0 kg per entry |

***Note**: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Director.*

**National Initial Varietal Trial**

**NIVT-1B-IR-TS-TAS, 2024-25**

**Conducting centres**

| Zone | No. | Centres |
|---|---|---|
| NWPZ | 8 | Delhi, Ludhiana, Gurdaspur, Hisar, Karnal, Bulandshahr, Pantnagar, Durgapura |
| NEPZ | 8 | Kanpur, Ayodhya, Varanasi, Sabour, Prayagraj, Ranchi, Kalyani, Manikchak |
| **Total** | **16** | |

**Details of trial entries**

| SN | Contributing centres | No. of Entries | Name of entries |
|---|---|---|---|
| 1. | IARI, Delhi | 4 | HP1985, HD3503, HD3504, HP1986 |
| 2. | IIWBR, Karnal | 5 | DBW483, DBW484, DBW485, DBW486, DBW487 |
| 3. | Ludhiana | 5 | PBW970, PBW971, PBW972, PBW973, PBW974 |
| 4. | Pantnagar | 3 | UP3154, UP3155, UP3162 |
| 5. | Ayodhya | 2 | NW8114, NW8116 |
| 6. | Hisar | 2 | WH1348, WH1349 |
| 7. | Kanpur | 2 | K2403, K2404 |
| 8. | Sabour | 2 | BRW3982, BRW3983 |
| 9. | Durgapura | 1 | RAJ4595 |
| 10. | Ranchi | 1 | JKW324 |
| 11. | Varanasi | 1 | HUW863 |
| 12. | Kalyani | 1 | BCW47 |
| 13. | Modipuram | 1 | SVPWL23-04 |
| 14. | Coochbehar | 1 | UBW25 |
| 15. | Nuziveedu Seeds | 1 | NWS2247 |
| | **Checks** | **4** | **DBW187, DBW222, DBW386, HD3086** |
| | **Total** | **36 (32+4)** | |

**Experimental details**

| | | |
|---|---|---|
| Design | **:** | Simple Lattice |
| Replication | **:** | Two |
| Plot size | **:** | 6 x 1.20m (6 rows) |
| Fertilizer dose (kg/ha) | **:** | 150:60:40 (N:P:K) |
| Time of sowing | **:** | November 1-15 |
| Seed requirement | **:** | 7.0 kg per entry |

***Note**: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Director*

**National Initial Varietal Trial**

**NIVT-2-IR-TS-TAS, 2024-25**

**Conducting centres**

| Zone | No. | Centres |
|---|---|---|
| CZ | 10 | Indore, Powarkheda, Jabalpur, Sagar, Gwalior, Bilaspur, Junagadh, Vijapur, SK Nagar, Udaipur |
| PZ | 6 | Niphad, Pune, Akola, Parbhani, Dharwad, Nippani |
| **Total** | **16** | |

**Details of trial entries**

| SN | Contributing Centres | No. of Entries | Name of entries |
|---|---|---|---|
| 1. | IARI, Delhi | 4 | HI1703, HI1704, HI1705, HI1706 |
| 2. | Pune | 3 | MACS6872, MACS6874, MACS6887 |
| 3. | Vijapur | 3 | GW569, GW570, GW571 |
| 4. | IIWBR, Karnal | 3 | DBW488, DBW489, DBW490 |
| 5. | Dharwad | 2 | UAS3035, UAS3036 |
| 6. | Jabalpur | 2 | MP3610, MP3620 |
| 7. | Niphad | 2 | NIAW4728, NIAW4761 |
| 8. | Powarkheda | 2 | MP1407, MP1408 |
| 9. | Junagadh | 2 | GW575, GW576 |
| 10. | Udaipur | 2 | PWU49, PWU50 |
| 11. | Ludhiana | 1 | PBW975 |
| 12. | Durgapura | 1 | RAJ4596 |
| 13. | Bilaspur | 1 | CG1053 |
| 14. | Akola | 1 | AKAW5347 |
| 15. | Lok Bharti | 1 | LOK84 |
| 16. | Hisar | 1 | WH1350 |
| 17. | Sagar | 1 | JWS1501 |
| | **Checks** | **4** | **GW322, DBW187, MACS6222, HI1650** |
| **Total** | | **36 (32+4)** | |

**Experimental Details**

| | | |
|---|---|---|
| Design | : | Simple Lattice |
| Replication | : | Two |
| Plot size | : | 6 x 1.20m (6 rows) |
| Fertilizer dose (kg/ha) | : | 120:60:40 (N:P:K) |
| Time of sowing | : | November5-15 |
| Seed requirement | : | 7.0 kg per entry |

***Note**: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Director*

**National Initial Varietal Trial**
**NIVT-3A-IR-LS-TAS, 2024-25**

**Conducting centres**

| Zone | No. | Centres |
|---|---|---|
| NWPZ | 9 | Delhi, Jammu, Ludhiana, Gurdaspur, Hisar, Karnal, Pantnagar, Durgapura, Modipuram |
| NEPZ | 10 | Kanpur, Ayodhya, Varanasi, Sabour, RPCAU-Pusa, Ranchi, Kalyani, Coochbehar, Burdwan, Shillongani |
| **Total** | **19** | |

**Details of trial entries**

| SN | Contributing centres | No. of Entries | Name of entries |
|---|---|---|---|
| 1. | IARI, Delhi | 4 | HD3505, HD3506, HD3507, HD3508 |
| 2. | IIWBR, Karnal | 5 | DBW491, DBW492, DBW493, DBW494, DBW495 |
| 3. | Ludhiana | 5 | PBW976, PBW977, PBW978, PBW979, PBW980 |
| 4. | Hisar | 3 | WH1353, WH1354, WH1355 |
| 5. | Kanpur | 2 | K2406, K2407 |
| 6. | Durgapura | 2 | RAJ4597, RAJ4598 |
| 7. | Ayodhya | 2 | NW8104, NW8122 |
| 8. | Pantnagar | 2 | UP3156, UP3157 |
| 9. | Ranchi | 1 | JKW325 |
| 10. | Sabour | 1 | BRW3975 |
| 11. | Varanasi | 1 | HUW864 |
| 12. | Kalyani | 1 | BCW44 |
| 13. | Coochbehar | 1 | UBW24 |
| 14. | Modipuram | 1 | SVPWL23-09 |
| 15. | Banda | 1 | BUBW1 |
| | **Checks** | **4** | **PBW771, DBW173, HI1563, HI1621** |
| **Total** | | **36 (32+4)** | |

**Experimental Details**

| | | |
|---|---|---|
| Design | **:** | Simple Lattice |
| Replication | **:** | Two |
| Plot size | : | 6 x 1.08m (6 rows) |
| Fertilizer dose (kg/ha) | **:** | 120:60:40 (N:P:K) |
| Time of sowing | **:** | December5-15 |
| Seed requirement | **:** | 7.0 kg per entry |

***Note**: Change in test sites, date of sowing, trial entries, etc. will be invalid if not approved by the Director*

**National Initial Varietal Trial**
**NIVT-3B-IR-LS-TAS, 2024-25**

**Conducting centres**

| Zone | No. | Centres |
|---|---|---|
| CZ | 9 | Indore, Powarkheda, Jabalpur, Gwalior, Bilaspur, Junagadh, Vijapur, SK Nagar, Lok-Bharti |
| PZ | 8 | Dharwad, Niphad, Akola, Pune, Bagalkot, Dhule, Nippani, Parbhani |
| **Total** | **17** | |

**Details of trial entries**

| SN | Contributing centres | No. of Entries | Name of entries |
|---|---|---|---|
| 1. | IARI, Delhi | 4 | HI1707, HI1708, HI1709, HD3509 |
| 2. | IIWBR, Karnal | 2 | DBW496, DBW497 |
| 3. | Dharwad | 1 | UAS3037 |
| 4. | Jabalpur | 2 | MP3607, MP3612 |
| 5. | Niphad | 2 | NIAW4668, NIAW4741 |
| 6. | Pune | 2 | MACS6885, MACS6869 |
| 7. | Vijapur | 1 | GW572 |
| 8. | Akola | 1 | AKAW5521 |
| 9. | Bilaspur | 1 | CG1054 |
| 10. | Hisar | 1 | WH1356 |
| 11. | Junagadh | 1 | GW577 |
| 12. | Lok Bharti | 1 | LOK85 |
| 13. | Ludhiana | 1 | PBW 981 |
| 14. | Powarkheda | 1 | MP1409 |
| 15. | Parbhani | 1 | PBN 2023319 |
| | **Checks** | **3** | **HD2864, HD2932, HI1633** |
| **Total** | | **25 (22+3)** | |

**Experimental Details**

| | | |
|---|---|---|
| Design | **:** | Simple Lattice |
| Replication | **:** | Two |
| Plot size | **:** | 6 x 1.08m (6 rows) |
| Fertilizer dose (kg/ha) | **:** | 90:60:40 (N:P:K) |
| Time of sowing | **:** | December 5-15 |
| Seed requirement | **:** | 7.0 kg per entry |

***Note**: Change in test sites, date of sowing, trial entries, etc. will be invalid if not approved by the Director*

**National Initial Varietal Trial**

**NIVT-4-IR-TS-TDM, 2024-25**

**Conducting Centres**

| Zone | No. | Centres |
|---|---|---|
| NWPZ | 6 | Delhi, Ludhiana, Hisar, Karnal, Pantnagar, Sriganganagar |
| CZ | 6 | Powarkheda, Indore, Junagadh, Gwalior, Vijapur, Udaipur |
| PZ | 7 | Dharwad, Bagalkot, Nippani, Niphad, Pune, Akola, Parbhani |
| **Total** | **19** | |

**Details of trial entries**

| SN | Contributing Centres | No. of Entries | Name of entries |
|---|---|---|---|
| 1. | IARI, Delhi | 3 | HI8859, HI8860, HI8861 |
| 2. | Niphad | 2 | NIDW1576, NIDW1578 |
| 3. | IIWBR, Karnal | 2 | DDW69, DDW70 |
| 4. | Dharwad | 2 | UAS488, UAS489 |
| 5. | Ludhiana | 2 | PDW369, PDW370 |
| 6. | Powarkheda | 1 | MPO1410 |
| 7. | Pune | 2 | MACS4154, MACS4158 |
| 8. | Vijapur | 2 | GW1373, GW1374 |
| 9. | Hisar | 1 | WHD970 |
| 10. | Udaipur | 1 | PWU112 |
| 11. | Junagadh | 1 | GW1375 |
| 12. | Parbhani | 1 | PBND2023-15 |
| 13. | Prayagraj | 2 | SHUATSD2, SHUATSD3 |
| | **Checks** | **3** | HI8737, MACS3949, PDW314 |
| Total | | **25 (22+3)** | |

**Experimental Details**

| | | |
|---|---|---|
| Design | **:** | Simple Lattice |
| Replication | **:** | Two |
| Plot size | : | 6 x 1.20m (6 rows) |
| Fertilizer dose (kg/ha) | **:** | 120:60:40 (N:P:K) |
| Time of sowing | **:** | November 5-15 |
| Seed requirement | **:** | 8.0 kg per entry |

***Note**: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Director*

**National Initial Varietal Trial**
**NIVT-5A-RI-TS-TAS, 2024-25**

**Conducting centres**

| Zone | No. | Centres |
|---|---|---|
| NWPZ | 10 | Delhi, Jammu, Gurdaspur, Ludhiana, Hisar, Karnal, Pantnagar, Modipuram, Bulandshahr, Durgapura |
| NEPZ | 9 | Kanpur, RPCAU-Pusa, Ayodhya, Varanasi, Sabour, Ranchi, Kalyani, Manikchak, Shillongani |
| **Total** | **19** | |

**Details of trial entries**

| SN | Contributing Centres | No. of Entries | Name of entries |
|---|---|---|---|
| 1. | IARI, Delhi | 4 | HD3510, HD3511, HP1987, HS706 |
| 2. | IIWBR, Karnal | 4 | DBW498, DBW499, DBW500, DBW501 |
| 3. | Ludhiana | 4 | PBW982, PBW983, PBW984, PBW985 |
| 4. | Hisar | 2 | WH1357, WH1358 |
| 5. | Pantnagar | 1 | UP3158 |
| 6. | Durgapura | 1 | RAJ4599 |
| 7. | Kanpur | 1 | K2410 |
| 8. | Varanasi | 1 | HUW865 |
| 9. | Sabour | 1 | BRW3981 |
| 10. | Jammu | 1 | JAUW731 |
| 11. | Modipuram | 1 | SVPWL23-06 |
| | **Checks** | **4** | **HI1612, K1317, PBW644, NIAW3170** |
| **Total** | | **25 (21+4)** | |

**Experimental Details**

| | | |
|---|---|---|
| Design | **:** | Simple Lattice |
| Replication | **:** | Two |
| Plot size | : | 6 x 1.20m (6 rows) |
| Irrigations | : | Two (pre-sowing & one irrigation at 45-50 DAS) |
| Fertilizer dose (kg/ha) | **:** | 90:60:40(N:P:K) |
| Time of sowing | **:** | Oct. 25 - Nov. 5 |
| Seed requirement | **:** | 7.0 kg per entry |

***Note**: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Director*

**National Initial Varietal Trial**

**NIVT-5B-RI-TS-TAD, 2024-25**

**Conducting centres**

| Zone | No. | Centres |
|---|---|---|
| CZ | 9 | Indore, Sagar, Jabalpur, Bilaspur, Udaipur, Vijapur, Junagadh, Dhandhuka, Powarkheda |
| PZ | 7 | Dharwad, Nippani, Niphad, Pune, Dhule, Akola, Parbhani |
| **Total** | 16 | |

**Details of trial entries**

| SN | Contributing Centres | No. of Entries | Name of entries |
|---|---|---|---|
| 1. | Delhi | 3+2 | HI1710, HI1711, HI1712, HI8862(d), HI8863(d) |
| 2. | IIWBR, Karnal | 2+1 | DBW502, DBW503, DDW71(d) |
| 3. | Dharwad | 1+1 | UAS3038, UAS490(d) |
| 4. | Niphad | 2 | NIAW4649, NIAW4652 |
| 5. | Vijapur | 1+1 | GW573, GW1376(d) |
| 6. | Pune | 2 | MACS6870, MACS6877 |
| 7. | Bilaspur | 1 | CG1055 |
| 8. | Jabalpur | 1 | JWS1595 |
| 9. | Powarkheda | 1 | MP1412 |
| 10. | Parbhani | 1 | PBN2023-126 |
| 11. | Banda | 1 | BUDW3(d) |
| | **Checks** | **4(2A+2D)** | **DBW110, HI1605, HI8627(d), UAS446(d)** |
| **Total** | | **25 (21+4)** | |

**Experimental Details**

| | | |
|---|---|---|
| Design | **:** | Simple Lattice |
| Replication | **:** | Two |
| Plot size | **:** | 6 x 1.20m (6 rows) |
| Irrigations | **:** | Two (1 pre-sowing & one irrigation at 40-45 DAS)<br>(Limit of 3 irrigations in Gujarat) |
| Fertilizer dose (kg/ha) | **:** | 90:60:40(N:P:K) |
| Time of sowing | **:** | Oct. 25 – Nov.05 |
| Seed requirement | **:** | 7.0 kg per entry |

***Note**: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Director*

**National Initial Varietal Trial**

**NIVT-6-ES-IR-NWPZ/CZ, 2024-25**

**Trial conducting centres**

| Zone | No. | Centres |
|---|---|---|
| NWPZ | 8 | Delhi, Ludhiana, Ladowal, Hisar, Karnal, Bulandshahr, Sriganganagar, Pantnagar |
| CZ | 7 | Indore, Powarkheda, Jabalpur, BISA-Jabalpur, Bilaspur, Junagadh, Vijapur |
| **Total** | **16** | |

**Details of test entries**

| SN | Contributing Centres | No. of entries | Name of entries |
|---|---|---|---|
| 1 | Delhi | 4 | HD3512, HD3513, HP1988, HI1713 |
| 2 | Ludhiana | 5 | PBW960, PBW961, PBW962, PBW963, PBW964 |
| 3 | IIWBR/BISA | 5 | DBW504, DBW505, DBW506, DBW507, DBW508 |
| 4 | Hisar | 2 | WH1351, WH1352 |
| 5 | Pantnagar | 1 | UP3159 |
| 6 | Vijapur | 1 | GW574 |
| 7 | Junagadh | 1 | GW578 |
| 8 | Powarkheda | 1 | MP1413 |
| 9 | Bilaspur | 1 | CG1056 |
| 10 | Nuziveedu | 1 | NWS2218 |
| | **Checks** | **3** | **DBW327, DBW187, GW322** |
| | **Total** | **25 (22+3)** | |

**Experimental details**

| | | |
|---|---|---|
| Design | : | Simple Lattice (5x5) |
| Replications | : | Two |
| Plot size | : | 6 x 1.20m (6 rows) |
| Fertilizer dose (kg/ha) | : | 150% RFD+ FYM15 t/ha+ Growth Regulators* |
| Time of sowing | : | **NWPZ:** Oct. 25 – Nov.5; **CZ:** Nov 1-10 |
| Seed requirement | : | 6 Kg per entry |

*** Note:** Two sprays as tank mix-Chlormequat chloride @ 0.2%+ tebuconazole @ 0.1% of commercial product dose at First Node and Flag leaf (Tank mix application). Use 400 l/ha of water for spraying.

*Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Director*

**Northern Hills Zone**
**Initial Varietal Trial, 2024-25**
**IVT-RF-TS-TAS**

**Trial conducting centres**

| State | Centres | Name of the centres |
|---|---|---|
| Himachal Pradesh | 3 | Malan, Shimla, Bajaura |
| Uttarakhand | 3 | Almora, Majhera, Gaja |
| J&K | 2 | Khudwani, Wadura |
| Manipur | 1 | Imphal |
| **Total** | **9** | |

**Details of test entries**

| Contributing Centres | No. of entries | Name of entries |
|---|---|---|
| IARI, Shimla | 6 | HS707, HS708, HS709, HD3514, HS713, HS714 |
| CSKHPKV, Malan | 6 | HPW506, HPW507, HPW508, HPW509, HPW512, HPW513 |
| VPKAS, Almora | 7 | VL2060, VL2061, VL2062, VL2063, VL2065, VL2066, VL2064[M] |
| SKUAST-K | 1 | SKAU70 (WW103) |
| GBPUA&T, Pantnagar | 2 | UP3160, UP3161 |
| **Checks** | **3** | **HS507, HS562, VL907** |
| **Total** | **25 (22+3)** | |

[M] denotes MABB entry

**Experimental details**

| | | |
|---|---|---|
| Design | : | R.B.D. |
| Replications | : | Four |
| Plot size | : | 3.5 x 1.20m (6 rows) |
| Fertilizer dose (kg/ha) | : | 60:30:20 (N:P:K) |
| Time of sowing | : | Oct. 15-31 |
| Seed rate (kg/ha) | : | 100 |
| Seed requirement | : | 4 kg per entry |

***Note:*** *Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Director*

**Northern Hills Zone**
**Advance Varietal Trial, 2024-25**
**IVT/AVT-RI-LS-TAS**

**Trial conducting centres**

| State | Centres | Name of the centres |
|---|---|---|
| Himachal Pradesh | 3 | Shimla, Malan, Bajaura |
| Uttrakhand | 3 | Almora, Majhera, Gaja |
| Manipur | 1 | CAU-Imphal |
| **Total** | 7 | |

**Details of test entries**

| Contributing Centres | No. of entries | Name of entries |
|---|---|---|
| CSKPHKV, Malan | 2 | HPW510, HPW511 |
| IARI, RS, Shimla | 3 | HS710, HS711, HS712 |
| VPKAS, Almora | 4 | VL3037, VL3038, VL3039, VL3040$^{M}$ |
| **Checks** | **2** | **VL892, HS490** |
| **Total** | **11 (9+2)** | |

**Experimental details**

| | | |
|---|---|---|
| Design | : | R.B.D. |
| Replications | : | Four |
| Plot size | : | 3.5 x 1.08m (6 rows) |
| Fertilizer dose (kg/ha) | : | 90:60:40 (N:P:K) |
| Time of sowing | : | December 1-15 |
| Seed rate (kg/ha) | : | 125 |
| Seed requirement | : | 4 kg per entry |

***Note:*** *Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Director*

**North Western Plains Zone**
**Advance Varietal Trial, 2024-25**
**AVT-IR-TS-TAS**

**Trial conducting centres**

| State | No. | Centres |
|---|---|---|
| Punjab | 2 | Ludhiana, Gurdaspur |
| Haryana | 3 | Hisar, Karnal, Bawal |
| Rajasthan | 2 | Sriganganagar, Durgapura |
| Uttar Pradesh | 3 | Bulandshahr, Modipuram, Nagina |
| Uttarakhand | 2 | Pantnagar, Dehradun |
| J & K | 1 | Jammu |
| Delhi | 1 | Delhi |
| **Total** | **14** | |

**Details of test entries**

| Contributing Centres | No. of entries | Name of entries |
|---|---|---|
| IIWBR, Karnal | 4 | DBW446, DBW448, DBW455, DBW477[M]* |
| PAU, Ludhiana | 3 | PBW938, PBW939, PBW943[#] |
| HAU, Hisar | 1 | WH1329 |
| ANDUAT, Ayodhya | 1 | NW8089 |
| Bioseeds Pvt Ltd | 1 | BW20R105 |
| UBKV, Coochbehar | 1 | UBW22 |
| IARI, Delhi | 1 | HD3515[M] |
| **Checks** | **5** | **DBW88, DBW222, PBW826, HD3386, HD3086** |
| **Total** | **17 (12+5)** | |

* denotes final year entry, [#] denotes Wheat blast resistance, [M] denotes MABB entry

**Experimental details**

| | | |
|---|---|---|
| Design | : | R.B.D. |
| Replications | : | Four |
| Plot size | : | 6 x 2.40m (12 rows) |
| Fertilizer dose (kg/ha) | : | 150:60:40 (N:P:K) |
| Time of sowing | : | November 1-15 |
| Seed rate (kg/ha) | : | 100 |
| Seed requirement | : | 18 kg per entry |

*Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Director*

**North Western Plains Zone**
**Advance Varietal Trial, 2024-25**
**AVT-IR-TS-TDM**

**Trial conducting centres**

| State | No. | Centres |
|---|---|---|
| Punjab | 2 | Ludhiana, Gurdaspur |
| Haryana | 2 | Hisar, Karnal |
| Rajasthan | 2 | Sriganganagar, Durgapura |
| Uttar Pradesh | 3 | Bulandshahr, Modipuram, Nagina |
| Uttarakhand | 1 | Pantnagar |
| J & K | 1 | Jammu |
| Delhi | 1 | Delhi |
| **Total** | **12** | |

**Details of test entries**

| Contributing Centres | No. of entries | Name of entries |
|---|---|---|
| IIWBR, Karnal | 3 | DDW65, DDW66, DDW67 |
| IARI, Indore | 4 | HI8853, HI8854, HI8855, HI8864[B] |
| HAU, Hisar | 1 | WHD969 |
| PAU, Ludhiana | 2 | PDW367, PDW368 |
| PDKV, Akola | 1 | AKDW5520 |
| ARS, Niphad | 2 | NIDW1542, NIDW1557 |
| JNKVV, Powarkheda | 1 | MPO1403 |
| ARI, Pune | 1 | MACS4146 |
| **Checks** | **4** | **PDW314, PDW291, WHD943, HD3386(aest.)** |
| **Total** | **19 (15+4)** | |

[B] Promotion from QCWBN

**Experimental details**

| | | |
|---|---|---|
| Design | : | R.B.D. |
| Replications | : | Four |
| Plot size | : | 6 x 2.40m (12 rows) |
| Fertilizer dose (kg/ha) | : | 150:60:40 (N:P:K) |
| Time of sowing | : | November 1-15 |
| Seed rate (kg/ha) | : | 100 |
| Seed requirement | : | 18 kg per entry |

*Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Director*

# North Western Plains Zone

## Advance Varietal Trial, 2024-25

## AVT-IR-LS-TAS

**Trial conducting centres**

| State | No. | Centres |
|---|---|---|
| Punjab | 2 | Ludhiana, Gurdaspur |
| Haryana | 2 | Hisar, Karnal |
| Rajasthan | 1 | Durgapura |
| Uttar Pradesh | 3 | Nagina, Bulandshahr, Modipuram |
| Uttarakhand | 1 | Pantnagar |
| J & K | 1 | Jammu |
| Delhi | 1 | Delhi |
| **Total** | 11 | |

**Details of test entries**

| Contributing Centres | No. of entries | Name of entries |
|---|---|---|
| IARI, Delhi | 2 | HD3495$^{M}$*, HD3482 |
| PAU, Ludhiana | 2 | PBW921*, PBW951 |
| IIWBR, Karnal | 3 | DBW422*, DBW459, DBW460 |
| HAU, Hisar | 1 | WH1337 |
| UBKV, Coochbehar | 1 | UBW21 |
| Modipuram | 1 | SVPWL22-02 |
| **Checks** | **4** | **HD3059, DBW173, PBW771, JKW261** |
| **Total** | **14 (10+4)** | |

* denotes final year entry, $^{M}$ denotes MABB entry

**Experimental details**

| | | |
|---|---|---|
| Design | : | R.B.D. |
| Replications | : | Four |
| Plot size | : | 6 x 2.16m (12 rows) |
| Fertilizer dose (kg/ha) | : | 120:60:40 (N:P:K) |
| Time of sowing | : | December 5-15 |
| Seed rate (kg/ha) | : | 125 |
| Seed requirement | : | 15 kg per entry |

*Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Director*

**North Western Plains Zone**
**Advance Varietal Trial, 2024-25**
**AVT-RI-TS-TAS**

**Trial conducting centres**

| State | No. | Centres |
|---|---|---|
| Punjab | 2 | Ludhiana, Gurdaspur |
| Haryana | 3 | Hisar, Karnal, Bawal |
| Uttar Pradesh | 3 | Modipuram, Nagina, Bulandshahr |
| Rajasthan | 2 | Sriganganagar, Durgapura |
| Uttarakhand | 2 | Pantnagar, Dehradun |
| J&K | 1 | Jammu |
| Delhi | 1 | Delhi |
| **Total** | **14** | |

**Details of test entries**

| Contributing Centres | No. of entries | Name of entries |
|---|---|---|
| IARI, Delhi | 4 | HD3471$^{M}$*, HD3468*, HD3486, HD3488 |
| IIWBR, Karnal | 3 | DBW465, DBW466, DBW467 |
| PAU, Ludhiana | 1 | PBW953 |
| BAU, Sabour | 1 | BRW3959 |
| HAU, Hisar | 2 | WH1339, WH1340 |
| CSSRI, Karnal | 1 | KRL2203 |
| **Checks** | **5** | **PBW644, NIAW3170, DBW296, HI1653, HD3086** |
| **Total** | **17 (12+5)** | |

