

प्रगति प्रतिवेदन
PROGRESS REPORT
2020-21



**PROCEEDINGS,
RECOMMENDATIONS
AND WORK PLAN**

अखिल भारतीय समन्वित गेहूँ एवं जौ अनुसंधान परियोजना

AICRP on Wheat and Barley

भा.कृ.अनु.प.-भारतीय गेहूँ एवं जौ अनुसंधान संस्थान, करनाल

ICAR-Indian Institute of Wheat and Barley Research, Karnal

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PROCEEDINGS

(Research Review, Recommendations and Plan of Work 2021-22)

60th All India Wheat & Barley Research Workers' Meet

In Virtual Mode

(August 23-24, 2021)

Organized by

ICAR-Indian Institute of Wheat & Barley Research

Issued by

Dr Gyanendra Pratap Singh

Director



ICAR-Indian Institute of Wheat & Barley Research

Karnal-132 001, Haryana, India

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FOREWORD AND ACKNOWLEDGEMENTS

It is a privilege and honour to organise the 60th All India Wheat and Barley Research Workers' Virtual Meet at the ICAR-Indian Institute of Wheat and Barley Research, Karnal during August 23-24, 2021. The meet was inaugurated by Dr. T Mohapatra, Secretary, DARE and Director General, ICAR, New Delhi. The other dignitaries who graced the occasion were Dr. TR Sharma, DDG (Crop Science); Dr. YP Singh, ADG (FFC); Dr. AK Singh, ICAR-IARI; Dr. NK Singh, ICAR-NIPB; Dr. Sanjay Kumar, ICAR-IISS; Dr. Ravi Singh, CIMMYT; Dr. AK Joshi, CIMMYT; Dr. Michael Baum, ICARDA; Dr. Harbans Bariana, University of Sydney; and Dr. Ashutosh Sarker, ICARDA. The two-day meeting, after the inaugural, had a session on reviewing the research progress of 2020-21, followed by five-year appraisal of the north eastern plains zone centres and planning of ensuing 2021-22 crop season. In addition, one session on international collaboration with the CIMMYT, ICARDA, ACIAR and JIRCAS was held wherein the past collaborative research and future prospects were deliberated. Despite the restrictions and challenges posed by the COVID-19 pandemic, the national wheat production registered an all-time gargantuan output of 109.52 million tonnes ensuring the Hon'ble Prime Minister's vision of *Atmanirbhar Bharat* (self-reliant India). I extend my heartfelt wishes and appreciation to the entire wheat and barley research fraternity for this significant achievement on production front which have been made possible with their continuous effort in technology development and outreach. Seed being the vehicle for technology delivery, a significant progress has been witnessed in 2020-21. The recently released varieties appear in seed indent list and for the first time ICAR-IIWBR variety (DBW 187) has replaced the ruling varieties like HD 2967 and HD 3086 by taking the first position. Hitherto, the country has not witnessed any pests and/or disease epidemic which are attributed to the timely monitoring and vigil as well as offering contingent advisories. Emerging transboundary threats like wheat blast has been managed coherently, since it's reporting in the neighbouring countries, with the continuous support and able leadership of Dr. T Mohapatra, Secretary, DARE and DG, ICAR. I also extend my sincere gratitude to Dr. TR Sharma, DDG (Crop Science), ICAR for his incessant interest and meticulous planning leading to the betterment of the AICRP on wheat and barley. My profound and sincere thanks to the PMC experts Dr. B Mishra (Ex. VC SKAUST-Jammu and Ex. Director ICAR-IIWBR, Karnal), Dr. BS Mahapatra (Vice Chancellor, BCKVV, Mohanpur), Dr. AN Mishra (ICAR-Emeritus Scientist, IARI RS, Indore), Dr. ML Lodha (Ex-Head, Division of Biochemistry, ICAR-IARI, New Delhi) and Dr. SR Verma (Ex- Barley Breeder, CCSHAU, Hisar) for their constructive suggestions and wisdom sharing to improve the functioning of the project. I would like to express my heartfelt gratitude to the international collaborators, Dr. Ravi Singh, CIMMYT; and Dr. AK Joshi, CIMMYT, and national collaborators and for their continuous support and every guidance to attain the stepping stone to success. I also thank all the AICRP co-operators for their timely submission of data, Principal Investigators and staff for their meticulous reporting and successful conduct of this meet. My appreciations are due to the Chairperson, Co-chair and rapporteurs of different sessions for timely conduct and recording of the proceeding. The support rendered by the Organising and Co-Organising secretary of the 60th AICRP meet is gratefully acknowledged. Finally, I believe the ensuing crop season brings new hope, new goals and new achievements.



(GP Singh)

SESSION I - INAUGURAL SESSION

August 23, 2021	Chairman	: Dr.TR Sharma, DDG(CS)
	Co-Chairman	: Dr. YP Singh, ADG(FFC)
	Chief Guest	Dr.T Mohapatra, Secretary, DARE & DG, ICAR
	Rapporteurs	: Drs.Gopalareddy K, Pramod Prasad & Mamrutha HM

The inaugural session of 60th All India Wheat and Barley Research Workers' meet was held virtually through zoom platform. The chief guest of the session was Dr. T. Mohapatra, Secretary, DARE & Director General, ICAR, New Delhi, who inaugurated the meet. Dr.TR Sharma, DDG (CS) graced the meet as chairman and Dr.YP Singh, ADG (FFC) as co-Chairman. The other dignitaries who graced the occasion were Dr. B Mishra, former VC, SKUAST-J, and Ex Director IIWBR (then DWR), Karnal Dr. AK Singh, Director, ICAR-IARI, New Delhi, Dr. AK Joshi, CIMMYT Co-ordinator, India, Dr Michael Baum, Director Biodiversity and Crop Improvement Program, ICARDA, Morocco, and others. Dr. Gyanendra Pratap Singh, Director, ICAR-IIWBR, Karnal welcomed all the dignitaries and participants attending the meet and presented the overall progress of the wheat programme made during 2020-21. Dr. Singh was pleased to appraise the house that Indian wheat production has been increasing consistently in the recent past with a record gargantuan level of 109.52 mt during 2020-21. He attributed this success to the hard work of scientists of ICAR & SAUs, policy level decisions of DAC, International cooperation with CIMMYT, ICARDA, Plant Breeding Institute, UOS, Australia, and sound policies of government and farmers faith in new production technology. He valued the notification and release of 11 wheat varieties namely, NIAW 3170, MACS 4058, DBW 303, WH1270, HD 3298, HD 3293, CG 1029, HI1633, HI 1634, NIDW1149 (d), and DDW 48 (d) during 2020-21 along with the approval of Central Sub-Committee on Crops Standards, Notification and Release of Varieties for Agricultural Crops for the area extension of DBW 187 to early sown, high fertility, irrigated condition of NWPZ. He further informed the house that during the year 2020-21 another eleven wheat varieties were released by SVRC and thirty genetic stocks of wheat were registered by the NBPGR's Plant Germplasm Registration Committee for different traits of economic importance. Likewise, two barley varieties (DWRB182 and KB1425) were released by CVRC and 7 genetic stocks of barley were registered with ICAR-NBPGR, New Delhi for traits like resistance/tolerance to biotic and abiotic stresses, male sterility, grain-quality and others. Dr. Singh also highlighted and acknowledged the major research achievements of crop protection, resource management technology, wheat and barley quality and social sciences groups. Dr. YP Singh, ADG (FFC) and co-chairman of the inaugural session praised the excellent work of wheat and barley programmes and congratulated the wheat fraternity for achieving a record wheat production along with biofortified wheat development in the country during 2020-21.

Dr. TR. Sharma, DDG, Crop science in his chairman address, congratulated the whole wheat and barley family including researchers and farmers for record wheat production in wheat and barley. He appreciated the growth rate of wheat production and also said that he gives wheat AICRP programmes as a set example for other AICRP programmes. He also listed few thrust areas to be addressed in wheat and barley research for future sustenance as listed below.

- Need to work on export quality of wheat.
- Targeted research for improving quality of specific products like pasta etc.
- Breeding should include biofortification also as major objective along with yield, as nutrition improvement is need of the hour after achieving sufficient yield.
- Pyramiding of genes for multiple diseases are important.

- Need to develop varieties through marker assisted selection and genomic selection.
- Need to use faster breeding in wheat for quicker generation advancement.
- Need to develop input use efficient varieties including WUE and NUE varieties.
- In the context of climate change, development of varietal mosaic is important instead of more area dominance by few varieties to combat stress and rust races.
- Drought and heat tolerance research needs to be strengthened along with international collaborations.
- Breed barley varieties with improved quality traits to curtail import of barley.
- Digitization of whole AICRP data at ICAR-IIWBR with good computational information is required.
- In public-private partnership need to have more industrial partnerships for product sharing.
- Celiac disease and anti-nutritional traits needs to be addressed.

Finally, he appreciated and acknowledged the good and sustained international collaboration of CIMMYT and ICARDA for sharing advanced lines. At the end he once again congratulated all wheat and barley workers.

The meeting later was followed by felicitation of crop varieties developers and it had a list of varieties which included DBW 303, DBW187(area extension in NWPZ), DDW 48(d), HD3293, HD 3298, HI1633, HI1634, WH1270, NIAW3170, CG1029, NIDW1149(d), MACS 4058, Rajendra Gehoon 3 (WB02, area extension in Bihar) as wheat varieties and one barley variety DWRB182. Organizers also felicitated the scientists super annuating before next AICRP meeting for their significant contribution in Wheat/Barley research which included the list of scientists as Drs. YP Singh (ADG, FFC), Jagdish Kumar (IIWBR), Navtej Bains (PAU), Nitish Dey (BAU), Akhilesh Tyagi (CSKHPKV), SC Bhardwaj (Flowerdale, IIWBR) and Indoo Bhagat (PAU). The IIWBR released few publications in virtual mode which included New Horizons in wheat and barley: Global trends, Breeding and quality enhancement by Springer, New Horizons in wheat and barley: Crop Protection and Resource management by Springer, Breeding frontiers in wheat published by Agrobios, Practical manual on protocols and methodologies in wheat rusts research by ICAR-Directorate of Knowledge Management in Agriculture, Bharat mein gehoon ki anumodit kismei evam unki visheshthaye, Print evam social media: Gehoon, evam jau techniques ke prasar ka sashakth madhyam, Processing and nutritional quality of Indian wheat cultivars.

Later Dr. T. Mohapatra, Secretary, DARE chief guest addressed the participants. He welcomed all national and international dignitaries and congratulated the whole wheat and barley fraternity for record production. He emphasized on collaborations of all national and international institutes and their sustained stance for significant yield improvement in India. He mentioned that setting a periodical production target goal for wheat crop has significantly helped in achieving the present yield in shorter period of time. He appreciated the significant wheat yield improvement happened in last three years along with 2.5% genetic gain. The contribution of ICAR- IIWBR for adding 9mt to the wheat production within a span of 3years was acknowledged by him. He also mentioned that we are the best in wheat productivity and in varietal development and replacement compared to other SAARC countries. Dr. Mohapatra mentioned that the varietal development and replacement rate in wheat has happened to the tune of 82% which has significantly contributed for yield improvement and congratulated ICAR-IIWBR, IARI-Delhi and IARI-Indore for their major contribution in high yielding varieties. He also mentioned that the significant and record production of wheat has to be celebrated with stamp

release. He congratulated all super-annuating scientists for their significant contribution in wheat/barley research.

He also enlisted few thrust areas to address as below

- Emphasized the need for building human resources in wheat/barley research and training young scientists in specific target areas are important
- Building schools with leaders for training youngsters are more important for having sustainability in future yield production of the crops
- As India is wide and diverse, the scientists can do still better and support in discovery of new rust resistance genes
- Nutritional improvement is very much important including Fe, Zn, Protein and antioxidants and benchmark needs to be set for all these traits in varietal release and he emphasized that in future all varieties should be biofortified
- Developing good malting barley varieties with improved nutrition is important
- Need to breed quality barley varieties to replace the importing of barley varieties
- Need to work on traits which are more important for export quality of crops
- Action taken report of previous workshop needs to be presented in present workshops
- There is a large yield gap between Punjab and Chhattisgarh in productivity, need to check with yield demonstration plots for the variations and if the productivity is too low then area extension in those areas should be avoided.
- ICAR-National Bureau of Agriculturally Important microorganisms (NBAIM), Mau institute has made consortium of microorganisms for improving nitrogen and phosphorus use efficiency. They can be extended to wheat/barley for improving nutrients use efficiency and there is a need for improving biofertilizers in wheat
- Use of nano-fertilizers in wheat/barley need to be explored and experiments have to be designed for validating their application in wheat
- Emphasized the need for digital platform in AICRP programme
- Production and protection technologies are also need to be released with certificates and implemented
- He praised the interest and involvement of researchers from SAARC countries such as Bangladesh, Bhutan, Pakistan etc. in Indian wheat programme
- He urged the need for transboundary disease protection in the context of climate change
- Submitting UC/SOE in time by centres is very much important along with complete utilization of funds in time.

The inaugural session ended with the formal vote of thanks by Dr. Gyanendra Singh, PI, Crop Improvement.

SESSION II: DISCIPLINE WISE PRESENTATION OF PROGRESS REPORT

(2020-21)

	Chairman	: Dr. B. Mishra, Ex. VC SKAUST- Jammu and Ex. Director ICAR-IIWBR, Karnal
August 23, 2021	Co-Chairman	: Dr. YP Singh, ADG (FFC), ICAR, New Delhi
	Rapporteurs	: Dr. S. Sendhil R, CN Mishra, Ravindra Kumar, RP Meena & Gopalareddy K

The session was chaired by Dr. B. Mishra, Ex. VC SKAUST-Jammu and Ex. Director ICAR-IIWBR, Karnal and co-chaired by Dr. YP Singh, ADG (FFC), ICAR. The session was graced by the Project Management Committee (PMC) experts viz., Dr. BS Mahapatra (Vice Chancellor, BCKVV, Mohanpur), Dr. AN Mishra (ICAR-Emeritus Scientist, IARI RS, Indore), Dr. ML Lodha (Ex-Head, Division of Biochemistry, ICAR-IARI, New Delhi) and Dr. SR Verma (Ex- Barley Breeder, CCSHAU, Hisar).

The chairman welcomed the delegates and invited Dr. Gyanendra Singh (PI, Crop Improvement) to deliver the progress report for the year 2020-21. Dr. Gyanendra Singh presented the list of varieties released during 2020-21 (CVRC: 12 and SVRC: 11) along with the genetic stocks registered for the various traits. He informed the house that the work plan for the ensuing crop season of the Crop Improvement was finalized on 3rd August 2021 in a pre-workshop meeting. During the reported year 2020-21, the trial conduction was 99.8% across the zones, however the reporting percent was 78.5%. The major reason for less reporting was due to low site mean observed at few centres. He also presented that 13 genotypes were found promising in the AVT trial and 47 in the NIVT trial and were promoted to the next level for evaluation. During the crop season 67% of the trials were monitored by the multi-disciplinary zonal monitoring team. He informed that through international collaboration with CIMMYT, about 350 lines were screened in Bangladesh and Bolivia against the wheat blast. Till date, 22 blast resistant wheat varieties have been released in India. He expressed his concern that the breeder seed indent has been declining over the years. In his presentation he emphasized that the recently released varieties are coming up in seed indents and for the first time the ICAR-IIWBR variety (DBW 187) has replaced the ruling varieties like HD 2967 and HD 3086 to take the first position. Initiation of 'Visitors' Week' was also highlighted. Towards the end of his presentation, he listed various capacity building programs offered during the year and different points for discussion by the august gathering. The chairman and experts appreciated Dr. Gyanendra Singh for highlighting the significant achievements of the crop improvement team. Dr. YP Singh was seeking action for the funded centres that hadn't conducted/reported the trails, for which Director ICAR-IIWBR responded that a 50% cut in contingency will be made and the fund will be diverted to the performing centres.

Dr. Tripathi presented the progress report of resource management experiments conducted during 2020-21. He informed the house that the work plan for the ensuing crop season of the Resource Management was finalized in a pre-workshop meeting held on 10th August, 2021. During the reported year 2020-21, the overall conduction of trial was 92.3 percent with a success and rejection rate of 95.8 percent and 4.2 percent, respectively. The reasons for rejection of trial were due to low site mean and improper data reporting. PI, RM presented that in AVT-II year trial of NWPZ, test entry JKW 261 was inferior to the best check PBW 771. In restricted irrigation timely sown trial, test entry DBW 296 found significantly better with a yield gain of 2.44 per cent. In early sown high yield trial, one test entry DBW327 was found significantly better with a yield gain of 6.92 per cent. In Central Zone under irrigated timely sown

conditions test entry HI 1636 was found significantly superior to the best check variety whereas in RIR trial, test entry HI 8823(d) found significantly superior to the best check DDW 47(d). In early sown high yield trial two test entries DBW 327 and DBW 333 were found significantly better than the best check with a yield gain of 4.68 and 4.30 per cent, respectively. In PZ, one test entry MP 1358 was tested under RIR conditions, found significantly superior to best check NIAW 3170 and check NIDW 1149 (dc) with a yield gain of 14.04 and 12.54 per cent respectively.

PI, Resource Management also presented the progress report of special trials conducted across the zones including trials on sowing dates, system diversification, input use efficiency especially water use efficiency. He also briefed the house on the modified rotary disc drill, a machine to overcome the problem of residue burning. After the presentation, Dr. Lodha insisted on inclusion of a trial on nitrogen use efficiency. Dr. Harbans suggested inclusion of trial on the genetic and agronomic interaction on yield levels. Dr. GP Singh informed the house that in the subsequent season, bio NPK and nano fertilizer trials will be conducted by the resource management team. Based on the results Dr. SC Tripathi presented the agronomic recommendations i.e. 1. Sowing from 25th Oct to 5th Nov. for maximizing wheat grain yield in NHZ and NWPZ, 2. Sowing from 5th to 15th Nov. for maximizing wheat grain yield in NEPZ, CZ and PZ, 3. Application of 150% RDF+ 15 t/ha FYM+ GR (CCC @ 0.2% + tebuconazole @0.1%) at first node and flag leaf stages to maximise wheat grain yield across the zones, 4. Surface seeding of 150kg seed/ha primed with 1% KNO₃ for maximizing wheat grain yield in wetland of NEPZ. PI, Resource Management also informed the house about new special agronomic experiments to be conducted across the zones covering aspects of efficacy of herbicides, nano fertilizers, foliar application of K for improving water productivity, quality improvement, NPK solubilising microbial consortium and application of KSi for improving wheat productivity.

Dr. Sudheer Kumar (PI, Crop Protection) presented the progress report of crop protection. During his presentation, Dr. Sudheer Kumar informed the house that total plant pathology centres are 33 out of which 17 are funded. Entomology and nematology programmes share 9 and 4 centres, respectively with 2 funded centres in each programme. PI, Crop Protection informed that the work plan for the ensuing crop season of the Crop Protection was finalized on 5th August 2021 in a pre-workshop meeting. He highlighted that 350 advanced breeding lines and potential germplasm were screened at Jessore, Bangladesh and Quirassallis, Bolivia through CIMMYT as the preparedness against wheat blast disease. Besides this, he also focused on IPM modules developed under this programme against major insect pests of wheat. Dr. Y.P. Singh, the Co-Chairman stressed upon the need of programme on biological control of wheat pathogens, focused work on aphids' resistance and suggested to include more centers on entomology and nematology perspective.

Dr. SC Bhardwaj (Head, ICAR-IIWBR, Regional Station Flowerdale, Shimla) in his presentation outlined the status of pathotypes of wheat rust pathogens in the samples received from different parts of the country and some neighbouring countries. Pathotype 238S119 is becoming dominant in the case of yellow rust and pathotype 77-9 is more prevalent in the case of brown rust of wheat. He highlighted the discovery of the *Lr* 80 gene from India, a significant achievement of ICAR-IIWBR. The house congratulated Dr. Bhardwaj for this wonderful contribution. The Chairman, Dr. B. Mishra and Co-Chairman, Dr. Y.P. Singh along with Dr. G.P. Singh, Director, ICAR-IIWBR extended their good wishes to Dr. S.C. Bhardwaj on his forthcoming superannuation.