* denotes final year entry, $^{M}$ denotes MABB entry

**Experimental details**

| | | |
|---|---|---|
| Design | : | R.B.D. |
| Replications | : | Four |
| Plot size | : | 6 x 2.40m (12 rows) |
| Irrigations | : | Two (pre-sowing & one irrigation at 45-50 DAS) |
| Fertilizer dose (kg/ha) | : | 90:60:40 (N:P:K) |
| Time of sowing | : | Oct. 25 – Nov. 5 |
| Seed rate (kg/ha) | : | 100 |
| Seed requirement | : | 18 kg per entry |

*Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Director*

**North Eastern Plains Zone**
**Advance Varietal Trial, 2024-25**
**AVT-IR-TS-TAS**

**Trial conducting centres**

| State | No. | Centres |
|---|---|---|
| Uttar Pradesh | 4 | Kanpur, Prayagraj, Ayodhya, Varanasi |
| Bihar | 2 | Sabour, RPCAU-Pusa |
| West Bengal | 4 | Coochbehar, Manikchik, Kalyani, Burdwan |
| Jharkhand | 3 | Ranchi, Dumka, IARI |
| Assam | 1 | Shillongani |
| **Total** | **14** | |

**Details of test entries**

| Contributing Centres | No. of entries | Name of entries |
|---|---|---|
| PAU, Ludhiana | 3 | PBW915*, PBW942, PBW944 |
| IARI, Delhi | 3 | HD3467*, HD3478, HD3515$^{M}$ |
| CSA, Kanpur | 1 | K2304 |
| IIWBR, Karnal | 1 | DBW452 |
| BCKV, Kalyani | 1 | BCW32 |
| **Checks** | **5** | **HD3249, DBW187, HD3086, PBW826, HD3388** |
| **Total** | **14 (9+5)** | |

* denotes final year entry, $^{M}$ denotes MABB entry

**Experimental details**

| | | |
|---|---|---|
| Design | : | R.B.D. |
| Replications | : | Four |
| Plot size | : | 6 x 2.40m (12 rows) |
| Fertilizer dose (kg/ha) | : | 150:60:40 (N:P:K) |
| Time of sowing | : | November 1-15 |
| Seed rate (kg/ha) | : | 100 |
| Seed requirement | : | 18 kg per entry |

***Note:*** *Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Director*

**North Eastern Plains Zone**
**Advance Varietal Trial, 2024-25**
**AVT-IR-LS-TAS**

**Trial conducting centres**

| State | No. | Centres |
|---|---|---|
| Uttar Pradesh | 4 | Kanpur, Prayagraj, Ayodhya, Varanasi |
| Bihar | 2 | Sabour, RPCAU-Pusa |
| West Bengal | 4 | Coochbehar, Kalyani, Burdwan, Manikchak |
| Jharkhand | 2 | Ranchi, IARI |
| Assam | 1 | Shillongani |
| **Total** | **13** | |

**Details of test entries**

| Contributing Centres | No. of entries | Name of entries |
|---|---|---|
| IARI, Delhi | 2 | HD3482, HP1983 |
| IIWBR, Karnal | 2 | DBW458, DBW462 |
| Modipuram | 1 | SVPWL22-02 |
| GBPUAT, Pantnagar | 1 | UP3145 |
| UBKV, Coochbehar | 1 | UBW21 |
| **Checks** | **5** | **HI1563, DBW107, HD3118, HI1621, PBW833** |
| **Total** | **12 (7+5)** | |

**Experimental details**

| | | |
|---|---|---|
| Design | : | R.B.D. |
| Replications | : | Four |
| Plot size | : | 6 x 2.16m (12 rows) |
| Fertilizer dose (kg/ha) | : | 120:60:40 (N:P:K) |
| Time of sowing | : | December 5-15 |
| Seed rate (kg/ha) | : | 125 |
| Seed requirement | : | 22 kg per entry |

***Note:*** *Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Director*

**North Eastern Plains Zone**
**Advance Varietal Trial, 2024-25**
**AVT-RI-TS-TAS**

**Trial conducting centres**

| State | No. | Centres |
|---|---|---|
| Uttar Pradesh | 4 | Kanpur, Prayagraj, Ayodhya, Varanasi |
| Bihar | 2 | Sabour, RPCAU-Pusa |
| West Bengal | 2 | Manikchak, Kalyani |
| Jharkhand | 2 | Ranchi, Dumka |
| Assam | 1 | Shillongani |
| **Total** | **11** | |

**Details of test entries**

| Contributing Centres | No. of entries | Name of entries |
|---|---|---|
| PAU, Ludhiana | 1 | PBW953 |
| **Checks** | **5** | **HI1612, K1317, HD3171, HD3293, DBW252** |
| **Total** | **6 (1+5)** | |

**Experimental details**

| | | |
|---|---|---|
| Design | : | R.B.D. |
| Replications | : | Four |
| Plot size | : | 6 x 2.40m (12 rows) |
| Irrigation | : | Two (pre-sowing & one irrigation at 45-50 DAS) |
| Fertilizer dose (kg/ha) | : | 90:60:40 (N:P:K) |
| Time of sowing | : | Oct. 25 – Nov.5 |
| Seed rate (kg/ha) | : | 100 |
| Seed requirement | : | 15 kg per entry |

*Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Director*

**Central Zone**
**Advance Varietal Trial, 2024-25**
**AVT-IR-TS-TAD**

**Trial conducting centres**

| State | No. | Centres |
|---|---|---|
| Gujarat | 4 | Vijapur, SK Nagar, Junagadh, Anand |
| Madhya Pradesh | 6 | Jabalpur, Sagar, Gwalior, Powarkheda, Indore, Jhansi |
| Chhattisgarh | 2 | Bilaspur, Raipur |
| Rajasthan | 1 | Udaipur |
| UP | 1 | Banda |
| **Total** | **14** | |

**Details of test entries**

| Contributing Centres | No. of entries | Name of entries |
|---|---|---|
| ARI, Pune | 3 | MACS6837*, MACS4135(d)*, MACS4146(d) |
| IARI, Indore | 7 | HI1683*, HI8849(d)*, HI8850(d)*, HI8853(d), HI8854(d), HI8855(d), HI8858(d) |
| SDAU, Vijaypur | 2 | GW561, GW1369(d) |
| JAU, Junagadh | 2 | GW554*, GW555* |
| JNKVV, Powarkheda | 2 | MP3570*, MPO1395(d)* |
| JNKVV, Jabalpur | 1 | MP1401 |
| UAS, Dharwad | 1 | UAS485(d) |
| PDKV, Akola | 1 | AKDW5520(d) |
| HAU, Hisar | 1 | WHD969(d) |
| IIWBR, Karnal | 2 | DBW457, DBW509[B] |
| **Checks** | **4** | **GW322, MACS6768, HI8737(d), HI8713(d)** |
| **Total** | **26 (22+4)** | |

* denotes final year entry, [B] Promotion from QCWBN

**Experimental details**

| | | |
|---|---|---|
| Design | : | R.B.D. |
| Replications | : | Four |
| Plot size | : | 6 x 2.40m (12 rows) |
| Fertilizer dose (kg/ha) | : | 120:60:40 (N:P:K) |
| Time of sowing | : | November5-15 |
| Seed rate (kg/ha) | : | 100 |
| Seed requirement | : | 18 kg per entry |

*Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Director*

**Central Zone**
**Advance Varietal Trial, 2024-25**
**AVT-IR-LS-TAS**

**Trial conducting centres**

| State | No. | Centres |
|---|---|---|
| Gujarat | 5 | Vijapur, SK Nagar, Junagadh, Anand, Lok-Bharti |
| Madhya Pradesh | 4 | Jabalpur, Gwalior, Powarkheda, Indore |
| Chhattisgarh | 2 | Bilaspur, Raipur |
| UP | 1 | Banda |
| Total | **12** | |

**Details of test entries**

| Contributing Centres | No. of entries | Name of entries |
|---|---|---|
| ARI, Pune | 2 | MACS6854, MACS6868 |
| IIWBR, Karnal | 1 | DBW425* |
| JAU, Junagadh | 1 | GW556* |
| PDKV, Akola | 1 | WSM138* |
| JNKVV | 1 | MP3598 |
| HAU, Hisar | 1 | WH1338 |
| ARS, Niphad | 1 | NIAW4621 |
| **Checks** | **4** | **HD2932, MP4010, HI1634, CG1029** |
| **Total** | **12 (8+4)** | |

* denotes final year entry

**Experimental details**

| | | |
|---|---|---|
| Design | : | R.B.D. |
| Replications | : | Four |
| Plot size | : | 6m x 2.16m (12 rows) |
| Fertilizer dose (kg/ha) | : | 90:60:40 (N:P:K) |
| Time of sowing | : | Dec. 5-15 |
| Seed rate (kg/ha) | : | 125 |
| Seed requirement | : | 15 kg per entry |

*Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Director*

**Central Zone**
**Advance Varietal Trial, 2024-25**
**AVT-RI-TS-TAD**

**Trial conducting centres**

| State | No. | Centres |
|---|---|---|
| Gujarat | 4 | Vijapur, Dhandhuka, Junagadh, Anand |
| Madhya Pradesh | 5 | Powarkheda, Jabalpur, Sagar, Indore, Jhansi |
| Chhattisgarh | 2 | Bilaspur, Raipur |
| Rajasthan | 1 | Udaipur |
| UP | 1 | Banda |
| **Total** | **13** | |

**Details of test entries**

| Contributing Centres | No. of entries | Name of entries |
|---|---|---|
| UAS, Dharwad | 3 | UAS484(d)*, UAS3034, UAS487(d) |
| ARI, Pune | 2 | MACS4131(d)*, MACS6851 |
| ARS, Niphad | 1 | NIAW4533 |
| IARI, Indore | 5 | HI8851(d)*, HI1700, HI1702, HI8856(d), HI8857(d) |
| IGKV, Bilaspur | 1 | CG1052 |
| Parbhani | 1 | PBN2115 |
| JNKVV | 2 | MPO1398(d)*, MP3601 |
| IIWBR, Karnal | 3 | DBW432*, DBW469, DBW470 |
| **Checks** | **4** | **DBW110, CG1040, HI8627(d), HI8823(d)** |
| **Total** | **22 (18+4)** | |

* denotes final year entry

**Experimental details**

| | | |
|---|---|---|
| Design | : | R.B.D. |
| Replications | : | Four |
| Plot size | : | 6 x 2.40m (12 rows) |
| Irrigations | : | Two (pre-sowing & one irrigation at 40-45 DAS (Limit of 3 Irrig. in Gujarat) |
| Fertilizer dose (kg/ha) | : | 90:60:40 (N:P:K) |
| Time of sowing | : | Oct. 25 – Nov. 05 |
| Seed rate (kg/ha) | : | 100 |
| Seed requirement | : | 18 kg per entry |

*Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Director*

**Peninsular Zone**
**Advance Varietal Trial, 2024-25**
**AVT-IR-TS-TDM**

**Trial conducting centres**

| State | No. | Centres |
|---|---|---|
| Maharashtra | 6 | Niphad, Pune, Akola, Parbhani, Nashik, Karad |
| Karnataka | 4 | Dharwad, Ugar-Khurd, Kalloli, Nippani |
| **Total** | **10** | |

**Details of test entries**

| Contributing Centres | No. of entries | Name of entries |
|---|---|---|
| ARI, Pune | 6 | MACS4135(d)*, MACS4125(d)*, MACS4146(d), MACS4147(d), MACS6844*, MACS6862 |
| IARI, Indore | 5 | HI8849(d)*, HI8853(d), HI8854(d), HI8855(d), HI8858(d) |
| SDAU, Vijaypur | 3 | GW1369(d), GW1370(d), GW1029[B] |
| ARS, Niphad | 2 | NIAW4581, NIDW1557(d) |
| PAU, Ludhiana | 2 | PDW367(d), PDW368(d) |
| IIWBR, Karnal | 2 | DDW65(d), DDW67(d) |
| IGKV, Bilaspur | 1 | CG1045* |
| CCSHAU, Hisar | 1 | WHD969(d) |
| UAS, Dharwad | 1 | UAS485(d) |
| **Checks** | **4** | **MACS3949(d), HI8737(d), GW322, MACS6222** |
| **Total** | **27 (23+4)** | |

* denotes final year entry, [B] Promotion from QCWBN

**Experimental details**

| | | |
|---|---|---|
| Design | : | R.B.D. |
| Replications | : | Four |
| Plot size | : | 6 x 2.40m (12 rows) |
| Fertilizer dose (kg/ha) | : | 120:60:40 (N:P:K) |
| Time of sowing | : | November 5-15 |
| Seed rate (kg/ha) | : | 100 kg/ha |
| Seed requirement | : | 15kg per entry |

*Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Director*

**Peninsular Zone**
**Advance Varietal Trial, 2024-25**
**AVT-IR-LS-TAS**

**Trial conducting centres**

| State | No. | Centres |
|---|---|---|
| Maharashtra | 6 | Niphad, Pune, Nashik, Akola, Karad, Parbhani |
| Karnataka | 5 | Dharwad, Ugar-Khurd, Bagalkot, Kalloli, Nippani |
| Tamil Nadu | 1 | Wellington |
| **Total** | **12** | |

**Details of test entries**

| Contributing Centres | No. of entries | Name of entries |
|---|---|---|
| IARI, Indore | 4 | HI1687*, HI1697, HI1696, HI1699 |
| ARI, Pune | 4 | MACS6829*, MACS6830*, MACS6854, MACS6868 |
| ARS, Niphad | 2 | NIAW4621, NIAW4624 |
| IIWBR, Karnal | 1 | DBW426$^{Q}$* |
| UAS, Dharwad | 1 | UAS3033 |
| JNKVV, Jabalpur | 1 | MP3598 |
| **Checks** | **4** | **RAJ4083, HD2932, HD3090, HI1633** |
| **Total** | **17 (13+4)** | |

* denotes final year entry, $^{Q}$ promotion on the basis of quality (softness)

**Experimental details**

| | | |
|---|---|---|
| Design | : | R.B.D. |
| Replications | : | Four |
| Plot size | : | 6m x 2.16m (12 rows) |
| Fertilizer dose (kg/ha) | : | 90:60:40 (N:P:K) |
| Time of sowing | : | Dec.5-15 |
| Seed rate (kg/ha) | : | 125 |
| Seed requirement | : | 15 kg per entry |

*Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Director*

**Peninsular Zone**
**Advance Varietal Trial, 2024-25**
**AVT-RI-TS-TAD**

**Trial conducting centres**

| State | No. | Centres |
|---|---|---|
| Maharashtra | 6 | Akola, Pune, Niphad, Nashik, Parbhani, Karad |
| Karnataka | 5 | Dharwad, Nippani, Bagalkot, Ugar-Khurd, Kalloli |
| **Total** | **11** | |

**Details of test entries**

| Contributing Centres | No. of entries | Name of entries |
|---|---|---|
| ARS, Niphad | 3 | NIAW4267*, NIDW1561(d), NIAW4533 |
| IGKV, Bilaspur | 1 | CG1047* |
| PDKV, Akola | 1 | AKAW5441 |
| Parbhani | 1 | PBN2115 |
| IARI, Indore | 1 | HI1700 |
| ARI, Pune | 1 | MACS6851 |
| UAS, Dharwad | 2 | UAS3034, UAS487(d) |
| SDAU, Vijapur | 1 | GW563 |
| **Checks** | **4** | **HI1605, NIAW3170, NIDW1149(d), UAS478(d)** |
| **Total** | **15 (11+4)** | |

* denotes final year entry

**Experimental details**

| | | |
|---|---|---|
| Design | : | R.B.D. |
| Replications | : | Four |
| Plot size | : | 6 x 2.40m (12 rows) |
| Irrigations | : | Two (pre-sowing & one irrigation at 40-45 DAS) |
| Fertilizer dose (kg/ha) | : | 90:60:40 (N:P:K) |
| Time of sowing | : | Oct. 25 – Nov. 5 |
| Seed rate (kg/ha) | : | 100 |
| Seed requirement | : | 15kg per entry |

*Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Director*

# SPL - HYPT, 2024-25
# (IR-ES-TAS-NWPZ)

**Trial conducting centres**

| Zone | No. | Centres |
|---|---|---|
| NWPZ | 8 | Delhi, Ludhiana, Ladowal, Hisar, Karnal, Modipuram, Sriganganagar, Pantnagar |
| **Total** | 8 | |

**Details of test entries**

| Contributing Centres | No. of entries | Name of entries |
|---|---|---|
| PAU, Ludhiana | 1 | PBW935 |
| **Checks** | **5** | **DBW187, DBW327, DBW371, DBW372, PBW872** |
| **Total** | **6 (1+5)** | |

**Experimental details**

| | | |
|---|---|---|
| Design | : | R.B.D. |
| Replications | : | Four |
| Plot size | : | 6 x 2.40m (12 rows) |
| Fertilizer dose (kg/ha) | : | 150% RFD+ FYM15 t/ha+ Growth Regulators* |
| Time of sowing | : | Oct. 25– Nov. 5 |
| Seed rate (kg/ha) | : | 100 |
| Seed requirement | : | 8 Kg per entry |

*** Note:** Two sprays as tank mix-Chlormequat chloride @ 0.2%+ tebuconazole @ 0.1% of commercial product dose at First Node and Flag leaf (Tank mix application). Use 400L/ha of water for spraying

*Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Director*

# SPL – HYPT, 2024-25
# (IR-ES-TAS-CZ)

**Trial conducting centres**

| Zone | No. | Centres |
|---|---|---|
| CZ | 7 | Indore, Powarkheda, BISA-Jabalpur, JNKVV-Jabalpur, Bilaspur, Junagadh, Vijapur |
| **Total** | 7 | |

**Details of test entries**

| Contributing Centres | No. of entries | Name of entries |
|---|---|---|
| PAU, Ludhiana | 3 | PBW906*, PBW929*, PBW934 |
| IARI, Delhi | 1 | HD3463* |
| IIWBR, Karnal | 1 | DBW445$^{Q}$* |
| JNKVV, Powarkheda | 1 | MP1399* |
| **Checks** | **5** | **DBW187, DBW303, DBW327, DBW377, GW322** |
| **Total** | **11 (6+5)** | |

* denotes final year entry, $^{Q}$ promotion on the basis of quality (softness)

**Experimental details**

| | | |
|---|---|---|
| Design | : | R.B.D. |
| Replications | : | Four |
| Plot size | : | 6 x 2.40m (12 rows) |
| Fertilizer dose (kg/ha) | : | 150% RFD+ FYM15 t/ha+ Growth Regulators* |
| Time of sowing | : | 1-10 November |
| Seed rate (kg/ha) | : | 100 |
| Seed requirement | : | 8 Kg per entry + Agronomy 16kg |

*** Note:** Two sprays as tank mix-Chlormequat chloride @ 0.2%+ tebuconazole @ 0.1% of commercial product dose at First Node and Flag leaf (Tank mix application). Use 400L/ha of water for spraying

# Special Trial (Dicoccum), 2024-25
## SPL-DIC-IR-TS-PZ

**Trial conducting centres**

| State | No. | Centres |
|---|---|---|
| Maharashtra | 4 | Pune, Karad, Kolhapur, Niphad |
| Karnataka | 5 | Dharwad, Ugar Khurd, Kalloli, Mudhol, Mandya |
| Tamil Nadu | 1 | Wellington |
| **Total** | **10** | |

**Details of test entries**

| Contributing Centres | No. of entries | Name of entries |
|---|---|---|
| ARI, Pune | 4 | MACS5064, MACS5065, MACS5066, MACS5067 |
| UAS, Dharwad | 3 | DDK1067, DDK1068, DDK1069 |
| IARI, Wellington | 2 | HW5305, HW5306 |
| **Checks** | **3** | **HW1098, DDK1029, MACS6222 (*aest*.)** |
| **Total** | **12 (9+3)** | |

**Experimental details**

| | | |
|---|---|---|
| Design | : | R.B.D. |
| Replications | : | Four |
| Plot size | : | **Gross**: 6 x 2.40m (12 rows); **Net** : 6 x 2.0m (10 middle rows) |
| Fertilizer dose (kg/ha) | : | 120:60:40 (N:P:K) |
| Time of sowing | : | **PZ:** Nov. 1-15, **SHZ:** Nov. 10-25 |
| Seed rate (kg/ha) | : | 100 |
| Seed requirement | : | 15 kg per entry |

*Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Director*

## SPL-AST, 2024-25 (Tentative)
## (IR-TS-TAS-All Zones)

**Trial conducting centers**

| State | Number of Centres | Conducting Centres |
|---|---|---|
| Haryana | 2 | ICAR-CSSRI Karnal, ICAR- IIWBR Hisar/ CCSHAU Hisar |
| Punjab | 2 | Muktsar, Bathinda |
| UP | 3 | ICAR-CSSRI Lucknow, Dalip Nagar, Ayodhya |
| Gujarat | 2 | ICAR-CSSRI Bharuch, Pali |
| Total | 8 | |

**Details of trial entries**

| Contributing Centre | No. of entries | Entries |
|---|---|---|
| CSSRI Karnal | 1 | KRL 2301 |
| Checks | 3 | 3 (Kharchia 65, KRL 210, KRL 19) |
| Total | 4 (1+3) | 4 (1 entry + 3 checks) |

**Experimental Details**

| | | |
|---|---|---|
| Design | : | R.B.D |
| Replication | : | Six |
| Plot size | : | 6 x 2.40 m (12 rows) |
| Fertilizer dose (kg/ha) | : | 120:60:40 (N:P:K) + 10 Kg Zinc Sulphate |
| Time of sowing | : | HAR/PUN: Nov. 5-20; UP/GUJ/Raj: 10-25 Nov |
| Seed rate | : | 100 |
| Seed requirement | : | 12 Kg per entry |

***Note: Change in test sites, date of sowing, trial entries, etc. will be invalid if not approved by the Director***

## Physiological Trial/ Nursery

### Heat & Drought Tolerance Screening Trial (HDTST), 2024-25

**Conducting centres**

| Zone | No. | Centres |
|---|---|---|
| NWPZ | 3 | Hisar, Karnal, Ludhiana |
| NEPZ | 3 | Ranchi, Sabour, RPCAU-Pusa |
| CZ | 3 | Junagadh, Indore, Vijapur |
| PZ | 3 | Pune, Dharwad, Niphad |
| **Total** | **12** | |

**Details of trial entries**

| SN | Contributing centres | No. of Entries | Name of entries |
|---|---|---|---|
| 1 | IIWBR, Karnal | | |
| 2 | Indore | | |
| 3 | PAU, Ludhiana | | AVT entries to be finalised based on crop improvement programme |
| 4 | IARI, New Delhi | | |
| 5 | Bilaspur | | |
| | **Checks** | **9** | DBW187, HD3086, WH730, RAJ3765, RAJ4083, HD3090, HI1633, GW322, DBW110 |
| **Total entries** | | **36 (27+9)** | |

**Experimental details**

| | | |
|---|---|---|
| Design | : | Simple lattice |
| Replications | : | Two |
| Plot size | : | 6 rows of 3m length spaced 20cm apart (3.6m$^2$) |
| Treatments | : | 3 (timely and late sown with minimum 21 days and maximum 1 month difference between the two sowings and one rainfed condition) |
| Time of sowing | : | **NWPZ&NEPZ: TS**: Nov.1-15 **LS:** Minimum 21 days and maximum 1 month difference between two sowings, **RF**-Oct.25-Nov.5$^{th}$<br>**CZ&PZ: TS:** Nov.5-15 **LS:** Minimum 21 days and maximum 1 month difference between two sowings, **RF**-Oct.25-Nov.5$^{th}$ |
| Fertilizer dose (Kg/ha) | : | As per the recommendation of the zones |
| Seed rate (kg/ha) | : | TS:100, LS:125, RF:125 |
| Seed requirement | : | 5kg. per entry |

***Observations to be recorded:*** Germination%, Days to heading, Days to anthesis, Days to maturity, Plant height (cm), Total biomass of each net plot at harvest (g), Productive tillers of one full row length, Grain yield of each gross plot (g), 1000-grains weight (g), Grain number per spike, Grain weight per spike. Two recordings of NDVI at 15 days after sowing and again at 21 days after anthesis. Canopy temperature at 15 days and 21 days after anthesis, Chlorophyll content at 15 days and 21 days after anthesis

## NATIONAL GENETIC STOCK NURSERY (NGSN) [Suggested Crossing Block]

### Conducting Centres

| Zone | No | Centres |
|---|---|---|
| NHZ | 3 | Almora, Malan, Khudwani |
| NWPZ | 7 | IIWBR-Karnal, CSSRI-Karnal, Jammu, Hisar, Pantnagar, Ludhiana, Durgapura |
| NEPZ | 8 | Ayodhya, Kanpur, Sabour, RPCAU-Pusa, Ranchi, Coochbehar, Kalyani, IARI-Hazaribagh |
| CZ | 11 | Indore, Gwalior, Jabalpur, Udaipur, Vijapur, Bilaspur, Junagadh, Lok-Bharti, Powarkheda, Mandor, Sagar |
| PZ | 5 | Pune, Dharwad, Akola, Niphad, Parbhani |
| **Total** | **34** | |

### Details of entries & Checks

| NGSN consists latest released/identified varieties, genetic stocks, confirmed elite lines from national nurseries, proven elite lines (with 3 years testing and/or published information) | |
|---|---|
| **Contributing Centres** | Dharwad, IARI-New-Delhi, IIWBR-Karnal, PAU-Ludhiana, CCHAU-Hisar, Vijapur, BARC, Pantnagar, NBPGR-New-Delhi |
| **Checks** | Total=04: Sonalika, HD 2967, DBW 187, HI 8713 (d) |
| **Total** | **100 (96+4)** |

### Experimental details

| | | |
|---|---|---|
| Design | **:** | Augmented Block Design |
| Plot size | **:** | 02 row plot of 2.5m length spaced at 20cm apart (1.0 $m^2$) |
| Fertilizer dose | **:** | As recommended |
| Time of sowing | **:** | **NWPZ/NEPZ:** November 1-15; **CZ / PZ**: November 5-20 |
| Seed requirement | **:** | 750g seed each entry; 2.0 kg check varieties |

**Observations:** Grain yield/plot (g), days to heading, days to maturity, plant height, tillers/m row, 1000 grains weight, rusts, leaf blight, powdery mildew, loose smut, other diseases (artificial epiphytotic conditions)

**Utilization report**: 1. As donor in hybridization 2. Direct selection 3. Germplasm enrichment (trait)

## 28th SEGREGATING STOCK NURSERY (SSN)

### Conducting Centres

| Zone | No. | Centres |
|---|---|---|
| NHZ | 3 | Khudwani, Wadura, Almora |
| NWPZ | 4 | Jammu, Hisar, Pantnagar, Durgapura |
| NEPZ | 4 | Ayodhya, Kalyani, Ranchi, Sabour, |
| CZ | 9 | Bilaspur, Durgapura, Jabalpur, Udaipur, Lok-Bharati, Junagadh, Powarkheda, Mandor, Sagar |
| PZ | 5 | Akola, Parbhani, Pune, Dharwad, Niphad |
| **Total** | **25** | |

### Details of cross combinations

| Contributing Centres | No. of crosses | Priority trait(s) |
|---|---|---|
| IIWBR Karnal | 100 | Yellow rust, spot blotch, quality, abiotic stress, pre-breeding |
| IARI, Delhi | 30 | Yield, adaptation, pre-breeding, quality, leaf rust, stem rust |
| Ludhiana | 30 | Yellow rust, quality, adaptation, KB, pre-breeding |
| Pantnagar | 10 | Yellow rust, leaf rust, heat, KB, quality |
| Almora | 10 | Winter x spring |
| Pune | 10 | Stem rust, quality, heat, drought, pre-breeding |
| Vijapur | 10 | Heat, short duration, bold grain, quality |
| **Total** | **200** | |

### Experimental details

| | | |
|---|---|---|
| Design | : | Augmented Block Design |
| Plot size | : | 4 row plot of 2.5 m length spaced at 20cm apart |
| Fertilizer dose | : | As recommended for the centre |
| Time of sowing | : | **NHZ / NWPZ / NEPZ** (November 1-15); **CZ / PZ** (November 5-20); |
| Seed requirement | : | 250g seed for each cross combination |

**Utilization Report:** No. of cross combinations / plants selected (Selected / preferred traits).

## Drought and Heat Tolerance Screening Nursery (DHTSN), 2024-25

**Conducting centres**

| Zone | No. | Centres |
|---|---|---|
| NWPZ<br>NEPZ | 2<br>2 | Hisar,Karnal<br>RPCAU-Pusa, Sabour |
| CZ | 2 | Junagadh, Indore |
| PZ | 2 | Pune, Dharwad |
| **Total** | **8** | |

**Contributing Centres:** Indore, Niphad, Vijapur, Dharwad, Pune, IARI, Hisar, Ludhiana, Karnal
**No. of Entries:** 5 to 7 promising entries/ centre
**Checks**: C306, MP3288, K1317, DBW110, NI5439
**Registered Genetic Stocks**: WH730, DBW150

**Experimental details**
**Design:** Augmented/Alpha lattice
**Plot size:**1.5m length x 3rows (spaced 20cm apart)
**Agronomy:** As per the package of practices
**Seed requirement**: 1.5 kg per entry

***Observations to be recorded:***
**Agro-morphological observations:** Germination percentage, Days to heading, Days to anthesis, Days to maturity, Plant height (cm), Total biomass at harvest (g), Productive tillers of one full row length, Grain yield / plot (g), 1000-grain weight (g), Grain number/spike, Grain weight/spike.