Dr. Sewa Ram (PI, Wheat Quality) presented the significant achievements in wheat quality. He highlighted the promising genotypes identified for different wheat products, processing and nutritional quality. He emphasised the benchmark developed for various quality traits. He also informed that the bread wheat produced in the NWPZ is better in quality in comparison to the CZ. In his presentation, he highlighted that there is a significant change in the gluten strength over years and increase in the yellow pigment in CZ and PZ, followed by briefing the house on agronomic intervention for biofortification. Further, he informed the house that due to COVID-19 restrictions, quality analysis of *mandi* samples was done on a limited scale. Dr. Lodha congratulated the progress and insisted to include the action taken report as well as to set a benchmark for quality parameters in varietal release and/or in pre-breeding program with respect to traits like protein and iron & zinc. Dr. GP Singh responded that despite quality being a very important component, yield level is relatively a more vital attribute for varietal release and hence cannot be compromised. Further, he added that at present two quality parameters are considered in the variety identification process. Dr. Mishra corroborated that fixing the quality parameter will not be advisable as bioavailability of nutrients is still a persisting issue. Dr. Anju M. Singh from ICAR-IARI, New Delhi suggested focusing on the NWPZ for research on wheat used to produce *chapati*, rather than the CZ.

Dr. RPS Verma (PI, Barley Network) presented the achievement and progress of barley coordination. He expressed his concern over the continuous decline in the breeder seed indent owing to fall in the crop acreage over years. In his presentation, he highlighted the overall production scenario, trials conducted including special trials and the progress in barley quality along with the PPP in technology transfer in collaboration with AB InBev (as a consultancy project). He also listed the new varieties released and genetic stocks registered for various traits including resistance for aphids, followed by research progress on malt barley. Dr. YP Singh and Dr. SR Verma congratulated the progress in barley improvement. Dr. SR Verma appreciated the research work on malt barley identification based on three quality traits.

Dr. Satyavir Singh (PI, Social Sciences) presented the progress report on technology transfer through FLDs at the farmers' field. In his presentation, he expressed his concern over non-allotment of wheat FLDs by the Ministry of Agriculture and Farmers Welfare for the year 2020-21. However, 160 wheat demonstrations (DBW 222) were conducted in Punjab and Haryana under the SCSP program. The DBW 222 variety yielded upto 70q/ha in Fatehabad (Haryana). In the case of barley, 250FLDs were conducted at 315 farmers' fields. He also presented the highest yielding variety in all barley growing zones. The highest yield level was recorded for RD 2907 with 70 q/ha at the NWPZ.

After the presentation of progress report by all the section PI's, there was a detailed deliberation by the Chairman, Co-Chairman, PMC experts and Dr.GP Singh, Director, ICAR-IIWBR on various issues like merging the PZ and CZ which was withheld. Dr. YP Singh, ADG (FFC) in his remarks congratulated the functioning of AICRP on wheat and barley. In the concluding remarks, Dr. B. Mishra appreciated the functioning of AICRP on wheat and barley as well as being a model for other AICRPs despite many challenges at the forefront. He suggested focusing more on input use efficiency and addressing the farmer-oriented problems. He viewed barley as a very good crop adaptive to climate change and it needs a boost on the policy front. The Day 1 session wrapped up with the concluding remarks by Dr. GP Singh, Director, ICAR-IIWBR. He acknowledged the presence of dignitaries across the globe and thanked the PMC experts for sharing their wisdom. He also complimented the research partners from India and abroad for the project outcome and impact.

SPECIAL SESSIONS: RESEARCH PLANNING AND FINALIZATION OF WORK PLAN (2021-22)

Due to the pandemic situation caused by COVID 19, the AICRP workshop was held on virtual mode for two days during August 23-24, 2021. To discuss the various activities for season 2021-22 in detail, the work plan meetings for finalization (disciplinewise) were held before actual virtual meeting. This gave the opportunity for discussion in detail to all the cooperating centers. The meeting of Crop Improvement was held on August 03, 2021, Crop Protection and Quality and Basic Sciences on August 05, 2021, Barley Network on August 07, 2021, Resource Management and Social Sciences on August 10, 2021. The work plan finalized for 2021-22 crop season of each program is given as under:-

PROCEEDINGS OF THE MEETING TO FINALIZE THE CROP IMPROVEMENT WORK PLAN

August 03, 2021	Chairman : Dr. GP Singh, Director ICAR-IIWBR
	Co-Chairman : Dr. Gyanendra Singh, PI, Crop Improvement
	Rapporteur : Drs. Charan Singh, Mamrutha HM and Vikas Gupta

The virtual meeting to finalize the work plan (2021-22) of crop improvement was organised on 03.08.2021 at ICAR-IIWBR, Karnal. The meeting was attended by the contributors, trial conducting centres and all the AICRP co-operators from funded as well as voluntary centres across the country. Dr. Gyanendra Singh, PI, Crop Improvement welcomed participants of the meeting to discuss and finalise work plan and recommendations. Dr. GP Singh, Chairman congratulated all wheat workers and farming community for the record wheat production in the last five years in the country. He also informed the participants about the financial situation in the present EFC and he opined about putting strict yardsticks for better trial conduction and reporting. Dr. Gyanendra Singh, Principal Investigator (Crop Improvement) submitted that utmost care has been taken in compiling and analysing the AICRP data and accordingly entries have been promoted. He also asserted that due weightage has been given to entries having wheat blast resistance and superiority for quality traits in promotion of entries. He then informed that tentative work plan (2021-22) of Crop Improvement was uploaded on the website on 16-07-2021 for the suggestions/ comments from the cooperators. All the possible changes were considered in light of the published guidelines and accordingly updated version was once again uploaded and shared through email on 02-08-2021. The updated version was then taken up for trial wise presentation made by Dr. Satish Kumar. The presentation highlighted trial conducting centres, constitution, entries promoted, checks included, sowing plan, seed rate and all other details for NIVTs, AVTs of all five zones and special trials followed by the discussion.

NIVTs

1. Dr. Surya Parkash (BAU-Ranchi) raised point regarding the dates of sowing for irrigated timely sown trials in NEPZ, but Dr. GP Singh asked him to plan in advance and being funded centre make sure to plant all the timely sown trials as per dates of sowing as all the RI trials are also planted in the same window.
2. On the request of Dr Rudrasain Singh (Sagar), chairman agreed to allot TS and LS trials to Sagar centre.
3. Hisar and Udaipur centre asked to allot more entries above allotted quotas in different trials but the same was not agreed as it is difficult to include new entries now.

4. Dr. Rajbir Yadav raised the issue of dropping Jammu centre data in NIVT-1A and asked to analyse the data according to BLUP. Dr. Ajay Verma responded to him and explained the advantages and disadvantages of BLUP analysis in case of balanced data and mentioned that the BLUP analysis is more used in case of unbalanced data for prediction analysis. Moreover, further analysis of only one trial after decoding is not permissible.

NHZ

5. Dr. Lakshmi Kant requested to continue all ongoing trials in NHZ, but keeping in view of all the constraints including limited area covered under NHZ varieties, breeder seed indent and more area in NHZ being occupied by NWPZ varieties, chairman suggested to work more on strategic research to checkmate rust diseases and not to focus on varietal programme. Dr. DP Walia and Dr. Vijay Rana also emphasised the need of RI-LS trial in NHZ to support the small and marginal farmers in NHZ. Dr. GP Singh agreed to continue the said trial subject to no contingency support by ICAR-IIWBR Karnal for the same. Dr. GP Singh asked Drs. Lakshmi Kant, DP Walia and Vijay Rana to send the commitment letter for contingency arrangement to voluntary centres in NHZ.

NWPZ

6. Dr. VS Sohu raised the query regarding non-inclusion of proposed entry on MABB basis in PBW175 background. Dr. Gyanendra Singh informed that the said entry was not meeting the SOP of MABB trial as PBW175 is more than 15 years old and also not figuring in seed chain.

NEPZ

7. The workplan of NEPZ was discussed and approved by the house.

CZ

8. The work plan of CZ was discussed and approved by the house.

PZ

9. Dr. Gyanendra Singh informed the house that on their request, Kolhapur and K-Digraj locations have been discontinued from this crop season. Dr. Dodke requested to shift trial from K-Digraj to Dhulia and was agreed. Dr. SS Dodake was asked to send email request to PI (CI) for this change along with complete postal address of proposed centre.
10. The work plan of PZ was discussed and approved by the house.

Special Trials

SPL-HYPT

11. Dr. VS Sohu requested to continue Gurdaspur location for SPL-HYPT and NIVT-6A and the same was agreed by the house. Work plan was approved as proposed.
12. SPL-SAT/ALK and SPL-Dic trials/ nurseries have been discontinued from this crop season and the promising entries if any, will be evaluated in the ongoing AVTs in respective zones and comparisons will be made with the corresponding best check.

National and International Nurseries

13. MLHT, DHTSN and SDN have been discontinued from this crop season. Few centres (Kalyani, Vijapur and Shillongani) have asked for some National & International trials/ nurseries and the same was agreed subject to set availability.
14. The updated work plan of national and international nurseries was approved by the group as proposed.

Remarks by PI-CI: PI-CI informed the co-operators to look into the revised DOS, site mean and also to harvest grossplot in all the coordinated trials.

Concluding Remarks of the Chairman: The chairman appreciated the efforts of PI, Crop Improvement and staff who contributed to compiling, tabulation, reporting and uploading of progress report well in time. He also pointed out that few centres are planting their test entries in AICRP yield trial blocks/ fields. For coded trial testing system, such violations will be taken very seriously and all the trials of that centre are liable to be rejected. Keeping in view of the COVID-19 situation, the decision was taken that from 2020-21 onwards all the AICRP trials will be constituted and dispatched by the ICAR-IIWBR, Karnal, hence the obligations and contingency support to zonal coordinators stands withdrawn. The Chairman also reiterated that all the decisions are taken in a transparent and unbiased manner for the betterment of AICRP and he wished that next year also we will achieve higher production with the concerted efforts of all co-operators and farming community.

The meeting was ended with a formal vote thanks by Dr. BS Tyagi and the proceedings are issued with the approval of the Chairman.

WORK PLAN (2021-22): CROP IMPROVEMENT

National Initial Varietal Trial NIVT-1A-IR-TS-TAS, 2021-22

Conducting centres

Zone	No.	Centres
NWPZ	11	Delhi, Jammu, Ludhiana, Gurdaspur, Hisar, Karnal, Bulandshahr, Pantnagar, Modipuram, Gwalior, Sriganaganagar
NEPZ	9	Kanpur, Ayodhya, Varanasi, Sabour, RPCAU-Pusa, Ranchi, Kalyani, Coochbehar, Shillongani
Total	20	

Details of trial entries

SN	Contributing Centres	No. of Entries	Name of entries
1.	IARI, Delhi	4	HD3419, HD3420, HD3421, HP1974
2.	IIWBR, Karnal	5	DBW379, DBW380, DBW381, DBW382, DBW383
3.	Durgapura	3	RAJ4566, RAJ4567, RAJ4568
4.	Ayodhya	1	NW8046
5.	Hisar	3	WH1301, WH1302, WH1303
6.	Kanpur	1	K2101
7.	Ludhiana	5	PBW882, PBW883, PBW884, PBW885, PBW886
8.	Pantnagar	4	UP3101, UP3102, UP3103, UP3104
9.	Varanasi	1	HUW849
10.	Sabour	1	BRW3921
11.	CSSRI, Karnal	1	KRL2002
12.	Coochbehar	1	UBW16
13.	Gwalior	1	RVW4350
14.	Jammu	1	JAUW695
15.	Bio Seed	1	BW17R6045
	Checks	3	DBW187, DBW222, HD3086
Total entries		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, 2021-22

Conducting centres

Zone	No.	Centres
NWPZ	11	Delhi, Jammu, Ludhiana, Gurdaspur, Hisar, Karnal, Bulandshahr, Pantnagar, Gwalior, Modipuram, Sriganaganagar
NEPZ	9	Kanpur, Ayodhya, Varanasi, Sabour, RPCAU-Pusa, Ranchi, Kalyani, Coochbehar, Shillongani
Total	20	

Details of trial entries

SN	Contributing centres	No. of Entries	Name of entries
1.	IARI, Delhi	4	HD3422, HD3423, HP1975, HI1668
2.	IIWBR, Karnal	4	DBW379, DBW384, DBW385, DBW386
3.	CSSRI, Karnal	1	KRL2020
4.	Durgapura	2	RAJ4569, RAJ4570
5.	Ayodhya	2	NW8044, NW8049
6.	Hisar	2	WH1304, WH1305
7.	Kanpur	3	K2103, K2104, K2105
8.	Ludhiana	4	PBW887, PBW888, PBW889, PBW890
9.	Pantnagar	2	UP3105, UP3106
10.	Ranchi	1	JKW297
11.	Sabour	2	BRW3926, BRW3910
12.	Varanasi	2	HUW850, HUW851
13.	BARC	1	TAW142
14.	Gwalior	1	RVW4353
15.	Nuziveedu Seeds	1	NWS2214
16.	Prayagraj	1	AAI-W49
	Checks	3	DBW187, DBW222, HD3086
Total entries		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-2-IR-TS-TAS, 2021-22

Conducting centres

Zone	No.	Centres
CZ	9	Indore, Powarkheda, Durgapura, Jabalpur, Bilaspur, Junagadh, Vijapur, Kota, Udaipur
PZ	7	Niphad, Pune, Akola, Parbhani, Dharwad, Ugar-Khurd, Nippani
Total	16	

Details of trial entries

SN	Contributing Centres	No. of Entries	Name of entries
1.	IARI, Delhi	4	HD3424, HI1669, HI1670, HI1671
2.	IIWBR, Karnal	2	DBW387, DBW388
3.	Bilaspur	1	CG1043
4.	Dharwad	2	UAS3020, UAS3021
5.	Durgapura	1	RAJ4575
6.	Gwalior	2	RVW4355, RVW4358
7.	Hisar	1	WH1306
8.	Jabalpur	2	MP3558, MP3559
9.	Ludhiana	1	PBW891
10.	Niphad	2	NIAW4153, NIAW4183
11.	Powarkheda	2	MP1386, MP1387
12.	Pune	4	MACS6811, MACS6809, MACS6808, MACS6815
13.	Akola	1+1	AKAW5100, AKAW 5314
14.	Vijapur	2	GW536, GW537
15.	Junagadh	2	GW540, GW541
16.	Udaipur	1	PWU15
17.	Nuziveedu Seeds	1	NWS2222
18.	NIF	1	BLK-Balaji
	Checks	3	GW322, HI1544, MACS6222
Total entries		36 (33+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	: 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, 2021-22**

Conducting centres

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

Details of trial entries

SN	Contributing centres	No. of Entries	Name of entries
1.	IARI, Delhi	4	HD3425, HD3426, HD3427, HD3428
2.	IIWBR, Karnal	5	DBW389, DBW390, DBW391, DBW392, DBW393
3.	Durgapura	3	RAJ4572, RAJ4573, RAJ4574
4.	Ayodhya	2	NW8040, NW8045
5.	Hisar	3	WH1307, WH1308, WH1309
6.	Kanpur	3	K2107, K2108, K2109
7.	Ludhiana	5	PBW892, PBW893, PBW894, PBW895, PBW896
8.	Pantnagar	3	UP3108, UP3109, UP3110
9.	Ranchi	1	JKW298
10.	Varanasi	1	HUW852
11.	Sabour	1	BRW3923
12.	Prayagraj	1	AAI-W42
	Checks	4	HD3059, DBW173, HI1563, DBW107
Total entries		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	: 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-3B-IR-LS-TAS, 2021-22**

Conducting centres

Zone	No.	Centres
CZ	10	Indore, Powarkheda, Jabalpur, Sagar, Bilaspur, Raipur, Junagadh, Vijapur, Durgapura, Udaipur
PZ	7	Dharwad, Niphad, Pune, Parbhani, Akola, Nippani, Ugar-khurd
Total	17	

Details of trial entries

SN	Contributing centres	No. of Entries	Name of entries
1.	IARI, Delhi	4	HI1672, HI1673, HI1674, HI1675
2.	IIWBR, Karnal	2	DBW394, DBW395
3.	Akola	1	AKAW5104
4.	Bilaspur	1	CG1042
5.	Dharwad	2	UAS3022, UAS3023
6.	Hisar	1	WH1310
7.	Jabalpur	2	MP3556, MP3557
8.	Junagadh	1	GW542
9.	Lok Bharti	1	LOK79
10.	Gwalior	1	RVW4355
11.	Ludhiana	1	PBW897
12.	Niphad	2	NIAW4114, NIAW4120
13.	Powarkheda	1	MP1388
14.	Pune	2	MACS6814, MACS6805
15.	Vijapur	1	GW538
	Checks	2	HD2864, HD2932
Total entries		25 (23+2)	

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, 2021-22**

Conducting centres

Zone	No.	Centres
CZ	10	Powarkheda, Indore, Sagar, Junagadh, Vijapur, SK Nagar, Jabalpur, Bilaspur, Kota, Udaipur
PZ	7	Dharwad, Ugar-Khurd, Nippani, Niphad, Pune, Akola, Parbhani
Total	17	

Details of trial entries

SN	Contributing Centres	No. of Entries	Name of entries
1.	IARI, Delhi	3	HI8841, HI8842, HI8843
2.	IIWBR, Karnal	2	DDW59, DDW60
3.	Dharwad	2	UAS479, UAS480
4.	Ludhiana	2	PDW362, PDW363
5.	Niphad	1	NIDW1485
6.	Powarkheda	2	MPO1389, MPO1390
7.	Pune	2+1	MACS4120, MACS4121, MACS4122
8.	Vijapur	2+1	GW1360, GW1361, GW1364
9.	Udaipur	1+1	PWU18, PWU19
10.	Junagadh	1	GW1363
	Checks	4	HI8713, HI8737, MACS3949, UAS428
Total entries		25 (21+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	: November 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-5A-RI-TS-TAS, 2021-22**

Conducting centres

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

Details of trial entries

SN	Contributing Centres	No. of Entries	Name of entries
1.	IARI, Delhi	4	HD3429, HD3430, HP1976, HI1676
2.	IIWBR, Karnal	4	DBW396, DBW397, DBW398, DBW399
3.	Ayodhya	1	NW8048
4.	Hisar	2	WH1311, WH1312
5.	Jammu	1	JAUW704
6.	Kanpur	1	K2121
7.	Ludhiana	3	PBW898, PBW899, PBW900
8.	Pantnagar	2	UP3111, UP3112
9.	Ranchi	1	JKW292
10.	Sabour	1	BRW3924
11.	Varanasi	1	HUW853
12.	BARC	1	TAW133
	Checks	3	HI1612, K1317, PBW644
Total entries		25 (22+3)	

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, 2021-22

Conducting centres

Zone	No.	Centres
CZ	10	Powarkheda, Indore, Sagar, Jabalpur, Bilaspur, Durgapura, Udaipur, Vijapur, Junagadh, Dhandhuka
PZ	10	Dharwad, Bagalkot, Nippani, Niphad, Pune, Akola, Ugar-Khurd, Parbhani, Savalivihir, Bailhongal
Total	20	

Details of trial entries

SN	Contributing Centres	No. of Entries	Name of entries
1.	Delhi	5	HI1677, HI1678, HI1679, HI8844(d), HI8845(d)
2.	IWBR, Karnal	3	DBW397, DBW400, DDW61(d)
3.	Akola	1	WSM253
4.	Bilaspur	1	CG1041
5.	Dharwad	2	UAS3024, UAS481(d)
6.	Jabalpur	1	MP3562
7.	Niphad	2	NIAW4172, NIAW4178
8.	Powarkheda	2	MP1384, MP1385
9.	Pune	2	MACS6797, MACS6801
10.	Vijapur	2	GW539, GW1362(d)
	Checks	4(2A+2D)	DBW110, HI1605, HI8627(d), UAS446(d)
Total entries		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) (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-6A-ES-IR-NWPZ/NEPZ, 2021-22