**Physiological parameters:** Two recordings of NDVI (one month after sowing & 21 days after anthesis), Canopy temperature, Chlorophyll fluorescence and Chlorophyll content (15 days & 21 days after anthesis), respectively.

# Salinity/Alkalinity Tolerance Screening Nursery 2024-25 (Tentative)

**Conducting centres**

| Zone | Number of Centres | Conducting Centres |
|---|---|---|
| Haryana | 2 | ICAR-CSSRI Karnal, ICAR- IIWBR Hisar/ CCSHAU Hisar |
| Punjab | 2 | Muktsar, Bathinda |
| UP | 3 | ICAR-CSSRI Lucknow, Daleep Nagar, Ayodhya |
| Gujarat | 2 | ICAR-CSSRI Bharuch, Pali |
| Total | 9 | |

***These centers are tentative and all possibilities will be explored for trial conductance**

**Details of trial entries**

| SN | Cooperating Centre | Entries |
|---|---|---|
| 1 | CSSRI Karnal | 10 |
| 2 | IIWBR Karnal | 5 |
| 3 | CSAUAT Kanpur | 2 |
| 4 | NDUAT Faizabad | 2 |
| 5 | CCSHAU Hisar | 2 |
| 6 | PAU Ludhiana | 2 |
| | | |
| | Checks | 3 (Kharchia 65, KRL 210, KRL 19) |
| | Total | 26 (23 entries + 3 checks) |

**Experimental Details**

| | | |
|---|---|---|
| Design | **:** | Augmented Design |
| Replication/Sets | **:** | One |
| Plot size | : | 5 x 0.60m (3 rows): ($3m^2$) |
| Fertilizer dose (kg/ha) | **:** | : 120:60:40 (N:P:K) |
| Time of sowing | **:** | **HAR/PUN:** Nov. 5-20; **UP/GUJ/RAJ:** 10-25 Nov |
| Seed requirement | **:** | Entries: 900 gm, Checks: 3Kg |

## Quality Component Wheat Biofortification Nursery – 2024-25

**Nursery Conducting Centers**

| Zone | Number | Centers |
|---|---|---|
| NWPZ | 4 | Ludhiana, Karnal, New Delhi and Pantnagar |
| NEPZ | 2 | Kanpur, Varanasi and Ranchi |
| CZ | 4 | Indore, Vijapur, Powarkheda and Junagadh |
| PZ | 3 | Dharwad, Pune and Niphad |
| Total | 13 | |

Details of Test Entries

| Contributing Center | No. of Entries | Name of Entries |
|---|---|---|
| IARI Delhi | 3 | After screening the genotypes received, for Protein, Fe and Zn, entries will be finalized |
| IIWBR Karnal | 3 | |
| PAU Ludhiana | 3 | |
| Hisar | 2 | |
| Pantnagar | 2 | |
| Kanpur | 2 | |
| Varanasi | 2 | |
| IARI Indore | 2 | |
| Vijapur | 2 | |
| Powarkheda | 2 | |
| Junagadh | 1 | |
| Dharwad | 2 | |
| Niphad | 2 | |
| Pune | 2 | |
| Ranchi | 1 | |
| NABI, Mohali | 1 | |
| Checks | 4 | DBW187, DBW327, HD3386, MACS6222 |
| Total | 32+4 | |

Experimental details

| | | |
|---|---|---|
| Design | : | Simple Lattice (6x6) |
| Replications | : | 2 |
| Plot size | : | Gross: 4X0.8(4 rows) |
| Fertilizer dose (kg/ha) | : | NW/NE: 150:60:40 (N:P:K)<br>CZ/PZ: 120:60:40 |
| Time of Sowing | : | 05-20 Nov |
| Seed rate | : | 100kg/ha |
| Seed requirement | : | 2.500 Kg |

Samples will be analyzed at ICAR-IIWBR, Karnal for grain appearance score, test weight, protein content, grain hardness index, sedimentation value, Fe and Zn content. Hand threshed samples using cloth should be provided for Fe and Zn analysis separately.

# Resource Management

**Technical Programme of Resource Management for 2024-25**

***Co-ordinated trials of wheat and barley***

Evaluation of AVT-II year entries of wheat and barley under different growing conditions (Timely, late, restricted irrigation, salinity, HYPT) in various zones will be conducted as per allotment of the trials from crop improvement programme.

***Production technologies trials***

Special trials *viz.* SPL-1, SPL-2, SPL-4, SPL-5 and SPL-6 conducted during 2023-24 will be continued for second year evaluation in 2024-25. Three new trials namely SPL-3, SPL-7 and SPL-8 have been formulated for season 2024-25.

**SPL-1: Effect of tillage, rice residue and microbial consortia management on wheat productivity, profitability and soil health**

Treatments:

**Main-Plots:** Tillage methods: 03

1. Zero tillage* 2. Strip Tillage# 3. Conventional Tillage

**Sub-Plots**: Rice residue levels: 03

1. No Residue 2. Full residue$ 3. Full residue + microbial consortia

*Sowing to be performed by RDD/Happy Seeder depending on the availability of machine

#Sowing to be performed by Strip-till drill (Smart Seeder)

$In case full residue load, anchored residue of about 30 cm may be kept and rest will be in the form of loose residue.

Design: Split –plot, Replications: Three

Centres: Bisa Ladowal, Ludhiana, Karnal, Kalyani, BISA Samastipur

**SPL-2: Effect of seed rate and growth regulators on productivity of wheat under early sowing in NWPZ**

Treatments:

**Main-Plots**: Seed rates: 03

1. 60 kg/ha 2. 80 kg/ha 3. 100 kg/ha

**Sub-Plots**: Foliar application of growth regulators and mechanical drum rolling: 05

1. Control (water spray)
2. Drum rolling (30 and 45 DAS)
3. 100 ppm. 2,3,5-triiodobenzoic Acid (TIBA) (Auxin transport inhibitor) at tiller initiation stage
4. 100 ppm. 6-benzyl amino purine (Cytokinin derivative) at tiller initiation stage
5. Two sprays as tank mix-Chlormequat chloride (Lihocin) @ 0.2%+ tebuconazole (Folicur 430 SC) @ 0.1% of commercial product dose at first node and flag leaf (Tank mix application)

Design: Split –plot, Replications: Three

Centres: Agra, Almora, Durgapura, Gurdaspur, Hisar, Karnal, Ludhiana, Pantnagar

**SPL-3: Comparative performance of nano urea plus and prilled urea in wheat (new experiment)**

Treatments:

1. Control
2. Nano urea plus* application @0.4% at 45-50 DAS
3. Prilled urea application @ 6.0% at 45-50 DAS
4. 50% Recommended Dose of Nitrogen (RDN)

5. 50% RDN + Nano urea plus application @ 0.4% at 45-50 DAS
6. 50% RDN + Prilled urea application @ 6.0% at 45-50 DAS
7. 75% RDN
8. 75% RDN + Nano urea plus application @ 0.4% at 45-50 DAS
9. 75% RDN + Prilled urea application @ 6.0% at 45-50 DAS
10. 100% RDN
11. 100% RDN + Nano urea plus application @ 0.4% at 45-50 DAS
12. 100% RDN + Prilled urea application @ 6.0% at 45-50 DAS

Design: RBD, Replications: 3
Centres: Karnal, Pantnagar, Ludhiana, Hisar, Kalyani, Shillongani
* It contains 20% nitrogen (w/v)

**SPL-4: Intercropping of oilseed/pulses with wheat and barley for enhancing productivity and profitability**

Treatments: 11
1. Wheat +Toria (8:2)
2. Wheat + Lentil (4:2)
3. Wheat + Linseed (4:2)
4. Barley +Toria (8:2)
5. Barley + Lentil (4:2)
6. Barley + Linseed (4:2)
7. Wheat (Sole)
8. Barley (Sole)
9. Toria (Sole)
10. Lentil (Sole)
11. Linseed (Sole)

Design: RBD, Replications: Three
Centres: Ayodhya, Burdwan, Hisar, Kanpur, Shillongani, Varanasi

**SPL-5: Evaluation of herbicides for broad-leaved weed control in barley**

Treatments: 10
T1: Halauxifen-methyl 1.21% + Fluroxypyr 38.9% EC at 200.6 (6.1+194.5) g a.i./ha
T2: Metsulfuron methyl 20 WG + Surfactant at 4 g a.i./ha+ 0.2% S
T3: Carfentrazone 20 g a.i./ha
T4: Metsulfuron + Carfentrazone @ 4+20 g a.i./ha + Surfactant + 0.2% S
T5: 2,4-D-Na 500 g a.i./ha
T6: 2,4-D-Na + Carfentrazone 400 + 20 g a.i./ha
T7: 2,4-D-E 500 g a.i./ha
T8: 2,4-D-E + Carfentrazone 400 + 20 g a.i./ha
T9: 2,4-D-Amine 500 g a.i./ha
T10: 2,4-D-Amine + Carfentrazone 400 + 20 g a.i./ha
T11: Weedy check
T12: Weed free
Design: RBD, Replications: Three
NHZ: Khudwani, Malan,
NWPZ: Agra, Durgapura, Hisar, Karnal
NEPZ: Ayodhya, Ranchi
CZ: Gwalior, Jabalpur, Udaipur, Vijapur

**SPL-6: Effect of seed rate and growth regulators on productivity of barley under early sowing in NWPZ**

Treatments:

Main-Plots: Seed rates: 03

1. 60 kg/ha 2. 80 kg/ha 3. 100 kg/ha

Sub-Plots: Foliar application of growth regulators and mechanical drum rolling: 05

1. Control (water spray)
2. Drum rolling (30 and 45 DAS)
3. 100 ppm. 2,3,5-triiodobenzoic Acid (TIBA) (Auxin transport inhibitor) at tiller initiation stage
4. 100 ppm. 6-benzyl amino purine (Cytokinin derivative) at tiller initiation stage
5. Two sprays as tank mix-Chlormequat chloride (Lihocin) @ 0.2%+ tebuconazole (Folicur 430 SC) @ 0.1% of commercial product dose at first node and flag leaf (Tank mix application)

Design: Split –plot, Replications: Three

Centres: Agra, Almora, Durgapura, Gurdaspur, Hisar, Karnal

**SPL-7: Efficacy of pre-mix combination of bixlozone + metribuzin against weeds in wheat (New experiment)**

Treatments: 09

1. Bixlozone 50% + metribuzin 10% - 60%WG + safener @ 600 (500+100) g a.i. + 1000 ml/ha at 25 DAS
2. Bixlozone 50% + metribuzin 10% - 60%WG + safener @ 750 (625+125) g a.i. + 1000 ml/ha at 25 DAS
3. Bixlozone 50% + metribuzin 10% - 60%WG + safener @ 900 (750+150) g a.i. + 1000 ml/ha at 25 DAS
4. Bixlozone 50% + metribuzin 10% - 60%WG + safener @ 600 (500+100) g a.i. + 1000 ml/ha at 35 DAS
5. Bixlozone 50% + metribuzin 10% - 60%WG + safener @ 750 (625+125) g a.i. + 1000 ml/ha at 35 DAS
6. Bixlozone 50% + metribuzin 10% - 60%WG + safener @ 900 (750+150) g a.i. + 1000 ml/ha at 35 DAS
7. Clodinafop 12% + metribuzin 42% @ 270 (60+210) g a. i. /ha + 1250 ml/ha surfactant at 35 DAS
8. Weedy check
9. Weed free

Design: RBD, Replications: 3

Centres: Karnal, Hisar, Ludhiana, Pantnagar

**SPL-8: Elucidating the effect of heat stress mitigators in terminal heat stress mitigation and yield improvement of wheat (New experiment)**

**Treatments:** Main-plot: Dates of sowing: 03

1. 15th November 2. 05th December 3. 25th December

**Sub-plot:** Heat stress mitigators: 05 **(**2 sprays at booting and anthesis)

**1.** Control (Water spray) 2. Control (2% $KNO_3$) 3. 2,4-Epibrassinolide 4. Sodium nitroprusside 5. Progesterone

Design: Split plot design, Replication: Three

Centres: NWPZ: Durgapura, Hisar, Karnal, Ludhiana and Pantnagar

CZ: Jabalpur, Bilaspur; PZ: Dharwad, Niphad, Pune

# Crop Protection

***The programme for the crop year 2024-25 was chalked out in the 63rd All India Wheat and Barley Research Workers Meet held at ANDUAT, Kumarganj during 11-13 September 2024. The various activities to be executed to be respective centers are given below***

***PROGRAMME 1: Host resistance -IPPSN and PPSN***

**Adult Plant Resistance for rusts & other diseases**

**1. Initial Plant Pathological Screening Nursery (IPPSN)**

**Objectives**

To evaluate breeding materials generated at various Centres against rusts and foliar blights for promoting to coordinated multi-location trials (Under artificial inoculated conditions).

(a) Rusts:

**Stripe rust:** Durgapura, Ludhiana, Gurdaspur, Pantnagar, Bajaura, Karnal, Hisar, Delhi, Dhaulakuan Jammu, Malan, and Khudwani.

**Leaf rust (North):** Durgapura, Ludhiana, Pantnagar, Karnal, Kanpur, Delhi, and Jammu

**Leaf rust (South):** Junagadh, Mahabaleshwar, Pune, Indore, Niphad, Powarkheda, Vijapur, Dharwad and Wellington.

**Stem rust:** Junagadh, Mahabaleshwar, Pune, Indore, Niphad, Powarkheda, Vijapur, Dharwad and Wellington.

(b) **Leaf Blights:** Ayodhya, Varanasi, RPCAU Pusa, Sabour, Kalyani, Coochbehar, Pune and Dharwad.

**2. Plant Pathological Screening Nursery (PPSN)**

**Objectives**

Evaluation of breeding material for promotion of entries from one stage to the other in the coordinated trials and identification of varieties for release after AVT level on the basis of their level of disease resistance.

**(a) Rusts:**

**Stripe rust:** Durgapura, Ludhiana, Gurdaspur, Pantnagar, Bajaura, Karnal, Hisar, Delhi, Dhaulakuan, Almora, Malan, Jammu, and Khudwani.

**Leaf rust (North):** Durgapura, Ludhiana, Pantnagar, Karnal, Kanpur, Hisar, Delhi, and Jammu

**Leaf rust (South):** Junagadh, Mahabaleshwar, Pune, Indore, Niphad, Powarkheda, Vijapur, Dharwad and Wellington.

**Stem rust:** Junagadh, Mahabaleshwar, Pune, Indore, Niphad, Powarkheda, Vijapur, Dharwad and Wellington.

**Note**: The samples of leaves of AVT entries and varieties (checks) in PPSN showed resistance in the past but now showing rust severity of 40S or more at any centre, should be sent to the Incharge, ICAR-IIWBR Regional Station Flowerdale, Shimla for pathotype analysis, with information to P.I. (Crop Protection).

For screening against rusts, the mixture of following races will be used and be provided by IIWBR, RS, Flowerdale, Shimla

| **Rust** | **Rust pathogen** | **Pathotypes** |
|---|---|---|
| Stem/Black | *Puccinia graminis tritici* | 11, 40A, 117-6, 21A-2, 122 |
| Stripe/Yellow | *P. striiformis* | 238S119, 46S119, 110S119, 110S84, T |
| Leaf/Brown | *P. triticina* | 77-9, 77-5, 104-2, 12-5, 77-1 |

**3. Monitoring of PPSN**

The teams of plant pathologists and breeders will be constituted by PI, CP for effective monitoring and data recording in PPSN at various locations in different zones.

The Plant Pathologists of other zones will monitor PPSN during Zonal monitoring tours.

**4. AUDPC based identification of slow rusters in AVT material:**

**Stripe rust:** Ludhiana, Karnal, Durgapura
**Leaf rust:** Ayodhya, Mahabaleshwar, Ludhiana
**Stem rust:** Mahabaleshwar, Indore

***PROGRAMME 2: Seedling rust resistance and rust gene postulation***

**1. Race specific adult plant resistance**

AVT entries will be screened for adult plant resistance to specific predominant races

**a) Stripe, leaf and stem rusts (under controlled conditions):** Flowerdale, Shimla
**b) Stripe rust –** Ludhiana and New Delhi
**c) Leaf rust –**Ludhiana and New Delhi
**d) Black rust (under controlled conditions):** Pune, Indore and Mahabaleshwar

Race inoculum to be supplied by RS, ICAR-IIWBR, Flowerdale and races should be the same for all the respective Centres as follows.

| Rust | Rust pathogen | Pathotypes | |
|---|---|---|---|
| | | **Flowerdale** | **Other Centres** |
| Stem/Black | *P. graminis tritici* | 11, 40A, 117-6 | 11, 40A, 117-6 |
| Stripe/Yellow | *P. striiformis* | 238S119, 46S119, 110S119 | 238S119, 46S119, 110S119 |
| Leaf/Brown | *P. triticina* | 77-9, 77-5, 104-2 | 77-9, 77-5, 104-2 |

**2. Seedling Resistance Tests (SRT) and postulation of rust resistance genes**

**(a) Stripe, leaf and stem rusts** (All races): ICAR-IIWBR, Regional Station, Flowerdale, Shimla for AVT's (*T. aestivum*) entries. Flowerdale centre to generate data on rust resistance genes of all the AVT entries.

**(b) Leaf and stem rust**: Mahabaleshwar for SRT on AVT entries of CZ, PZ and NIVT (durum entries).

***PROGRAMME 3: Leaf Blight***

**Leaf Blight Screening Nursery (LBSN):**

This nursery will consist of AVT entries as well as other resistant entries identified. It will have all the released varieties and material found resistant in preceding years.

**Centres:**
**NWPZ:** Ludhiana, Karnal, Hisar, Delhi, and Pantnagar
**NEPZ:** Ayodhya, Varanasi, RPCAU Pusa, Sabour, Kalyani, Coochbehar and Shillongani
**PZ:** Pune and Dharwad

***PROGRAMME 4: Karnal Bunt***

**Karnal Bunt Screening Nursery (KBSN):**

This nursery will consist of the earlier identified resistant materials, released varieties along with AVT entries under artificially inoculated conditions.

**Centres:** Malan, Jammu, Ludhiana, Karnal, Hisar, New Delhi, and Pantnagar

***PROGRAMME 5: Loose Smut***

**Loose Smut Screening Nursery (LSSN):** It will contain resistant materials identified in the past released varieties and AVT entries.
**Centres:** Malan, Almora, Ludhiana, Hisar and Durgapura.

***PROGRAMME 6: Powdery Mildew***

**Powdery Mildew Screening Nursery (PMSN):** All entries of AVT, previously identified resistant varieties
**Centres:** Malan, Dhaulakuan, Almora, Shimla, Jammu, Pantnagar and Wellington

***PROGRAMME 7: Region specific diseases***

1. **Flag Smut Screening Nursery:** Ludhiana, Hisar and Durgapura
2. **Head scab:** Dhulakuan, Gurdaspur, Karnal, Delhi, Dharward, Kalyani and Wellington
3. **Foot rot:** Dharwad
4. **Hill bunt:** Malan, Bajaura, IARI-RS Shimla and Almora (AVT entries NHZ only)

***PROGRAMME 8: Crop Health***

**1. Pre- harvest crop health monitoring**

**Crop Health Monitoring: Pre harvest surveys**

- All the centres associated with crop protection programme will conduct the surveys on regular interval during crop season and will send the information after every survey. Rust samples collected during the survey should be sent to Incharge, ICAR-IIWBR, RS, Flowerdale, Shimla and other disease P.I. Crop Protection.
- Wheat Crop Health Newsletter will be issued on monthly basis by PI (CP) ICAR-IIWBR, Karnal, during the crop season. Information on off season surveys will be included.

- Monitoring of new virulence's of rusts in NWPZ by specially constituted teams: Specially constituted teams will visit the areas as per the schedules given below for effective monitoring of crop health in general and appearance and spread of yellow rust in particular, along the areas near the western border and foothills/sub mountainous areas of NWPZ. Entomologists will also accompany the teams.

**Team I (last week of Dec. 2024):** Drs. Ravindra Kumar, Vaibabh Kumar Singh, Jaspal Kaur, Beant Singh
(Haryana and Punjab)
**Team II (second week of Jan. 2025)**: Drs. P.L. Kashyap, O. P. Gangwar, M. K. Pandey
(Haryana, Punjab and Jammu)
**Team III (last week of January, 2025)**: Drs. Pradeep Sharma, P. Prasad, Suman Kumar
(Haryana, Punjab and H.P.)
**Team IV (Second week of Feb. 2025)**: Drs. Pradeep Sharma, P.L. Kashyap, R. S. Beniwal
(Haryana, Punjab and Jammu)
**Team V (Fourth week of Feb., 2025)**: Drs. O. P. Gangwar, Ritu Bala, Shivali Dhiman, Beant Singh
(Haryana, Punjab and West U. P.)

**Monitoring the pathotype distribution of rust pathogens:** It will be undertaken by IIWBR, Regional Station, Flowerdale, Shimla (all three rusts from all zones) and Rust Research Station, Mahabaleshwar (brown and black rust from CZ and PZ). All the cooperating Centres are required to send the rust infected samples (natural infection) for pathotype analysis to the concerned centres according to recommended protocol.

**Wheat Disease Monitoring Nursery (To be coordinated by Flowerdale, Shimla):** The nursery will be planted at 38 locations including Khudwani (Srinagar), Yamunanagar (Haryana), and Varanasi KVK, Rampur. Samples from

this nursery should be sent regularly to ICAR-IIWBR, RS, Flowerdale, Shimla for virulence analysis and information. Information on rust appearance to be provided at monthly intervals, starting from end of December to the P.I. (Crop Protection).

**Off-season Disease Monitoring Nursery (To be coordinated by ICAR-IIWBR Reg. Station, Flowerdale)**: This nursery will be planted in Dalang Maidan, Kukumseri, Sangla, Sarahan (HP) and Leh (J&K). High altitude varieties and one hulless barley variety will also be included in this nursery.

**SAARC- Nursery (To be coordinated by ICAR-IIWBR Reg. Station):** Nursery will be planted at 15 Indian locations, *viz*., Ludhiana, Delhi, Dhaulakuan, Gurdaspur, Dera-Baba-Nanak, Abohar, Sri Ganganagar, Chattha, Kathua, Rajouri, Almora, Durgapura, Ayodhya, Pantnagar and Wellington.

**2. Post- harvest crop health monitoring**

**Monitoring of Karnal bunt and black point in harvested grains**

Post harvest monitoring will be undertaken by all the cooperating centres by analyzing samples from grain *mandies* of their respective states.

***PROGRAMME 9: Integrated disease management***

1. **Elite Multiple Disease Screening Nursery (EMDSN):** It will have sources of resistance to rusts and other diseases found earlier and will revalidate their status to different diseases:

**DISEASES**

**Stripe rust:** Durgapura, Ludhiana, Gurdaspur, Pantnagar, Bajaura, Karnal, Hisar, Delhi, Dhaulakuan, Almora, Malan, Jammu, and Khudwani.

**Leaf rust (North):** Durgapura, Ludhiana, Pantnagar, Karnal, Kanpur, Delhi, and Jammu

**Leaf rust (South):** Junagadh, Mahabaleshwar, Pune, Indore, Niphad, Powarkheda, Vijapur, Dharwad and Wellington.

**Stem rust:** Junagadh, Mahabaleshwar, Pune, Indore, Niphad, Powarkheda, Vijapur, Dharwad and Wellington.

**Leaf Blight:** Ayodhya, Varanasi, RPCAU Pusa, Sabour, Kalyani, Coochbehar, Pune, Ludhiana and Dharwad**.**

**Karnal Bunt:** Malan, Jammu, Ludhiana, Karnal, Hisar, New Delhi, and Pantnagar.

**Loose smut**: Malan, Almora, Ludhiana, Hisar and Durgapura.

**Powdery mildew:** Malan, Dhaulakuan, Almora, Shimla, Jammu, Pantnagar and Wellington

**Flag smut:** Ludhiana, Hisar and Durgapura

**Head scab:** Dhaulakuan,Gurdaspur, Karnal, Kalyani, Wellington, Dharwad and Delhi

**Nematodes (CCN):** Hisar and Durgapura.

The confirmed sources of resistance will be multiplied and seed will be shared with breeders along with passport data in NGSN.