Trial conducting centres

Zone	No.	Centres
NWPZ	12	Delhi, Ludhiana, Ladowal, Gurdaspur, Hisar, Karnal, Modipuram, Bulandshahr, Pantnagar, Bharatpur, Gwalior, Sriganaganagar
NEPZ	7	Kanpur, Ayodhya, Varanasi, Sabour, BISA-Pusa, Ranchi, Kalyani
Total	19	

Details of test entries

Contributing Centres	No. of entries	Name of entries
IARI, Delhi	4	HD3431, HD3432, HD3433, HI1682
PAU, Ludhiana	4	PBW877, PBW878, PBW879, PBW880
IIWBR, Karnal/BISA	5+2	DBW296, DBW379, DBW380, DBW382, DBW383, DBW403, DBW404
CCSHAU, Hisar	2	WH1313, WH1314
GBPUAT, Pantnagar	2	UP3115, UP3116
RARI, Durgapura	1	RAJ4571
CSA, Kanpur	1	K2001
BAU, Sabour	1	BRW3922
Checks	3	HD3086, DBW187, DBW303
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	: October 25- November 5
Seed rate (kg/ha)	: 100
Seed requirement	: 7 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

National Initial Varietal Trial
NIVT-6B-ES-IR-CZ/PZ, 2021-22

Trial conducting centres

Zone	No.	Centres
CZ	9	Indore, Powarkheda, BISA-Jabalpur, Jabalpur, Bilaspur, Junagadh, Vijapur, Durgapura, Udaipur
PZ	6	Niphad, Pune, Dharwad, Ugar-Khurd, Nashik, Karad
Total =	15 (9+6)	

Details of test entries

Contributing Centres	No. of entries	Name of entries
IARI, Delhi	3+1	HD3435, HI1680, HI1681, HP1977
PAU, Ludhiana	1	PBW881
IIWBR, Karnal/BISA	2+2	DBW381, DBW401, DBW405, DBW406
Bilaspur	1	CG1044
Jabalpur	2	MP3564, MP3567
Junagadh	2	GW545, GW546
Vijapur	2	GW543, GW544
Powarkheda	1	MP1391
Pune	2	MACS6802, MACS6803
Dharwad	2	UAS3025, UAS3026
Niphad	2	NIAW4040, NIAW4174
Checks	2	GW322, DBW187
Total	25 (23+2)	

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	: 1-10 November
Seed rate (kg/ha)	: 100
Seed requirement	: 7 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
Advance Varietal Trial, 2021-22
AVT-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
VPKAS, Almora	3	VL2041 ^{Q*} , VL2043, VL2044
IARI, New Delhi	1	HD3402
Checks	4	VL907, HS507, HPW349, HS562
Total	8 (4+4)	

Experimental details

Design	: R.B.D.
Replications	: Six
Plot size	: 3.5 x 1.20m (6 rows)
Fertilizer dose (kg/ha) (N:P:K)	: (60:30:20)
Time of sowing	: October 15-31
Seed rate (kg/ha)	: 100
Seed requirement	: 6 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
Initial Varietal Trial, 2021-22
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	4	HS688, HS689, HS690, HS691
CSKHPKV, Malan	4	HPW483, HPW484, HPW485, HPW486
VPKAS, Almora	4	VL2047, VL2048, VL2049, VL2050
GBPUA&T, Pantnagar	1	UP3113
SKUAST-K, Khudwani	1	SKW362
Checks	2	HS507, HS562
Total	16 (14+2)	

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	: 6 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
Initial Varietal Trial, 2021-22
IVT/AVT-RI-LS-TAS

Trial conducting centres

State	Centres	Name of the centres
Himachal Pradesh	3	Shimla, Malan, Bajaura
Uttarakhand	3	Almora, Majhera, Gaja
Manipur	1	Imphal
Total	7	

Details of test entries

Contributing Centres	No. of entries	Name of entries
CSKPHKV, Malan	3	HPW481, HPW487, HPW488
IARI, RS, Shimla	3	HS692, HS693, HS694
VPKAS, Almora	3	VL3028, VL3029, VL3030
GBPUA&T, Pantnagar	1	UP3114
Checks	2	VL892, HS490
Total	12 (10+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	: 7 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, 2021-22
AVT-IR-TS-TAS**

Trial conducting centres

State	No.	Centres
Punjab	4	Ludhiana, Gurdaspur, Rauni, Faridkot
Haryana	4	Hisar, Karnal, Rohtak, Bawal
Rajasthan	1	Sriganganagar
Uttar Pradesh	4	Nagina, Bulandshahr, Modipuram, Ujhani
Uttarakhand	2	Pantnagar, Kashipur
J & K	1	Jammu
MP	1	Gwalior
Delhi	1	Delhi
Total	18	

Details of test entries

Contributing Centres	No. of entries	Name of entries
IARI, Delhi	1	HD3386
PAU, Ludhiana	1	PBW826*
Checks	4	HD2967, HD3086, DBW187, DBW222
Total	6 (2+4)	

* denotes final year 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	: 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 Western Plains Zone
Advance Varietal Trial, 2021-22
AVT-IR-LS-TAS**

Trial conducting centres

State	No.	Centres
Punjab	4	Ludhiana, Gurdaspur, Rauni, Faridkot
Haryana	4	Hisar, Karnal, Rohtak, Bawal
Rajasthan	1	Sriganganagar
Uttar Pradesh	4	Nagina, Bulandshahr, Modipuram, Ujhani
Uttarakhand	2	Pantnagar, Kashipur
J & K	1	Jammu
MP	1	Gwalior
Delhi	1	Delhi
Total	18	

Details of test entries

Contributing Centres	No. of entries	Name of entries
IIWBR, Karnal	1	DBW353
Checks	5	HD3059, DBW173, WH1124, PBW771, JKW261(I)
Total	6 (1+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 Western Plains Zone
Advance Varietal Trial, 2021-22
AVT-RI-TS-TAS**

Trial conducting centres

State	No.	Centres
Punjab	3	Ludhiana, Gurdaspur, Balachaur
Haryana	3	Hisar, Karnal, Bawal
Uttar Pradesh	3	Modipuram, Nagina, Bulandshahr
Rajasthan	1	Sriganganagar
Uttarakhand	1	Pantnagar
J&K	1	Jammu
MP	1	Gwalior
Delhi	1	Delhi
Total	14	

Details of test entries

Contributing Centres	No. of entries	Name of entries
IWBR, Karnal	2	DBW358, DBW359
HAU, Hisar	2	WH1402, WH1403
IARI, Delhi	4	HD3369*, HD3397, HD3400, HD3418
IARI, Indore	2	HI1653*, HI1654*
GBPUAT, Pantnagar	1	UP3090
Checks	6	PBW644, HD3043, NIAW3170, HI1628, DBW296(I), HUW838(I)
Total	17 (11+6)	

* 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 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, 2021-22
AVT-IR-TS-TAS**

Trial conducting centres

State	No.	Centres
Uttar Pradesh	7	Kanpur, Prayagraj, Araul, Ghaghraghat, Ayodhya, Varanasi, Gorakhpur
Bihar	3	Sabour, Purnea, RPCAU-Pusa
West Bengal	4	Coochbehar, Kalyani, Burdwan, Manikchak
Jharkhand	3	Ranchi, Chianki, Dumka
Assam	1	Shillongani
Total	18	

Details of test entries

Contributing Centres	No. of entries	Name of entries
PAU, Ludhiana	2	PBW826 ^{#*} , PBW852
IARI, Delhi	2	HD3386 [#] , HD3388
Checks	5	HD3249, DBW187, HD3086, HD2967, DBW222(I)
Total	9 (4+5)	

[#] denotes resistance to wheat blast; ^{*} final year 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	: 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, 2021-22
AVT-IR-LS-TAS**

Trial conducting centres

State	No.	Centres
Uttar Pradesh	7	Kanpur, Prayagraj, Araul, Ghaghraghat, Ayodhya, Varanasi, Gorakhpur
Bihar	3	Sabour, Purnea, RPCAU-Pusa
West Bengal	4	Coochbehar, Kalyani, Burdwan, Manikchak
Jharkhand	3	Ranchi, Chianki, Dumka
Assam	1	Shillongani
Total	18	

Details of test entries

Contributing Centres	No. of entries	Name of entries
IWBR, Karnal	1	DBW316 ^{#*}
PAU, Ludhiana	2	PBW833 [*] , PBW835 ^{Q*}
IARI, Delhi	1	HD3392
Checks	4	HI1563, DBW107, HD3118, HI1621
Total	8 (4+4)	

[#] denotes resistance to wheat blast; ^{*} final year 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	: 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, 2021-22
AVT-RI-TS-TAS**

Trial conducting centres

State	No.	Centres
Uttar Pradesh	7	Kanpur, Prayagraj, Araul, Ghaghraghat, Ayodhya, Varanasi, Gorakhpur
Bihar	3	Sabour, Purnea, RPCAU-Pusa
West Bengal	4	Coochbehar, Kalyani, Burdwan, Manikchak
Jharkhand	3	Ranchi, Chianki, Dumka
Assam	1	Shillongani
Total	18	

Details of test entries

Contributing Centres	No. of entries	Name of entries
IIWBR, Karnal	1	DBW359
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	: 22 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, 2021-22
AVT-IR-TS-TAD

Trial conducting centres

State	No.	Centres
Gujarat	5	Vijapur, SK Nagar, Anand, Amreli, Junagadh
Madhya Pradesh	5	Jabalpur, Sagar, Powarkheda, Indore, KVK-Ujjain
Chhattisgarh	4	Bilaspur, Raipur, Jagdalpur, Ambikapur
Rajasthan	5	Durgapura, Tabiji, Kota, Udaipur, Mandor
Total	19	

Details of test entries

Contributing Centres	No. of entries	Name of entries
IARI, Indore/Delhi	2	HI1650*, HD3441 ^B
IWBR, Karnal	3	DBW352 [#] , DBW407 ^B , DBW408 ^B
JNKVV, Jabalpur	1	MP3535*
Nuziveedu Seeds	1	NWS2194 [#]
ARI, Pune	1	MACS6768*
SDAU, Vijapur	1	GW547 ^B
Checks	4	GW322, HI1544, GW513(I), HI1636(I)
Total	13 (9+4)	

* denotes final year entry; [#] denotes resistance to wheat blast

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
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, 2021-22
AVT-RI-TS-TAD

Trial conducting centres

State	No.	Centres
Gujarat	5	Vijapur, Amreli, Dhandhuka, Sanosara, Junagadh
Madhya Pradesh	4	Jabalpur, Powarkheda, Sagar, Indore
Chhattisgarh	4	Bilaspur, Ambikapur, Raipur, Jagdalpur
Rajasthan	3	Durgapura, Udaipur, Mandor
Total	16	

Details of test entries

Contributing Centres	No. of entries	Name of entries
IARI, Indore	4	HI8830(d)*, HI1655 ^{Q*} , HI1665, HI1666
IARI, Delhi	1	HD3401
IWBR, Karnal	3	DBW358, DBW359, DDW55(d) ^{Q*}
UAS, Dharwad	1	UAS3019
ARI, Pune	1	MACS6795
ARS, Niphad	1	NIAW4028
IGKV, Bilaspur	2	CG1036*, CG1040
SDAU, Vijapur	1	GW532
JNKV, Powarkheda	1	MP1377
Checks	5	HI8627(d), MP3288, DBW110, DDW47(d), HI8823(d)(I)
Total	20 (15+5)	

* 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	: 16 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, 2021-22
AVT-IR-TS-TAD

Trial conducting centres

State	No.	Centres
Maharashtra	8	Niphad, Pravaranagar, Pune, Akola, Parbhani, Nashik, Dhule, Karad
Karnataka	7	Dharwad, Ugar-Khurd, Arbhavi, Kalloli, Mudhol, Nippani, Mandya
Total	15	

Details of test entries

Contributing Centres	No. of entries	Name of entries
IARI, Indore/Delhi	2	HI8826(d)*, HD3442 ^B
UAS, Dharwad	1	UAS3015
ARI, Pune	1	MACS4100(d)*
JNKV, Jabalpur	1	MP3552
JNKV, Powarkheda	1	MP1378
IIWBR-Karnal	1	DBW409 ^B
Checks	5	MACS3949(d), UAS428(d), MACS6222, GW322, DDW48(d)
Total	12 (7+5)	

* final year entry

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/acre
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, 2021-22
AVT-IR-LS-TAS

Trial conducting centres

State	No.	Centres
Maharashtra	8	Niphad, Pravaranagar, Pune, Akola, Parbhani, Nashik, Dhule, Karad
Karnataka	7	Dharwad, Ugar-Khurd, Arbhavi, Kalloli, Mudhol, Nippani, Mandya
Total	15	

Details of test entries

Contributing Centres	No. of entries	Name of entries
JNKV, Powarkheda	1	MP1380 [#]
IWBR, Karnal	1	DBW320 ^{#*}
Checks	4	RAJ4083, HD2932, HD3090, HI1633
Total	6 (2+4)	

[#] denotes resistance to wheat blast, * 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	: 16 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, 2021-22
AVT-RI-TS-TAD

Trial conducting centres

State	No.	Centres
Maharashtra	8	Akola, Pune, Niphad, Nashik, Parbhani, Savalivihir, Karad, Dhule
Karnataka	5	Dharwad, Nippani, Bagalkot, Mudhol, Bailhongal
Total	13	

Details of test entries

Contributing Centres	No. of entries	Name of entries
UAS, Dharwad	1	UAS478(d)
ARS, Niphad	2	NIAW3922, NIAW4028
IARI, Indore	3	HI1665, HI8839(d), HI8840(d)
IIWBR, Karnal	2	DBW358, DBW359
Checks	5	HI1605, NIAW3170, UAS446(d), NIDW1149(d), MP1358(I)
Total	13 (8+5)	

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	: 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 - HYPT, 2021-22
(IR-ES-TAS-NWPZ/NEPZ)

Trial conducting centres

Zone	No.	Centres
NWPZ	12	Delhi, Ludhiana, Gurdaspur, Ladowal, Hisar, Karnal, Bulandshahr, Pantnagar, Bharatpur, Modipuram, Sriganaganagar, Gwalior
NEPZ	07	Kanpur, Ayodhya, Varanasi, Sabour, BISA-Pusa, Ranchi, Kalyani
Total	19	

Details of test entries

Contributing Centres	No. of entries	Name of entries
IWBR, Karnal	5	DBW318 [#] , DBW370*, DBW371*, DBW372 ^{#*} , DBW373 [#]
PAU, Ludhiana	3	PBW872*, PBW871, PBW868 [#]
Checks	5	HD3086, DBW187, DBW303, DBW327(I), DBW332(I)
Total	13 (8+5)	

[#] denotes resistance to wheat blast; * final year entry

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	: 16 Kg per entry + Agronomy 22kg

* **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, 2021-22
(IR-ES-TAS-CZ/PZ)

Trial conducting centres

Zone	No.	Centres
CZ	9	Indore, Powarkheda, Durgapura, BISA-Jabalpur, Jabalpur, Bilaspur, Junagadh, Vijapur, Udaipur
PZ	6	Niphad, Pune, Dharwad, Ugar-Khurd, Nashik, Karad
Total	15	

Details of test entries

Contributing Centres	No. of entries	Name of entries
IWBR, Karnal	2	DBW372 ^{#*} , DBW377
PAU, Ludhiana	1	PBW870
Checks	4	HD3086, DBW187, DBW303, GW322
Total	7 (3+4)	

[#] denotes resistance to wheat blast; ^{*} final year entry

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	: 16 Kg per entry + Agronomy 18kg

* **Note:** Two sprays as tank mix-[Chloromequat 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 – AST, 2021-22
(IR-TS-TAS-NWPZ)**

Trial conducting centres

State	No.	Centres
Haryana	3	CSSRI-Karnal, Anjanthali, IIWBR-Hisar
UP	1	Agra
Punjab	2	Muktsar, Bhatinda
Total	6	

Details of test entries

Contributing Centres	No. of entries	Name of Entries
Durgapura	1	RAJ4565
IARI Delhi	1	HD3415
CSSRI Karnal	2	KRL2006, KRL2021
UAS Dharwad	1	UAS310
IIWBR Karnal	3	DBW365, DBW366, DBW402
Checks	3	Kharchia65, KRL19, KRL210
Total	11 (8+3)	

Experimental details

Design	:	R.B.D.
Replications	:	Six
Plot size	:	6 x 2.40m (12 rows)
Fertilizer dose (kg/ha)	:	120:60:40 (N:P:K) + 10 Kg Zinc Sulphate
Time of sowing	:	1-15 Nov.
Seed rate (kg/ha)	:	100
Seed requirement	:	8 Kg per entry

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

SPL-MABB - NWPZ
IR-TS-TAS - 2021-22

Trial conducting centres

State	No.	Centres
Punjab	4	Ludhiana, Gurdaspur, Rauni, Faridkot
Haryana	4	Hisar, Karnal, Rohtak, Bawal
Rajasthan	1	Sriganganagar
Uttar Pradesh	4	Nagina, Bulandshahr, Modipuram, Ujhani
Uttarakhand	2	Pantnagar, Kashipur
J & K	1	Jammu
MP	1	Gwalior
Delhi	1	Delhi
Total	18	

Details of test entries

Contributing Centres	No. of entries	Name of entries
IARI, Delhi	3	HD3406*, HD3436, HD3437
PAU, Ludhiana	2	PBW901, PBW902
Checks	5	HD2967, DBW187, DBW222, PBW677, PBW175
Total	10 (5+5)	

* final year 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	: 22 kg per entry

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

**SPL-MABB - NEPZ
IR-TS-TAS - 2021-22**

Trial conducting centres

State	No.	Centres
Uttar Pradesh	7	Kanpur, Prayagraj, Araul, Ghaghraghat, Ayodhya, Varanasi, Gorakhpur
Bihar	3	Sabour, Purnea, RPCAU-Pusa
West Bengal	4	Coochbehar, Kalyani, Burdwan, Manikchak
Jharkhand	3	Ranchi, Chianki, Dumka
Assam	1	Shillongani
Total	18	

Details of test entries

Contributing Centres	No. of entries	Name of entries
IARI, Delhi	5	HD3406*, HD3411*, HD3436, HD3437, HD3440
Checks	5	HD3249, DBW187, HD3086, HD2967, HD2733
Total	10 (5+5)	

final year 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	: 22 kg per entry

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

SPL-MABB - CZ
IR-TS-TDM - 2021-22

Trial conducting centres

State	No.	Centres
Gujarat	5	Vijapur, SK Nagar, Anand, Amreli, Junagadh
Madhya Pradesh	5	Jabalpur, Sagar, Powarkheda, Indore, KVK-Ujjain
Chhattisgarh	4	Bilaspur, Raipur, Jagdalpur, Ambikapur
Rajasthan	5	Durgapura, Tabiji, Kota, Udaipur, Mandor
Total	19	

Details of test entries

Contributing Centres	No. of entries	Name of entries
IARI, Indore	2	HI8846, HI8847
Checks	4	HI8498, HI8713, HI8737, HI8759
Total	6 (2+4)	

* denotes final year entry

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
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

SPL-MABB - CZ
IR-LS-TAS - 2021-22

Trial conducting centres

State	No.	Centres
Gujarat	5	Anand, Junagadh, Vijapur, SK Nagar, Sanosara
Madhya Pradesh	5	Indore, Jabalpur, Sagar, Powarkheda, KVK-Ujjain
Chhattisgarh	4	Bilaspur, Ambikapur, Raipur, Jagdalpur
Rajasthan	4	Durgapura, Tabiji, Udaipur, Mandor
Total	18	

Details of test entries

Contributing Centres	No. of entries	Name of entries
IARI, Delhi	3	HD3407*, HD3438, HD3439
Checks	5	HD2932, HD2864, MP3336, CG1029, HI1634
Total	8 (3+5)	

* 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	: 18 kg per entry

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

SPL-MABB - PZ
IR-LS-TAS, 2021-22

Trial conducting centres

State	No.	Centres
Maharashtra	8	Niphad, Pravaranagar, Pune, Akola, Parbhani, Nashik, Dhule, Karad
Karnataka	7	Dharwad, Ugar-Khurd, Arbhavi, Kalloli, Mudhol, Nippani, Mandya
Total	15	

Details of test entries

Contributing Centres	No. of entries	Name of entries
IARI, Delhi	2	HD3438, HD3439
Checks	4	RAJ4083, HD2932, HD3090, HI1633
Total	6 (2+4)	

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	: 16 kg per entry

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

National Genetic Stock Nursery (NGSN)

Conducting Centres

Zone	No.	Centres
NHZ	3	Almora, Malan, Khudwani
NWPZ	7	IIWBR-Karnal, CSSRI-Karnal, Jammu, Hisar, Pantnagar, Ludhiana, Gwalior
NEPZ	10	Ayodhya, Kanpur, Varanasi, Sabour, RPCAU-Pusa, Ranchi Coochbehar, Kalyani, Burdwan, Shillongani
CZ	8	Indore, Jabalpur, Udaipur, Durgapura, Vijapur, Bilaspur, Junagadh, Lok-Bharti
PZ	5	Pune, Dharwad, Akola, Niphad, Parbhani
Total	33	

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, N. 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 of 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)

25th Segregating Stock Nursery (SSN)

Conducting Centres

Zone	No.	Centres
NHZ	2	Khudwani, Wadura
NWPZ	6	Jammu, Hisar, Pantnagar, Gwalior, Sriganaganagar, Modipuram
NEPZ	8	Coochbehar, Ayodhya, Kalyani, Ranchi, Sabour, RPCAU-Pusa, Shillongani, Burdwan
CZ	7	Bilaspur, Jabalpur, Durgapura, Udaipur, Lok-Bharati, Junagadh,
PZ	4	Akola, Parbhani, Pune, Dharwad
Total	27	

Details of cross combinations

Contributing Centres	No. of crosses	Priority trait(s)
IWBR Karnal	50	Yellow rust, spot blotch, quality, abiotic stress, pre-breeding
IARI, Delhi	50	Yield, adaptation, pre-breeding, quality, leaf rust, stem rust
Ludhiana	30	Yellow rust, quality, adaptation, KB, pre-breeding
Hisar	20	Leaf rust, drought, heat, adaptation
Pantnagar	20	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	: November 1-15
Seed requirement	: 250g seed for each cross combination

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

Quality Component and Wheat Biofortification Nursery (QCWBN)

Conducting Centres

Zone	No.	Centres
NWPZ	5	Karnal, Delhi, Ludhiana, Hisar, Pantnagar
NEPZ	5	Kanpur, Sabour, Varanasi, Ranchi, RPCAU-Pusa
CZ	4	Indore, Vijapur, Powarkheda, Jabalpur
PZ	4	Dharwad, Pune, Niphad, Akola
Total	18	

Details of Entries

SN	Contributing Centers	No. of Entries	Name of Entries
1	Karnal	50	Total 250 genotypes received for QCWBN were analysed for grain Fe and Zn through high through-put XRF facility and 50 better performing entries with high Fe and Zn will be included for multilocation testing across zones.
2	Ludhiana		
3	Dharwad		
4	Pantnagar		
5	Delhi		
6	Jabalpur		
7	Vijapur		
8	Bilaspur		
9	Pune		
10	Akola		
11	Parbhani		
Checks		6	DBW187, DBW222, GW322, WB02, RAJ4083, IC427824 (High Zn)
Total Entries		56 (50+6)	

Experimental details

Design	: Augmented Block Design
Plot size	: 4 x 1.20m (6 rows); 4.8m ²
Fertilizer dose (kg/ha)	: 150:60:40 (N:P:K)
Time of sowing	: November 1-15
Seed requirement	: Biofortification: 2.5 kg per entry

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

International Trials & Nurseries (2021-22)

CIMMYT

Trial /Nursery	Sets	Cooperating centres
42 nd ESWYT	14	Ludhiana, Hisar, Indore, Pantnagar, Jabalpur, Powarkheda, Niphad, Dharwad, Karnal, Delhi, Gwalior, Kanpur, RPCAU-Pusa, Vijapur
29 th HRWYT	2	Karnal, Shillongani
20 th HTWYT	20	Ludhiana, Hisar, Indore, Pune, Jabalpur, Vijapur, Karnal, Powarkheda, Bilaspur, Niphad, Dharwad, Ayodhya, Delhi, Durgapura, Varanasi, Kanpur, Udaipur, RPCAU-Pusa, Junagadh, Wellington
29 th SAWYT	18	Ludhiana, Hisar, Indore, Pantnagar, Jabalpur, Vijapur, Powarkheda, Bilaspur, Niphad, Dharwad, Ayodhya, Ranchi, Karnal, Delhi, Durgapura, Varanasi, Kanpur, Parbhani
9 th WYCYT	6	Ludhiana, Pantnagar, Dharwad, Karnal, Delhi, Malan
11 th SATYN	4	Ludhiana, Dharwad, Karnal, Delhi
3 rd CWYT	3	Ludhiana, Delhi, Karnal
54 th IBWSN	17	Ludhiana, Hisar, Indore, Pantnagar, Ayodhya, Wellington, Karnal, Delhi, Durgapura, RPCAU-Pusa, Coochbehar, Varanasi, Jammu, Malan, Gwalior, Vijapur, Bilaspur
32 nd HRWSN	3	Wellington, Karnal, Shillongani
39 th SAWSN	18	Ludhiana, Pune, Hisar, Jabalpur, Powarkheda, Junagadh, Bilaspur, Niphad, Dharwad, Sabour, Ayodhya, Ranchi, Karnal, Delhi, Durgapura, Kanpur, RPCAU-Pusa, Vijapur
16 th STEMRSN	4	Karnal, Mahabaleshwar, Wellington, Delhi
13 th HLBSN	8	Karnal (2 set), Ayodhya, Varanasi, Sabour, Coochbehar, Delhi, RPCAU-Pusa
23 rd KBSN	6	Karnal (2sets), Hisar, Ludhiana (2sets), Pantnagar
2 nd IYPTE	5	Karnal, Ludhiana, Indore, Delhi, Vijapur
53 rd IDYN	8	Ludhiana, Pune, Niphad, Indore, Vijapur, Dharwad, Karnal, Hisar
53 rd IDSN	5	Ludhiana, Pune, Niphad, Indore, Karnal

ICARDA

SN	Trial /Nursery	Number of sets	Cooperating centres
1	22 nd ESBWYT	5	Karnal, Pantnagar, Kalyani, Jabalpur, Kanpur
2	22 nd SBWON-HT	5	Karnal, Hisar, Jammu, Dharwad, Pune
3	45 th IDYT	2	Karnal, Vijapur
4	45 th IDON	2	Karnal, Dharwad
5	24 th IWWYT- SA	2	Almora, Srinagar
6	29 th FAWWON-SA	2	Almora, Malan

BREEDER and NUCLEUS SEED PRODUCTION PROGRAMME, 2020-21
(Allocation of Breeder & Nucleus Seed Production of Notified Varieties)

1. Proforma No. : BSP I & BNS I
Year of indent: 2021-22 (for use during 2022-23)
Crop: Wheat

All quantities in quintals

Production Centre	Variety	Year of release	DAC Indent	Breeder seed Allocation	Indenting Agency	Nucleus seed allocation	Monitoring Team
1) Dr. Yashavantha KJ, Scientist B. ARI , Pune (MH)	MACS 3949	2017	2.80	2.80	NSAI 2.80	0.50	Yashavantha Kumar KJ, Representative of IIWBR NSC & SSCA.
	MACS 6222	2010	40.00	40.00	MH 40.0	2.00	
	MACS 6478	2014	8.00	8.00	MH 4.0, NSAI 4.0	0.50	
	Total			50.80		3.00	
2) Dr. PK Singh, Director, Seed & Farm, BAU Sabour, Bihar	BRW 3708 (Sabour Samridhi)	2017	50.00	50.00	BI 50.0	2.50	Dr. PK Singh, BAU Sabour. Representative of IIWBR NSC & SSCA..
	BRW 3723 (Sabour Nirjal)	2017	50.00	50.00	BI 50.0	2.50	
	BRW 934 (Sabour Sreshtha)	2017	100.00	100.00	BI 100.0	4.00	
	Total			200.00		9.00	
3) Prof. PK Singh, IAS, BHU Varanasi (UP)	HUW 669 (Malviya 669)	2018	12.00	12.00	NSAI 2.0, UP 10	1.00	Prof. VK Mishra Representative of IIWBR NSC & SSCA.
	Total			12.00		1.00	
4) Dr. SS Atwal, BISA Jabalpur (MP)	DBW 110	2015	85.85	85.85	CG 20, MP 40, NSC 5, NSAI 20.85	3.00	Dr. SS Atwal, BISA Representative of IIWBR NSC & SSCA.
	DDW 47	2020	160.80	160.80	MP 160.0 NSAI 0.80	4.00	
	Total			246.65		7.00	
5) Dr. SS Atwal, BISA Ludhiana (Pb)	DBW 303 (Karan Vaishnavi)	2021	1326.30	287.20	KCO 9.20, IFFDC 7.0, NAFED 8.0, PB 3.0, RJ 100, KVSS 10, UP 150	1.00	Dr. SS Atwal, BISA Ludhiana Representative of IIWBR NSC & SSCA.
	DBW 222 (Karan Narendra)	2020	640.80	128.40	HR 8.0, JK 20.0, KCO 26.40, IFFDC 4.0, NAFED 2, NFL 5, PB 3, KVSS 10, UK50	1.50	
	Total			365.60		2.50	
6) Dr. SS Atwal, BISA Pusa (Bihar)	DBW 187 (Karan Vandana)	2020	2055.10	310.00	BI300.0, JH 5.0, WB 5	6.00	Dr. SS Atwal, BISA Representative of IIWBR NSC & SSCA.
	HD 2967	2014	1196.20	100.00	UP 100	6.00	
	Total			410.00		12.00	
7) Dr. KD Sharma Head, Deptt. of Seed Sc. & Tech., CCS HAU Hisar-125 004.	WH 1105	2013	33.00	33.00	HR10, HP 15, IFFDC 8,	2.00	Dr. K,D Sharma , Head Dr. O P Bishnoi Representative of IIWBR NSC & SSCA.
	WH 1124	2014	76.20	76.20	CG 20, HR 8, IFFDC 3, NSC 15, NSAI 30.20	2.00	
	WH 1270	2021	226.00	226.00	HR 10, NSC 40, KVSS 5, NSAI 71, UP 100	5.00	
	WH1142	2014	42.40	42.40	NSAI 2.4, UP 40	1.00	
	WH 1184	2019	59.00	59.00	RJ 50, NSAI 9	2.00	
	C 306	1969	0.80	0.80	HR 0.80	0.50	
	DBW 221	2021	10.00	10.00	HR 10,	2.00	
Total				447.40		14.50	

8) Dr. CP Sachan In-charge, BSP CSAUA&T Kanpur	K 1006	2014	100.00	100.00	BI 100,	2.50	Dr CP Sachan , CSAUA&T Representative of IIWBR NSC & SSCA.
	K 1317	2018	3.00	3.00	NSAI 3.0	0.50	
	Total			103.00		3.00	
9) Dr. N. Kulshrestha, CSSRI Karnal	KRL 283	2018	1.60	1.60	NSAI 1.60	1.00	Dr, N. Kulshrestha, Representative of IIWBR NSC & SSCA.
	Total			1.60		1.00	
10) Dr. R.K. Panwar Joint Director (Seeds), GBPUAT Pantnagar (UK)	UP 2003	2021	10.00	10.00	NSC 10	0.50	Prof. R.K. Panwar Prof. J P Jaiswal, Representative of IIWBR NSC & SSCA.
	UP 2855	2019	11.20	11.20	NSC 10, NSAI 1.20	0.50	
	UP 2865	2019	10.00	10.00	NSC 10	0.50	
	UP 2944	2021	10.00	10.00	NSC 10	0.50	
	UP-2784	2016	2.00	2.00	UK 2	0.50	
	UP 2003	2021	10.00	10.00	NSC 10	1.00	
	UP 2855	2019	11.20	11.20	NSC 10, NSAI 1.20	1.00	
	UP 2865	2019	10.00	10.00	NSC 10	0.50	
Total			74.40		5.00		
11) Dr. Rakesh Kapila Nodal Officer (Seeds), HPKVV Palampur- 176 062	HPW 349	2013	20.00	20.00	JK 20.0	1.00	Dr. Rakesh Kapila , HPKVV Representative of IIWBR NSC & SSCA.
	HPW 368	2020	20.00	20.00	HP 20.0	1.00	
	Total			40.00		2.00	
12) Dr. Gyanendra Singh I/C, SPU, IARI, New Delhi	HD 2967	2014	1196.20	282.20	CG 25, HR 5.0, KCO 15.20, IFFDC 82.0, NFL 50, NSC 100, KVSS 5.0,	6.00	Dr. Gyanendra Singh, IARI, New Delhi Representative of IIWBR NSC & SSCA
	HD 3298	2021	46.60	46.60	HR 10, IFFDC 10, NSAI 16.60, UP 10	1.50	
	PUSA YASHASVI (HD- 3226)	2019	939.70	630.70	NSAI 130.70, UP 450, UK 50	15.0	
	HD 3059 (Pusa Pachheti)	2013	30.00	30.00	CG 20 NSC 10	1.00	
	HDCSW-18	2016	6.00	6.00	NAFED 3.0, NSAI 3.0	0.50	
	PUSA WHEAT 3237(HD-3237)	2019	68.00	68.00	JK 10, IFFDC 2, NSC 15, NSAI 16, UP 25	2.00	
	Pusa Wheat 3271 HD 3271	2020	18.40	18.40	KCO 8.40, NSAI 10	1.00	
	Pusa Gautami (HD 3086)	2014	929.30	240.20	HIL 5, HR 40, HP10, JK 5, KCO 17.20, IFFDC 40, NAFED 2, NFL 23, NSC 50, PB 11, RJ 37	6.00	
	Total			1322.70		33.00	
13) Dr. KC Sharma Head IARI-RS, Indore (MP)	Pusa Ujala (HI 1605)	2017	8.40	8.40	KK 1.6, NFL 1.0, NSC 5.0, NSAI 0.80	1.00	Dr. JB Singh Representative of IIWBR NSC & SSCA.
	HI 1633 (Pusa Vani) Bio F	2021	7.00	7.00	MH 2.0, NSC 5.0	2.00	
	HI 1634 (Pusa Ahilya)	2021	195.00	195.00	MP 161, NSC 10.0, NSAI 4.0, UP 20.0	2.00	
	HI 8759 (PUSA TEJAS-8759)	2017	638.80	638.80	CG 10.0, IFFDC 5.0, MP 509, NAFED 2.0, NFL 10.0, NSC 5.0, KVSS 20.0, NSAI 22.80, UP 50	15.00	
	HI 8777	2018	30.80	30.80	CG 20, NSC 5.0, NSAI 5.0, NSAI 0.80	1.50	
	Purna (HI-1544)	2008	32.00	32.00	CG 10, IFFDC 2.0, MH 10, NFL 10	1.00	

	Pusa Anmol (HI 8737)	2015	196.20	196.20	CG 30, MP 156, NFL 2.0, NSC 5.0, NSAI 3.2	5.00	
	HD 4728 (PUSA MALWI)	2016	140.00	140.00	CG 25, MP 105, NSC 5.0, NSAI 5.0	4.00	
	Pusa Wheat 8802 (HI 8802)	2020	0.80	0.80	NSAI 0.80	1.00	
	Total			1249.00		32.50	
14) Dr. VK Pandita, Head, Regional Station, IARI Karnal-132001.	Pusa Gautami (HD 3086)	2014	929.30	638.10	NSAI 438.10, UP 200,	14.00	Dr. RN Yadav, IARI, Karnal, Representative of IIWBR NSC & SSCA.
	HI-1620 (PUSA WHEAT-1620)	2019	46.60	46.60	JK 5.0, NSC 20.0, NSAI 21.60	1.50	
	PUSA YASHASVI (HD-3226)	2019	939.70	309.00	HIL 5, HR 10, HP 20, JK 5, KCO 12.80, IFFDC 26.20, NAFED 2, NFL 23, NSC 100 RJ 100, KVSS 5,	8.00	
	HS 562	2018	62.00	62.00	HP 40, JK 10.0, NSC 2.0, UK 10	1.50	
	Pusa Wheat 1628 (HI 1628)	2020	5.40	5.40	NFL 1.0, NSAI 4.4	1.00	
	HD 2967	2014	1196.20	454.00	NSAI 454	10.00	
	Pusa Wheat 1621 (HI 1621)	2020	22.00	22.00	NSC 2, UP 20	1.50	
	HD-2851(Pusa Vishesh)	2005	2.00	2.00	IFFDC 2.0	0.50	
	Total			1539.10		38.00	
15) Dr. K K Singh Head, Regional Station, IARI Pusa, (Bihar)	HD 2967	2014	1196.20	360.00	BI 200, WB 10.0 UP 150	6.00	Dr. K.K. Singh Representative of IIWBR NSC & SSCA.
	Pusa Gautami (HD 3086)	2014	929.30	51.00	BI 50,, WB 1.0	2.00	
	Pusa Wheat 3249 HD (3249)	2020	30.00	30.00	NSAI 10.0, UP 20	1.00	
	Pusa Prachi (HI-1563)	2011	50.00	50.00	BI 50	2.00	
	HI 1612	2018	6.00	6.00	NSAI 6.0	1.00	
	HD 3171	2017	1.20	1.20	NSAI 2.1	1.00	
	Total			498.20		13.50	
16) Dr. Sivasamy Head IARI, RS-Wellington	Nilgiri Khapli (HW 1098)	2015	20.00	20.00	CG 20.0	1.00	Dr. Sivasamy, Representative of IIWBR NSC & SSCA.
	Total			20.00		1.00	
17) Dr. PK Chandrakar Pr. Scientist & I/C , NSP, IGKVV Raipur (Chhatish.) nspigkv@gmail.com	Kanishka (CG 1029)	2021	137.00	137.00	CG 40, MP 97.0	3.00	Dr. PK Chandrakar, IGKVV Raipur. Representative of IIWBR NSC & SSCA.
	Hansa Wheat (CG 1023)	2021	50.00	50.00	CG 50.0	1.50	
	Chh. Amber Wheat (CG 1018)	2019	45.00	45.00	CG 45.0	1.50	
	Chhattisgarh Gehun 3 (CG-1013)	2018	65.00	65.00	CG 65.0	2.00	
	Chhattisgarh Gehun 4 (CG-1015)	2018	65.00	65.00	CG 65.0	2.00	
	Ratan (CG 5016)	2009	79.00	79.00	CG 79.0	2.00	
	Total			441.00		12.00	
18) Dr. AK Sharma PS & Nodal Officer (Seeds) ICAR-IIWBR, Karnal	DBW 187 (Karan Vandana)	2020	2055.10	1745.10	HIL 5.0, HR 45.0, HP 55.0, JK 10.0, KCO, 52.0, IIFDC 43.0, NAFED 12.0, NFL 33.0, NSC 350, PB 13, RJ 100, KVSS 20, NSAI 332.10, UP 625, UK 50,	50.00	Drs. AK. Sharma, CN Mishra, Umesh Kabmlle, IIWBR Dr. R.N. Yadav, IARI-RS, Karnal Representative NSC & SSCA.