**2. Management of diseases**

**(a) Chemical management of Karnal bunt of wheat:**

**Centres:** Malan, Jammu, Ludhiana, Karnal, Hisar and Pantnagar.

The chemicals will be tested are:

| S. No. | Treatments | Doses |
|---|---|---|
| 1 | Azoxystrobin 11% + Tebuconazole 18.3% w/w SC | @ 0.1% |
| 2 | Azoxystrobin 18.2% + Difenoconazole 11.4% w/w SC | @ 0.1% |
| 3 | Azoxystrobin 18.2% w/w + Cyproconazole 7.3% w/w SC | @ 0.1% |
| 4 | Picoxystrobin 7.05% + Propiconazole 11.7% SC, | @ 0.1% |
| 5 | Pyraclostrobin 133g/l + Epoxiconaxole 50g/l SE, | @ 0.1% |
| 6 | Tebuconazole 50% + Trifloxystrobin 25% WG, | @ 0.06% |
| 7 | Propiconazole | @ 0.1% |

| | | |
|---|---|---|
| 8 | Tebuconazole | @ 0.1% |
| 9 | Control | - |

The chemical will be evaluated under artificial inoculated condition and spray will be done at heading stage. Design – RBD, Plot size – 6 rows of 3 meters, replications - 3.

**(b) Chemical management of Loose smut of wheat (New Experiment):**

**Centres:** Malan, Almora, Ludhiana, Karnal Hisar and Durgapura.

The chemicals will be tested are:

| S. No. | Treatments | Doses |
|---|---|---|
| 1 | Imidacloprid 18.5% + Hexaconazole 1.5% FS | 0.2% |
| 2 | Carboxin 37.5%+ Thiram 37.5%WS | 3 gm/Kg seed |
| 3 | Difenoconazole 3% WS | 2.5 g $kg^{-1}$ seed) |
| 4 | Carbendazim 50%WP | 2gm/kg seed |
| 5 | Control | - |

The chemical will be evaluated under artificial inoculated condition and spray will be done at heading stage. Design – RBD, Plot size – 6 rows of 3 meters, replications - 3.

**(c) Management of head scab through bioformulations**

**Centres (Head scab):** Gurdaspur, Ludhiana, Karnal, and Wellington

The bioformulations will be tested are:

| S. No. | Treatments | Dose per 100g seed |
|---|---|---|
| 1 | KUSH-PlantEx | 2 ml |
| 2 | KUSH-PlantEx | 1 ml |
| 3 | KUSH-PlantEx | 0.5 ml |
| 4 | KUSH-SalBoost | 2 ml |
| 5 | KUSH-SalBoost | 1 ml |
| 6 | KUSH-SalBoost | 0.5 ml |
| 7 | KUSH-PhosphoBoost | 2 ml |
| 8 | KUSH-PhosphoBoost | 1 ml |
| 9 | KUSH-PhosphoBoost | 0.5 ml |
| 10 | Control | - |

The chemical will be evaluated under artificial inoculated condition. Design – RBD, Plot size – 6 rows of 3 meters, replications - 3.

*Parameters to be recorded*-Seed germination, Disease incidence, Plant height after 30 days, Number of tillers, Root biomass, Yield.

*Root biomass determination method*: Uproot the plants carefully in a such as that maximum number of roots remain intact. Remove soil particles by shaking and then clean under running tap- water. After cleaning, separate the roots from stem by cutting at the crown region. Soak excess water from the roots using paper towel or tissue paper. Weigh the roots using an electronic balance. Take observation at 28 and 60 days after sowing.

*Root volume determination method*: After the root fresh biomass is recorded, put the roots (from each plant) into a beaker (250 ml or 500 ml) half of which is filled with water. Record the volume of the water displaced by the roots. The volume of the water displaced will be considered as root volume.

**(d) Management of Leaf blight through bioformulations**

**Centres:** Karnal, Ayodhya, Sabour, Kalyani, Coochbehar, Pune, RPCAU, Pusa and Dharwad

The bioformulations will be tested are:

| S. No. | Treatments | Dose per 100g seed |
|---|---|---|
| 1 | KUSH-PlantEx | 2 ml |
| 2 | KUSH-PlantEx | 1 ml |
| 3 | KUSH-PlantEx | 0.5 ml |
| 4 | KUSH-SalBoost | 2 ml |
| 5 | KUSH-SalBoost | 1 ml |
| 6 | KUSH-SalBoost | 0.5 ml |
| 7 | KUSH-PhosphoBoost | 2 ml |
| 8 | KUSH-PhosphoBoost | 1 ml |
| 9 | KUSH-PhosphoBoost | 0.5 ml |
| 10 | Control | - |

The chemical will be evaluated under artificial inoculated condition and spray will be done at heading stage. Design – RBD, Plot size – 6 rows of 3 meters, replications - 3.

**Parameters to be recorded-**Seed germination, Disease incidence, Plant height after 30 days, number of tillers, root biomass, and yield.

**(e) Assessment of yield losses caused by stripe rust in wheat**

**Centres:** Karnal, Ludhiana, Hisar, Pantnagar, Jammu, Durgapura, Gurdaspur

| Variety | Protected | | Unprotected Conditions | | |
|---|---|---|---|---|---|
| | ACI | Yield (qha $^{-1}$) | ACI | Yield (qha $^{-1}$) | Yield loss (%) |
| HD 3086 | | | | | |
| Agra local | | | | | |
| HD 2967 | | | | | |
| Unnat 343 | | | | | |
| PBW 725 | | | | | |
| PBW 343 | | | | | |

Wheat varieties will be planted in plots consisting of 6 rows, each 6 meters long, in a randomized complete block design (RCBD). The trial will be replicated three times. The experiment includes two conditions: protected (sprayed with fungicides) and unprotected (unsprayed).The fungicides used will be Propiconazole 25% EC at 0.1% or Tebuconazole 50% + Trifloxystrobin 25% WG at 0.06%. These will be applied as a foliar spray when the disease first appears and again after 14 days. Data on disease severity will be collected three times at 15-day intervals. At harvest, grain yield (q/ha) will be measured to assess yield losses under both protected and unprotected conditions.

***PROGRAMME 10: ENTOMOLOGY***

1. **Host plant resistance:** Entomological screening nurseries (ESN), elite multiple pest screening nurseries (EMPSN) and special screening nurseries of promising entries identified during previous season will be evaluated as per following plan.

**(a) Entomological screening nurseries (ESN)-** In these nurseries, AVT entries along with those found resistant during previous years will be screened for

**(i)** Shootfly (Centres: Dharwad, Ludhiana, Kanpur, Niphad)

**(ii)** Brown wheat mite (Centres: Kanpur and Ludhiana)

**(iii)** Wheat Aphids (Centres: Niphad, Ludhiana, Khudwani, RPCAU Pusa and Kharibari)

(**iv)** Root aphid (Centres: Ludhiana)

**(b) Elite Multiple pest screening nurseries (EMPSN)-** In these nurseries, the germplasm having resistance to multiple diseases and insect-pests will be screened for

**(i)** Shootfly (Centres: Dharwad, Ludhiana, Kanpur and Niphad)

**(ii)** Brown wheat mite (Centres: Kanpur and Ludhiana)

**(iii)** Foliar aphids(Centres: Niphad, Ludhiana, Khudwani, RAU Pusa and Kharibari)

**(iv)** Root aphid (Centres: Kharibari and Ludhiana)

**2. Integrated Pest Management**

**(i) Survey and surveillance of insect-pests and their natural enemies in wheat** *(All centres)*

Roving surveys will be carried out at peak period of activity of different pests during the cropping season in wheat for insect-pests and their natural enemies. Population and damage levels of different insect-pests will be recorded and indicated as grades or percent damage inflicted to crop. The severity of damage of different insect-pests will also be recorded.

**(ii) Influence of sowing time on the incidence and population build-up of major insect-pest of wheat** (**Centres**: Ludhiana, Kharibari)

The effect of four different dates of sowing i.e. early (first fortnight of November), timely (second fortnight of November), late (first fortnight of December) and very late (second fortnight of December) will be evaluated on the population build-up of major insect-pests of wheat to better understand the insect-pest behaviour under different climatic conditions. At Kharibari, as the wheat sowing is done late, the four different dates of sowing that will be tested are early (first fortnight of December), timely (second fortnight of December), late (first fortnight of January) and very late (second fortnight of January) will be evaluated.

**(iii) Population dynamics of insect-pests and natural enemies under different residue management scenarios in rice-wheat cropping system** (**Centres:** Ludhiana)

Effect of different sowing methods (Surface Seeder, Super Seeder, Happy seeder, Smart Seeder) under varied residue amounts will be tested to study the population dynamics of insect-pests and natural enemies in rice-wheat cropping system.

**(iv) Assessment of grain yield losses caused by aphid complex in wheat (Centres:** Ludhiana, Kharibari, Niphad and RPCAU, Pusa**)**

The susceptible wheat variety for aphids will be sown plots in 6 rows of 6 m length in a replicated trial under irrigated conditions in the month of November. The trial will consists treatments viz. spraying of crop at flag leaf stage, ear head emergence stage and milking grain stage along with un-sprayed plots. The CIB recommended insecticide, thiamethoxam 25% WG @ 12.5 a.i. g/ha will be used for spraying for the management of aphids in wheat. The experiment will be conducted in randomized complete block design and each treatment will be replicated five times. Data will be collected at flag leaf stage, ear head and milking stage. During each sampling date, five wheat plants from each plot will be selected randomly and the number of aphids per tiller of each plant will be counted. At harvest, TKW and grain yield (q/ha) will be recorded from each plots will be recorded to assess yield losses. The data obtained from this experiment will be used to revisit the economic threshold level of aphids for wheat crop.

**(v) Management of aphids in wheat through border crops** (**Centres:** Ludhiana, and Kharibari)

The main hypothesis of the experiment is that more diverse cropping systems harboured lower incidence of aphids and help in reduction aphid infestation as compared to mono-cropping systems. In this experiment, the susceptible wheat variety for aphids will be sown plots size of 50 $m^2$ under irrigated conditions in the month of November. Border crop of mustard and radish will be also sown at the same time. Five plants from each plot from main crop as well as border crop will be selected randomly, and observations will be recorded on the number of aphids per tiller of each plant. At harvest time, yield will be recorded from main land border crop.

| Treatment | Treatment details |
|---|---|
| 1 | Wheat + 1 row of border crop of mustard |
| 2 | Wheat + 2 rows of border crop of mustard |
| 3 | Wheat +1 row of border crop of radish |
| 4 | Wheat + 2 rows of border crop of radish |
| 5 | Control |

**(vi) Management of aphids through foliar application of new chemical molecules (Centres:** Ludhiana, Niphad, RPCAU, Pusa**)**

Following chemicals will be evaluated against foliar aphids in wheat. Insect population counts before and after the treatment will be recorded along with yield in each treatment.

| Treatment ID | Treatments | Dosage /ha |
|---|---|---|
| T1 | Dinotefuran 20 SG | 40 g |
| T2 | Dinotefuran 20 SG | 60 g |
| T3 | Dinotefuran 20 SG | 80 g |
| T4 | Pymetrozine 50 % WG | 50 g |
| T5 | Thiamethoxam 25 % WG | 12.5 g |
| T6 | Imidacloprid 17.8 SL | 100 ml |
| T7 | Acetamiprid 20 SP | 100 g |
| T8 | Untreated Check | - |

**(vii) Management of lepidoterous pests (pink stem borer, army worm & cutworms) of wheat: (Centres:** Kharibari and Ludhiana)

Following chemicals will be evaluated against lepidopterous insect-pests in wheat. Observations will be recorded on percentage of damage tillers before and after 3, 7 and 15 days of treatment. Yield in each treatment will also be recorded during harvest time.

| Treatments ID | Treatments | Dosages/ha |
|---|---|---|
| T1 | Foliar spray of Coragen 18.5 SC (chlorantraniliprole) | 125 ml |
| T2 | Soil application of fipronil 0.6 GR | 7.0 Kg |
| T3 | Soil application of chlorpyriphos 20EC | 2.5 litre |
| T4 | Takumi 20 WG (flubendiamide 20%) | 40 g |
| T5 | Takumi 20 WG (flubendiamide 20%) | 50 g |
| T6 | Takumi 20 WG (flubendiamide 20%) | 60 g |
| T7 | Untreated Check | - |

**(viii) Management of termites through seed treatment of chemical molecules combinations** (**Centres:** Durgapura, Kanpur, Ludhiana)

Following insecticides will be tested as seed treatment /soil application against termites. Observation will be recorded on plant population/m row, per cent damaged shoots/m row after 3,4 and 5 weeks of treatment, percent damaged tillers/m row at earhead stage, No. of damaged effective tillers/ha and grain yield (q/ha).

| Treatment ID | Treatment | Dosages/ha |
|---|---|---|
| T1 | Seed treatment with Neonix (Imidacloprid18.5%+Hexaconazole 1.5% FS) | 2ml/kg of seed |
| T2 | Seed treatment with Cruiser 70WS (thiamethoxam) | 1ml/kg of seed |
| T3 | Soil application of fipronil 0.6 GR | 7.5 Kg |
| T4 | Soil application of fipronil 0.6 GR | 7.0 Kg |
| T5 | Soil application of fipronil 0.6 GR | 10 Kg |
| T6 | Soil application of chlorpyriphos 20EC | 3.0 l |
| T7 | Untreated control | - |

**3. Stored Grain Pest Management**

**(a) Storability and damage potential of major storage insect-pests of barley; *Sitophilus oryzae* or *Rhizopertha dominica* in wheat (Centres**: Niphad, Kanpur and Durgapura)

Each treatment will consist of 0.5 kg seed sample of wheat in a clothbag. Freshly emerged 20 adults of *S. oryzae* or *R. dominica* will be released into each bag then bags will be closed and kept undisturbed. Experiment will be laid out in RBD design with three replications. The 1st count will be taken 30 days after inoculation of insects and continued at 60, 90, 120, 150 and 180 days. At each census the dead insects will be removed. During each census, data on weight of seed grains, adult survival population, percent grain damage, percent repellence and percent seed germination will be taken.

***PROGRAMME 11. NEMATOLOGY***

**1. Monitoring of Nematodes:** *Heterodera avenae*, *Anguina tritici*, *Meloidogyne graminicola* and other plant parasitic nematode: Hisar, Udaipur, and Durgapura

**2. Evaluation of resistance against nematodes parasitizing wheat**

***Heterodera avenae*:** Hisar, Udaipur, and Durgapura. (AVT and EMDSN lines)

**3. Management of cereal cyst nematode, *Heterodera avenae* in wheat through bio-agents and organic manure**

**Centres:** Hisar, Udaipur, and Durgapura.

**Treatments:**

*T1-Purpureocillium lilacinum @ 2.5 Kg /ha.*
*T2-Purpureocillium lilacinum @ 3.5 Kg /ha.*
*T3-Pseudomonas fluorescens @ 2.5 Kg /ha.*
*T4-Pseudomonas fluorescens @ 3.5 Kg /ha.*
*T5-Trichoderma harzianum @ 2.5 Kg /ha.*
*T6-Trichoderma harzianum @ 3.5 Kg /ha.*
*T7-T1+500 kg Vermicompost / ha*
*T8-T4+500 kg Vermicompost / ha*
*T9-T6+500 kg Vermicompost / ha*
*T10-Untreated check*

# Wheat Quality

**NIVT and IVT:**

NIVT and IVT entries will be analysed for grain appearance score, hectoliter weight, protein content, sedimentation value, iron, and zinc content; in both *aestivum* and durum wheat genotypes. In addition, phenol reaction in bread wheat and yellow berry and yellow pigment in durum wheat will also be analysed.

- **NIVT 1A** (Irrigated Timely Sown) samples from Ludhiana, Delhi, Hisar, Pantnagar, Durgapura, (NWPZ), and Kanpur, RPCAU-Pusa, Varanasi and Sabour (NEPZ) **and**

  **5A (NWPZ)** (Restricted Irrigation Timely Sown) from Pantnagar, Ludhiana, Delhi, Hisar, Durgapura, will be analysed at PAU, Ludhiana.
- **NIVT 1B** (Irrigated Timely Sown) from Ludhiana, Delhi, Hisar, Durgapura, Pantnagar (NWPZ), Kanpur, RPCAU-Pusa, Varanasi and Sabour (NEPZ) **and**

  **NIVT 6** (Irrigated early sown) **(NWPZ)** from Ludhiana, Hisar, Delhi, Pantnagar samples will be analysed at RAU, Durgapura.
- **NIVT 2** (Irrigated Timely Sown) samples from Indore, Vijapur, Junagarh, Powarkheda (CZ), and Dharwad, Pune and Niphad (PZ) **and**

  **NIVT 6 (CZ)** from Indore, Vijapur, Junagarh, Powarkheda will be analysed at SDAU**,** Vijapur.
- **NIVT 3A** (Irrigated Late Sown) Entries from Ludhiana, Hisar, Pantnagar, Delhi, Durgapura, (NWPZ) and RPCAU-Pusa, Sabour, Kanpur, Varanasi (NEPZ) **AND**

  **NIVT 5A (NEPZ)** (Restricted Irrigation Timely Sown) from RPCAU-Pusa, Sabour, Kanpur, Varanasi will be analysed at GBPUA&T, Pantnagar Centre.
- **NIVT 3B** (Irrigated Late Sown) samples from Vijapur, Indore, Powarkheda, Junagarh (CZ) and Dharwad, Niphad, Pune (PZ) will be analysed by the quality laboratory at ARS, Niphad.
- **NIVT 4** (Irrigated Timely Sown *T. durum*) samples from Vijapur, Indore, Powarkheda, Junagarh (CZ) and Dharwad, Niphad, Pune (PZ) will be analysed by the quality laboratory at ARI, Pune.
- **NIVT 4** (Irrigated Timely Sown *T. durum*) samples from Ludhiana, Delhi, Hisar, Pantnagar (NWPZ) will be analysed ICAR-IIWBR, Karnal.
- **NIVT 5B** (Restricted Irrigation Timely Sown, both durum and aestivum) samples from Vijapur, Indore, Powarkheda, Junagarh (CZ) and Dharwad, Niphad, Pune (PZ) will be analysed at UAS, Dharwad.
- arnal centre (NIVT 1A, 1B, 3A, 4, 5A and 6) will be analysed at ICAR-IIWBR, Karnal.
- **IVT (NHZ)** samples from Shimla, Almora and Malan will be analysed at ICAR-IIWBR, Karnal.

**Note:** For estimation of NIVT/IVT parameters, the samples should be sent to the centres designated for their estimation as given above while for iron and zinc estimation, only hand-threshed samples (approx. 40 g) should be sent separately to ICAR-IIWBR, Karnal.

**AVT and HYPT**

- AVT and HYPT samples from all the centres mentioned in NIVTs and IVTs will be analyzed by ICAR-IIWBR, Karnal for various quality parameters including baking evaluation of II$^{nd}$ year entries and checks. Grain hardness index of selected centres of AVT/HYPT will be evaluated at ICAR-IARI, New Delhi.

**QCWBN** All QCWBN samples will be analyzed at ICAR-IIWBR, Karnal.

**Salinity/alkalinity nursery**: All SATSN samples will be analyzed at ICAR-IIWBR, Karnal.

**Note**:

- For iron and zinc estimation, only hand-threshed samples should be sent separately.
- It was recommended last year that the scientists contributing towards Quality Component and Biofortification Nursery (QCWBN) should provide only the entries having exceptionally high Fe, Zn, and protein content for testing. Therefore, henceforth, it was recommended that to promote QCWBN entries, iron and zinc should be ≥42 ppm each along with ≥13.0% protein at 12% moisture basis. The entry should meet any two parameters out of three to ascertain better wheat quality.
- It was decided that iron, zinc, and nitrogen profile of soil samples will be provided to ICAR-IIWBR by all the co-operating centres conducting the trials after taking due care of soil sample collection and analysis.
- All trials should be conducted as per the standard agronomic practices.

The last dates for supplying the samples by respective centres are finalized as follow:NHZ 15$^{th}$ June 2025

| | |
|---|---|
| NWPZ & NEPZ | 20$^{th}$ May 2025 |
| CZ | 15$^{th}$ May 2025 |
| PZ | 30$^{th}$ April 2025 |

- All the wheat grain samples, duly cleaned, and properly packed in biodegradable polythene bags separately, enclosed in cloth bags should be sent by registered post parcel.

- All the co-operators, who will analyze the wheat samples of various NIVTs should send the data to ICAR-IIWBR, Karnal positively by 15th July, 2025, by e-mail in the format used in annual report.

# Barley Improvement

## IMPORTANT POINTS FOR BREEDERS, ZONAL COORDINATORS AND TRIAL CONDUCTING CENTRES

| | | |
|---|---|---|
| 1. | Last date for seed to be received by coordinator | 25 September |
| 2. | Last date for trial supply | At least 10 days before the due sowing date |
| 3. | Last date for information of trial conduct by centre to ICAR-IIWBR | 1st December (Timely sown) |
| 4. | Last date for supply of filled data books to ICAR-IIWBR, Karnal | 30th May (Plains) and 15th June (Hills) |

5. The zonal coordinator shall supply the seed for the disease nursery to Dr. Om Vir Singh from the same seed lot, received for yield trial. Action: Dr. Omvir Singh)

6. Also, each centre must supply the seed of new station trial entries for **IBDSN to Dr. Omvir Singh, Principal Scientist & P.I. Barley Network, IIWBR, PB 158, Karnal-132001**, failing which no entry will be accepted for IVT next year.

7. Breeders must supply the **insect free, untreated seed of new entries along with the 1000 g. w. data** to the concerned coordinator for timely trial constitution and despatch to the testing centres.

8. The ancillary data on disease/ pests incidence, agronomic and grain characters must be reported in the trial by all centres.

9. Grain yield should be reported in grams / plot only on each replication and not in q/ha per plot.

10. Observations on disease incidence made by **the monitoring team must be reported** by the trial conducting centres in the data book along with other data.

11. The trial conducting centres are requested to send data in digital data booklet only.

12. Promotion of entries from AVT-I to AVT-II will be contingent upon demonstrating a significantly superior yield compared to the best check, or at least a numerically superior yield coupled with an additional trait of quality or economic significance. Furthermore, all other requisite conditions for promotion to AVT-II must be satisfied.

| | | |
|---|---|---|
| CROP | BARLEY | |
| **Name of Trial** | **AVT (I) & AVT- II- Malt barley (Combined)** | |
| Production Condition | Irrigated, Timely Sown | |
| Zone | NWPZ | |
| **No. of Trial Centres** | **14** | |
| State | NO. | Name of centres |
| Haryana<br>Punjab<br>Rajasthan<br>U.P.<br>Uttrakhand<br>Kashmir | 3<br>2<br>4<br>3<br>1<br>1 | Hisar, Karnal, Bawal<br>Bathinda, Ludhiana<br>Naugaon, Durgapura,Tabijji, Sri Ganganagar<br>Modipuram, Nagina, Bulandsahar<br>Pantnagar<br>Wadura |
| **No. of varieties including checks** | **16** | |
| Contributing Centres | No. | Name of varieties |
| Entries promoted to AVT-II for testing during 2024-25 | | |
| Karnal | 2 | DWRB 235, DWRB 238 |
| Durgapura | 1 | RD 3064 |
| Entries promoted to AVT-I for testing during 2024-25 | | |
| Karnal | 4 | DWRB 2307, DWRB 2309, DWRB 2311, DWRB 2312, |
| Durgapura | 4 | RD 3084, RD 3086, RD 3105, RD 3087* |
| Ludhiana | 2 | PL 958, PL 959 |
| Checks | 3 | DWRB182, RD2849, DWRUB52 |
| Experimental Design | | RBD |
| Replications | | 3 (Three) |
| Plot Size | | Gross: 5 m x 2.40 m (12 Rows @ 20cm)<br>Net: 4.5 m x 2.0 m (10 Rows) |
| Fertilizer dose | | 90 Kg N: 40 Kg P: 20 Kg K /ha (1/2N + full P&K as Basel dose) |
| Irrigation | | 2-3 or more as per requirement of location |
| Date of sowing (Between) | | 10-25 November |
| Seed requirement | | 8.0 Kg/Entry<br>(At 45 gm thousand grain weight, If thousand grain weight is more, then increase seed quantity accordingly) |
| Last date of seed to be received at Karnal | | 25 September |
| Seed to be supplied to Trial Coordinator | | Dr. Omvir Singh, P.I. Barley, ICAR-Indian Institute of Wheat and Barley Research , P.B. 158, Agrasain Road, Karnal – 132001 (Haryana) Mobile No. 9350511040:9414030319 |

**Potential New Centers** (approved in 63rd workshop):
**Nagina and Bulandshahar**: These locations are projected to be high-yielding centers due to their optimal climatic conditions for barley cultivation, making them prime candidates for expansion.

**Wadura**: With extended crop growth periods, Wadura is poised to deliver superior malt quality coupled with high yields, making it an invaluable addition to the malt barley research network. This centre falls in NHZ.

| CROP | BARLEY | |
|---|---|---|
| **Name of Trial** | **IVT- Malt barley** | |
| Production Condition | Irrigated, Timely Sown | |
| Zone | NWPZ | |
| **No. of Trial Centres** | **13** | |
| State | NO. | Name of centres |
| Haryana<br>Punjab<br>Rajasthan<br>U.P.<br>Uttrakhand<br>Kashmir | 3<br>2<br>4<br>2<br>1<br>1 | Hisar, Karnal, Bawal<br>Bathinda, Ludhiana<br>Naugaon, Durgapura, Tabiji, Sri Ganganagar<br>Modipuram, Bulandshahar<br>Pantnagar<br>Wadura |
| **No. of varieties including checks** | **25** | |
| Contributing Centres | No. | Name of varieties |
| Karnal | 5 | DWRB2401, DWRB2402, DWRB2403, DWRB2404, DWRB2405 |
| Durgapura | 5 | RD3112, RD3113, RD3114, RD3115, RD3116 |
| Ludhiana | 5 | PL 969, PL 970, PL 971, PL 972, PL 974 |
| Hisar | 5 | BH1066, BH1067, BH1068, BH1069, BH1070 |
| Pantnagar | 2 | UPB1132, UPB1133 |
| Checks | 3 | DWRB182, DWRB219, RD2849 |
| Experimental Design | | Lattice square design |
| Replications | | 2 (Two) |
| Plot Size | | Gross: 5 m x 1.2 m (6 Rows @ 20cm)<br>Net: 4.5 x 1.0 (5 Rows) |
| Fertilizer dose | | 90 Kg N: 40 Kg P: 20 Kg K /ha (1/2N + full P&K as Basel dose) |
| Irrigation | | 2-3 or more if required at certain location |
| Date of sowing (Between) | | 10-25 November |
| Seed requirement | | 4.0 Kg/Entry<br>(At 45 gm thousand grain weight, If thousand grain weight is more, then increase seed quantity accordingly) |
| Last date of seed to be received at Karnal | | 25 September |
| Seed to be supplied to Trial Coordinator | | Dr. Omvir Singh, P.I. Barley, ICAR-Indian Institute of Wheat and Barley Research , P.B. 158, Agrasain Road, Karnal – 132001 (Haryana) Mobile No. 9350511040:9414030319 |

**Potential New Centers** (approved in 63rd workshop):

**Bulandshahar**: These locations are projected to be high-yielding centers due to their optimal climatic conditions for barley cultivation, making them prime candidates for expansion.