	DBW 222 (Karan Narendra)	2020	640.80	512.40	HR 8.0, JH 20.0, KCO 26.40, IFFDC 4.0, NAFED 2, NFL 5, NSC 50, PB 3, RJ 100, KVSS 10, NSAI 212.40, UP 150,	20.00	
	DBW 303 (Karan Vaishnavi)	2021	1326.30	1189.40	HR 10, KCO 9.20, IFFDC 7.0, NAFED 8.0, NSC 250.0, PB 3.0, KVSS 10, NSAI 259.10, UP 500, UK 20	35.00	
	Total			3296.90		105.00	
19) Dr. K H Dabhi Asso. Res. Scientist (Wheat), JAU Junagarh	GW 366	2007	30.00	30.00	CG 30.0	1.50	Dr. KH Dabhi, GAU Junagarh. Representative of IIWBR NSC & SSCA.
	GJW 463	2017	17.80	17.80	NSC 10.0, NSAI 7.80	1.00	
	Total			47.80		2.50	
20) Dr. R.S. Shukla Director Farms, JNKVV Jabalpur (MP) seeds.jnkvv@gmail.com	JW 3382 (MP3382)	2016	372.40	372.40	MP 339.80, NSC 5.0, NSAI 27.40	11.50	Dr. R.S. Shukla Dr. D.K. Pahalwan Representative of IIWBR, NSC & SSCA.
	MP 3336 (JW 3336)	2013	15.00	15.00	CG 15.0	1.00	
	MP 3465 (JW 3465)	2021	261.50	261.50	MP 257.50, NSAI 4.0	8.00	
	MP 3211(JW-3211)	2010	20.00	20.00	CG 20	1.00	
	MPO 1255(MPO(JW)1255)	2016	93.00	93.00	MP 91.0 NSAI 2.0	2.00	
	Total			761.90		23.50	
21) Dr. CP Singh, Wheat Research Center, Lokbharti Sanosara-364 230	LOK-1	1982	110.00	110.00	MH 80, NFL 10.0, NSC 20.0	4.00	Dr. CP Singh, Representative of IIWBR NSC & SSCA.
	Total			110.00		4.00	
22) Dr. SS Dodake, Wheat Specialist, MPKV Nipad-422 303.	Netravati (NIAW-1415)	2011	2.00	2.00	MH 2.0	0.50	Dr. SS Dodake, MPKV Nipad. Representative of IIWBR NSC & SSCA.
	PHULE SAMADHAN	2016	38.60	38.60	MH 30, NSC 5.0, NSAI 3.60	2.00	
	Total			40.60		2.50	
23) Dr. Rajinder Singh Director (Seeds), PAU Ludhiana- 141 004. Nucleus Seed Dr. VS Sohu, Sr. Wheat Breeder, PAU Ludhiana- 141004	UNNAT PBW 550 (PBW 761)	2019	166.90	166.90	HP 15, KCO 3.2, MP 5, PB 30, NSAI 93.70, UK 20	4.00	Dr. T. P. Singh , PAU Ludhiana Dr. VS Sohu, Dr. G. MAVI, , PAU Ludhiana Representative of IIWBR NSC & SSCA.
	Unnat PBW 343(PBW-723)	2017	364.40	364.40	HIL 2, JK 5, KCO 11.20, IFFDC 5.0, NAFED 2, NFL 7, NSC 25, PB 40, KVSS 20, NSAI 107, UP 100, UK 40	9.00	
	PBW 1 ZN	2017	177.60	177.60	PB 20, NSAI 3.6, UP 150, UK 2. NSC 2	5.00	
	PBW 771	2020	17.40	17.40	PB 2.0, NSAI 15.40	1.00	
	PBW 550	2008	2.00	2.00	PB 2.0,	1.50	
	PBW 660	2016	2.00	2.00	PB 2.0	0.50	
	PBW 677	2016	111.20	111.20	NSC 20, PB 40, NSAI 51.20	2.50	
	PBW 725	2016	180.20	180.20	HR 10.0, JK 10.0, IFFDC 1.2, NFL 3.0, NSC 30.0, PB 40.0, NSAI 86	7.00	
	PBW 752	2019	33.20	33.20	JK 10, PB 5, NSAI 18.20	0.50	
	PBW 757	2019	12.80	12.80	JK 5.0, PB 5.0, NSAI 2.8	1.00	
	Total			1067.70		32.00	
24) Dr. NR Potdukhe,	AKAW 4210-6	2016	2.00	2.00	NSAI 2.0	0.25	Dr. NR
	PDKV SARDAR	2016	10.00	10.00	MH 10	1.00	

Sr. Wheat Scientist, WRU, PDKV, Akola							Potdukhe, PDKV Akola. IIWBR Representative of IIWBR, NSC & SSCA
	Total			12.00		1.25	
25) Dr. Ved Prakash Nodal Officer (Seeds) RARI, SKNAU, Durgapura, Jaipur (Raj.)	RAJ 4079	2011	23.00	23.00	IFFDC 5, NFL 8, RJ 10	1.50	Dr. Ved Prakash Representative of IIWBR, NSC & SSCA
	RAJ 4037	2004	79.00	79.00	KCO 6.0, IFFDC 16.0, NFL 7, NSC 50,	2.50	
	RAJ 4120	2009	105.00	105.00	BI 100, NSC 5	2.50	
	RAJ4238	2016	750.20	750.20	CG 20, KCO 6, IFFDC 25, MP 95, NFL 2, NSC 15, RJ 575, NSAI 12.20	4.00	
	Total			957.20		10.50	
26) Dr. Dr. Sushma Tiwari I/C Seed, RVSKVV Gwalior	Raj Vijay Wheat 4106 (MP 4106)	2012	20.00	20.00	CG 20.0	1.00	Dr. Sushma Tiwari Representative of IIWBR, NSC & SSCA
	Total			20.00		1.00	
27) Dr. SI Patel Wheat Research Station, SDAU Vijapur- 382 870, Distt. Mehasana (Gujarat).	GUJRAT WHEAT 496	1990	85.00	85.00	MH 75.0, NSC 10.	1.00	Dr. JM Patel, SDAU Vijapur Representative of IIWBR, NSC & SSCA
	GW 1339	2021	10.00	10.00	NSC 10	2.50	
	GW 499	2021	10.00	10.00	NSC 10.0	0.50	
	GW 173	1994	20.00	20.00	NSC 20	1.00	
	GW 273	1998	8.60	8.60	KK 1.6, IFFDC 2.0, NSC 5.0	0.50	
	GW 322	2002	9.00	9.00	IFFDC 7.0, NSC 2.0	0.50	
	GW 451	2016	76.65	76.65	CG 20.0, NSC 35.0, NSAI 21.65	3.00	
	Total			119.25		8.50	
28) Mr. K J Suthar ARS (PB), ARS, AAU, Dhandhuka (Guj.)	GW 1346	2020	2.80	2.80	MH 2.0, NSAI 0.80	0.50	Mr. K J Suthar Representativ e of IIWBR, NSC & SSCA
	Total		2.80	2.80		0.50	
29) Dr. Amriesh Vaid Nodal Officer (Seed) SKUA&T, Jammu	DBW 173	2018	108.60	15.00	JK 15.0,	0.00	Dr. Anjani Kumar Singh SKUAS&T J, Representative of IIWBR, NSC & SSCA
	WB 2	2017	112.00	10.00	JK 10.0	0.00	
	DBW 71	2013	15.00	15.00	JK 15,	0.00	
	Total			40.00		0.00	
30) Dr. Mukesh Kumar, ADR (PB), SVPUA&T Meerut	DBW 173	2018	108.60	93.60	NSC 5.0, NSAI 32.60, UP 50, UK 6,	0.00	Dr. Mukesh Kumar , Representative of IIWBR, NSC & SSCA.
	WB-2	2017	112.00	52.00	IFFDC 2.0, UP 50	0.00	
	Total			145.60		0.00	
31) Prof. J.S. Hilly Special Officer (Seeds), UAS Dharwad	DBW 168	2018	6.80	6.80	KK 2.0, MH 4.0, NSAI, 0.8	0.50	Dr. Vijay Kumar, UAS Dharwad Dr. Suma Biradar UAS Dharwad Representative of IIWBR, NSC & SSCA
	UAS - 304	2013	5.80	5.80	KK 5.80	0.50	
	UAS 334	2018	1.60	1.60	KK 1.60	0.25	
	UAS 347	2015	1.60	1.60	KK 1.60	0.25	
	UAS 375	2018	1.60	1.60	KK 1.60	0.50	
	UAS 428	2012	5.00	5.00	MH 5	0.25	
	UAS 446		1.60	1.60	KK 1.6	0.25	
	DWR-162	1993	17.80	17.80	KK 12.80, NSC 5	1.50	
Total			41.80		4.00		
32) Dr. Maha Balram Director Research SHIATS, Prayagraj (UP)	AAI- W10(SHIATS W10)	2018	10.00	10.00	UP 10.0	1.00	Crop Breeder, Representative of IIWBR, NSC & SSCA
	Total			10.00		1.00	
33) Dr. Lakshmi Kant, Director (A)	VL 2014	2018	10.00	10.00	NSC 10	1.00	Dr. Lakshmi Kant, Representative
	VL 2015	2020	10.00	10.00	NSC 10	1.00	
	VL Gehun	2010	20.00	20.00	HP 20	1.00	

VPKAS Almora.	907(VL 907)						of IIWBR, NSC & SSCA
	VL Gehun 967 (VL 967)	2019	40.00	40.00	NSC 5, UK 35	2.00	
	VL-953	2016	30.00	30.00	NSC 5, UK 25	1.50	
	Total			110.00		6.50	
34) Dr. P. P. Singh Director Seeds & Farms RPCAU, Dholi, Muzaffarpur Bihar	DBW 107	2015	67.50	67.50	BI 50.0, NSC 15, NSA 0.50. WB 2	2.00	Dr. Rajesh Singh, Dr. Satish Kumar Singh, RPCAU Representative of IIWBR, NSC & SSCA.
	WB-2	2017	112.00	50.00	BI 50	2.00	
	KARAN SHRIYA (DBW 252)	2020	13.00	13.00	NSC 10, NSAI 2.0, WB 1.0	1.00	
	Total			130.50		5.00	
Grand Total				14084.9 0		397.7 5	

2. Proforma No. : BSP I & BNS I

Year of indent: 2021-22 (for use during 2022-23)

Crop: Barley

Production Centre	Variety	Year of release	DAC Indent	Breeder seed Allocation	Indenting Agencies	Nucleus seed allocation	Monitoring Team Constitution
1) Prof. PK Singh, IAS, BHU Varanasi (UP)	Mahamana 113 (HUB 113)	2014	50.00	50.00	UP 50	2.00	Dr. PK Singh, BHU Varanasi Representative of IIWBR NSC & SSCA.
	Total			50.00		2.00	
2) Dr. KD Sharma , Head, Deptt. of Seed Sc. & Tech., CCS HAU Hisar	BH 952		2.00	2.00	NSAI 2.0	1.00	Dr. Yogender Kumar Gulia , Representative of IIWBR, NSC & SSCA.
	BH-902	2010	0.30	0.30	HR 0.30	0.10	
	BH-946	2014	26.30	26.30	HR 0.30, NSC1.0, RJ 20, NSAI 5.0	1.40	
	BH-959	2015	34.90	34.90	MP 1, NSC 10, RJ 20, NSAI 3.90	1.50	
	Total			63.50		4.00	
3) Dr. C.P. Sachan Nodal Officer Seeds CSAUA&T Kanpur	Prakhar (K-1055)	2018	20.00	20.00	UP 20	1.00	Dr. C.P. Sachan , Dr. PK Gupta CSAUA&T, Representative of IIWBR NSC & SSCA.
	Total			20.00		1.0	
4) Dr. VK Pandita, Head, Regional Station, IARI, arnal	BHS-380	2019	0.50	0.50	HP 0.50	0.20	Dr. RN Yadav, IARI, Karnal, Representative of IIWBR NSC & SSCA.
	BHS-400 (Pusa Sheetal)	2014	0.75	0.75	HP 0.75	0.20	
	Total			1.25		0.40	
5) Dr. A.K. Sharma Pr. Scientist (PB) ICAR-IIWBR Karnal	DWRB 101	2015	3.40	3.40	NSC 1, NSAI 2.4	0.40	Dr. A.K. Sharma Dr. S.K. Bishnoi, IIWBR, Hisar Dr O.P. Bishnoi , CCSHAU, Representative of NSC & SSCA.
	DWRB-123	2017	5.40	5.40	KVSS 5.0, NSAI 0.40	0.60	
	DWRB-137	2018	120.70	120.70	HU 0.30, MP 6.0, RJ 55, KVSS 5.0, NSAI 4.40, UP 50	3.00	
	Karan Maltsona DWRB 160	2020	8.10	8.10	NAFED2.10, KVSS 5, NSAI 1	1.00	
	Total			137.60		5.00	
6) Dr. Rajinder Singh, Director (Seeds), PAU Ludhiana	PL 891	2020	4.00	4.00	PB 2.0, NSAI 2.0	0.50	Dr. T.P. Singh PAU, Representative of IIWBR & NSC & SSCA.
	PL-426	1996	2.00	2.00	PB 2.0,	0.20	
	Total			6.00		0.70	

7) Dr Ved Prakash Nodal Officer Seeds RARI, SKNAU, Durgapura, Jaipur	RD 2849	2016	5.00	5.00	NSAI 5.0	0.25	Dr Ved Prakash .Representative of IIWBR , NSC & SSCA.
	RD 2899	2018	49.10	49.10	IFFDC2, MP3, NSC2, RJ40 NSAI 2.10	2.00	
	RD-2035	1994	15.00	15.00	IFFDC3, NSC 5, RJ 5, KVSS 2	1.00	
	RD-2786	2013	2.00	2.00	KVSS 2	0.25	
	RD-2794	2016	25.40	25.40	NSC 0, RJ10, KVSS2. NSAI 3.40	1.50	
	RD-2907	2018	44.00	44.00	IFFDC 2.0, NSC2, RJ 40	2.50	
	Total					7.50	
				140.50			
8). Dr. Lakshmi Kant Director VPKAS Almora	VL Jau 118 (VLB 118)	2015	3.00	3.00	KVSS 2.0, UK 1.0	0.50	Dr. Lakshmi Kant, VPKAS Almora. Representative of IIWBR , NSC & SSCA.
	Total			3.00		0.50	
	Grand Total			421.85		21.10	

PROCEEDINGS OF THE MEETING TO FINALIZE THE RESOURCE MANAGEMENT AND SOCIAL SCIENCES WORK PLAN

August 10, 2021	Chairman	: Dr. GP Singh, Director ICAR-IIWBR
	Co-Chairman	: Dr. SC Tripathi, PI, Resource Management
	Rapporteur	: Drs. Raj Pal Meena and Neeraj Kumar

Work plan meeting was held on August 10th 2021 under the chairmanship of Director, ICAR-IIWBR, Karnal regarding finalization of trials for Rabi season 2021-22 under AICRP at 10:30 am in V.S. Mathur Hall. Dr. SC Tripathi, Principal Investigator, Resource Management, welcomed the chairman and all co-operators from different centres. Chairman in his opening remarks highlighted the role of resource management and social sciences in record food grains production.

PI, Resource Management welcomes and invited Director, ICAR-NBAIM, Mau to make a presentation on Bio NPK liquid formulation for nutrient management. The representative scientist of Director, ICAR-NBAIM, Mau presented about Bio NPK formulation in detail and he emphasised its importance and scope in future to reduce the dependency on chemical fertilizers. He requested to include the formulation for evaluation in wheat crop across the wheat growing zones. Director, ICAR-IIWBR assured him about experimental trials and asked to supply the required material in time so that experiments can be conducted in the *Rabi* season 2021-22.

Dr. SC Tripathi presented the progress report and recommendations of resource management coordinated trials. He informed the house about overall conduction of trials and trials those are rejected due to improper data reporting or due to low centre mean. He highlighted the major findings *viz.* under restricted irrigation conditions of NWPZ, test entry DBW 296 produced significantly higher grain yield, in high yield potential trial DBW 327 ranked first with 69.69 q/ha, in CZ sowing time trial test entry HI 1636 ranked first whereas under restricted irrigation conditions of CZ test entry HI 8823 ranked first and produced significantly higher yield than check genotypes. Under restricted irrigation conditions of PZ test entry MP 1358 ranked first and produced significantly higher yield than check genotypes. Recommendation was made based on special agronomic trials *viz.* 1 sowing from 25th Oct to 5th November for maximizing wheat grain yield in NHZ and NWPZ. 2 sowing from 5th to 15th Nov. for maximizing wheat grain yield in NEPZ, CZ and PZ. 3 application of 150% RDF+ 15 t/ha FYM+ GR (CCC @0.2% + tebuconazole @0.1%) at first node and flag leaf stages to maximise wheat grain yield across the zones and 4 surface seeding of 150kg seed/ha primed with 1% KNO₃ for maximizing wheat grain yield in wetland of NEPZ. Dr Subhash Chander presented work plan for 2021-22 in that special agronomic trials were proposed requested to the scientist of all centres for provide their input to finalize these trials. Dr Satyavir Singh Bajwa PI, Social Science presented front line demonstration programme.

The key points highlighted by the Chairman during the meeting are as under

All the centres are requested to follow the SOP strictly and to submit the data in proper format timely. AICRP Trials may not be allotted to isolated centre as it is very difficult to monitor the experiments in far isolated centres. There is need to relook on seed rate by conducting experiments with precision seed drill machines. Development, identification and mass propagation of weedicides should go like genotypes to tackle the weed infestation like *Phalaris minor* and there is a need to update agronomical package and practices time to

time in all zones. It was also discussed and decided to workout the economics of all new technologies. Due to not conducting trials satisfactorily few centres (Akola, Washim and Agra) dropped from the AICRP. The contingency of centres those are not performing well cut by 50% and diverted to the centres those are performing well. Due to non performing for continuously no trials to be allotted to IARI, New Delhi and IARI PUSA, Bihar. Chairman asserted that non-recommended varieties should not be demonstrated in any circumstances.

There was a big concern of not conduction of trials and improper reporting of data, it was seriously reviewed by the Chairman and it was also decided to write the letters of Vice Chancellors with request to look into the matter.

In SPL-5 (new experiment), suggestions were made to change the main and sub-main plot. It was argued by cooperating scientists that centres should be allowed to deviate from standard size of plots but PI, RM insisted that it is not allowed to deviate from net plot size.

WORK PLAN (2021-22): RESOURCE MANAGEMENT AND SOCIAL SCIENCES

The chairman welcomed the delegates and invited Dr. SC Tripathi (PI, Resource Management) to deliver the recommendations and work plan for the year 2021-22. Dr. Tripathi presented the recommendations of resource management group that were as under

1. Sowing from 25th Oct to 5th Nov. for maximizing wheat grain yield in NHZ and NWPZ.
2. Sowing from 5th to 15th Nov. for maximizing wheat grain yield in NEPZ, CZ and PZ.
3. Application of 150% RDF+ 15 t/ha FYM+ GR (CCC @0.2% + tebuconazole @0.1%) at first node and flag leaf stages to maximise wheat grain yield across the zones.
4. Surface seeding of 150kg seed/ha primed with 1% KNO₃ for maximizing wheat grain yield in wetland of NEPZ.

PI, Resource Management also presented the house about work plan 2021-22 and informed that new special agronomic experiments to be conducted across the zones covering aspects of efficacy of herbicides, nano fertilizers, foliar application of K for improving water productivity, quality improvement, NPK solubilising microbial consortium and application of KSi for improving wheat productivity.

WORK PLAN (2021-22): RESOURCE MANAGEMENT

1. **SPL-1:** Efficacy of herbicides against diverse weed flora of wheat
2. **SPL-2:** Effect of seaweed extract on growth and yield of wheat
3. **SPL-3:** Effect of nano urea on increasing N use efficiency and productivity of wheat under irrigated condition
4. **SPL-4:** Effect of nano urea on increasing N use efficiency and productivity of wheat under restricted irrigation condition
5. **SPL-5:** Lodging management for enhancing yield in dicoccum wheat using potential plant growth regulator
6. **SPL-6:** Resource conservation techniques for enhancing the productivity and resource-use efficiency of soybean-wheat cropping system
7. **SPL-7:** Precision nutrient management for higher yield in wheat through fertigation
8. **SPL-8:** Effect of foliar K application for improving wheat yield and water productivity under restricted irrigation condition
9. **SPL-9:** Agronomic interventions for quality enhancement in wheat varieties across different wheat growing zones
10. **SPL-10:** Effect of NPK solubilizing microbial (Rhizosphere) consortium on productivity of wheat under irrigated condition
11. **SPL-11:** Effect of Silica foliar (KSi) application for improving wheat yield and productivity under restricted irrigation condition (PZ)
12. **SPL-12:** Effect of N, P and K solubilizing microbial (Rhizosphere) consortium on productivity of wheat under irrigated condition (PZ)

WORK PLAN (2021-22): SOCIAL SCIENCES

1. During the year 2021-22, the Barley Frontline Demonstrations (FLDs) will be conducted in 100 hectares (250 Acres) area in different zones of the country.
2. Wheat Demonstrations under SCSP Programme will be conducted as per availability of improved wheat varieties seed with National Seeds Corporation (NSC) and ICAR-IWBR, Karnal.
3. The new wheat and barley varieties (DBW 303, DWRB 182 and other varieties) will be used to conduct the Barley FLDs and Wheat demonstrations.

PROCEEDINGS OF THE MEETING TO FINALIZE THE CROP PROTECTION WORK PLAN

August 05, 2021	Chairman	: Dr. GP Singh, Director ICAR-IIWBR
	Co-Chairman	: Dr. Sudheer Kumar, PI, Crop Protection
	Rapporteurs	: Drs. P.L. Kashyap and Ravindra Kumar

The research plan meeting of All India Coordinated Research Projects on Wheat and Barley (AICRPW&B) crop protection (2021-22) was held on 5th August, 2021 at VS Mathur Hall, ICAR-IIWBR, Karnal through online zoom platform. The meeting was chaired by Dr. G.P. Singh, Director, ICAR-IIWBR, Karnal and co-chaired by Dr. Sudheer Kumar, Principal Investigator (PI), Crop Protection. PI, Crop Protection welcomed the chairman and other participants attending the meeting. The meeting was started with the welcome address by chairman. He appreciated the efforts of crop protection team for untiring efforts made by them in securing the wheat crop from diseases and pest. Further, he also expressed his satisfaction on no major disease and pest outbreak in the country since decades. Besides this, he also showed his concerns to the frequent transfer of AICRP scientists at collaborative centers which adversely affected the programme. Chairman also pointed out that the centers constantly not performing should not be allotted the nurseries/trials in the programme.

The detailed presentations on the achievements of AICRPW&B Crop Protection during 2020-21 and work plan for year 2021-22 was made by Dr. Sudheer Kumar. The trial conduction was very good with almost 100%. However, the data of few centers were not included due to very low/ erratic disease development during the cropping season. Though, this was a challenging year to create the rust epiphytotics in the field, as the minimum temperature remained high in comparison to previous years. During the discussion, it was decided that in view of present disease scenario, Coochbehar and Sabour centers will conduct the IPPSN trials for leaf rust. Similarly, Pune and Vijapur for leaf and stem rust and Dharwad and Pune for leaf blight will conduct the IPPSN trials. Rajendra Prasad Central Agricultural University (RPCAU), Pusa has been included as a new centre in place of IARI, Pusa. It was discussed that the NIVT 1A, 1B and 3A which are being screened for leaf blight at different centers in NEPZ is of less practical utility and hence discontinued and additional responsibility of IPPSN and PPSN has been given to these centers. Dr. Pradeep Shekhawat, Durgapura desired to conduct AUDPC trial for stripe rust and same is allotted to the center.

Dr. Gayanendra Singh, PI (Crop Improvement) expressed his concerns for screening of AVT entries in central zone and it is decided that Powarkheda and Indore center will also conduct LBSN trials. The LBSN nursery is discontinued from voluntary centers namely Naini and Gorla Karma because of their continuous failure in creating desired level of disease epiphytotics for effective screening. Dr. Vaibhav Kumar, IARI, Delhi and Dr. P. Nallathumbi, IARI, Regional Station, Wellington showed willingness to conduct flag smut screening nursery and head scab screening nursery, respectively and the house is agreed to allot the same. The changes have also been made in the EPPSN and MDSN centers in corroboration to changes made in IPPSN and PPSN centers.

Dr. S.C. Bhardwaj, In-charge, ICAR-IIWBR, Regional Station, Shimla gave the valuable suggestions for planning of the programme for 2021-22 especially on racial change and predominant races which should be included in screening of breeding material. It was also discussed that survey and surveillance is an important activity and will be done by all the centers in their jurisdiction area. Further emphasis has been given to collect and send the

wheat leaf samples immediately after the appearance of rust disease under natural conditions to IIWBR, Regional Station, Flowerdale, Shimla and samples of other diseases to PI, Crop Protection, IIWBR, Karnal. Similarly, all the centers will collect the seed samples from grain markets, analyzed and submit the report to the PI, Crop Protection. One trial on chemical control of yellow rust was concluded last season, and a new experiment on chemical management of leaf blight was proposed with different treatments.

Dr. Poonam Jasrotia, Principal Scientist, Entomology presented the work plan of 2021-2022 of entomological trials. Three new trials have been added in the 2021-22 work plan. Due to the increasing adoption of conservation agriculture practices in North Western Plains Zone, concerns have been raised about insect-pest dynamics under such cropping systems. Keeping in view, one study on "Population dynamics of insect-pests and natural enemies under different residue management scenarios in rice-wheat cropping system" has been proposed. The other experiments that were proposed are "Effect of silicon on the incidence of major insect-pests and natural enemies of wheat" and "Evaluation of biodegradable insecticide loaded hydrogels for management of termites in wheat". Data of insect resistance from few centres were not included in the report owing to the low infestation of the insects. Therefore, the centres were advised to build of proper infestation load by artificially releasing the insect population into the border rows of highly susceptible check entries. Two new centres viz., Kalyani and RPCAU, Pusa were added for conducting Entomological trials during 2021-22.

In the nematology experiments, the data from Delhi centers was not received from last three years; hence the trials are not allotted to the center. Ludhiana center also informed that the nematology scientist left the university, so it will not be possible to conduct the nematology trials. While discussion it was noticed that many new scientists have joined the crop protection, therefore, need was felt to organize training course on crop protection trial conductance, uniform diseases/pest recording and reporting to improve the accuracy and efficiency.

The following recommendations have been emerged in the meeting:

- It is recommended to cultivate newly released yellow rust resistant varieties like DBW303, DBW187, WH1270, DBW 222, PBW 771, HD 3226, PBW 752, HD 3237, HI 1620, DBW 173, WB 02, HD 3096, DBW 90, WH 1124, WH 1080, and WH 1142 etc. in view of current pathotype prevalence in Haryana, Punjab, Himachal Pradesh and Jammu.
- Newly released blast resistant variety HD 3293 (restricted irrigation and timely sown) should also be deployed in NEPZ more specifically in West Bengal along with already blast resistant varieties recommended viz., DBW 187, HD 3249 and HD 2967 (irrigated and timely sown); DBW 252 and HD 3171 (restricted irrigation and timely sown).
- Strict monitoring for wheat blast in NEPZ specially areas bordering to Bangladesh. Use of preventive measures i.e. quarantine, adoption of alternate crop plan, seed treatment etc. in disease prone areas.
- It is recommended to use Tebuconazole 50 % + Trifloxystrobin 25 % WG @ 0.06% for the effective management of yellow rust on appearance of disease and repeat after 15 days, if needed.
- Seed treatment with pre-mixed insecticide Imidacloprid 18.5%+ Hexaconazole 1.5% FS @ 2 ml/Kg seed is recommended for management of termites in wheat.
- Application of ZnSO₄ @ 0.5% found compatible with Thiamethoxam 25 WG @ 50 g/ ha and found effective for management of aphids without any phytotoxic effects on wheat.
- Training to scientist recently associated with crop protection programme for diseases and insect pest scoring, recording and reporting to further improving effectiveness of the programme.

WORK PLAN (2021-22): CROP PROTECTION

The programme for the crop year 2021-22 discussed in detail in work plan finalization meeting held on 05.08.2021 through virtual platform and finalized in the 60th All India Wheat and Barley Research Workers Meet held in August 23-24, 2021 through virtual platform. The various activities to be executed at respective Centres 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:

North

Stripe rust: Malan, Dhaulakuan, Jammu, Gurdaspur, Ludhiana, Karnal, Hisar and Durgapura.

Leaf rust: Ludhiana, Karnal, Delhi, Durgapura, Ayodhya, Kanpur, Sabour and Coochbehar.

South

Leaf rust + Stem rust: Vijapur, Indore, Powarkheda, Niphad, Pune, Mahabaleshwar, Dharwad and Wellington.

(b) **Leaf Blight:** 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

North

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

Leaf rust: Jammu, Ludhiana, Karnal, Hisar, Delhi, Durgapura, Pantnagar, Kanpur, Ayodhya and Kalyani.

South

Leaf rust and Stem rusts: Junagarh, Vijapur, Indore, Powarkheda, Niphad, Pune, Mahabaleshwar, 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, 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	<i>Puccinia graminis tritici</i>	11, 40A, 117-6, 21A-2, 122
Stripe/Yellow	<i>P. striiformis</i>	238S119, 46S119, 110S119, 110S84, T
Leaf/Brown	<i>P. triticina</i>	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.

4. AUDPC based identification of slow rusters in AVT material

Stripe rust: Ludhiana, Karnal, Durgapura

Leaf rust: Ayodhya, Mahabaleshwar

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

- Stripe, leaf and stem rusts (under controlled conditions)*: Flowerdale, Shimla
- Stripe rust: Ludhiana and New Delhi
- Leaf rust*: Powarkheda, New Delhi and Ludhiana
- Black rust (under controlled conditions)*: Pune, Indore and Mahabaleshwar

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

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

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

- Stripe, leaf and stem rusts (All races)*: 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.
- 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's 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 and Pantnagar. *NEPZ:* Ayodhya, Varanasi, RPCAU Pusa, Sabour, Ranchi, Kalyani Coochbehar and Shillongani. *CZ:* Indore and Powarkheda. *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 material and released varieties (NHZ, NWPZ)

Centres: Malan, Dhaulakuan, Almora, Jammu, Pantnagar and Wellington

PROGRAMME 7: Region specific diseases

1. *Flag Smut Screening Nursery:* Ludhiana, Hisar, Delhi and Durgapura.
2. *Head scab:* Dhulakuan, Gurdaspur, Delhi and Wellington
3. *Foot rot:* Dharwad
4. *Hill bunt:* Malan, Bajaura 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 supply information fortnightly on crop health from the areas of their jurisdiction to P.I. Crop Protection starting from November 2020 till the harvest of crop.
- Wheat Crop Health Newsletter will be issued on monthly basis by PI (CP) IIWBR, Karnal, during the crop season. Information on off season surveys will be included in first issue.

Monitoring of new virulences of yellow rusts in NWPZ by specially constituted teams: Specially constituted teams will visit the areas as per the need 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 in NWPZ. Teams will be constituted as per the need for survey.

Monitoring of wheat blast: The teams are constituted to monitor wheat crop in West Bengal, Bihar and Assam along the Indo-Bangladesh borders for the presence of wheat blast. Teams will be constituted as per the need for survey. If any suspected samples of wheat blast like disease found will be analyzed at Kalyani and Coochbehar centre.

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 co-ordinated by Flowerdale, Shimla): The nursery will be planted at 38 locations including Kudwani (Srinagar), Varanasi KVK, Rampur and Yamunanagar (Haryana). Samples from this nursery should be sent regularly to 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 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. (Inclusion of PBW 757 in place of WL 711)

SAARC- Nursery (To be coordinated by Flowerdale, Shimla): 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 analysing samples from grain *mandies* of their respective states.

PROGRAMME 9: Integrated disease management

- 1. Elite Plant Pathological Screening Nursery (EPPSN):** The sources of resistance to three or two rusts identified in PPSN will be retested to confirm their resistance to rusts:
Stripe rust: Kudwani, Malan, Dhaulakuan, Almora, Jammu, Ludhiana, Karnal, Hisar, Delhi, Durgapura and Pantnagar.
Leaf rust (N): Jammu, Ludhiana, Karnal, Hisar, Delhi, Durgapura, Pantnagar, Kanpur, Ayodhya and Kalyani.
Leaf rust (S) and Stem rusts: Vijapur, Indore, Powarkheda, Niphad, Pune, Mahabaleshwar, Dharwad and Wellington.
- 2. Multiple Disease Screening Nursery (MDSN):** It will have sources of resistance to rusts and other diseases found earlier and will revalidate their status to different diseases:

DISEASES

Stripe rust: Kudwani, Malan, Dhaulakuan, Almora, Jammu, Ludhiana, Karnal, Hisar, Delhi, Durgapura and Pantnagar.

Leaf rust (N): Jammu, Ludhiana, Karnal, Delhi, Durgapura, Pantnagar, Kanpur, Ayodhya and Kalyani.

Leaf rust (S) and Stem rusts: Vijapur, Indore, Powarkheda, Niphad, Pune, Mahabaleshwar, Dharwad and Wellington.

Leaf blights: Ludhiana, Karnal, Pantnagar, Ayodhya, Varanasi, Sabour, Kalyani, Coochbehar, Indore, Powarkheda, Pune 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, Jammu, Pantnagar and Wellington

Flag smut: Ludhiana, Hisar, Delhi and Durgapura

Head scab: Dhulakuan, Gurdaspur, Delhi and Wellington

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.

3. Management of diseases

(a) Chemical management of powdery mildew

Centres: Malan, Dhaulakuan, Almora, Jammu Pantnagar and Wellington.

The chemicals will be tested are:

SN	Treatments	Doses
1	Azoxystrobin 18.2% w/w + Cyproconazole 7.3% w/w SC,	@ 0.1%
2	Azoxystrobin 18.2% w/w + Difenconazole 11.4% w/w SC,	@ 0.1%
3	Tebuconazole 50% + Trifloxystrobin 25% WG,	@ 0.06%
4	Propiconazole	@ 0.1%
5	Tebuconazole	@ 0.1%
6	Control	-

The chemical will be evaluated under artificial inoculated condition and spray will be done on initiation of diseases and repeated once after 15 days. Design – RBD, Plot size – 6 rows of 3 meters, replications - 3.

(b) Chemical management of head scab

Centres: Gurdaspur, Ludhiana, Karnal and Wellington.

The chemicals will be tested are:

SN	Treatments	Doses
1	Picoxystrobin 7.05% + Propiconazole 11.7% SC,	@ 0.1%
2	Pyraclostrobin 133g/l + Epoxiconazole 50g/l SE,	@ 0.1%
3	Tebuconazole 50% + Trifloxystrobin 25% WG,	@ 0.06%
4	Azoxystrobin 18.2% w/w + Cyproconazole 7.3% w/w SC	@ 0.1%
5	Azoxystrobin 18.2% + Difenconazole 11.4% w/w SC	@ 0.1%
6	Azoxystrobin 11% + Tebuconazole 18.3% w/w SC	@ 0.1%
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.

(c) Chemical management of leaf rust

Centres: Ludhiana, Karnal, Durgapura, Pantnagar, Kanpur, Ayodhya, Indore, Powarkheda, Niphad, Mahabaleshwar.

The chemicals will be tested are

SN	Treatments	Doses
1	Picoxystrobin 7.05% + Propiconazole 11.7% SC,	@ 0.1%
2	Pyraclostrobin 133g/l + Epoxiconazole 50g/l SE,	@ 0.1%
3	Tebuconazole 50% + Trifloxystrobin 25% WG,	@ 0.06%
4	Azoxystrobin 18.2% w/w + Cyproconazole 7.3% w/w SC	@ 0.1%
5	Azoxystrobin 18.2% + Difenconazole 11.4% w/w SC	@ 0.1%
6	Azoxystrobin 11% + Tebuconazole 18.3% w/w SC	@ 0.1%
7	Propiconazole	@ 0.1%
8	Tebuconazole	@ 0.1%
9	Control	-

The chemical will be evaluated under artificial inoculated condition and spray will be done on initiation of diseases and repeated once after 15 days. Design – RBD, Plot size – 6 rows of 3 meters, replications - 3.

(d) Chemical management of stem rust:*

Centres: Vijapur, Indore, Niphad, Pune, Mahabaleshwar, Dharwad and Wellington.

The chemicals will be tested are

SN	Treatments	Doses
1	Picoxystrobin 7.05% + Propiconazole 11.7% SC,	@ 0.1%
2	Pyraclostrobin 133g/l + Epoxiconazole 50g/l SE,	@ 0.1%
3	Tebuconazole 50% + Trifloxystrobin 25% WG,	@ 0.06%
4	Azoxystrobin 18.2% w/w + Cyproconazole 7.3% w/w SC	@ 0.1%
5	Azoxystrobin 18.2% + Difenconazole 11.4% w/w SC	@ 0.1%
6	Azoxystrobin 11% + Tebuconazole 18.3% w/w SC	@ 0.1%
7	Propiconazole	@ 0.1%
8	Tebuconazole	@ 0.1%
9	Control	-

The chemical will be evaluated under artificial inoculated condition and spray will be done on initiation of diseases and repeated once after 15 days. Design – RBD, Plot size – 6 rows of 3 meters, replications - 3.

(e) Chemical management of leaf blight

Centres: Karnal, Ayodhya, Sabour, Kalyani, Coochbehar, Pune and Dharwad.

The chemicals will be tested are:

SN	Treatments	Dosages
1	Tebuconazole 50% + Trifloxystrobin 25%,	0.1%
2	Propiconazole 13.9% + Difenconazole 13.9%	0.1%
3	Azoxystrobin 12.5% + Tebuconazole 12.5%	0.1%

4	Picoxystrobin 7.05% + Propiconazole 11.7%	0.1%
5	Kresoxim Methyl 44.3% SC	0.1%
6	Propiconazole 25%	0.1%
7	Tebuconazole 25.9%	0.1%
8	Mancozeb 75%	0.2%
9	Control	-

The chemical will be evaluated under artificial inoculated condition and spray will be done on initiation of diseases and repeated once after 15 days. Design – RBD, Plot size – 6 rows of 3 meters, replications - 3.

PROGRAMME 10. ENTOMOLOGY

1. **Host plant resistance:** Entomological screening nurseries (ESN), Multiple pest screening nurseries (MPSN), National initial varietal trial nurseries (NIVT) and special screening nurseries of promising entries identified during previous season

- (a) *Entomological screening nurseries (ESN):* In these nurseries, AVT entries along with those found resistant during previous years will be screened for
- (i) *Shoot fly* (Centres: Dharwad, Ludhiana, Kanpur, Niphad)
 - (ii) *Brown wheat mite* (Centres: Durgapura and Ludhiana)
 - (iii) *Wheat Aphids* (Centres: Niphad, Ludhiana, Karnal, Durgapura, Khudwani, Kalyani, RAU Pusa, and Kharibari)
 - (iv) *Root aphid* (Centres: Karnal and Ludhiana)

The NIVT entries will also be screened against foliar aphids at Niphad, Ludhiana and Karnal

- (b) *Multiple pest screening nurseries (MPSN):* In these nurseries, the germplasm having resistance to multiple diseases and insect-pests will be screened for
- (i) *Shoot fly* (Centres: Dharwad, Ludhiana, Kanpur and Niphad)
 - (ii) *Brown wheat mite* (Centres: Durgapura and Ludhiana)
 - (iii) *Foliar aphids* (Centres: Niphad, Ludhiana, Karnal, Durgapura, Khudwani, Kalyani, RAU Pusa, and Kharibari)
 - (iv) *Root aphid* (Centres: Karnal and Ludhiana)

2. Integrated Pest Management

- (a) *Survey and surveillance of insect-pests and their natural enemies in wheat and barley cropping systems (All centres):* Roving surveys will be carried out at fortnightly intervals during the cropping season in wheat and barley crops 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 peak period of pest activity and its severity of damage will also be recorded.
- (b) *Influence of sowing time on the incidence and population build-up of major insect pest of wheat (Centres: Karnal, Ludhiana, Kharibari):* The effect of sowing time on the population build-up of major insect-pests of wheat will be studied at four geographical locations to better understand the insect-pest behaviour under different climatic conditions.
- (c) *Population dynamics of insect-pests and natural enemies under different residue management scenarios in rice-wheat cropping system (Centres: Karnal, Ludhiana-New*

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

- (d) *Effect of silicon on the incidence of major insect-pests and natural enemies of wheat (Centres: Karnal and Ludhiana-New trial)*: Different doses of Monosilicic acid (MSA) will be evaluated against major insect-pests and natural enemies of wheat.
- (e) *Evaluation of biodegradable insecticide loaded hydrogels for management of termites in wheat (Centres: Karnal and Ludhiana-New trial)*: Soil application of polyacrylamide and alginate loaded insecticide hydrogel formulations will be tested for management of termites in wheat.
- (f) *Basic studies for development of IPM strategies (Centres: Karnal, Niphad, Ludhiana, Kharibari)*: The study will be conducted to generate region-wise data on population dynamics of major insect-pests of wheat and barley for developing pest-forecasting models. Weather parameters of a location will be correlated with insect population to determine the effect of climatic variations on the pest population dynamics under changing climate scenario.
- (g) *Zone specific IPM modules (Centres: Karnal, Ludhiana, Niphad, Kanpur)*: The integrated pest module consisting of effective cultural, physical, biological and chemical components of integrated pest management will be formulated and tested against major pests of wheat viz., foliar aphids, shootfly and termites.
- (h) *Management of aphids through foliar application of new chemical molecules (Centres: Karnal, Ludhiana, Niphad, Vijapur, Kanpur, Durgapura)*: New chemical molecules 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.
- (h) *Management of lepidopterous pests (pink stem borer, army worm & cutworms) of wheat: (Centres: Karnal and Ludhiana)*: With increasing incidence of lepidopterous insect-pests in rice-wheat cropping system, an experiment will be conducted on the management of these pests through, chemicals, biopesticides etc.
- (i) *Management of termites, aphids and seed borne diseases of wheat through seed treatment of chemical molecules combinations (Centres: Durgapura, Kanpur, Ludhiana and Vijapur)*: Few selected insecticides and their combination with fungicides will be tested as seed treatment against termites. The observations on insect population counts before and after the treatment will be recorded along with yield in each treatment.