**Wadura**: With extended crop growth periods, Wadura is poised to deliver superior malt quality coupled with high yields, making it an invaluable addition to the malt barley research network. This centre falls in NHZ.

| | | |
|---|---|---|
| CROP | BARLEY | |
| **Name of Trial** | **AVT-I /IVT-SAL/ALK** | |
| Production Condition | SAL / ALK | |
| Zone | NWPZ /NEPZ | |
| **No. of Trial Centres** | **7** | |
| State | No. | Name of centres |
| Haryana<br>Rajasthan<br>UP | 3<br>2<br>2 | CSSRI Karnal, IIWBR (Hisar-I), IIWBR (Hisar-II),<br>Bhilwara, Fatehpur<br>Ayodhya, Dilipnagar |
| **No. of varieties including checks** | **21** | |
| Contributing Centres | No. | Name of varieties |
| *Durgapura* | *2* | *RD 3102, RD3109 (All in AVT-I)* |
| *Varanasi* | *1* | *HUB 294 (AVT-I)* |
| Durgapura | 7 | RD3136, RD3137, RD3138, RD3139, RD3140, RD3141, RD3142 |
| Hisar | 2 | HB1071, HB1072 |
| Kanpur | 2 | KB 2348, KB 2364 |
| Varanasi | 2 | HUB302, HUB303 |
| Kumarganj | 2 | NDB1847, NDB1850 |
| Checks | 3 | NDB1173, RD2794, RD2907 |
| Experimental Design | | RBD |
| Replications | | 3 (Three) |
| Plot Size | | Gross: 5 x 1.38 m (6 Rows@23 cm)<br>Net: 4.5 x 0.92m (4 Rows) |
| Fertilizer dose | | 60 Kg N:30 Kg P:20 Kg K /ha (1/2N + full P&K as basel dose) |
| Irrigation | | 2-3 or more if required at certain location |
| Date of sowing (Between) | | NWPZ / NEPZ (10-25 November) |
| Seed requirement | | 4. 0 Kg / Entry (At 40 gm thousand grain weight, If thousand grain weight is more, then increase seed quantity accordingly) |
| Last date of seed to be received at Karnal | | 25 September |
| Seed to be supplied to Trial Coordinator | | Dr. Omvir Singh, P.I. Barley, ICAR-Indian Institute of Wheat and Barley Research , P.B. 158, Agrasain Road, Karnal – 132001 (Haryana) Mobile No. 9350511040:9414030319 |

| CROP | BARLEY | |
|---|---|---|
| **Name of Trial** | **AVT/IVT-Rainfed** | |
| Production Condition | Rainfed | |
| Zone | NEPZ | |
| No. of Trial Centers | 7 | |
| State | NO. | Name of centres |
| UP | 4 | Kanpur, Varanasi, Faizabad, Saini |
| Bihar | 1 | Pusa (CAU) |
| Jharkhand | 2 | Ranchi, Chiyanki |
| No. of varieties including checks | 21 | |
| Contributing centers | No. | Name of varieties |
| Varanasi | 1 | HUB288 (AVT-1)* |
| Durgapura | 1 | RD 3098 (AVT-I)* |
| Kanpur | 2 | KB2301, KB2358 |
| Pantnagar | 2 | UPB1127, UPB 1128 |
| Varanasi | 3 | HUB296, HUB297 |
| Durgapura | 6 | RD3130, RB3131, RD3132, RD3133, RD3134, RD3135 |
| Kumarganj | 2 | NDB1841,NDB1842 |
| Ludhiana | 2 | PL961, PL966 |
| Checks | 2 | K 603, Lakhan |
| Experimental Design | | RBD |
| Replications | | 3 |
| Plot Size | | Gross: 5m x 1.38 m (6 Rows @23 cm)<br>Net: 4.5 x 0.92 m (4 Rows) |
| Fertilizer dose | | 40 Kg N : 30 Kg. P: 20Kg K /ha (1/2N + full P&K as Basel dose) |
| Irrigation | | None |
| Date of sowing | | NEPZ (20 October -10 November) |
| Seed requirement | | 4.0 Kg / Entry (At 40 gm thousand grain weight, If thousand grain weight is more, then increase seed quantity accordingly) |
| Last date of seed to be received at Karnal | | 25 September |
| Seed to be supplied to Trial Coordinator | | Dr. Omvir Singh, P.I. Barley, ICAR-Indian Institute of Wheat and Barley Research , P.B. 158, Agrasain Road, Karnal – 132001 (Haryana) Mobile No. 9350511040: 9414030319 |

| | | |
|---|---|---|
| CROP | BARLEY | |
| **Name of Trial** | **AVT (I&II) - Naked barley** | |
| Production Condition | Irrigated, Timely sown | |
| Zone | NWPZ | |
| **No. of Trial centres** | **12** | |
| State | NO. | Name of centres |
| Haryana | 2 | Hisar, Karnal, |
| Punjab | 2 | Ludhiana, Bhatinda |
| Rajasthan | 4 | Durgapura , Naugaon, Tabijji, Sri Ganganagar |
| Uttrakhand | 1 | Pantnagar |
| U. P | 3 | Modipuram, Nagina, Bulandshahar |
| **No. of varieties including checks** | **8** | |
| Contributing centres | No. | Name of varieties |
| Karnal | 1 | DWRB 244(AVT-II) |
| Ludhiana | 1 | PL 960*(AVT-I) |
| Durgapura | 4 | RD 3091*, RD 3092@, RD3089# RD 3090# |
| Checks | 2 | KARAN 16, PL891 |
| Experimental Design | | RBD |
| Replications | | 3 (three) |
| Plot Size | | Gross: 5m x 2.76m (12 rows)<br>Net: 4.5m x 2.3m (10 rows) |
| Fertilizer dose | | 60 Kg. N : 30Kg P: 20Kg K /ha (1/2N + full P&K as Basal dose) |
| Irrigation | | 2-3 or more as per requirement of location |
| Date of sowing (Between) | | 10-25 November |
| Seed requirement | | 7.5 Kg / Entry<br>(At 40 gm thousand grain weight, If thousand grain weight is more, then increase seed quantity accordingly) |
| Last date of seed supply | | 20 September |
| Seed to be supplied to Trial Coordinator | | Dr. Omvir Singh, P.I. Barley, ICAR-Indian Institute of Wheat and Barley Research , P.B. 158, Agrasain Road, Karnal – 132001 (Haryana) Mobile No. 9350511040:9414030319 |

***Establishing additional testing sites is essential to fully exploit the genetic potential of hulless barley under optimal conditions. Expanding locations, including Bawal, Bhatinda, Sriganganagar, Tabiji, Naogaon, Nagina and Bulandshahar, will boost awareness, adoption, and facilitate genotype selection for breeding programs.*** **(approved in 63rd workshop).**

| CROP | BARLEY | |
|---|---|---|
| **Name of Trial** | **AVT (I) - Naked barley** | |
| Production Condition | Irrigated, Timely sown | |
| Zone | NEPZ | |
| **No. of Trial centres** | **8** | |
| State | NO. | Name of centres |
| U.P. | 3 | Kanpur, Varanasi, Faizabad |
| Jharkhand | 2 | Ranchi, Chiyanki |
| Bihar | 2 | RPCAU Pusa, BISA Samastipur |
| West Bengal | 1 | Burdwan |
| **No. of varieties including checks** | **10** | |
| Contributing centres | No. | Name of varieties |
| Karnal | 2 | DWRB 2304*, DWRB 2306* |
| Ludhiana | 1 | PL 960*, |
| Durgapura | 4 | RD 3088*, RD 3089*, RD 3091*, RD 3092* |
| Pantnagar | 1 | UPB 1121* |
| Checks | 2 | K1149 (Gitanjali), NDB 943 |
| Experimental Design | | RBD |
| Replications | | 3 (Three) |
| Plot Size | | Gross: 5m x 2.76m (12 rows)<br>Net: 4.5m x 2.3m (10 rows) |
| Fertilizer dose | | 60 Kg. N : 30Kg P: 20Kg K /ha (1/2N + full P&K as Basal dose) |
| Irrigation | | 2-3 or more as per requirement of location |
| Date of sowing (Between) | | 10-25 November |
| Seed requirement | | 5 Kg / Entry<br>(At 40 gm thousand grain weight, If thousand grain weight is more, then increase seed quantity accordingly) |
| Last date of seed supply | | 20 September |
| Seed to be supplied to Trial Coordinator | | Dr. Omvir Singh, P.I. Barley, ICAR-Indian Institute of Wheat and Barley Research , P.B. 158, Agrasain Road, Karnal – 132001 (Haryana) Mobile No. 9350511040:9414030319 |

- These entries are significantly superior to check of the zone K1149 (Gitanjli) of NEPZ.

***Establishing additional testing sites is essential to fully exploit the genetic potential of hulless barley under optimal conditions. Expanding locations, including Bawal, Bhatinda, Sriganganagar, Tabiji, Naogaon, Nagina and Bulandshahar, will boost awareness, adoption, and facilitate genotype selection for breeding programs.*** **(approved in 63rd workshop).**

| CROP | BARLEY | |
|---|---|---|
| **Name of Trial** | **AVT (I) - Naked barley** | |
| Production Condition | Irrigated, Timely sown | |
| Zone | CZ | |
| **No. of Trial centres** | **8** | |
| State | No. | Name of centres |
| Rajasthan | 1 | Udaipur |
| MP | 3 | Morena, Gwalior, Tikamgarh |
| Gujarat | 1 | Vijapur |
| UP | 2 | Banda, Jhansi |
| **No. of varieties including checks** | **10** | |
| Contributing centres | No. | Name of varieties |
| Karnal | 2 | DWRB 2304[@], DWRB 2306[@] |
| Ludhiana | 1 | PL 960* |
| Durgapura | 3 | RD 3088*, RD 3089* RD3092[#] |
| Pantnagar | 1 | UPB 1121* |
| Checks | 3 | KARAN 16, PL891, K1149 |
| Experimental Design | | RBD |
| Replications | | 3 (Three) |
| Plot Size | | Gross: 5m x 2.76m (12 rows)<br>Net: 4.5m x 2.3m (10 rows) |
| Fertilizer dose | | 60 Kg. N : 30Kg P: 20Kg K /ha (1/2N + full P&K as Basel dose) |
| Irrigation | | 2-3 or more as per requirement of location |
| Date of sowing (Between) | | 10-25 November |
| Seed requirement | | 5 Kg / Entry (At 40 gm thousand grain weight, If thousand grain weight is more, then increase seed quantity accordingly) |
| Last date of seed receipt at Karnal | | 25 September |
| Seed to be supplied to Trial Coordinator | | Dr. Omvir Singh, P.I. Barley, ICAR-Indian Institute of Wheat and Barley Research , P.B. 158, Agrasain Road, Karnal – 132001 (Haryana) Mobile No. 9350511040: |

***Establishing additional testing sites is essential to fully exploit the genetic potential of hulless barley under optimal conditions. Expanding locations, including Banda and CAU., Jhansi will boost awareness, adoption, and facilitate genotype selection for breeding programs*** **(approved in 63rd workshop).**

| | | |
|---|---|---|
| CROP | BARLEY | |
| **Name of Trial** | **IVT- Naked barley** | |
| Production Condition | Irrigated, Timely sown | |
| Zone | NWPZ/ NEPZ / CZ | |
| No. of Trial centres | 29 | |
| Zones | NO. | |
| NWPZ | 13 | Hisar, Karnal, Bhatinda, Ludhiana, Durgapura, Udaipur, Tabiji, Nawagaon, Sriganganagar, Pantnagar, Modipuram, Nagina, Bulandshahar |
| NEPZ | 7 | Kanpur, Varanasi, Faizabad, Ranchi, Chiyanki, RPCAU Pusa, BISA Samastipur |
| CZ | 8 | Udaipur, Morena, Gwalior, Dholpur, Tikamgarh, Vijapur, Banda , CAU., Jhansi |
| West Bengal | 1 | Burdwan |
| **No. of varieties including checks** | 36 | |
| Contributing Centers | No. | Name of varieties |
| Karnal | 23 | DWRB2407, DWRB2408, DWRB2409, DWRB2410, DWRB 2425 to DWRB 2441 |
| **Durgapura** | 7 | RD3119, RD3120, RD3121, RD3122, RD3123, RD3124, RD3125 |
| Pantnagar | 1 | UPB1138 |
| Ludhiana | 1 | PL976 |
| Checks | 4 | Karan16, K1149, PL891, DWRB-223 |
| Experimental Design | | Lattice |
| Replications | 1 | 2 (Two) |
| Plot Size | 4 | Gross: 5m x 1.38m (6 rows @23 cm)<br>Net: 4.5 x 0.92 (4 rows) |
| Fertilizer dose | | 60 Kg. N : 30Kg P: 20Kg K /ha (1/2N + full P&K as Basel dose) |
| Irrigation | | 2-3 or more as per requirement of location |
| Date of sowing (Between) | | 10-25 November |
| **Seed requirement** | | 7.5 Kg / Entry (At 40 gm thousand grain weight, If thousand grain weight is more, then increase seed quantity accordingly) |
| Last date of seed receipt at karnal | | 25 September |
| Seed to be supplied to Trial Coordinator | | Dr. Omvir Singh, P.I. Barley, ICAR-Indian Institute of Wheat and Barley Research , P.B. 158, Agrasain Road, Karnal – 132001 (Haryana) Mobile No. 9350511040: |

*Establishing additional testing sites is essential to fully exploit the genetic potential of hulless barley under optimal conditions. Expanding locations, including Bawal, Bhatinda, Sriganganagar, Tabiji, Naogaon, Nagina, Bulandshahar, Chiyanki, RPCAU Pusa, BISA Samastipur, Sabour, Banda and CAU Jhansi will boost awareness, adoption, and facilitate genotype selection for breeding programs* **(approved in 63rd workshop)**.

| CROP | BARLEY | |
|---|---|---|
| **Name of Trial** | **IVT/AVT** | |
| Production Condition | Rainfed-Dual Purpose | |
| Zone | NHZ | |
| **No. of Trial Centres** | **9+1** | |
| State | NO. | Name of centres |
| Himachal | 3 | Bajaura, Malan, Shimla |
| Uttrakhand | 3 | Almora, Gaja, Majhera |
| J&K | 3 | Khudwani, Wadura, (Leh-May sowing) |
| Manipur | 1 | Imphal |
| **No. of varieties including checks** | **24** | |
| Contributing Centres | No. | Name of varieties |
| ***Entries to be promoted from IVT (2023-24) to AVT-I (2024-25)*** | | |
| Shimla | 2 | BHS 498@ (AVT-I, FB- Uncut ),<br>BHS 498$(AVT-I,DP), BHS 502$(AVT-I,DP), |
| Bajaura | 2 | *HBL884*(AVT-1,FB-Uncut);HBL886@*(AVT-I,FB-Uncut),<br>*HBL 884$(AVT-I, DP),* |
| Almora | 2 | *VLB185@(FB-Uncut), VLB187*(AVT-,FB,Uncut)*<br>VLB 185$ (AVT-I, DP) |
| Pantnagar | 1 | UPB 1118$ (AVT-I, DP) |
| *New entries to be contributed by the respective centres and to be evaluated in IVT (2024-25)* | | |
| IARI, RS, Shimla | 3 | BHS 503, BHS504, BHS505 |
| Pantnagar | 3 | UPB1126,UPB1127, UPB1128 |
| Almora | 3 | VLB190, VLB191, VLB 192 |
| Bajaura | 3 | HBL 889,HBL890,HBL891, HBL892 |
| Checks | 4 | BHS380, BHS400, HBL113, VLB118 |
| **Experimental Design** | | **RBD** |
| Replications | | 4 (Four) Two replications for cutting at 70-75 days<br>and two reps for uncut. |
| Plot Size | | Gross: 3.5 m x 1.38 m (6 Rows) Net: 3.5 x 0.92 m (4 Rows) |
| Fertilizer dose | | 40 Kg N: 30 Kg P: 20 kg K/ha (All as basal) |
| Irrigation | | None |
| Date of sowing (Between) | | NHZ (15 October-10 November) |
| Seed requirement | | **5.0 Kg/Entry** |
| Last date of seed supply | | 25 September |
| Seed to be supplied to Trial Coordinator | | Dr. Omvir Singh, P.I. Barley, ICAR-Indian Institute of Wheat and Barley Research , P.B. 158, Agrasain Road, Karnal – 132001 (Haryana) Mobile No. 9350511040: |

| | | |
|---|---|---|
| CROP | BARLEY | |
| **Name of Trial** | **IVT/AVT-(I&II)** | |
| Production Condition | Rainfed-Naked Barley | |
| Zone | NHZ | |
| **No. of Trial Centres** | **9+1 (Leh)** | |
| State | NO. | Name of centres |
| Himachal | 3 | Bajaura, Malan, Shimla |
| Uttrakhand | 3 | Almora, Gaja, Majhera |
| J&K | 3 | Khudwani, Wadura, (Leh-May sowing) |
| Manipur | 1 | Imphal |
| **No. of varieties including checks** | **16** | |
| Contributing Centres | No. | Name of varieties |
| ***Entries to be promoted from IVT & AVT –I (2023-24) to AVT-I & AVT-II (2024-25)*** | | |
| Shimla | 3 | BHS497 (AVT-II), BHS 499(AVT-I), BHS500(AVT-I) |
| *New entries to be contributed by the respective centres and to be evaluated in IVT (2024-25)* | | |
| IARI, RS, Shimla | 4 | BHS 507, BHS 508, BHS 509, BHS 510 |
| Srinagar | 2 | SKUA-WK-101, SKUA-WK-102 |
| Bajaura | 4 | HBL893, HBL894, HBL895, HBL896 |
| Pantnagar | 2 | UPB1134, UPB1135 |
| Checks | 1 | BHS352 |
| **Experimental Design** | | **RBD** |
| Replications | | Three |
| Plot Size | | Gross: 3.5 m x 1.38 m (6 Rows) Net: 3.5 x 0.92 m (4 Rows) |
| Fertilizer dose | | 40 Kg N: 30 Kg P: 20 kg K/ha (All as basal) |
| Irrigation | | None |
| Date of sowing (Between) | | NHZ (15 October-10 November) |
| Seed requirement | | **5.0 Kg/Entry** |
| Last date of seed supply | | 25 September |
| Seed to be supplied to Trial Coordinator | | Dr. Omvir Singh, P.I. Barley, ICAR-Indian Institute of Wheat and Barley Research , P.B. 158, Agrasain Road, Karnal – 132001 (Haryana) Mobile No. 9350511040: |

*The new trial of 16 hulless barley entries has been established. This focused trial is set to accelerate the cultivation process and amplify awareness of the crop's significant health benefits.*

| CROP | BARLEY | |
|---|---|---|
| Name of Trial | AVT-I-Feed barley | |
| Production Condition | Irrigated-Timely sown | |
| Zone | NWPZ | |
| **No. of Trial Centers** | **7** | |
| State | NO. | Name of centers |
| Haryana | 2 | Hisar, Karnal |
| Punjab | 1 | Ludhiana |
| Rajasthan | 2 | Durgapura, Tabiji |
| Uttrakhand | 1 | Pantnagar |
| U. P | 1 | Modipuram |
| **No. of varieties including checks** | **8** | |
| Contributing Centers | No. | Name of varieties |
| Durgapura | 1 | RD 3095* |
| Hisar | 2 | BH 1059* BH 1058@ |
| Pantnagar | 1 | UPB 1123@ |
| Ludhiana | 2 | PL 955* PL 954@ |
| Checks | 2 | BH 946, DWRB137 |
| **Experimental Design** | | **RBD** |
| Replications | | 4 (Four) |
| Plot Size | | Gross: 5m x 1.38m (6 rows @23 cm)<br>Net: 4.5 x 0.92 (4 rows) |
| Fertilizer dose | | 60 Kg. N : 30 Kg P: 20 Kg K /ha (1/2N + full P&K as Basel) dose) |
| Irrigation | | 2-3 or more as per requirement of location |
| Date of sowing (Between) | | 10-25 November |
| Seed requirement | | 6.0 Kg / Entry<br>(At 40 gm thousand grain weight, if thousand grain weight is more, then increase seed quantity accordingly) |
| Last date of seed to be received at Karnal | | 25 September |
| Seed to be supplied to Trial Coordinator | | Dr. Omvir Singh, P.I. Barley, ICAR-Indian Institute of Wheat and Barley Research , P.B. 158, Agrasain Road, Karnal – 132001 (Haryana) Mobile No. 9350511040:9414030319 |

| | | |
|---|---|---|
| CROP | BARLEY | |
| **Name of Trial** | **AVT-1-Feed barley** | |
| Production Condition | Irrigated-Timely sown | |
| Zone | NEPZ | |
| **No. of Trial centers** | **6** | |
| State | NO. | Name of centers |
| UP | 3 | Kanpur, Varanasi, Faizabad |
| Bihar | 2 | RPCAU Pusa, BISA Samastipur |
| Jharkhand | 1 | Ranchi |
| **No. of varieties including checks** | **8** | |
| Contributing centres | No. | Name of varieties |
| Hisar | 1 | BH1059* , BH1058# |
| Karnal | 1 | DWRB 2302@ |
| Pantnagar | 1 | UPB 1122# |
| Durgapura | 1 | RD 3095@ |
| Varanasi | 1 | HUB 290* |
| Ludhiana | 1 | PL 955* |
| Checks | 2 | DWRB137, HUB113 |
| **Experimental Design** | | **RBD** |
| Replications | | 4 (Four) |
| Plot Size | | Gross: 5m x 1.38m (6 rows @23 cm)<br>Net: 4.5 x 0.92 (4 rows) |
| Fertilizer dose | | 60 Kg. N : 30 Kg P: 20 Kg K /ha (1/2N + full P&K as Basel dose) |
| Irrigation | | 2-3 or more as per requirement of location |
| Date of sowing (Between) | | 10-25 November |
| Seed requirement | | 6.0 Kg / Entry<br>(At 40 gm thousand grain weight, if thousand grain weight is more, then increase seed quantity accordingly) |
| Last date of seed to be received at Karnal | | 25 September |
| Seed to be supplied to Trial Coordinator | | Dr. Omvir Singh, P.I. Barley, ICAR-Indian Institute of Wheat and Barley Research , P.B. 158, Agrasain Road, Karnal – 132001 (Haryana) Mobile No. 9350511040:9414030319 |

| | | |
|---|---|---|
| CROP | BARLEY | |
| Name of Trial | IVT-Feed barley | |
| Production Condition | Irrigated, Timely sown | |
| Zone | NWPZ/ NEPZ / CZ | |
| **No. of Trial Centers** | **21** | |
| **Zone** | **No.** | **Name of centers** |
| NWPZ | 7 | Hisar, Karnal, Ludhiana, Durgapura, Tabiji, Pantnagar, Modipuram |
| NEPZ | 7 | Kanpur, Varanasi, Kumarganj, Pusa (CAU), BISA Samastipur, Ranchi, |
| CZ | 7 | Udaipur, Gwalior, Morena, Tikamgarh, Banda Vijapur, Dholpur |
| **No. of varieties including checks** | **36** | |
| Contributing Centers | No. | Name of varieties |
| Kanpur | 3 | KB2339, KB2321, KB2323 |
| Varanasi | 3 | HUB298, HUB299, HUB301 |
| Hisar | 3 | BH1063, BH1064, BH1065 |
| Durgapura | 4 | RD3126, RD3127, RD3128, RD3129 |
| Pantnagar | 2 | UPB1130, UPB1131 |
| Ludhiana | 7 | PL 961, PL964, PL 965, PL967, PL968, PL977, PL978 |
| Vijapur | 2 | GB3, GB4 |
| Karnal | 6 | DWRB2411, DWRB2412, DWRB2413, DWRB2414, DWRB 2406, DWRB 2423, |
| Jhansi | 1 | JHSBK 5 |
| Jammu | 1 | JAUB6 |
| Checks | 4 | BH 946, DWRB137, RD2899, HUB113 |
| Experimental Design | | Lattice |
| Replications | | 2 (Two) |
| Plot Size | | Gross: 5m x 1.38m (6 rows@23 cm)<br>Net: 4.5 x 0.92 (4 rows) |
| Fertilizer dose | | 60 Kg. N : 30Kg P: 20Kg K /ha (1/2N + full P&K as Basel dose) |
| Irrigation | | 2-3 or more as per requirement of location |
| Date of sowing (Between) | | 10-25 November |
| Seed requirement | | 5.0 Kg / Entry (At 40 gm thousand grain weight, If thousand grain weight is more, then increase seed quantity accordingly) |
| Last date of seed to be received at Karnal | | 25 September |
| Seed to be supplied to Trial Coordinator | | Dr. Omvir Singh, P.I. Barley, ICAR-Indian Institute of Wheat and Barley Research , P.B. 158, Agrasain Road, Karnal – 132001 (Haryana) Mobile No. 9350511040:9414030319 |

| | | |
|---|---|---|
| CROP | BARLEY | |
| Name of Trial | IVT- Dual Purpose barley | |
| Production Condition | Irrigated, Timely sown | |
| Zone | NWPZ/ NEPZ / CZ | |
| **No. of Trial Centers** | **18** | |
| **Zone** | **No.** | **Name of centers** |
| NWPZ | 7 | Hisar, Karnal, Ludhiana, Durgapura, Tabiji, Pantnagar, Modipuram |
| NEPZ | 6 | Kanpur, Varanasi, Kumarganj, Pusa (CAU), BISA Samastipur, Ranchi |
| CZ | 5 | Udaipur, Gwalior, Morena, Tikamgarh, Banda |
| **No. of varieties including checks** | **25** | |
| Contributing Centers | No. | Name of varieties |
| Karnal | 8 | DWRB2415, DWRB 2416, DWRB 2417, DWRB 2418, DWRB 2419, DWRB 2420, DWRB 23, DWRB 24 |
| Hisar | 2 | BH1073, BH1074 |
| Durgapura | 6 | RD3143, RD3144, RD3145, RD3146, RD3147, RD3148 |
| Kanpur | 1 | KB2365 |
| Ludhiana | 5 | PL 979, Pl 980, PL981, PL982, PL983 |
| Jhansi | 1 | JHSBK 19 |
| Checks | 2 | RD 2715, RD2552 |
| Experimental Design | | RBD |
| Replications | | 3 (Three) |
| Plot Size | | Gross: 5m x 1.38m (6 rows@23 cm)<br>Net: 4.5 x 0.92 (4 rows) |
| *First Cut | | All the replications are to be cut at 55 days of sowing and fresh weight of green fodder is to be recorded. |
| Fertilizer dose | | N=75 Kg, P= 30 Kg, K=20 Kg per hectare. 50% N as basal dose; 25 % at first irrigation (21 days of sowing) and remaining 25% (~20 kg N/ha) after first cut at 55 DAS along with irrigation) |
| Irrigation | | 2-3 or more as per requirement of location |
| Date of sowing (Between) | | 10-25 November |
| Seed requirement | | 4 Kg / Entry (At 40 gm thousand grain weight, If thousand grain weight is more, then increase seed quantity accordingly) |
| Last date of seed to be received at Karnal | | 25 September |
| Seed to be supplied to Trial Coordinator | | Dr. Omvir Singh, P.I. Barley, ICAR-Indian Institute of Wheat and Barley Research , P.B. 158, Agrasain Road, Karnal – 132001 (Haryana) Mobile No. 9350511040:9414030319 |

***On 55th day of sowing both the replications are to be cut at uniform height of at least 2.5 inches above ground to ensure that the primordial are not disturbed and the regeneration/rejuvenation is there. Immediately after the cut, 1/4th of the nitrogen (urea) will be applied along with irrigation to ensure regeneration.**

| | | |
|---|---|---|
| CROP | BARLEY | |
| Name of Trial | AVT (I) - Dual Purpose barley | |
| Production Condition | Irrigated, Timely sown | |
| Zone | NWPZ | |
| **No. of Trial Centers** | **7** | |
| **Zone** | **No.** | **Name of centers** |
| NWPZ | 7 | Hisar, Karnal, Ludhiana, Durgapura, Tabiji, Pantnagar, Modipuram |
| **No. of varieties including checks** | **8** | |
| Contributing Centers | No. | Name of varieties |
| Karnal | 2 | DWRB 2318, DWRB 2313 |
| Jhansi | 4 | JHSBB19, JHSBE16, JHSBD22, JHSBF28, |
| Checks | 2 | RD 2715, RD 2552 |
| Experimental Design | | RBD |
| Replications | | 4 (Four) |
| Plot Size | | Gross: 5m x 2.76m (12 rows @23 cm)<br>Net: 4.5 x 2.3 (10rows) |
| *First Cut | | All the replications are to be cut at 55 days of sowing and fresh weight of green fodder is to be recorded. |
| Fertilizer dose | | N=75 Kg, P= 30 Kg, K=20 Kg per hectare. 50% N as basal dose; 25 % at first irrigation (21 days of sowing) and remaining 25% (~20 kg N/ha) after first cut at 55 DAS along with irrigation) |
| Irrigation | | 2-3 or more as per requirement of location |
| Date of sowing (Between) | | 10-25 November |
| Seed requirement | | 3.5 Kg / Entry<br>(At 40 gm thousand grain weight, If thousand grain weight is more, then increase seed quantity accordingly) |
| Last date of seed to be received at Karnal | | 25September |
| Seed to be supplied to Trial Coordinator | | Dr. Omvir Singh, P.I. Barley, ICAR-Indian Institute of Wheat and Barley Research , P.B. 158, Agrasain Road, Karnal – 132001 (Haryana) Mobile No. 9350511040:9414030319 |

**Entries JHSBB19, JHSBB16, JHSBB22, JHSBB28, DWRB 2318 and DWRB 2313 gave significantly higher income per hectare than check RD2715. So these entries may be promoted from IVT (2023-24) to AVT-I(2024-25).

***On 55th day of sowing both the replications are to be cut at uniform height of at least 2.5 inches above ground to ensure that the primordia are not disturbed and the regeneration/rejuvenation is there. Immediately after the cut, 1/4th of the nitrogen (urea) will be applied along with irrigation to ensure regeneration.**

| | | |
|---|---|---|
| CROP | BARLEY | |
| Name of Trial | AVT (I) - Dual Purpose barley | |
| Production Condition | Irrigated, Timely sown | |
| Zone | CZ | |
| **No. of Trial Centers** | **5** | |
| **Zone** | **No.** | **Name of centers** |
| CZ | 5 | Udaipur, Gwalior, Morena, Tikamgarh, Vijapur |
| **No. of varieties including checks** | **7** | |
| Contributing Centers | No. | Name of varieties |
| Karnal | 3 | DWRB2316*, DWRB 2313*, DWRB 2314@ |
| Jhansi | 2 | JHSBF21*, JHSBD11@ |
| Checks | 2 | RD 2715, RD 2552 |
| Experimental Design | | RBD |
| Replications | | 4 (Four) |
| Plot Size | | Gross: 5m x 2.76m (12 rows @23 cm)<br>Net: 4.5 x 2.3 (10rows) |
| *First Cut | | All the replications are to be cut at 55 days of sowing and fresh weight of green fodder is to be recorded. |
| Fertilizer dose | | N=75 Kg, P= 30 Kg, K=20 Kg per hectare. 50% N as basal dose; 25 % at first irrigation (21 days of sowing) and remaining 25% (~20 kg N/ha) after first cut at 55 DAS along with irrigation) |
| Irrigation | | 2-3 or more as per requirement of location |
| Date of sowing (Between) | | 10-25 November |
| Seed requirement | | 3.5 Kg / Entry<br>(At 40 gm thousand grain weight, If thousand grain weight is more, then increase seed quantity accordingly) |
| Last date of seed to be received at Karnal | | 25September |
| Seed to be supplied to Trial Coordinator | | Dr. Omvir Singh, P.I. Barley, ICAR-Indian Institute of Wheat and Barley Research , P.B. 158, Agrasain Road, Karnal – 132001 (Haryana) Mobile No. 9350511040: 9414030319 |

***Entries DWRB 2316, DWRB 2313, DWRB 2314, JHSBF 21 and JHSBD 11gave significantly higher income per hectare than check RD2715. So these entries may be promoted from IVT (2023-24) to AVT-I(2024-25).*

*@ Entries DWRB 2314 Rust (ACI= 0.8, HS=5MR),& moderately resistance to leaf blight and JHSBD11 rust (0.1, HS=TMS) and moderately resistant to leaf blight are at par with best check.*

***On 55th day of sowing both the replications are to be cut at uniform height of at least 2.5 inches above ground to ensure that the primordia are not disturbed and the regeneration/rejuvenation is there. Immediately after the cut, 1/4th of the nitrogen (urea) will be applied along with irrigation to ensure regeneration.**

**Table. List of AICRP Centres of barley (2024-25)**

| Sr.No | Location | Name | Designatio | Cooperating Centres address |
|---|---|---|---|---|
| 1. | Almora | Dr. Navin Gahtyari | Senior Scientist | ICAR-VPKAS, Almora – 263 601 (U.K)<br>Mob: 9358044714 |
| 2 | Bawal | Dr. Ankit Yadav | (Pl Breeder) | CCSHAU, Regional Research Station<br>Bawal, District-Rewari,PIN-123501(HR)<br>Mobile No: 8901151570<br>Email: yadavankitgpb@gmail.com |
| 3. | Bajaura | Dr Neha Sharma, | Scientist | CSKHPKV, HAREC, Bajaura,<br>Kullu -175 125 (H.P.).<br>Mob: 9736909876 |
| 4. | Banda | Dr Mukul Kumar | Prof. & Head, Division of Plant Breeding and Genetics, | Division of Plant Breeding and Genetics,<br>Banda University of Agriculture and Technology, BANDA, U.P. - 210001 |
| 5. | Bhatinda | Dr. Vineet Kumar | (Cotton Breeder) | PAU, Regional Research Station<br>Dabwali Road, Bathinda-151005 (Punjab)<br>Mobile No: 9411159840<br>Emil: vineet2906@pau.edu |
| 6. | Chyanki | Dr. DN Singh | (Associate Director) | Birsa Agri University, Zonal Research Station<br>Chiyanki-822102, Palamu (Jharkhand)<br>Mobile No:9430362061<br>Email: dnsingh_baurnchi@gmail.com |
| 7. | Dholpur | Dr Ashish Sheera | Assistant Professor | SKNAU , College of Agriculture,<br>Basedi (Dholpur)<br>Email: sheeraashish.pbg@sknau.ac.in |
| 8 | Durgapura | Dr. SS Rajput | Barley Breeder | RARI, Durgapura,<br>Jaipur City-302018 (Rajasthan)<br>Mobile No: 8302035321<br>Email: ssrajput.skncoa@sknau.ac.in |
| 9. | Gwalior | Dr. Sushma Tiwari | Scientist (Pl. Breed. Genet.) | AICRP- Wheat &Barley, Collage of Agriculture , RVRSUA&T, GWALIOR - 474002 (M.P.) |
| 10. | Hisar | Dr. Y K Gulia | Barley Breeder, | Deptt. of Plant Breeding, College of Agri.<br>CCS H.A.U., Hisar- 125004 (Haryana)<br>Mobile No: 9416320888<br>Email: yogendergulia@gmil.com |
| 11. | Kanpur | Dr. Vijay Yadav | (Barley Breeder) | Section of Economic Botany (R)<br>CSAUA&T, Kanpur-208002 (UP)<br>Mobile No: 7408339333<br>Email: pkguptacsau@rediffmail.com |
| 12. | Kumarganj | Dr Vinod Singh | (Wheat Breeder) | Deptt. of Plant Breeding, N.D. University of Agri & Tech., Kumarganj – 224001,<br>Ayodhya (U.P.) Mobile No: 9450882524<br>Email: singhv.1959@gmail.com |
| 13. | Khudwani | Dr. S.H. Wani | Associate Director of Research | Associate Director of Research,<br>SKUAST, Kashmir, Khudwani, Anantnag,<br>192 102 (J&K)Mob: 77006907220 |

| | | | | |
|---|---|---|---|---|
| 14. | Kangra | Dr. Vijaya Rana, | (Wheat Breeding), | Principal Scientist (Wheat Breeding), CSKHPKV, Rice & Wheat Research Centre, Malan,<br>Post office- Nagrota Bagwan, Kangra -176 047, (HP)<br>Mob: 9418457124 |
| 15. | Ludhiana | Dr. Simarjit Kaur | (Barley Breeder) | Deptt. of Plant Breeding, College of Agri, P.A.U., Ludhiana - 141004 (Punjab)<br>Mobile No: 8198050999<br>Email: simarjitpau@pau.edu |
| 16. | Morena | Dr Jagendra Singh | Scientist (Plant Breeding) | RVSKVV, Zonal Agriculture Research Station, A.B. Road, MORENA - 476001 (M.P.) |
| 17. | Modipuram | Dr. Lokesh Gangwar | Prof & Head Genetics & Plant Breeding | SVBPUA&T, Meerut-250110 (UP)<br>Mobile No: 7704014035<br>Email: gangwarlk@gmail.com |
| 18. | Majhera | Dr.Anjuli Agarwal | The Joint Director & Officer Incharge | ZARS, GBPUA&T,<br>Majhera, Nainital- 263 135, (U.K).<br>Mob: 7500241431 |
| 19. | Navgaon | Dr Indubala | Assist Professor (Agronomy) | College of Agriculture,<br>Navgaon-301025, Alwar (Rajasthan)<br>Mobile no: 9027997764<br>Email: ibsethi.agro@sknau.ac.in |
| 20. | Pantnagar | Dr. JP Jaiswal | (Wheat Breeder) | Dept. Genetics & Plant Breeding<br>GBPUA&T, Pantnagar-263145 (UK)<br>Mobile No: 9411159751<br>Email: jpj.gbpu@gmil.com |
| 21 | Pusa (CAU) | Dr. SK Singh | (Associate Professor) | Deptt.of Genetics & Plant Breeding<br>Rajendra Prasad Central Agri University<br>PUSA- 848125, Samastipur (Bihar)<br>Mobile No: 7250209227<br>Email: satish.singh@rpcau.ac.in |
| 22. | Ranchi | Dr. Surya Prakash | ( Genetics & PB ) | Birsa Agri University, Kanke, Patratu Road<br>Ranchi- 843006, (Jharkhand)<br>Mobile No: 9430393412<br>Email: suryapbg@gmail.com |
| 23. | Ranichauri | Dr. Ajay, Agronomist | Dean/Director Research | College of Forestry and Hill Agriculture,<br>Ranichauri – 249 199, Tehri Garwal, (U.K)<br>Mob: 9415278438 |
| 24. | SG Nagar | Dr. Pradeep Kumar | Agri. Res Station, | Karni Marg, Surendra Dental College Road,<br>Sri Ganganagar-335001(Raj.)<br>Mobile No: 9414537801<br>Email: pradeep.patho@gmail.com |
| 25. | Sabour | Dr. DK Barnwal | (Barley Breeder) | Deptt.of Genetics & Plant Breeding<br>Bihar Agriculture University,<br>Sabour- 813210, Bhagalpur (Bihar)<br>Mobile No: 9006828656<br>Email:dkbbhu@gmail.com |

| | | | | |
|---|---|---|---|---|
| 26. | Saini | Dr.P.K Gupta | . (Barley Breeder) | Section of Economic Botany (R)<br>CSAUA&T, Kanpur-208002 (UP)<br>Mobile No:<br>Email: |
| 27. | Shimla | Dr. D.P. Walia | Principal Scientist & Incharge | IARI, Regional station,<br>Tutikandi, Shimla - 171 004, (HP)<br>Mob: 9817163305 |
| 28 | Samastipur | Mr Manish Kumar | (BISA), Plant Breeders, | Borlaug Institute for South Asia (BISA),<br>New Farm Area, PUSA, SAMASTIPUR,<br>Bihar-848125 |
| 29. | Tabiji | Dr. Dinesh Kumar | (In-charge) SKNAU, | SKNAU, Agricultural Research Sub-Station<br>Tabiji-305206, Ajmer (Rajasthan)<br>Mobile No: 9460089702<br>Email: inchrge.arss.tabiji@sknau.ac.in |
| 30. | Tikamgarh | Dr. Rudrasen Singh | Plant Breeders, | College of Agriculture (JNKVV), Madhuban Colony, Kudeshwar Road, TIKAMGARH (MP)- 472001 |
| 31. | Udaipur | Dr. Abhay Dashora | Asstt. Prof. (Plant Breeding), | Rajasthan College of Agriculture (MPUA&T), UDAIPUR-313001(Rajasthan) |
| 32. | Varanasi | Dr. Sandeep Sharma | Barley Breeder | Department of Plant Breeding, Institute of Agriculture Sciences, BHU, **Varnasi** - 221005 (U.P.) |
| 33. | Vijapur | Dr. AM Patel | Assistant Research Scientist, | Wheat Research Station, S. D. Agricultural University, VIJAPUR-382 870, Distt.: Mehsana (Gujarat) |
| 34. | Wadura | Dr. Reyazul Rouf Mir, | Associate Professor | Division of Genetics and Plant Breeding, SKUAST, Kashmir,<br>Wadura Campus, Sopore, - 193 201 (J&K)<br>Mob: 9622152829 |
| 35. | Imphal | Dr. Vikas Verma | Junior Plant Breeder | CAU, Imphal<br>+91-8770534290<br>vikasvermagpb@outlook.com |
| 36. | Nagina | Dr. R.S. Malik | Plant Breeder | SPUA&T R/S., Nagina (U.P.) |
| 37 | Bulandshahar | Dr. L. Kant | Head | KVK., Bulandshahar |

# Proceedings of Session V - Status Report from Neighboring Countries, States and Farmers Interaction

| | | | |
|---|---|---|---|
| **August 25, 2018** | **Chief Guest:** | **:** | Sh. Surya Pratap Shahi, Cabinet Minister Agriculture, Agriculture Education and Agriculture Research, Govt. of Uttar Pradesh |
| 4.00 PM-6.00 PM | **Chairman** | **:** | Dr. T.R. Sharma, DDG (CS), ICAR, New Delhi |
| | **Co-Chairman** | **:** | Dr. Bijendra Singh, VC, ANDUAT Ayodhya<br>Dr. SK Pradhan, ADG (FFC), ICAR, New Delhi |
| | **Session Coordinator** | **:** | Dr. Anuj Kumar |
| | **Rapporteurs** | **:** | Dr. Umesh Kamble and Dr. Neeraj Kumar |

The session was graced by hon'ble Sh. Surya Pratap Shahi, Cabinet Minister Agriculture, Agriculture Education and Agriculture Research, Govt. of Uttar Pradesh as a chief guest. Chairman and Co-chairman welcomed the chief guest and briefed about 63rd All India Wheat and Barley Research Workers' Meet being organized at ANDUAT Ayodhya during 11-13 Sep, 2024. Dr. TR Sharma, DDG (CS), highlighted the importance of wheat crop in national food security and acknowledged the rigorous efforts of scientists and farmers bringing the wheat production from 6.9 million tonnes during the time of independence to 112.9 million tonnes during 2023-24. He further stated that wheat production of India needs to be increased to 140 million tonnes by 2050 with the same land resources. He exhorted that research program of ICAR Institutes shall be re-oriented considering the inputs and feedback from the farmers. Dr. Bijendra Singh, VC, ANDUAT Ayodhya appreciated the support from state government in creation of state of art infrastructure facilities with respect to education, research and extension activities at ANDUAT Ayodhya. On this occasion, a total of 12 progressive farmers from different parts of the country were felicitated by the chief guest. The following key points emerged from the deliberations;

- Rakesh Dubey, a progressive farmer, shared his experience and appreciated efforts of ICAR institutes/SAUs in developing high yielding varieties in various crops. He stressed that improved wheat varieties suitable for organic cultivation with aroma and taste of indigenous/traditional varieties may be developed and made available to farmers.
- Another progressive farmer from Punjab, Kuldeep Shergill highlighted the importance of social media in extending the scientific information to the farmers.
- The chief guest Sh. Surya Pratap Shahi, Cabinet Minister Agriculture, Agriculture Education and Agriculture Research, Govt. of Uttar Pradesh, highlighted the contribution of Uttar Pradesh (22%) in total food grains production of the country. Further, the chief guest underlined the contribution of Uttar Pradesh to the tune of 34% in total wheat production of the country and emphasized on developing more wheat and barley varieties suitable for cultivation in Uttar Pradesh to uplift the wheat productivity in the state.
- Considering depleting groundwater resources, improved varieties requiring less water needs to be developed and released for cultivation.
- The chief guest informed the house that seed replacement rate in *Rabi* crops in Uttar Pradesh is about 45% and further stressed upon setting a target of 10 lakhs quintals seed distribution of different wheat varieties on annual basis thereby, elevating seed replacement rate in the state.

- In view of increased sugarcane area in Uttar Pradesh, the chief guest urged that strategies should be developed and deployed for better late sown varieties to cater the demand of the farmers.
- Uttar Pradesh holds the potential for cultivation of barley, therefore, breeding improved barley varieties needs special attention to increase the productivity and area of barley.
- State agriculture universities in Uttar Pradesh need to re-orient wheat and barley breeding program in order to develop and release wheat and barley varieties at national level.
- Dr. Ratan Tiwari, Director ICAR-IIWBR, Karnal assured to support the wheat improvement programs of state agriculture universities in Uttar Pradesh.

The session ended with vote of thanks by Dr. Ratan Tiwari, Director ICAR-IIWBR, Karnal.

## Session VI: Plenary Session

| | | | |
|---|---|---|---|
| **September 13, 2024** | **Chief Guest** | **:** | Dr. TR Sharma, DDG, (CS), ICAR, New Delhi |
| | **Chairman** | **:** | Dr. Bijendra Singh, Vice-Chancellor, ANDUAT, Ayodhya, Uttar Pradesh |
| | **Co-Chairman** | **:** | Dr. SK Pradhan, ADG (FFC), ICAR, New Delhi |
| | **Rapporteurs** | **:** | Drs. Pramod Prasad, ICAR-IIWBR, Regional Station, Shimla and Charan Singh, ICAR-IIWBR, Karnal |
| | **Session Coordinators** | **:** | Dr. Sanjeet Kumar, ANDUAT, Ayodhya, |

The Plenary session of 63rd All India Wheat and Barley Research Workers Meet started with the welcome address by Dr. Sanjeet Kumar, Session Coordinator. The chairman in his opening remarks welcomed all the delegates and invited all the Principal Investigators (PIs) to present the significant recommendations for crop season 2024-25. The observations made by the Chief Guest, Chairman and other dignitaries were as follows:

Dr. Bijendra Singh, VC, ANDUAT informed the house about the bailayering followed by mulching and spraying for residue management facilities available at ANDUAT, Ayodhya and the good results obtained thereof. Dr. TR Sharma, chief guest of the session, raised the questions on the experimentation on conservation agriculture and informed the house that till now very few varieties are available for conservation agriculture, which were supported by Dr. RR Hanchinal, Ex-Chairman PPVFRA and VC, UAS Dharwad. Dr. Hanchinal advocated the need of conservation agriculture experiments and advised for initiating the natural/organic wheat breeding programme. Dr. Ratan Tiwari, Director, ICAR-IIWBR, Karnal updated the house on the experiments that are currently being organized by the resource management group on such aspects.

On quality trials the house reached a conclusion that for considering a particular variety as biofortified it must have minimum 13% protein and a minimum level of either iron or zinc as fixed in previous guidelines. Dr. Bijendra Singh advised to plan some experiments on bioavailability of micronutrients in both wheat and barley. In response, Dr. TR Sharma advised the PIs and Co-PI's of CRP on biofortification project for demanding extra budget from the funders for measuring bioavailability of micronutrients at cellular and molecular levels.

On the recommendation of Crop Protection group, Dr. TR Sharma enlightened the wheat and barley workers on the role of CIMMYT, ICARDA and other CGIAR institutions in providing all the help desired by the group. He mentioned that these institutions are there to help in providing crop genotypes, screening wheat and barley materials against different insect pests and diseases such as Ug99 (wheat stem Rust) and wheat blast at different locations. He advised to restart wheat screening for wheat stem rust in East Africa or other regions where Ug99 types of pathotypes have already been reported. Similarly, for wheat blast, he advised to screen advanced wheat material at hot spot locations i.e., Bangladesh and Bolivia. Dr. SK Jha, Senior Scientist, ICAR-IARI, New Delhi informed the house about the role of two robust co-dominant markers WGGB156 and WGGB159 linked to 2AS/2NS for screening wheat material for wheat blast resistance. Dr. TR Sharma also emphasized effective monitoring and screening wheat material for blast resistance.

On barley, Dr. TR Sharma advised PI, Barley Network to merge related recommendations and make them crisper and clearer. Dr. Deepak Baranwal informed the house about the probability of occurrence of a highly virulent isolate of leaf blight pathogen at Sabour center and requested for dropping some of the

barley trials from the center due to high severity of leaf blight at the center, which was unanimously agreed by the house. On recommending chemicals for the management of barley leaf blight, Dr. TR Sharma discussed that before recommending any of the chemicals for diseases and insect pests management we should do thorough screening of these chemicals at multi-locations and different years before recommending them for a particular zone if they are found effective. He also advised to avoid recommendations based on data collected from only few locations or seasons. He also recommended to thoroughly understand the variability among wheat and barley pathogens using phenotypic and molecular markers.

In Chairman's remark, Dr. Bijendra Singh suggested to undertake thorough survey of wheat and barley varieties being grown at different locations in a particular zone, so that the status of the seed replacement could be understood and further guidelines could be formulated for improving seed replacement ratio. He also discussed that additional work should be carried out on the value addition of wheat and barley products. He suggested doing such work in the competent labs/universities/institutes. In continuation, Dr. TR Sharma also supported Dr. Bijendra Singh and suggested to plan some meeting/workshop on the value addition and quality improvement of wheat and barley products. Dr. RR Hanchinal also advocated the role of value addition and highlighted the medicinal value of wheat and barley with special reference to dicoccum wheat. On the issue of seed of susceptible verities being marketed by private agencies, which was raised by Dr. Harikrishna, Scientist, IARI, New Delhi, Dr. Ratan Tiwari opined that farmers may lose trust in the seeds supplied by companies/ agencies and advised private companies to be very careful while selling their seeds. After these remarks, felicitation of superannuating wheat & barley researchers was done and proposal for venue of 64$^{th}$ All India Wheat and Barley Research Workers' Meet 2025 were discussed. Two venues i.e., Dharwad, Karnataka and Palampur, Himachal Pradesh were proposed by the respective centers. The final decision on the venue will be taken in due-course of time.

Dr. SK Pradhan, Co-Chairman of the session, in his concluding remarks, congratulated all the researchers' of wheat and barley group for conduction of a very useful and successful organization of the meeting. He appreciated the efforts of organizers, participants, and thanked them. He also applauded the commitment and dedication of Vice Chancellor of the university staff for successful conduction of the meeting. He suggested to do all the experiments more precisely and timely manner to avoid human error. He also congratulated superannuating scientists and wished them best.

Dr. Bijendra Singh, Chairman of the session congratulated and appreciated the hard work of DDG, ADG and whole wheat and barley group. He was satisfied with the conduct and proceedings of the meeting. He emphasized that all the researchers should share their improved materials with their colleague from other zones/institutions, which is one of the most important objectives of AICRP's. He appreciated the efforts of Dr. RR Hanchinal and other PAMC members, organizers, research teams, recreation club of the university for contributing in the successful organization of the meeting. He also acknowledged DDG (CS), ADG (FFC), Director, ICAR-IIWBR and his team and finally whole ICAR team for choosing ANDUAT, Kumarganj, Ayodhya for organization of this mega event.

Dr. TR Sharma, DDG CS, ICAR, New Delhi, in his concluding remarks, was concerned about narrowing down of genetic base of wheat and barley varieties being released, and advised to conduct a brainstorming on improving the genetic base of wheat and barley material. He suggested planning wheat and barley hybridization program and sharing of material with cooperators on CIMMYT's pattern. Besides selecting good genotypes from CIMMYT and ICARDA nurseries, he suggested to strengthen hybridization program. He was concerned about the proportion of the trials being failed or rejected by monitoring teams or afterwards. He advised agronomy and crop protection scientists to look for the reasons of the trial failure or rejection and work on those issues. He felt the need for the development of a comprehensive database, wherein all the historical data from AICRP trials should be stored for used for analysis alongwith the recent

data. He advised the group for avoiding routine research work and try to include recent tools and technologies for getting good publications. He appreciated the work of superannuating scientists, congratulated and wished them best. He also thanked Dr. Bijendra Singh for providing all the help and congratulated him for successfully hosting the meeting. He motivated and congratulated all the wheat and barley researchers for successful completion of the meeting.

The session ended with formal vote of thanks by Dr. CN Mishra, Senior Scientist, ICAR-IIWBR, Karnal and Organizing Secretary of 63rd All India Wheat and Barley Research Workers Meet.