3. Stored Grain Pest Management

- (a) *Evaluation of different packaging bags for storage insect-pest infestation and its effect wheat seed quality (Centre: Karnal, Ludhiana, Kharibari, Niphad)*: Different types of storage bags viz., jute bags, High density polyethylene bags (HDPE) and Biaxially Oriented Polypropylene (BOPP) bags will be evaluated for storage insect-pest infestation and its effect on wheat seed quality will be determined.

- (b) *To evaluate seed protectants for management of storage insect pests of wheat (Centres: Karnal, Ludhiana, Kharibari, Niphad):* Effect of seed protectants will be tested against infestation of major storage insect pests; *Sitophilus oryzae* or *Rhizopertha dominica* in wheat.

PROGRAMME 11. NEMATOLOGY

1. *Monitoring of Nematodes: Heterodera avenae, Anguina tritici, Meloidogyne graminicola* and other plant parasitic nematode: All centres of Nematology
2. *Evaluation of resistance against nematodes parasitizing wheat*
(a) *Heterodera avenae*: Hisar and Durgapura. (AVT and MDSN lines)
3. *Evaluation of new chemical against cereal cyst nematode, Heterodera avenae*
Centres: Hisar and Durgapura.

Treatments:

- T1 = Fluensulfone 2% GR @0.5 Kg a.i./ha at sowing (25 Kg formulation/ha)
- T2 = Fluensulfone 2% GR @1.0 Kg a.i./ha at sowing (50 Kg formulation/ha)
- T3 = Fluensulfone 2% GR @1.5 Kg a.i./ha at sowing (75 Kg formulation/ha)
- T4 = Fluensulfone 2% GR @2.0 Kg a.i./ha at sowing (100 Kg formulation/ha)
- T5 = Carbofuran @2 kg a.i/ ha at sowing
- T6 = Untreated Check

4. *Differentiation of CCN Pathotype by using International differential*
Centre: Durgapura

PROCEEDINGS OF THE MEETING TO FINALIZE THE WHEAT QUALITY WORK PLAN

August 05, 2021	Chairman	: Dr. GP Singh, Director ICAR-IIWBR
	Co-Chairman	: Dr. Sewa Ram, PI, Quality & Basic Science
	Rapporteurs	: Drs. Sunil Kumar & OP Gupta

The online meeting started with the formal welcome of all the participants by Dr. Sewa Ram, PI Quality. A total of 30 scientists including breeders representing AICRP centres across the country participated in the meeting.

Dr. GP Singh, Director, ICAR-IIWBR, Karnal delivered his opening remark on the overall progress made in wheat quality. He appreciated the significant progress made in wheat quality over the last 10 years across the zones specially in NWPZ. He also highlighted the importance of wheat quality for both industrial and nutritional purposes and informed that out of 70 biofortified varieties developed across crops, 22 belong to wheat. He informed that the inclusion of statistical analysis of wheat quality data will be conducted from next year onwards, which will help in identification of superior entries for promotion. For this purpose bench making has also been done for both industrial and nutritional quality traits specially Fe, Zn and protein content. The chairman informed that breeders were included in the meeting so that quality issue is discussed in greater detail and implemented in the field.

Dr. Sewa Ram presented the work plan of wheat quality for the year 2021-22 and informed the house about the inclusion of NIVT6A and NIVT6B for quality analysis by different centres and accordingly work plan for 2021-22 was made. He also emphasized that recommendations with respect to wheat quality should be followed by breeders for improving both industrial and nutritional uses. This has become necessary as both the quality aspects are being discussed at high level meetings in the country. He also emphasized that breeders and Quality scientist should work hand in hand to meet the expectation of both domestic and international market and improved human nutrition.

Issue of large variations among centres in Fe and Zn content was discussed in detail and Dr. Sewa Ram suggested that centres conducting trials should generate data on Fe, Zn content in soils before sowing the trial as well as after conducting the trial and submit it to PI quality. It was informed by Dr. Anju Mahendru Singh, ICAR-IARI, New Delhi that Zn (@50kg zinc sulphate/ha) is applied in trial blocks every season before sowing wheat in ICAR-IARI, New Delhi. This is the main reason of unusually higher Zn content in wheat samples from IARI, New Delhi in AVT samples. Therefore, it was decided that standard common agronomic practices should be followed by each centre conducting the trials to identify superior genotypes for nutritional quality traits.

Among participants, suggestions came from Dr. Manoj Oak and Anju Mahendru Singh regarding analysis of thousand-grain weight of QCWBN samples and also the inclusion of more checks for analysis of quality traits in QCWBN trials and accordingly PI Crop Improvement was requested to take action. It was decided that 3 locations should be selected in each zone for QCWBN analysis. It was also decided that QCWBN samples from 2 centres of each zone will be taken for grain hardness analysis by ICAR-IARI, New Delhi.

WORK PLAN (2021-22): WHEAT QUALITY

Work plan was finalized based on the meeting held on 5th August 2021 in virtual mode and discussions held during the wheat and barley research worker's meet (23-24 August 2021). The detailed work plan for 2021-22 is given below.

NIVT and IVT

NIVT entries will be analysed for grain appearance score, test weight, protein content, sedimentation value in both aestivum and durum 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, Hisar, Durgapura, Delhi, Pantnagar (NWPZ), Kanpur, RPCAU-Pusa, Varanasi and Sabour (NEPZ) will be analyzed at **PAU, Ludhiana**.
- **NIVT 1B** (Irrigated Timely Sown) and **NIVT 6A**: Samples from Ludhiana, Hisar, Durgapura, Delhi, Pantnagar (NWPZ), Kanpur, RPCAU-Pusa, **BISA-Pusa (for NIVT 6A)**, Varanasi and Sabour (NEPZ) will be analyzed at **RAU, Durgapura**.
- **NIVT 2** (Irrigated Timely Sown): Samples from Indore, Vijapur, Junagarh, Powarkheda (CZ), Dharwad, Pune and Niphad (PZ) will be analysed at **SDAU, Vijapur**.
- **NIVT 3A** (Irrigated Late Sown) AND **NIVT 5A** (Restricted Irrigation Timely Sown): Entries from Pantnagar, Hisar, Ludhiana, Durgapura, Delhi (NWPZ) and RPCAU-Pusa, Sabour, Kanpur, Varanasi (NEPZ) will be analysed at **GBPUA&T, Pantnagar Centre**.
- **NIVT 3B** (Irrigated Late Sown T. Aestivum) AND **NIVT 4** (Irrigated Timely Sown T. *duruml*) samples from Vijapur, Indore, Powarkheda, Junagarh (CZ) and Dharwad, Niphad, Pune (PZ) will be analysed by the quality laboratory at **ARI, Pune**.
- **NIVT 5B** (Restricted Irrigation Timely Sown, both durum and aestivum) and **NIVT 6B**. Samples from Vijapur, Indore, Powarkheda, Junagarh (CZ) and Dharwad, Niphad, Pune (PZ) will be analysed at **UAS, Dharwad**.
- **IVT (NHZ)**: Samples from Shimla, Almora and Malan will be analysed at 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 IIInd year entries. Grain hardness index of selected centres of AVT and QCWBN entries will be evaluated at ICAR-IARI, New Delhi.

Quality Components and Wheat Biofortification Nursery (QCWBN)

Quality Components and Wheat Biofortification Nursery (QCWBN): samples will be analysed at ICAR-IIWBR, Karnal for grain appearance score, test weight, protein content, grain hardness index and sedimentation value, Fe and Zn content. **Hand threshed samples using cloth should be provided for Fe and Zn analysis separately.** Followings are the **13 centres** for providing samples of the nursery for quality analysis.

Ludhiana, Karnal, New Delhi and Pantnagar (**NWPZ**); Sabour, Kanpur and Varanasi (**NEPZ**); Indore, PowarKheda and Vijapur (**CZ**) and Pune, Dharwad and Niphad (**PZ**)

The last dates for supplying the samples by respective centres were finalised as follows:

NHZ	15 th June 2020
NWPZ & NEPZ	20 th May 2020
CZ	15 th May 2020
PZ	30 th April 2020

All the wheat grain samples, duly cleaned and properly packed in polythene bags separately, enclosed in cloth bags should be sent by registered post parcel. The *T. dicoccum* samples should be sent after de-husking.

All the co-operators, who will analyze the wheat samples of various NIVTs and Special Trials should send the data to ICAR-IIWBR, Karnal positively by 15th July, 2020, by e-mail in the format used in annual report.

PROCEEDINGS OF THE MEETING TO FINALIZE THE BARLEY IMPROVEMENT WORK PLAN

August 07, 2021	Chairman	: Dr. GP Singh, Director ICAR-IIWBR
	Co-Chairman	: Dr. RPS Verma, PI, Barley Improvement
	Rapporteurs	: Drs. Chuni Lal and SK Bishnoi

The meeting was chaired by Dr GP Singh, Director, ICAR-IIWBR, Karnal and co-chaired by Dr RPS Verma, Principal Investigator, Barley Improvement. At the outset, the chairman welcomed all the participants and mentioned that wheat and barley are very important *rabi* crops essential for food security of the nation. He stressed that, the varietal development programme is helping in continuous rise in productivity of barley however, the acreage of barley is decreasing. The centres need to look into it and do their efforts to help in increase of area under barley in their respective states. He expressed his satisfaction on barley seed production and the performance of the newly released varieties He apprised the house that the varieties DWRB137 was ranking first in breeder seed production during Rabi 2020-21 season and again for 2021-22 DWRB137 is at first rank as per the current DAC indent (draft) received for finalization. Couple of barley varieties from Durgapura centre are among the top indented barley varieties and he expressed his satisfaction for this.

The chairman emphasized that the barley varieties older than 10 years should be discouraged for planting and instead new varieties preferably lesser than 7 years of release should be popularized. He expressed his deep concern about the effective and timely utilization of funds which are already limited. He cautioned the centres that the performance will be evaluated critically and the available funds will be shifted to the better performing centres to improve the efficiency of the barley improvement programme. The issue of disbursement of the available funds was also flagged during the meeting as the disbursement of funds is not on expected lines and the main reason for this is non-receipt of AUCs from the centres. He urged the centres to ensure that AUCs are sent to ICAR-IIWBR, Karnal as soon as possible so that the disbursement efficiency could be improved. Another issue of vacant positions of scientists at many centres, for a long time was again highlighted as despite of pursuing the matter hard with the SAUs, the situation has remained unsatisfactory. Associated to this the frequent transfer of AICRP scientists was highlighted as another serious problem that adversely impacts the barley improvement programme. The chairman also expressed his unhappiness for the situation that scientists engaged in the AICRP who got trained at international platforms such as ICARDA and other CGIAR institutions are being transferred to other positions at the SAUs without any information to the ICAR-IIWBR.

At the end, the chairman paid homage to the departed soul of Dr. Naval Kishore, who worked as barley breeder at Bajaura centre for long period and prayed for strength to the grieved family to cope up with the loss.

Dr RPS, Verma, Principal Investigator, Barley Improvement presented the work plan of barley improvement. The major trials rejection was attributed to complete failure of a trial on hullless barley due to non/poor germination of couple of entries and check PL891. Now onwards the centres were asked to provide mandatorily certified information on the minimum germination percentage of seeds of their checks and entries at the time of sending seeds to ICAR-IIWBR for constituting trials.

Dr Verma presented the work plan trial-wise and enlisted the entries which could be promoted to next stage of testing in the AVT. Taking notice of the entries being promoted /retained based on their numerical superiority over the best check variety in few cases, Dr GP Singh, Director and chairman of the meeting suggested that like wheat, in barley also promotions/retentions should be based on the statistical significance in yield or numerically higher in grain yield over the best check with some speciality trait such as novel gene for disease and insect resistance; unique grain quality or morphology parameters. It was decided that the promotions/retentions of entries in different zones will be done based on the agreed criteria and the work plan (2021-22) will be circulated among the centres.

Dr RPS Verma informed the house that data of some centres were rejected due to low site mean yield and high CV. For Ranichauri location, Drs L. Kant and DP Walia were asked to propose a new centre as the yield levels at this centre are always very poor in both wheat and barley crops. Based on the interaction with authorities of University and it was replaced by Gaza centre about 13 km away from Ranichauri, where the land is better. The rejection of data from, Varanasi, Kumarganj and Kalyani centres was also discussed, and centers were advised to put better efforts for next year. CAU, Jhansi had returned trial sets on AVT feed barley and conducted only the huskless barley trial. The chairman suggested that a letter should be written to the Director of Research of this university and only after his consent the trials should be sent. In case of other centres also which are not funded centres their willingness should be taken beforehand for conducting of trials.

Dr Sudheer Kumar, Principal Scientist, Crop Protection, presented the work plan for pathology, entomology and nematology experiments of barley to be carried out at different barley cooperating centres during *rabi* 2021-22 season. Dr Sudheer pointed out that *rabi* 2020-21 was a difficult year to create rust disease as it coincided with high temperature and humid weather. He proposed that for nurseries (IBDSN, NBDSN and EBDSN) there will be no change in the centres. One trial on chemical control of yellow rust was concluded last season, and a new experiment on chemical management of leaf blight in barley was proposed with different treatments. In Entomological screening, besides NBDSN, elite lines will be screened against the leaf aphids. NBDSN and EIBDSN will also be screened against nematodes (CCN) at Durgapura and Hisar locations.

Dr AS Kharub, Principal Scientist, presented the work plan for agronomical experiments. He told the house that the six experiments (SPL1, SPL2, SPL3, SPL4, SPL5 and SPL6) will continue as they are yet to be concluded. However, in SPL4, this year onwards there will be 9-treatments instead of earlier 8. Treatment 9 has been added as recommended doses of fertilizers for the comparison. A new experiment on "enhancing yield and quality through sowing methods and seeding rate in NWPZ" was proposed. Dr Ajay Verma, Principal Scientist (Statistics), pointed out that the experiment did not meet the statistical requirements of a split plot design. It was decided that the treatments of this experiment will be finalized after discussion with the statistician.

Regarding testing of AVT final year entries for their agronomic performance, Dr Kharub told the house that this activity will depend on the entries being promoted/retained and both the fertilizer and sowing dates aspects will be evaluated.

On behalf of Dr Dinesh Kumar, barley biochemistry, Dr RPS Verma presented the work plan for different experiments on barley quality. The house was informed that in different trials and nurseries, dealing with barley quality has generated good information. Barley genotypes with <4% β -glucan have been identified. Such lines will be evaluated this year also and the promising ones will be included in the crossing programme in future. The lines performing

better than the already registered genetic stocks ones may be got registered. In case of phytic acid, the findings are encouraging and few genotypes such as BCU73, NDB1173 has low phytic acid content. In barley quality experiments, BQSN will continue and new nurseries on malt barley and food barley will be included.

Dr RPS Verma informed the house that couple of new initiatives were taken last year, such as AUDC for leaf blights in pathological experiments; DNA profiling of all the entries in IVTs and AVTs and information on utilization of nurseries by the barley breeders in their breeding programmes. He urged that the breeders should ensure that their entries are genetically pure, otherwise DNA profiling, which exhausts considerable funds and time of the scientist, will be a futile exercise.

The following recommendations emerged in the meeting

Technical

1. Promotions and retention of entries should only be based on statistical significance or the numerically superior than the best check test entry with advantage of some speciality trait like different gene for disease/ insect resistance; important grain quality parameters. **(Action: PI, Barley Improvement)**
2. Certified information on germination percentage should be supplied by the centre at the time of supplying seed of their entries and checks to ICAR-IIWBR, Karnal for constitution of trials and germination below 85% should not be accepted **(Action: all the cooperating centres)**
3. All the centres should adhere to the technical programme sent to them and should follow the plot size mentioned for each trial **(Action: all the cooperating centres)**
4. A letter should be written to the Director of Research, CAU, Jhansi for their consent to conduct trials. Similarly, from other non-funded centres willingness to conduct trials should also be taken **(Action: PI, Barley Improvement)**

Policy issues

5. The centres should ensure that AUC of their centre is sent to ICAR-IIWBR well in time for timely disbursement of funds to the centre and also to enhance the percentage of disbursement of AICRP **(Action: all the cooperating centres)**
6. The vacant positions should be filled immediately **(Action: all the cooperating centres)**
7. The SAUs must consult ICAR-IIWBR authorities before transferring their staff engaged in AICRP activities of wheat and barley crops **(Action: all the cooperating centres)**

WORK PLAN (2021-22): BARLEY IMPROVEMENT

A: Coordinated Yield Trials (*Rabi* 2021-22)

1. Advanced Varietal Trial -Irrigated Feed barley-NEPZ

Name of Trial	Advanced Varietal Trial -Irrigated Feed barley-NEPZ	
Trial Centers	7	Kanpur, Varanasi, Kumarganj, Pusa (CAU), Sabour, Ranchi, Kalyani
Entries	6	RD3034, PL917* , UPB1095, NDB1756, HUB113©, DWRB137(C)
Experimental Design		RBD
Replications		4
Plot Size		Gross: 5m x 2.76m (12 rows) Net: 4.5 x 2.30 (10 rows)

2. Advanced Varietal Trial -Irrigated Malt Barley-NWPZ

Name of Trial	AVT-Malt Barley-NWPZ (IRTS)	
Trial Centers	11	Bawal, Hisar, Karnal, Ludhiana, Bathinda, Durgapura, SG Nagar, Navgaon, Tabiji, Modipuram, Pantnagar
No. of varieties including checks	6	DWRB219, DWRB221, DWRB137(C), DWRUB52(C), RD2849(C), DWRB182(C)
Experimental Design		RBD
Replications		4
Plot Size		Gross: 5 m x 2.40 m (12 Rows@ 20 cm)
Fertilizer dose		90 Kg. N: 40Kg P: 20Kg per ha

3. Advanced Varietal Trial- SAL / ALK-IRTS- NWPZ / NEPZ

Name of Trial	AVT- SAL / ALK-IRTS- NWPZ / NEPZ	
Trial Centers	8	Dalipnagar, Kumarganj, CCSHAU Hisar, IIWBR (Hisar), CSSRI Karnal, Fatehpur, Bhilwara, Samdari
No. of varieties including checks	14	BH1045, KB2013, KB2031, NDB1776, NDB1782, NDB1783, DWRB228, RD3059, RD3060, RD3061, RD3062, NDB1173 (C), RD2794 (C), RD2907 (C)
Experimental Design		RBD
Replications		4 (Four)