The discipline wise recommendations agreed upon by the house are as follows:

**Crop Improvement**

In the Crop Improvement program, the Progress of all the Centres was reviewed on 02.09.2024 in Online mode. Similarly, the Work Plan 2024-25 was presented before the PAMC on 03.09.2024. During this three-day event, the discussions were again held on progress made by the program during 2023-24, and finalization of the Work Plan 2024-25. Based on the above deliberations, following major recommendations were made for the Crop Improvement program:

- More number of trials are getting rejected on low site mean, the trial conducting scientist should also mention the exact reason of rejection.
- Molecular marker-based diversity analysis of the final year entries should be carried out with the varieties recommended of each zone.
- Breeding programs for developing climate resilient varieties should be strengthened.
- Pre-breeding network should be strengthened and a strong National Hybridization Program needs to be set-up.
- The narrow resistance base for wheat rust diseases is a worrisome issue, and IIWBR should focus on disease resistance breeding utilizing molecular markers.
- Data reporting on all the breeding trials is to be done after harvesting Gross Plot. A strip on 3-4 wheat lines should be planted on the sides of the trial/experiment, to as to avoid any bias due to border effect.
- Promotion of entries in breeding trials should be done on significantly superior basis. However, any genotype/entry with at par yield levels to the best check, may be promoted if better in other traits such as grain quality, heat/drought tolerance, etc. should be promoted. In no case relaxation in rust criteria is to be given.
- A separate AVT for *durum* was constituted in NWPZ.
- Special trial on *Dicoccum* constituted for PZ.
- The high rust score (> 40S), if observed in the breeding trials leaf sample should be sent to IIWBR-RS, Shimla, with information to PI-Crop Protection.
- Separate teams should be constituted for monitoring of pathological nurseries (particularly IPPSN & PPSN). The teams should include one wheat breeder.
- Entry testing quota on all the contributing centres in NHZ will be increased from the existing one.
- SPL - Very High Altitude (VHA) for Ladakh and Lahaul Spiti areas of HP will be constituted from 2025 summer. Dr Dharam Pal Walia (Zonal Coordinator) will arrange the logistics for the same.
- Trials finalized for 2024-25:
    1. NIVTs = 9
    2. IVTs: = 1
    3. AVTs: 2 (NHZ)
    4. AVTs: 4 (NWPZ)
    5. AVTs: 3 (NEPZ)

6. AVTs: 3 (CZ)
7. AVTs: 3 (PZ)
8. SPL trials = 4 (2 HYPTs, 1 *Dicoccum*, 1 SAL/ALK)
9. 7 National nurseries

**Resource Management**

Based on the progress report and work plan presentations of Resource Management and Social Sciences, the group arrived at the following points;

- Evaluation of AVT-II year entries of wheat and barley under different growing conditions (Timely, late, restricted irrigation, salinity, HYPT) in various zones will be conducted as per allotment of the trials from crop improvement programme.

- As per the suggestion of PAMC member, the SPL-3 trial on "Precision N management in wheat using green seeker (GS) tool" is discontinued.
- The following five special trials will be continued during the 2024-25 crop season;

**SPL-1:** Effect of tillage, rice residue and microbial consortia management on wheat productivity, profitability and soil health

**SPL-2:** Effect of seed rate and growth regulators on productivity of wheat under early sowing in NWPZ

**SPL-4:** Intercropping of oilseed/pulses with wheat and barley for enhancing productivity and profitability of rice-fallow area with one irrigation.

**SPL-5:** Evaluation of herbicides for broad-leaved weed control in barley

**SPL-6:** Effect of seed rate and growth regulators on productivity of barley under early sowing.

The following three new special trials were formulated;

**SPL-3:** Comparative performance of nano urea plus and prilled urea in wheat.

**SPL-7:** Efficacy of pre-mix combination of bixlozone + metribuzin against weeds in wheat in NWPZ.

**SPL-8:** Elucidating the effect of heat stress mitigators in terminal heat stress mitigation and yield improvement of wheat.

**Work Plan of Social science**

- During the Rabi season 2024-25, the barley front line demonstrations (FLDs) will be conducted and coordinated as per the approval of the Ministry of Agriculture and Farmers Welfare, GOI, New Delhi.
- The cluster demonstrations will be conducted in seven states covering eleven districts.

**Recommendations**

- Cluster size in the cluster demonstrations should be increased so that bio-fortified varieties reaches to larger masses.
- Experiment on new fertilizer formulations such as nano urea should be initiated to access their efficacy
- Trials on system perspective should be initiated
- Trials on some of the emerging issues such as herbicide resistance should also be initiated

**Quality and Basic sciences**

1. There are huge variations in several quality traits' data (especially iron and zinc) across centres and hence it is recommended that standard common agronomic practices should be followed by each centre conducting the trials. To nullify the disparity for iron and zinc data, only hand-threshed samples should be sent separately.
2. It was decided that iron, zinc, and nitrogen profile of soil samples will be provided to ICAR-IIWBR by all the co-operating centres conducting the trials after taking due care of soil sample collection and analysis.

3. It was recommended last year that the scientists contributing towards Quality Component and Biofortification Nursery (QCWBN) should provide only the entries having exceptionally high Fe, Zn, and protein content for testing. Therefore, henceforth, it was recommended that to promote QCWBN entries, iron and zinc should be ≥42 ppm each along with ≥13.0% protein at 12% moisture basis. The entry should meet any two parameters out of three to ascertain better wheat quality.
4. To have a better-quality estimate, iron and zinc analysis of NIVTs/IVTs should be carried out as additional parameters along with basic quality parameters.

**Crop Protection**

In the Crop Protection program, the Progress of all the Centres was reviewed on 02.09.2024 in Online mode. Similarly, the Work Plan 2024-25 was presented before the PAMC on 03.09.2024. During this three-day event, the discussions were again held on progress made by the program during 2023-24, and finalization of the Work Plan 2024-25. Based on the above deliberations, following major recommendations were made as follow:

1. Teams for monitoring of PPSN, IPPSN and other pathological nurseries should be made along with at least one breeder from coming crop season.
2. Ensure sufficient disease pressure in infectors for the precise and effective disease creation.
3. Screening of stem rust lines for UG99 at Kenya should be continued. Also, the material for wheat blast screening at Bangladesh and Bolivia in collaboration with CIMMYT should be continued.
4. To prevent the introduction of new rust races in the country, there is a need to take utmost care of infected wheat samples obtained from SAARC or neighboring countries.
5. For precise and uniform disease screening, a training program in the coming season (Feb-March) should be conducted.

**General Recommendations:**

- It is recommended to grow the highly resistant, newly released varieties for yellow rust at NWPZ and stem rust-resistant varieties for CZ and PZ having ACI<10 in view of the current pathotype prevalence in Northern and Southern India.
- Strict monitoring for wheat blast was advised in NEPZ, especially in areas bordering Bangladesh. The use of wheat blast-free varieties and the application of preventive measures such as quarantine, adoption of alternate crop plans, and seed treatment are recommended for the disease-prone areas of NEPZ.

**Highlights of work Plan:**

- Conductance of trials on Karnal bunt should be continued to track Karnal bunt disease-free areas.
- Entomological trials for screening ESN and EPSN should be continued.
- The Udaipur center for screening CCN trials, the Ludhiana center for AUDPC of leaf rust, and IARI - RS Shimla for Hill bunt of AVT entries for NHZ trials should be included.
- Strengthening the program for emerging diseases like head scab and powdery mildew in wheat.
- Strengthening the Mahabaleshwar center, being an important center for screening stem rust for CZ and PZ.

**Barley Network:**

1. Raising awareness of hulless barley's health benefits through targeted educational campaigns, while prioritizing seed production and farmer education, is crucial for its sustainable adoption and improved crop productivity.
2. ADG FFC recommended using ICARDA's materials as a base population and markers for simultaneous multi-trait selection to accelerate genetic gains, prioritizing the development of high-yielding, disease-resistant hulless barley with enhanced nutrients to address nutritional deficiencies and ensure food security across all agro-climatic zones.

3. A dedicated trial in the NHZ should be established to evaluate and select region-specific hulless barley cultivars for optimal performance.
4. Expanding hulless barley testing centers to locations such as CAZRI, Leh; PAU, R/S, Bhatinda; SKN, R/S, Nawagaon; SKN, R/S, Tabiji; RAU, R/S, Sriganganagar; SPUA&T, R/S, Bulandshahar; SPUA&T, R/S, Nagina; Govt. Farm Burdwan; CSSRI, Karnal; and SKAUST Jammu; HPKV., R/S Malan, and SKAUST Wadura will enhance the accuracy of varietal performance assessments across diverse agro-climatic regions. This network will also increase awareness of barley's health benefits, encouraging wider adoption by farmers and consumers. Feed barley trials should be conducted in Jammu, while two malt barley testing centers should be established in Bulandshahar and Nagina to support Uttar Pradesh, the second-largest barley producer in India.
5. In malt barley, genotypes with superior quality should be promoted if their yield matches or surpasses the top-performing check variety. Additionally, malt barley trials at Wadura should focus on identifying superior entries based on genotype-by-environment (GxE) interactions, as the extended growth period and cooler climate provide optimal conditions for quality assessment.
6. Dual-purpose barley should be promoted based on superior overall economic returns, calculated by combining grain yield (multiplied by MSP) and forage yield (multiplied by market rates), rather than separate comparisons with the best check. Alternatively, a grain yield index can be developed by converting forage yield into its economic value, dividing it by the grain MSP, and adding it to grain yield, thereby integrating both yields into a single economic metric for evaluation.
7. The ICAR Research Complex for NEH Region, Manipur, should be established as a new center for barley research, testing, and development in the NEH Region. Sabour should be excluded as a testing site due to severe leaf blight infestations, which compromise the reliability of experimental results.
8. To identify sources resistant to leaf blight, a major threat in the NEPZ and CZ, the 2,500 distinct entries (500 per location) should be evaluated under natural conditions at known infection hotspots, including Sabour, Kanpur, Kumarganj, Varanasi, and Kalyani.

# Session: Varietal Identification Committee meeting

## Proceedings of Varietal Identification Committee meeting of Wheat and Barley

The meeting of Varietal Identification Committee of Wheat & Barley was held on 7th October, 2024 under the Chairmanship of Dr. D K Yadava, ADG (Seed), ICAR, ICAR through virtual mode. The following members of the committee approved by Deputy Director General (Crop Science) participated in the meeting:

1. Dr. D K Yadava, ADG (Seed), ICAR, Krishi Bhawan New Delhi
2. Dr. P K Singh, Agriculture Commissioner, DA&FW, MoA&FW, GOI,
3. Dr. S K Pradhan, ADG (FFC), ICAR, Krishi Bhawan New Delhi
4. Dr. Sanjay Kumar, Director, ICAR-IISS, Mau Nath Bhanjan
5. Dr. A K Singh, Director Agriculture, UP Govt., Lucknow
6. Dr. Aseem Gangwar, Regional Manager, NSC, Uttar Pradesh.
7. Dr. A K Gangwar, Director Research, ANDUAT, Ayodhya, Uttar Pradesh
8. Dr. N S Bains, Ex-Director Research, PAU, Ludhiana
9. Dr. S C Bhardwaj, Emeritus Scientist, IIWBR-RS, Flowerdale, Shimla
10. Dr. P K Rai, Head, Varietal Seeds India, Tata Rallis Pvt. Ltd.
11. Dr. Ratan Tiwari, Director, ICAR-IIWBR, Karnal (*Member Secretary*)

All Principal Investigators (PI) from IIWBR, Karnal also attended as Non-Voting members.

Identification proposals of 19 genotypes of wheat and three of barley were received for consideration in the VIC. Variety-wise detailed presentations on performance of each variety including yield, reaction to biotic and abiotic stresses, quality and other ancillary characters were made by the member secretary. After detailed deliberations, the following recommendations as indicated against each proposal were made:

**Wheat**

1. ***NWS2222:*** This wheat genotype had a yield advantage of more than 6 *per cent* over the best check variety and was also resistant to rusts. It **was identified** for release under irrigated timely sown conditions of Peninsular Zone (PZ) comprising of the states of Maharashtra, Karnataka and plains of Tamil Nadu.
2. ***PBW891:***ThegenotypePBW891was having yield advantage of more than 3 *per cent* over the best check and also high protein content (12.6%) and bread loaf volume (610cc). The committee **identified** the variety for release under irrigated timely sown conditions of Peninsular Zone (PZ), comprising of the states of Maharashtra, Karnataka and plains of Tamil Nadu.
3. ***WH1306:***WH 1306 has high yield and superior grain quality parameters such as protein content (12.1%), Iron content (40.8ppm) and Zinc content (40.6ppm). Committee recommended the **identification** of this genotype for release under irrigated timely sown conditions of Peninsular Zone (PZ), comprising of the states of Maharashtra, Karnataka and plains of Tamil Nadu.

4. ***AKAW5100:*** This wheat genotype had high protein (12.5%) and bread loaf volume (608cc), along with high disease resistance. It **was identified** for release under irrigated timely sown conditions of Peninsular Zone (PZ), comprising of the states of Maharashtra, Karnataka and plains of Tamil Nadu.
5. ***DBW443:*** The wheat genotype was proposed as a biofortified variety based on its excellent grain quality, with protein content of 13.5% and high micronutrient content of 42.1 ppm Iron & 42.6 ppm Zinc. It **was identified** for release under irrigated timely sown conditions of Peninsular Zone (PZ), comprising of the states of Maharashtra, Karnataka and plains of Tamil Nadu.
6. ***NIAW4114:***Wheat genotype proposed, had a yield advantage of more than 3 *per cent* over the best check, was rust resistant and had good grain quality. It **was identified** for release under irrigated late sown conditions of Peninsular Zone (PZ), comprising of the states of Maharashtra, Karnataka and plains of Tamil Nadu.
7. ***NIAW4120:***This wheat genotype proposed under irrigated late sown conditions of Peninsular Zone (PZ), had no yield advantage over the check varieties hence **was not-identified.**
8. *HI1674:*HI1674had better rust resistance and grain quality traits such as protein (12.6%), iron content (40.1ppm), zinc content (42.6ppm). Based on quality traits and resistant to rust, the variety is **identified** for release under irrigated late sown conditions of Peninsular Zone (PZ), comprising of the states of Maharashtra, Karnataka and plains of Tamil Nadu.
9. ***LOK79:***This wheat genotype had superior rust resistance, improved quality traits viz., protein (12.6%), iron content (44.4ppm) and zinc content (42.4ppm).It was **identified** release under as a biofortified variety for irrigated late sown conditions of Peninsular Zone (PZ), comprising of the states of Maharashtra, Karnataka and plains of Tamil Nadu.
10. ***HI1669:***It had yield superiority (> 4.0%) over best check along with rust resistance. It was **identified** for release under irrigated timely sown conditions of Central Zone (CZ), comprising of the states of Madhya Pradesh, Gujarat, Rajasthan (Kota & Udaipur Divisions) and Chhattisgarh states, Jhansi Division of UP.
11. ***HI1674:***It had yield superiority (> 7.0%) over best check along with rust resistance. The wheat variety was **identified** for release under irrigated late sown conditions of Central Zone (CZ), comprising of the states of Madhya Pradesh, Gujarat, Rajasthan (Kota & Udaipur Divisions) and Chhattisgarh states, Jhansi Division of UP.
12. ***CG1044:***This wheat genotype, proposed under high fertility early sown conditions of Central Zone, had high levels of susceptibility to black (ACI=19.0) and brown (ACI=18.4) rusts. Performance in agronomic trials was also poor. No significant edge in quality parameters in comparison to qualifying entries, hence it was **not recommended for identification.**
13. ***GW543:***This wheat genotype GW543,proposed for high fertility irrigated conditions, had yield advantage and rust resistance in comparison to the checks and qualifying varieties. It was **identified** for release under high fertility early sown conditions of Central Zone (CZ), comprising of the states of Madhya Pradesh, Gujarat, Rajasthan (Kota & Udaipur Divisions) and Chhattisgarh states, Jhansi Division of UP.
14. ***$DBW441^{M}$:*** This MABB wheat genotype for restricted irrigation timely sown conditions of CZ **was not-identified** for release due to its high susceptibility to black rust. Also, there was no significant advantage in yield and grain quality.

15. ***DBW386:*** This variety had yield superiority over the check varieties and better disease resistance. It was **identified** for release under irrigated timely sown conditions of North Eastern Plains Zone (NEPZ), comprising of the states of Eastern UP, Bihar, Jharkhand, Orissa, West Bengal, Assam and plains of NE States.
16. ***HD3428:***This wheat genotype was having yield advantage, and disease resistance in comparison to the check varieties. Also, it had better grain quality traits. It was **identified** for release under irrigated late sown conditions of North Western Plains Zone (NWPZ), comprising of the states of Punjab, Haryana, Delhi, Rajasthan (excluding Kota and Udaipur), Western Uttar Pradesh (except Jhansi), Jammu and Kathua district of Jammu & Kashmir, Paonta Valley and Una district of HP and Tarai region of Uttarakhand.
17. ***HI1668:*** The wheat genotype proposed under irrigated timely sown conditions of NWPZ ,had no yield advantage against the best check and recently released variety HD3386. Also, it was highly susceptible to yellow rust races under SRT screening, hence was **not identified.**
18. ***DBW386:***This genotype proposed under irrigated timely sown conditions of NWPZ, had no yield advantage against the best check and recently released variety HD3386. Also, it was highly susceptible to yellow rust races under SRT screening, hence was **not identified.**
19. ***HD3471$^{M}$:*** This MABB wheat genotype proposed under irrigated timely sown conditions of NWPZ. QTLs for drought tolerance were introgressed in this variety but these were not validated under field conditions, hence the committee recommended for field validation of introgressed trait by testing for one more year under stresses environment of limited irrigation i.e. AVT-II-RI-TS-NWPZ.

**Barley**

20. ***DWRB223:***The barley variety had higher yield advantage, disease resistance and improved grain quality attributes in comparison to the check varieties. It was **identified** for release under irrigated timely sown conditions of North Western Plains Zone (NWPZ), including Punjab, Haryana, Delhi, Rajasthan (excluding Kota and Udaipur), Western Uttar Pradesh (except Jhansi), Jammu and Kathua district of Jammu & Kashmir, Paonta Valley and Una district of Himachal Pradesh and Tarai region of Uttarakhand.
21. ***UPB1106:*** The barley variety had higher yield, disease resistance and better grain quality traits in comparison to the check varieties. It was **identified** for release under irrigated timely sown conditions of North Eastern Pains Zone (NEPZ), including Eastern UP, Bihar, Jharkhand, Orissa, West Bengal, Assam and plains of NE States.
22. ***KB2031:***This variety had superior yield performance, disease resistance and improver grain quality attributes in comparison to the check varieties. It was **identified** for release under irrigated timely sown conditions of North Western Plains Zone (NWPZ) including Punjab, Haryana, Delhi, Rajasthan (excluding Kota and Udaipur), Western Uttar Pradesh (except Jhansi), Jammu and Kathua district of J & K, Paonta Valley and Una district of Himachal Pradesh and Tarai region of Uttarakhand; and North Eastern Plains Zone (NEPZ) including Eastern UP, Bihar, Jharkhand, Orissa, West Bengal, Assam and plains of NE States.

The Meeting ended with the thanks to the Chair and members of the committee.

**(Dr. Ratan Tiwari)**
**Member Secretary**

**(Dr. D K Yadava)**
**Chairman**

## Proceedings of the "Pre-Workshop Meeting on Review of Progress of AICRP on Wheat & Barley, Coordinated Centers" on 02-03 Sep, 2024 in Hybrid Mode

| | | | |
|---|---|---|---|
| **September 02-03, 2024** | **Chairman** | : | Dr S K Pradhan, ADG-FFC, ICAR New Delhi |
| | **PAMC Chairman** | : | Dr. RR Hanchinal |
| | **PAMC Members** | : | Dr ML Jat, Dr NS Bains, Dr SC Bhardwaj |
| | **Director** | : | Dr. Ratan Tiwari |
| | **Rapporteur** | : | Drs. Charan Singh, and OP Gupta |

The pre-workshop meeting of the All India Coordinated Research Project (AICRP) on Wheat & Barley was held in hybrid mode at ICAR-IIWBR, Karnal, on 2-3 September 2024. The meeting aimed to review the progress made by coordinated centers across all five wheat and barley growing zones of the country.

Dr. Ratan Tiwari, Director, ICAR-IIWBR, delivered the welcome address, formally acknowledging the presence of the meeting chair, Dr. S.K. Pradhan, ADG-FFC, and distinguished members of the Project Advisory and Monitoring Committee (PAMC) including Dr. R.R. Hanchinal, Dr. M.L. Jat, Dr. N.S. Bains, and Dr. S.C. Bhardwaj. He extended a warm welcome to the Principal Investigators (PIs) and representatives from various cooperating centers. Dr. Tiwari highlighted the significance of the meeting and congratulated the wheat and barley workers for their efforts in achieving the record wheat production of 112.9 million tonnes in 2023-24.

Dr. R.R. Hanchinal, Chairman of PAMC, provided opening remarks, stressing the need to reduce dependency on international germplasm, increase input use efficiency, and explore possibilities of research activities on natural and organic farming. He also acknowledged the various awards won by centers and recommended exploring breeding strategies to address gluten sensitivity, given the rising cases in the population. He also stressed the need to strengthen the pre-breeding activities involving native/well adapted local germplasm.

Dr. N.S. Bains commended the overall performance of the AICRP and assured the audience that detailed feedback would be provided during the presentations. Dr. S.C. Bhardwaj emphasized the importance of including essential details in the presentations, such as the number of crosses made, filial generations screened for blight and rust resistance, and the success rate of trial conduction. He also encouraged centers to focus on developing trait-specific pipeline materials to enhance research competitiveness.

Dr. S.K. Pradhan, ADG, formally welcomed the esteemed gathering of wheat and barley researchers, extending his congratulations for achieving record wheat production. He projected that by 2047, the demand for wheat is expected to reach approximately 140 million tonnes, a target that will require an annual production growth rate of 1.3% to 1.4% over the preceding year. Dr. Pradhan emphasized that, meeting this demand will be challenging due to factors such as climate change, rising temperatures, and the

emergence of new diseases and pests. He urged the development and dissemination of location-specific wheat and barley varieties to address these challenges. Additionally, in light of the declining soil nutrient profiles, he stressed the importance of enhancing input use efficiency, particularly for water and NPK fertilizers. Concluding his address, Dr. Pradhan expressed his appreciation for the exceptional work being undertaken by the AICRP on Wheat and Barley, acknowledging its significant contributions on various platforms.

**Northern Hills Zone (NHZ)**

Following the opening remarks by the ADG, Dr. R.R. Hanchinal assumed the chair of the session and invited each center from the Northern Hill Zone (NHZ) to deliver formal presentations. The NHZ consists of five centers: Malan, Bajora, Imphal, Almora, and Shimla. Each center presented their progress as per the provided template, covering topics such as the year of inception, mandates, budget, significant achievements, publications, and new initiatives. The presentations were followed by an open-house discussion, after which Dr. Hanchinal requested the Project Advisory and Monitoring Committee (PAMC) members to provide their comments and suggestions.

Remarks by Dr. N.S. Bains: Dr. Bains suggested that each zone should start with an overview presentation detailing the prevailing cropping patterns, production systems, and constraints in their respective zones. He recommended appointing zonal coordinators to facilitate this.

Khudwani Center: Dr. Bains emphasized the importance of utilizing newly identified genes in the breeding program and advised against the use of genes already exploited in the North Western Plains Zone (NWPZ). He recommended prioritizing breeding populations over mapping populations.

Palampur Center: He advocated for a more focused breeding program, recommending fewer, targeted crosses to enhance efficiency.

Imphal Center: Noting stagnation in yield performance, Dr. Bains encouraged the center to learn from better-performing centers in the NWPZ.

Almora Center: Dr. Bains questioned the continued seed rate experiments, other than the regular trial for new lines, and urged for the adoption of a uniform infection (artificial inoculation) strategy across all centers.

Remarks by Dr. S.C. Bhardwaj: Dr. Bhardwaj echoed Dr. Bains' recommendation of limiting the number of crosses, making them more targeted. He congratulated the presenters for adhering to the suggested presentation guidelines. However, he expressed concern over the lack of Front Line Demonstrations (FLD) at the Bajora center and the inability of some centers to create an epiphytotic environment for disease trials, urging immediate corrective measures.

Remarks by Dr. R.R. Hanchinal: Dr. Hanchinal acknowledged the valuable suggestions from the PAMC members and provided the following observations:

NHZ centers are not ideally suited for high yield trials but excel in race evaluation.

He emphasized the need to increase efforts in developing barley varieties with industrial value.

Concerns were raised over low yields, poor publication output, and a lack of collaboration.

He recommended exploring grants from the Rashtriya Krishi Vikas Yojana (RKVY) to upgrade infrastructure at the centers.

Dr. Hanchinal highlighted the importance of breeding T. dicoccum wheat and suggested transferring resistance genes for yellow rust and powdery mildew from durum wheat.

He appreciated the uniformity and quality of the presentations.

Dr. Lakshmikant: Dr. Lakshmikant expressed concern over the suspected detection of the stem rust race Ug99 in Nepal and warned of its potential spread to India. He urged the NHZ centers to send all their released wheat varieties for screening against Ug99.

The session concluded with a call for intensified efforts in breeding, disease resistance, and infrastructure development to strengthen the research and productivity of the NHZ centers.

**North Western Plains Zone (NWPZ) and Peninsular Zone (PZ)**

A total of six centers from the NWPZ (Jammu, Ludhiana, Hisar, Pantnagar, Durgapura, and Delhi) and four centers from the PZ (Pune, Niphad, Dharwad, and Mahabaleshwar) presented their key achievements during the session.

Dr. Bains' Observations:

Peninsular Zone (PZ): Dr. Bains highlighted the emphasis laid by most of the PZ centres on breeding for organic as a new initiative and raised concern about how it may harmonize with the current priorities of AICRP system. He encouraged the incorporation of T. dicoccum into mainstream products like chapati and bread to enhance its utilization.

North-Western Plains Zone (NWPZ): Dr. Bains emphasized the need for active exchange of heat and terminal heat stress-tolerant materials between NWPZ centers to optimize breeding efforts. He praised Ludhiana for its outstanding work and recommended additional support for germplasm and wheat quality research. He highlighted an improved protocol for bread loaf volume developed at Ludhiana, suggesting its testing at Karnal. Dr. Bains stressed the importance of using newly identified genes in breeding programs and expressed concern over yellow rust resistance in IPPSN entries. He recommended strategic research improvements at Hisar, and Pantnagar, and a focus on chapati and industrial end product quality at Durgapura, given the industry's reliance on wheat from Rajasthan. For the Delhi center, he emphasized the importance of donor material exchange and suggested IARI to offer training to NHZ center staff for seed programme. IARI’s focus on Resource Conservation technologies was appreciated. Additionally, Dr. Bains addressed concerns about chemical usage, water saving technologies under irrigated conditions, and

the need to conduct varietal surveys aimed at promoting mosaics and diversity, and for some larger centres to breed towards reduction of gluten intolerance in wheat.

Dr. S.C. Bhardwaj's Input:

Dr. Bhardwaj acknowledged the outstanding performance of most NWPZ centers, particularly Ludhiana and Delhi, recommending other centers to learn from their success. He stressed the need for research on late-sown genotypes and the identification of low-gluten germplasm. For PZ, he suggested focusing on Khapli wheat utilization and minimizing fungicide application.

Dr. R.R. Hanchinal's Remarks:

Dr. Hanchinal commended Ludhiana and Delhi centers for their focus on wheat quality, and terminal heat stress. He urged Durgapura to continue breeding for malt barley and encouraged NWPZ centers to prioritize bread loaf volume. Notably, he referred Dr. Ajit Sood’s observation of an increase in gluten-intolerant patients, calling for targeted breeding to develop low CD toxic epitope wheat genotypes.

The meeting concluded with emphasis on inter-center collaboration, targeted breeding strategies, and continued focus on quality improvement and stress tolerance in wheat.

NEPZ and CZ:

During the meeting, presentations were made by nine centers from NEPZ (Kanpur, Ayodhya, Varanasi, Kalyani, Coochbehar, Shillongani, Sabour, Ranchi) and CZ (Bilaspur, Gwalior, Jabalpur, Powarkheda, Sagar, Udaipur, Junagadh, Vijapur).

Following the presentations, Dr. Bains emphasized the need to strengthen breeding pipelines in NEPZ (whether in-house or collaborative) with respect to region specific needs such as salt tolerance, spot blotch resistance, pre-harvest sprouting resistance, FHB, wheat blast, acid soil tolerance, etc. He expressed doubts regarding prospects of breeding for aphid resistance as proposed by a NEPZ center. With respect to CZ he emphasized the common thread across centres which mentioned development of low-gluten wheat, biofortification, and organic wheat as their new initiatives. Prioritized germplasm and well-structured breeding strategy, however needs to be specified.

Dr. S.C. Bhardwaj expressed concern that many centers are not performing up to expectations and called for increased efforts. He noted that centers performing well could still improve. Dr. R.R. Hanchinal described NEPZ as a "sleeping giant" with untapped potential. He raised concerns about the underutilization of high-quality materials developed at Kanpur and Varanasi in the current breeding programs, and the fact that some centers had not released a single variety through CVRC. He proposed a brainstorming session for NEPZ to address future strategies and challenges, particularly focusing on terminal heat stress, powdery mildew, and the development of early-maturing varieties suited for summer-moong crop rotations. He also suggested exploring the applicability of NWPZ materials in NEPZ.

The final remarks of day one were made by Dr. Ratan Tiwari, Director, ICAR-IIWBR. He appreciated all the centers for their critical and to the point presentation. He flagged several key points for future programme including priority of pre-breeding at all centers, identify niche area for organic/natural farming, increase use of drones for precision wheat farming, increased public-private partnership, central facility developed by resource rich center like PAU should be open to all cooperating centers, development of pilot plant for product development at ICAR-IIWBR, capital required by centers need to be mentioned in upcoming EFC proposal, sharing of heat stress tolerant materials among centers, development of clear SOP for biofortification, low CD toxic epitope genotype and product specific variety development.

Day 2:

Day 2 focused on discussions regarding the work plan for the 2024-25 crop season. The session commenced with opening remarks from the Chairman, Director, and other PAMC members. Dr. S.C. Bhardwaj expressed concern over the low yield performance of newly identified varieties when used as checks. Dr. M.L. Jat stressed the importance of initiating research on soil-root microbe interactions at selected centers. Dr. R.R. Hanchinal highlighted the need for enhanced utilization of the off-season facilities at Wellington and Mahabaleshwar for rust screening. Subsequently, the work plans for each discipline were presented by the respective Principal Investigators, followed by detailed discussions and clarifications.

Crop Improvement:

Dr. Hanchinal emphasized the importance of including entries developed by private partners to strengthen public-private partnerships. He also recommended reinitiating a special trial on dicoccum wheat.

Dr. Sunil Umate requested the allocation of the NIVT-4 trial, which was duly assigned to his center. Dr. J.P. Jaiswal sought trials for NIVT-1B, NIVT-6, and AVT-RI for his center. It was noted that if disease scoring is based on individual plants, this should be explicitly stated in the report. As there were no promoted late-sown entries from the NIVT trials, the AVT-Late sown trial was not constituted this year. Additionally, the Coochbehar station will distribute trials to Manikchak.

The AVT Late-sown and Dicoccum trials were allocated to the Wellington center upon request. Dr. Rajbir Yadav raised concerns about most of the checks being derived from international material, which often become susceptible after one or two years. He also highlighted about trials of some centres getting rejected due to low site means. Dr. Yadav further pointed out that rejections by AICRP may stem from issues in disease data recording and suggested giving numerically superior entries a chance for further evaluation.

Dr NS Bains suggested that breeders capitalize on availability of rust resistant, known gene isogenic material (as in MABB trial) for development of elite breeding materials

Barley:

Dr. Deepak Baranwal requested the distribution of germplasm specifically resistant to leaf blight, which was agreed upon by the committee. It was also decided to discontinue the barley dual-purpose trial. Dr.

Neeraj Kulshrestha proposed the inclusion of ICAR-CSSRI for IVT (hulless barley) in the NWPZ, which was approved by the house.

Crop Protection:

The following key points were discussed during the meeting:

NIVT SRT Screening at Mahabaleshwar: It was noted that only the Special Rust Trials (SRT) of the National Initial Variety Trials (NIVT) need to be conducted at the Mahabaleshwar center.

Collaboration on Stored Grain Pest Research: It was recommended to initiate research on stored grain pests in collaboration with IISS Mau.

Urgent Need for Ug99 Research: The house emphasized the urgency of starting work on Ug99 in collaboration with SAARC countries. Old released wheat varieties should be sent to Kenya for screening against Ug99.

SRT for IVT and AVT: Dr. D.P. Walia highlighted the need for SRT screening for both Initial Variety Trials (IVT) and Advanced Variety Trials (AVT) to clearly demarcate disease response in the entries.

IPPSN Quota Increase: Dr. V.K. Singh from Ayodhya requested an increase in the IPPSN (International Pathology and Physiology Screening Nursery) quota for the upcoming season.

Ug99 Screening at Border Areas: Dr. M.S. Saharan advised focusing on bordering regions concerning Ug99 and reiterated the importance of sending material to Kenya and Ethiopia for effective screening. He also mentioned the need to improve epiphytotic conditions due to the limited disease reports in nurseries.

Recognition of Cooperators: Dr. Hegde from Dharwad suggested that breeders and cooperators should be recognized at the national level, and more entries should be sent by the respective PIs.

Leaf Blight Trials Inclusion: Dr. Raghunath Mondal from Kalyani requested the inclusion of leaf blight trials (MDSN, EBDSN) for his center.

Data Sharing and Pathology Team Evaluation: Dr. Rajbir Yadav inquired about SRT, APR, and natural condition data. The pathology team was asked to critically assess the situation, and Dr. Yadav opined out that blast data should also be shared with cooperators.

Hill Bunt Nursery: Dr. D.P. Walia requested that the hill bunt nursery be allocated to the Shimla center.

Leaf Blight Nursery Allocation: Dr. Jaspal Kaur recommended that the leaf blight nursery should not be assigned to the Ludhiana center.

Dr NS Bains said that gene postulation exercise needs to be made more relevant by employing markers/pedigree information to postulate effective genes

These points reflect the discussions, recommendations, and requests made during the meeting regarding wheat trial management, pest research, disease screening, and data sharing.

Resource Management:

Dr. M.L. Jat in his remarks highlighted the need to align research priorities with emerging challenges, recommending the inclusion of additional trials focused on issues such as biofortification and soil-microbe interactions. He emphasized novel approaches, including the use of microbial consortia in tillage and residue management from a system perspective, and development of herbicide resistance management strategies. Dr. Jat opined green seeker experiments validation and application in nitrogen management at the farmers' field. He also recommended that future experiments should be considered within system perspective taking into cognizance specific crop rotations. He suggested inclusion of more research highlights out of resource management from coordinating centers. Dr. Jat commended the weed management trials underway at ICAR-IIWBR, however, suggested that future trials dedicated to zone-specific challenges should be included. Dr. Jat opined that more funds should be allocated for research purposes with equitable distribution. He invited the Director for his comments. In response, Director ICAR-IIWBR, while giving the historical perspective of resource management activities under the AICRP focusing on complete package of practices for newly developed varieties, shift in work plan based on the contemporary issues has kept the system vibrant. However, he agreed to give good consideration to the suggestions made by the learned member and invited the resource management group to take into cognizance the important suggestions made by Dr. ML Jat.

Quality & Basic Sciences:

Soil data on Fe and Zn content should be provided by cooperating centers, and optimal locations for biofortification trials should be identified. The Quality Group should develop Standard Operating Procedures (SOPs) for Fe and Zn trials. Additionally, Fe and Zn estimation should be carried out for selected Nationally Coordinated Varietal Trials (NIVTs).

In his concluding remarks, Dr. SC Bhardwaj underscored several important aspects. He stressed the necessity of leveraging AICRP data for enhancing research and informing policy papers. He advocated for a shift towards greater utilization of indigenous materials, emphasizing their potential benefits. Additionally, he highlighted the need to identify and develop niche areas for organic products and export-quality goods. He reiterated that ICAR-IIWBR should prioritize and actively work on identification and characterization of new resistance genes and decipher their genetics. Furthermore, Dr. Bhardwaj called for a thorough examination of yield discrepancies between farmers' fields and experimental fields to better understand and address performance gaps.

There was also discussion on the harvesting of gross or net plot for reporting the yield. It was opined that the gross plot should be harvested at all centres in both agronomy and breeding trials.

The meeting concluded with a formal vote of thanks extended by Dr. BS Tyagi.

**Annexure I**

**List of Final Year Entries & Checks for season - 2024-25**

| Zone/Trial | Final Year Entries | Checks |
|---|---|---|
| **North Western Plains Zone** | | |
| AVT-IR-TS-TAS | DBW477[M]* | DBW88, DBW222, PBW826, HD3386, HD3086 |
| AVT-IR-LS-TAS | HD3495[M]*, PBW921*, DBW422* | HD3059, DBW173, PBW771, JKW261 |
| AVT-RI-TS-TAS | HD3468*, HD3471[M]* | PBW644, NIAW3170, DBW296, HI1653, HD3086 |
| **North Eastern Plains Zone** | | |
| AVT-IR-TS-TAS | PBW915*, HD3467* | HD3249, DBW187, HD3086, PBW826, HD3388 |
| **Central Zone** | | |
| AVT-IR-TS-TAD | MACS6837*, MACS4135(d)*, HI1683*, HI8849(d)*, HI8850(d)*, GW554*, GW555*, MP3570*, MPO1395(d)* | GW322, MACS6768, HI8737(d), HI8713(d) |
| AVT-IR-LS-TAS | DBW425*, GW556*, WSM138* | HD2932, MP4010, HI1634, CG1029 |
| AVT-RI-TS-TAS | UAS484(d)*, MACS4131(d)*, HI8851(d)*, MPO1398(d)*, DBW432* | DBW110, CG1040, HI8627(d), HI8823(d) |
| **Peninsular Zone** | | |
| AVT-IR-TS-TAD | MACS4135(d)*, MACS4125(d)*, MACS6844*, HI8849(d)*, CG1045* | MACS3949(d), HI8737(d), GW322, MACS6222 |
| AVT-IR-LS-TAS | HI1687*, MACS6829*, MACS6830*, DBW426[Q]* | RAJ4083, HD2932, HD3090, HI1633 |
| AVT-RI-TS-TAS | NIAW4267*, CG1047* | HI1605, NIAW3170, DBW359 |
| **SPL-HYPT** | | |
| IR-ES-TAS-CZ | PBW906*, PBW929*, HD3463*, DBW445[Q]*, MP1399* | DBW187, DBW303, DBW327, DBW377, GW322 |

**Annexure – II**

| | | |
|---|---|---|
| **Agenda**<br>**63rd ALL INDIA WHEAT & BARLEY RESEARCH WORKERS' MEET**<br>**Acharya Narendra Deva University of Agriculture and Technology (ANDUAT), Kumarganj, Ayodhya (Uttar Pradesh), India**<br>**(September 11-13, 2024)**<br>**Venue: ABM Auditorium, ANDUAT, Kumarganj, Ayodhya (Uttar Pradesh)** | | |
| **DAY-1: September 11, 2024 (Wednesday)** | | |
| **08.30-09.00** | **Welcome & Registration** | |
| **09.00-11.15** | **Session-I: Inaugural Session** | |
| | **Chief Guest** | **Dr. TR Sharma**, Deputy Director General (CS), ICAR, New Delhi |
| | **Chairman** | **Dr. Bijendra Singh**, Vice-Chancellor, ANDUAT, Ayodhya |
| | **Special Guest** | **Dr. PL Patil**, Vice-Chancellor, UAS, Dharwad |
| | **Guest of Honour** | **Dr. SK Pradhan**, ADG (FFC), ICAR, New Delhi |
| | **Rapporteurs** | **Drs. BS Tyagi & Kiran Gaikwad** |
| | **Stage Convener** | **Dr. Anuj Kumar**, ICAR-IIWBR, Karnal |
| 09.00-09.10 | ICAR & University Songs | |
| 09.10-09.15 | Welcome Address | **Dr. AK Gangwar**, Director Research, ANDUAT, Ayodhya |
| 09.15-09.30 | Brief Progress Report (2023-24) | **Dr. Ratan Tiwari**, Director, ICAR-IIWBR, Karnal |
| 09.30-09.40 | Remarks by Guest of Honour | **Dr. SK Pradhan**, ADG (FFC), ICAR, New Delhi |
| 09.40-10.05 | Address by the Special Guest | **Dr. PL Patil**, Vice-Chancellor, UAS, Dharwad |
| 10.06-10.30 | Address by the Chairman | **Dr. Bijendra Singh**, Vice-Chancellor, ANDUAT, Ayodhya |
| 10.30-10.50 | Presentation of Varietal Plaques & Release of Publications | All the Dignitaries on the Dias |
| 10.50-11.10 | Inaugural Address by the Chief Guest | **Dr. TR Sharma**, Deputy Director General (CS), ICAR, New Delhi |
| 11.10-11.15 | Vote of Thanks | **Dr. Pratibha Singh**, Organizing Secretary |
| **National Anthem** | | |
| **Group Photo & High Tea (11.15-11.40)** | | |

| *DAY-1: September 11, 2024 (Wednesday)* | | |
|---|---|---|
| **11.40-14.05** | **Session II- Emerging techniques for improving food and nutritional security with climate resilience** | |
| | **Chairman** | **Dr. TR Sharma,** DDG (CS), ICAR, New Delhi |
| | **Co-Chairman** | **Dr. Ratan Tiwari**, Director, ICAR-IIWBR, Karnal |
| | **Rapporteurs** | **Drs. Hanif Khan & OP Gupta,** ICAR-IIWBR, Karnal |
| | **Session Coordinator** | **Dr. HM Mamrutha** |
| 11.40-11.55 | Advancing global food and nutritional security with climate-resilient wheat solutions | Prof. Arun K. Joshi, BISA CIMMYT |
| 11.55-12.10 | Delivering genetic gain in wheat and barley in the backdrop of climate change | Dr. S K Agrawal, ICARDA |
| 12.10-12.20 | A Journey from Wild Wheats to Farmers Fields: Harnessing Genomics Technologies | Dr. Parveen Chhuneja, Director SAB, PAU Ludhiana |
| 12.20-12.30 | Accelerated breeding to mainstream grain zinc in CIMMYT wheat germplasm | Dr. Velu Govindan, CIMMYT, Mexico |
| 12.30-12.40 | Harnessing genebank germplasm diversity for stress tolerance and quality enhancement through genomics | Dr. Sundeep Sharma, NBPGR, New Delhi |
| 12.40-12.50 | New Initiatives in Rice AICRP for benefits of wheat and barley workers | Dr. SV Sai Prasad, ICAR-IRRI Hyderabad |
| 12.50-13.00 | Cultivating Global Collaborations for Wheat Health | Dr. Maricelis Acevedo, Cornell University, USA |
| 13.00-13.15 | Mobile and Real time Plant Disease diagnostic approach for rapid strain identification of rusts | Dr. David Hodson, CIMMYT Nepal |
| 13.15-13.25 | Remarks by the Co-Chairman | Dr. Ratan Tiwari, Director, IIWBR, Karnal |
| 13.25-13.40 | Remarks by the Chairman | Dr. TR Sharma, DDG (CS), ICAR, New Delhi |
| 13.40-13.45 | Vote of Thanks | Dr. OP Ahlawat, PI (CI), ICAR-IIWBR, Karnal |
| **Lunch Break (13.45-14.40)** | | |

| *DAY-1: September 11, 2024 (Wednesday)* | | |
|---|---|---|
| **14.40-17.00** | **Session III- Discipline-wise Presentation of Progress Report (2023-24)** | |
| | **Chairman** | **Dr. TR Sharma**, DDG (CS), ICAR, New Delhi |
| | **Co-Chairman** | **Dr. SK Pradhan**, ADG (FFC), ICAR, New Delhi |
| | **Rapporteurs** | **Drs. RS Chhokar** & **Vikas Gupta,** ICAR-IIWBR, Karnal |
| | **Session Coordinator** | **Dr. Anuj Kumar (Jr),** ICAR-IIWBR, Karnal |
| 14.40-14.55 | Chairman's opening remarks | Dr. TR Sharma, DDG (CS), ICAR, New Delhi |

| | | |
|---|---|---|
| 14.55-15.15 | Crop Improvement | Dr. OP Ahlawat, PI, Crop Improvement |
| 15.15-15.35 | Resource Management | Dr. SC Gill PI, Resource Management |
| 15.35-15.55 | Crop Protection | Dr. Pradeep Sharma, PI, Crop Protection |
| 15.55-16.10 | IIWBR-RS, Shimla | Dr. OP Gangwar, I/c IIWBR-RS, Shimla |
| 16.10-16.25 | Quality & Basic Sciences | Dr. Sunil Kumar, PI, Quality & Basic Sciences |
| 16.25-16.35 | Barley Network | Dr. Omvir Singh, PI, Barley Network |
| 16.35-16.40 | Social Sciences | Dr. Satyaveer Singh, PI, Social Sciences |
| 16.40-16.50 | Remarks by the Co-Chairman | Dr. SK Pradhan, ADG (FFC), ICAR, New Delhi |
| 16.50-17.00 | Concluding Remarks by the Chairman | Dr. TR Sharma, DDG (CS), ICAR, New Delhi |
| 17.00-17.05 | Vote of Thanks | Dr. BS Tyagi, PI, Coordination, ICAR-IIWBR, Karnal |
| **Tea Break (17.05-17.15)** | | |

| | | |
|---|---|---|
| **17.15-19.00** | **Varietal Identification Committee (VIC) Meeting** | |
| | Chairman | Dr. TR Sharma, DDG (CS), ICAR, New Delhi |
| | Member Secretary (VIC) | Dr. Ratan Tiwari, Director, ICAR-IIWBR, Karnal |
| | Experts | VIC members and all PIs (non-voting members) |
| | Facilitators | Drs. Satish Kumar and Jogendra Singh |
| **Cultural Evening Followed by Dinner** | | |

| **DAY-2: September 12, 2024 (Thursday)** | | |
|---|---|---|
| **09.00-11.30** | **Session-IV: Finalization of Work Plan (2024-25)** | |
| | **Chairman** | **Dr. SK Pradhan**, ADG (FFC), ICAR, New Delhi |
| | **Co-Chairman** | **Dr. Ratan Tiwari**, Director, ICAR-IIWBR, Karnal<br>**Dr. MS Saharan**, Head Pathology, IARI New Delhi |
| | **Rapporteurs** | **Drs. Satish Kumar** & **Harikrishna**, ICAR-IIWBR, Karnal |
| | **Session Coordinator** | **Dr. CN Mishra**, ICAR-IIWBR, Karnal |
| 09.00-09.10 | Opening Remarks of the Chairman | Dr. SK Pradhan, ADG (FFC), ICAR, New Delhi |
| 09.10-09.30 | Initial Remarks of the Chairman and members PAMC | **Dr. RR Hanchinal**, Former Chairperson PPVFRA<br>**Dr. ML Jat**, Global Research Program Director ICRISAT;<br>**Dr. NS Bains**, Former Director Research, PAU, Ludhiana;<br>**Dr. SC Bhardwaj**, Emeritus Scientist, IIWBR-RS, Shimla |

| | | |
|---|---|---|
| 09.30-09.50 | Briefing on Pre-workshop Meeting including Presentation on border rows effect on yield estimation on AICRP trials | Dr. Bhudeva Singh Tyagi, PI, Coordination, ICAR-IIWBR, Karnal |
| 09.50-11.00 | Crop Improvement | Dr. OP Ahlawat, PI, Crop Improvement |
| 11.00-11.10 | Resource Management | Dr. SC Gill, PI, Resource Management |
| **Tea Break (11.30-12.00)** | | |
| **12.00-13.35** | **Session-IV Finalization of Work Plan (2024-25)…..continued** | |
| 12.00-12.10 | Crop Protection | Dr. Pradeep Sharma, PI, Crop Protection |
| 12.10-12.20 | Quality & Basic Sciences | Dr. Sunil Kumar, PI, Quality & Basic Sciences |
| 12.20-12.30 | Social Sciences | Dr. Satyaveer Singh, PI, Social Sciences |
| 12.30-12.40 | Barley Network | Dr. Omvir Singh, PI, Barley Network |
| 12.40-13.00 | PAMC | Dr. RR Hanchinal, Dr. ML Jat, Dr. NS Bains and Dr. SC Bhardwaj |
| 13.00-13.20 | Remarks by the Co-Chairman | Dr. Ratan Tiwari, Director, ICAR-IIWBR, Karnal<br>Dr. MS Saharan, Head Pathology, IARI New Delhi |
| 13.20-13.30 | Concluding Remarks by the Chairman | Dr. SK Pradhan, ADG (FFC), ICAR, New Delhi |
| 13.30-13.35 | Vote of Thanks | Dr. Arun Gupta, ICAR-IIWBR, Karnal |
| **Lunch Break (13.35-14.30)** | | |
| **DAY-2: September 12, 2024 (Thursday)** | | |
| **14.30-16.05** | **Session V- Status Report from Neighbouring Countries, States and Farmers Interaction** | |
| | **Chairman** | **Dr. TR Sharma**, DDG (CS), ICAR, New Delhi |
| | **Co-Chairman** | **Dr. SK Pradhan**, ADG (FFC), ICAR, New Delhi<br>**Dr. Sanjay Kumar**, Director, ICAR-IISS Mau |
| | **Rapporteurs** | **Drs. Umesh Kamble** & **Neeraj Kumar,** ICAR-IIWBR, Karnal |
| | **Session Coordinator** | **Dr. Amit Kumar Sharma,** ICAR-IIWBR Karnal |
| 14.30-14.50 | Percolation of New Technologies in Wheat and Barley | DWD, Directors (Punjab, Haryana, UP, MP, Raj.) |
| 14.50-15.00 | Status Reports from States | Concerned Director (Agriculture) from States |
| 15.00-15.10 | Remarks from Director, ATARI | Concerned Director, ATARI |
| 15.10-15.30 | Country Report Nepal and Bangladesh | Director NARC Nepal and DG BWMRI Bangladesh |
| 15.30-15.40 | Farmers Experiences and Views | Progressive farmers from different states |
| 15.40-15.50 | Industry Experiences and Views | Industry Participants |
| 15.50-15.55 | Remarks by the Co-chairman | Dr. SK Pradhan, ADG (FFC), ICAR, New Delhi |

| | | |
|---|---|---|
| | | Dr. Sanjay Kumar, Director, ICAR-IISS Mau |
| 15.55-16.00 | Concluding Remarks by the Chairman | Dr. TR Sharma, DDG (CS), ICAR, New Delhi |
| 16.00-16.05 | Vote of Thanks | Dr. Anuj Kumar, ICAR-IIWBR, Karnal |
| **Tea Break (16.05-16.15)** | | |
| 16.15-17.30 | SAWABAR General Body Meeting and VS Mathur Memorial Lecture | |
| Cultural Evening Followed by Dinner | | |
| **DAY-3: September 13, 2024 (Friday)** | | |
| **10.00-13.00** | **Session VI- Plenary Session** | |
| | **Chief Guest** | **Dr. TR Sharma**, DDG (CS), ICAR, New Delhi |
| | **Chairman** | **Dr. Bijendra Singh**, Vice-Chancellor, ANDUAT, Ayodhya |
| | **Co-Chairman** | **Dr. SK Pradhan**, ADG (FFC), ICAR, New Delhi |
| | Rapporteurs | Drs. Pramod Prasad & Charan Singh, ICAR-IIWBR, Karnal |
| | Session Coordinator | Dr. Sanjeet Kumar, ANDUAT, Ayodhya |
| 10.00-11.20 | Significant Recommendations and Highlights of Work Plan (2024-25) | Respective PIs<br>(Dr. OP Ahlawat, Dr. SC Gill, Dr. Sunil Kumar, Dr. Pradeep Sharma & Dr. Omvir Singh) |
| 11.20-11.30 | Discussion & Remarks | All Participants |
| 11.30-11.40 | Presentation VIC report | Dr. Ratan Tiwari, Director, ICAR-IIWBR, Karnal |
| 11.40-12.05 | Felicitation of Superannuating Scientists | All Dignitaries |
| 12.05-12.10 | Finalization of Venue for Next AICRP Workshop | All participants |
| 12.10-12.30 | Remarks by the Co-Chairman | Dr. SK Pradhan, ADG (FFC), ICAR, New Delhi |
| 12.30-12.40 | Remarks by the Chairman | Dr. Bijendra Singh, Vice-Chancellor, ANDUAT, Ayodhya |
| 12.40-12.50 | Address by the Chief Guest | Dr. TR Sharma, DDG (CS), ICAR, New Delhi |
| 12.50-13.00 | Vote of Thanks | Dr. CN Mishra, Organizing Secretary |
| **National Anthem** | | |
| **Lunch (13.00 - 14.30) and Departure** | | |

हर कदम, हर डगर
किसानों का हमसफर
भारतीय कृषि अनुसंधान परिषद
Agrisearch with a human touch

बेटी बचाओ
बेटी पढाओ

स्वच्छ भारत
एक कदम स्वच्छता की ओर

भाकृअनुप
ICAR

ICAR-Indian Institute of Wheat & Barley Research

# 63वीं अखिल भारतीय गेहूँ एवं जौ अनुसंधान कार्यकर्ता गोष्ठी-2024

## आचार्य नरेन्द्र देव कृषि एवं प्रौद्योगिकी विश्वविद्यालय, अयोध्या (उत्तर प्रदेश)

# 63rd All India Wheat and Barley Workers Meet-2024

## Acharya Narendra Deva University of Agriculture & Technology, Ayodhya (Uttar Pradesh)

**सितम्बर 11-13, 2024 | September 11-13, 2024**