4. IVT Rainfed- NH Zone

Name of Trial	IVT Rainfed- NH Zone	
Trial Centres	12	Bajaura, Berthein, Kangra, Katrain, Malan, Shimla, Almora, Gaza, Majhera, Rajauri, Khudwani, Wadura
Total entries + checks	23	Names of varieties

Entries	18	BHS488, BHS489, BHS490, BHS491, BHS492, UPB1101, UPB1102, UPB1103, VLB175, VLB176, VLB177, VLB178, VLB179, HBL874, HBL875, HBL876, HBL877, HBL878
Checks	5	HBL113, BHS352, BHS380, BHS400, VLB118
Experimental Design		RBD
Replications		4 (2 for green forage cut at 70-75 DAS and 2 as non-cut)

5. IVT-IRTS-Malt Barley NWPZ

Name of Trial	IVT-IRTS-Malt Barley NWPZ	
Trial Centers	11	Bawal, Hisar, Karnal, Ludhiana, Bathinda, Durgapura, SG Nagar, Navgaon, Tabiji, Modipuram, Pantnagar
# Varieties including checks	25	
Contributing Centers	No.	Name of varieties
Hisar	4	BH1040, BH1041, BH1042, BH1043
Pantnagar	2	UPB1107, UPB1108
IWBR, Karnal	6	DWRB229, DWRB230, DWRB231 DWRB232, DWRB233, DWRB234
Durgapura	5	RD3055, RD3056, RD3057, RD3058, RD3063
Ludhiana	4	PL933, PL934, PL935, PL938
Checks	4	DWRUB52, RD2849, DWRB182, DWRB137
Experimental Design		Lattice (5x5) Rep= Two
Plot Size		Gross: 5 m x 1.08 m (6 Rows@ 20 cm)
Fertilizer dose		90 Kg. N: 40Kg P: 20Kg per ha

6. Initial Varietal Trial- Feed Barley- IRTS- (NWPZ/ NEPZ / CZ)

Name of Trial	Initial Varietal Trial-IRTS- Feed Barley NWPZ/ NEPZ / CZ	
Trial Centers	20	Names
NWPZ	7	Hisar, Karnal, Ludhiana, Durgapura, Tabiji, Pantnagar, Modipuram
CZ	6	Udaipur, Samdari, Gwalior, Morena, Tikamgarh, Vijapur
NEPZ	7	Kanpur, Varanasi, Kumarganj, Pusa (CAU), Sabour, Ranchi, Kalyani
No. of varieties plus checks	25	
Kanpur	3	KB2004, KB2015, KB2031
Varanasi	1	HUB281
Kumarganj	2	NDB 1793, NDB1800
Hisar	2	BH1043, BH1044
Durgapura	4	RD3051, RD3052, RD3053, RD3054,
Pantnagar	2	UPB1105, UPB1106
Ludhiana	4	PL936, PL937, PL939, PL940
Karnal	2	DWRB225, DWRB226
Checks	4	BH 946, DWRB137, RD2899, HUB113

Experimental Design		Lattice
Replications		2 (Two)
Plot Size		Gross: 5m x 1.38m (6 rows) Net: 4.5 x 0.92 (4 rows)
Fertilizer dose		60 Kg. N: 30Kg P: 20Kg K /ha

7. Advance/ Initial Varietal Trial (Huskless Barley)

Name of Trial	Advance Varietal Trial-IRTS- Hulless	
Zone	NWPZ/ NEPZ / CZ	
No. of Trial Centers	14	
NWPZ	6	Hisar, Karnal Ludhiana, Durgapura, Pantnagar, Modipuram
NEPZ	5	Udaipur, Gwalior, Morena, Tikamgarh, Vijapur
Punjab	3	Kanpur, Varanasi, Kumarganj
No. of varieties including checks	7	
Entries	5	KB2019, DWRB223, DWRB227, UPB1086 , UPB1104
Checks	2	NDB943, PL891
Experimental Design		RBD (Replications= 4)

*UPB1086 in AVT 1st Year of **NEPZ and CZ only***

8. Initial Varietal Trial-RFTS- NEPZ

Name of	IVT- Rainfed- NEPZ	
Trial centers	8	Kanpur, Varanasi, Kumarganj, Saini, Pusa (CAU), Sabour, Ranchi, Chiyanki
No. of varieties including checks	13	
Contributing Centers	No.	Name of varieties
Kanpur	2	KB2008, KB2018
Karnal	1	DWRB225
Kumarganj	3	NDB1784, NDB1785, NDB1789
Durgapura	5	RD3037 , RD3047, RD3048, RD3049, RD3050
Checks	2	K603, Lakhan
Experimental Design		RBD (Replications =4)

RD3037 will be tested in IVT-RF-NEPZ of 2021-22 as AVT-1st year as it is the only entry promoted to AVT.

Important points for breeders, zonal coordinators and trial conducting centres

1. Last date for seed supply to trial coordinator: Rainfed (15 September) Irrigated (20 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, Karnal: 1st December (Timely sown)
4. Last date for supply of filled data books to ICAR-IIWBR, Karnal: 15th May (Plains), 15th June (Hills)
5. Breeders must supply the insect free, untreated viable seed of new entries **along with the germination %age and 1000 gw data** to PI Barley for in time trial constitution and despatch to the testing centres.

6. The trial coordinators shall supply about 200g seed of coded entries for the disease nursery (NBDSN) from the same seed lot, received for constitution of yield trial to Dr. RPS Verma, P.I. (Barley Network), ICAR-IIWBR, PB 158, Karnal-132001, Haryana.
7. Also, each centre must supply the seed of their new station trial entries for IBDSN to Dr. RPS Verma, Principal Scientist & P.I. Barley Network, IIWBR, PB 158, Karnal-132001, failing which no entry will be accepted for IVT next year.
8. Observations on disease incidence made by **the monitoring team at the centre must be reported** by the trial conducting centres in the data book along with other data. In case higher scores are recorded after the visit same may be included in data, but in no case the disease data should be missed in the data reporting.
9. Because of introduction of double coding system in AICW&BIP, the trial packets of entries are carrying entry code and plot number only. The trial may be sown by arranging by the plot numbers, because all replications of one entry are packed in one polythene envelope to avoid the transportation damage.

List of barley breeding centers

1. **Almora:** Dr. Lakshmi Kant, Principal Scientist, Division of Crop Improvement, ICAR-VPKAS, ALMORA-263601 Uttarakhand
2. **Bajaura:** Dr. Vijay Rana, Barley Breeder, HAREC (H.P.K.V.), BAJAURA – 175125 Distt. Kulu (H.P.)
3. **Durgapura:** Dr. Ved Prakash, I/C AICRP Wheat & Barley, RARI, DURGAPURA, Jaipur - 302018 (Rajasthan)
4. **Hisar:** Dr. Y K Gulia, Barley Breeder, Deptt. of Plant Breeding, CCS H.A.U., HISAR-125004 (Haryana)
5. **Kanpur:** Dr. P.K Gupta, Barley Breeder, Section of E.B.(R), CSAUA& T, KANPUR-208002 (U.P.)
6. **Karnal:** Dr. RPS Verma PI, Barley, Barley Improvement Unit, ICAR-IIWBR, PO Box-158, Agrasain Road KARNAL-132001 (Haryana)
7. **Kumarganj:** Dr. R.B. Singh, Barley Breeder, Deptt. of Plant Breeding, N.D. University of Agric. and Tech., KUMARGANJ, Ayodhya - 224001 (U.P.)
8. **Ludhiana:** Dr. Simarjit Kaur, Barley Breeder, Deptt. of Plant Breeding, P.A.U., LUDHIANA - 141004 (Punjab)
9. **Pantnagar:** Dr. J P Jaiswal, Professor G&PB, College of Agriculture, GBP University of Ag. & Tech. PANTNAGAR-263145, Uttarakhand
10. **Shimla:** Dr DP Walia / Dr. Madhu Chauhan, ICAR-IARI, Regional Station, Tutikandi, SHIMLA - 171004 (H.P.)
11. **Varanasi:** Dr. Sandeep Sharma, Barley Breeder, Deptt. of Plant Breeding, Institute of Agricultural Sciences, BHU, VARANASI- 221005 (U.P.)

B. Barley Quality

1. Malt Barley Yield Trials

Identification of Promising genotypes for malting quality traits

Trial: Advanced Varietal Trial (Malt Barley) and Initial Varietal Trial (Malt Barley)

Number of Locations: 11 each

Entries: AVT = 6, IVT = 25, Total = 31 genotypes

Traits to be analysed:

Grain Traits: Test weight, Thousand Grain weight, Kernel Plumpness, Husk Content, Germination percentage, Protein Content, Starch Content, Beta Glucan content

Malt traits: Malt yield, Friability, Homogeneity, Wort Filtration rate, Wort pH, Wort Colour, Saccharification Rate, Hot Water Extract, Wort Beta Glucan, Wort Free Amino Nitrogen.

2. Feed & Hulless Barley

Quality Evaluation of Feed and Hulless Barley Genotypes

Trials: Feed Barley / Hulless Barley

Zones: NWPZ, NEPZ, CZ & NHZ

Grain Traits: Test Weight, Thousand Grain Weight, Protein, Starch, and Beta Glucan (in selected entries of hulless genotypes).

3. Barley Quality Component Screening Nursery

Identification of promising sources of quality traits with respect to malt and food barley for use in Quality Improvement Programme

Malt Barley Genotypes: 20 Food Barley Genotypes: 15

Number of Locations: 5 (Karnal, Hisar, Ludhiana, Pantnagar & Durgapura)

C. Barley Crop Protection

Crop Health Survey: All barley cooperating centres in their area of command will carry out the survey and record the incidence and infestation of disease and insect pest in the farmer's fields. The samples of rust are to be sent to IIWBR, RS Flowerdale and leaf blight to IIWBR, Karnal for further analysis. Any entry showing > 40S rust reaction in the trials has to be informed to IIWBR, Karnal and sample should be sent to RS Flowerdale, Shimla for race analysis.

Plant Pathology

1. Evaluation for status of host resistance in test entries

- i. *Initial Barley Disease Screening Nursery (IBDSN):* This nursery will comprise test entries of station trial of barley breeding centres. The entries will be screened against rusts and leaf blight at hot spot locations.

Yellow rust: Ludhiana, Durgapura, Bajaura, Karnal, Almora and Jammu (6)

Leaf blight: Pantnagar, Kanpur, Faizabad, and Varanasi (4)

- ii. *National Barley Disease Screening Nursery (NBDSN):* This nursery will comprise of entries from yield trials (IVT and AVT) which will be screened against rusts and leaf blight.

Yellow rust: Ludhiana, Durgapura, Bajaura, Hisar, Almora, Karnal and Jammu (7)

Leaf rust: Ludhiana and Jammu (2)

Stem rust: Dharwad and Arabhavi (2)

Leaf blight: Pantnagar, Kanpur, Faizabad, Varanasi, and Dharwad (5)

- iii. *Elite Barley Disease Screening Nursery (EBDSN)*: This nursery will have resistant entries identified in NBDSN and EBDSN tested at hot spot locations. The confirmed sources of resistance would later be shared with different barley breeders for their utilization.

Yellow rust: Ludhiana, Durgapura, Bajaura, Hisar, Almora, Karnal and Jammu (7)

Leaf rust: Ludhiana and Jammu (2)

Leaf blight: Pantnagar, Kanpur, Faizabad, and Varanasi (4)

- iv. *Seedling Resistant Test (SRT) of NBDSN and EBDSN*: The test would be conducted against different pathotypes of three rusts at RS, Flowerdale, Shimla.

2. **Chemical control of leaf blight (Centres: Pantnagar, Kanpur, Faizabad, and Varanasi)**

SN	Treatment	Dosages
1	Tebuconazole 50% + Trifloxystrobin 25%,	0.1%
2	Propiconazole 13.9% + Difenconazole 13.9%	0.1%
3	Azoxystrobin 12.5% + Tebuconazole 12.5%	0.1%
4	Picoxystrobin 7.05% + Propiconazole 11.7%	0.1%
5	Kresoxim Methyl 44.3% SC	0.1%
6	Propiconazole 25%	0.1%
7	Tebuconazole 25.9%	0.1%
8	Mancozeb 75%	0.2%
9	Control	-

The chemical will be evaluated under artificial inoculated condition and spray will be done on initiation of diseases and repeated once after 15 days.

Design – RBD, Plot size – 6 rows of 3 meters, replications - 3.

Entomology

- i. *Screening of NBDSN and Elite lines against foliar aphids (Centres: Ludhiana, Kanpur, Khudwani, Pantnagar, Durgapura, Hisar and Karnal)*: The national barley aphid screening nursery (NBDSN) will be continued. It will comprise entries from coordinated trials. Besides, 10-20 extra entries found promising for aphid resistance at Karnal will be screened against aphids at four centres; Ludhiana, Kanpur, Durgapura and Karnal.
- ii. *Survey and surveillance of insect-pests and their natural enemies in barley (All centres)*: Roving surveys will be carried out at fortnightly intervals during the cropping season 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 peak period of pest activity and its severity of damage will also be recorded.
- iii. *Management of aphids through foliar application of new bio-chemical molecules (Centres: Vijapur, Ludhiana, Kanpur, Durgapura and Karnal)*: New chemical molecules will be evaluated against foliar aphids in barley. Insect population counts before and after the treatment will be recorded along with yield to determine efficacy of each treatment.

- iv. *Effect of silicon on the incidence of foliar aphids and natural enemies:* (Centres: Karnal and Ludhiana) Foliar application of Monosilicic acid (MSA) will be tested against aphids and natural enemies in barley crop.

Nematology

1. *Screening of NBDSN and EBDSN against CCN:* The entries of NBDSN and EBDSN will be tested against Cereal Cyst nematode (CCN) at Durgapura and Hisar centers in sick plots/field.

D. Resource Management

Varietal Trial: NORTH EASTERN PLAIN ZONE

Title: Response of new barley genotypes to different N levels and sowing dates conditions in NEPZ.

Objectives: To work out optimum nitrogen level & sowing time for different barley genotypes

Treatments

A. Nitrogen Levels (Main Plots): 3, N1-45 kg, N2-60 kg, N3-75 kg

B. Sowing conditions and Varieties (Sub-Plots): 6

S1V1: Timely sown PL917	S2V1: Late sown PL 917
S1V2: Timely sown DWRB137	S2V2: Late sown DWRB137
S1V3: Timely sown HUB 113	S2V1: Late sown HUB113

Design: Double split plot, Replication: Three, Centres: Varanasi, Kanpur, Kumarganj

Special Trials

1. Barley agronomy experiment no. Spl-1

Title: Productivity enhancement through adjusting sowing dates in barley

Objective: To optimise sowing dates for increasing the feed and malt barley productivity

Treatments: Main plot: Sowing dates

NWPZ, CZ	NEPZ	NHZ
1-5 November	11-15 November	25-30 October
11-15 November	21-25 November	5-10 November
21-25 November	1-5 December	15-20 November
1-5 December	11-15 December	25-30 November

Subplot: Varieties: NWPZ: BH 946, DWRB160; NEPZ: DWRB137, HUB113

CZ: DWRB137, RD2899 NHZ: BH 400, VLB 118

Design: Split plot Design Replication: 3

Centres: NWPZ: Agra, Durgapura, Hisar, Karnal, Ludhiana
Kumarganj, Kanpur NHZ: Bajaura, Malan CZ: Udaipur

NEPZ: Varanasi,

2. Barley agronomy experiment no. Spl-2

Title: Productivity and quality enhancement of barley through Nitrogen and Zinc scheduling

Objective: To enhance quality and productivity through different N and Zinc scheduling

Treatments: N and Zn scheduling

1. 1/2 at basal+1/2 at tillering (35-40 DAS)
2. 1/2 at basal+1/4 at tillering (35-40 DAS) +1/4 at anthesis stage (80-90DAS)
3. 1/3 at basal+1/3 at tillering (35-40 DAS) +1/3 at flag leaf stage (65-70DAS)
4. 1/2 at basal+1/2 at tillering (35-40 DAS) +5.0% urea spray at anthesis stage (80-90DAS)
5. 1/2 at basal+1/2 at tillering (35-40 DAS) +5.0% urea + 0.5% ZnSO₄.7H₂O spray at anthesis stage (80-90DAS)
6. 1/2 at basal+1/4 at tillering (35-40 DAS) +5.0% urea spray at anthesis stage (65-70DAS)
7. 1/2 at basal+1/4 at tillering (35-40 DAS) +5.0% urea + 0.5% ZnSO₄.7H₂O spray at flag leaf (65-70DAS) and 0.5% urea spray at anthesis stage (80-90DAS)
8. 1/3 at basal+1/3 at tillering (35-40 DAS) +5.0% urea spray at flag leaf stage (80-90DAS)
9. 1/3 at basal+1/3 at tillering (35-40 DAS) +5.0% urea + 0.5% ZnSO₄.7H₂O spray at anthesis (80-90DAS)

Variety: NWPZ: DWRB160, Design: RBD, Replications: 3

Centres: NWPZ: Agra, Durgapura, Hisar, Karnal, Ludhiana

3. Barley agronomy experiment no. SPL-3

Title: Yield maximisation of barley through integrated nutrient supply and PGRs application

Objective: To increase barley productivity and nutrient use efficiency.

Treatments:

1. Control (No fertiliser)
2. RDF 50%+10t FYM
3. RDF 50%+10t FYM+PGR
4. RDF 75%+10t FYM
5. RDF 75%+10t FYM+PGR
6. RDF
7. RDF+PGR
8. RDF + 10t FYM
9. RDF + 10t FYM+PGR
10. RDF 125%+PGR
11. RDF 125%+10t FYM+PGR
12. RDF 150%+PGR

Plant Growth regulator: Chlormequat-chlorid (CCC) @1.25 L ha⁻¹ at GS₃₀₋₃₁ followed by ethephon (Cerone) @0.5 L ha⁻¹ at GS₃₉₋₄₀ as per recommendations

Variety: NWPZ: BH946 NEPZ: DWRB 137 CZ: DWRB137, NHZ: BHS400

Design: RBD Replications:3

Centres: NWPZ: (Agra, Durgapura, Hisar, Karnal, Ludhiana) NEPZ: (Varanasi, Kumarganj, Kanpur) NHZ: (Bajaura, Malan) CZ: Udaipur

4. Barley agronomy experiment no. Spl - 4

Title: Enhancing nutrient use efficiency through nano fertiliser in barley

Objective: To enhance the nutrient use efficiency and to optimise dose of nano fertiser in barley.

Treatments:

1. Control (P+K only)
2. Control (P+K only) +1000 ml NN/ha at 30-35 DAS+1000ml/ha at 60-65 DAS
3. 50% RDN + 500ml NN/ha at 30-35 DAS+500ml/ha at 60-65 DAS
4. 50% RDN + 1000 NN/ha at 30-35 DAS+1000ml/ha at 60-65 DAS
5. 75% RDN +500ml NN at 30-35 DAS+500ml NN at 60-65 DAS
6. 75% RDN + 1000ml NN at 30-35 DAS+1000ml NN at 60-65 DAS
7. RDN + 500ml NN/ha at 30-35 DAS+500ml/ha at 60-65 DAS
8. RDN + 1000ml NN/ha at 30-35 DAS+1000ml/ha at 60-65 DAS
9. Recommended doses of fertiliser

Variety: NWPZ: BH 946 CZ: DWRB137 **Design:** RBD **Replications:**3

Centres: NWPZ: Agra, Durgapura, Hisar, Karnal, Ludhiana CZ: Udaipur

5. Barley agronomy experiment no. Spl-5

Title: Effect of Zn application on quality and productivity of barley

Objective: To enhance the quality and productivity of barley

Treatments:

A. Main Plot: Zinc Application

1. No zinc application
2. Soil application of zinc (12.5 kg Zinc sulphate/ha)
3. Soil application of zinc (25.0kg Zinc sulphate/ha)
4. Two Foliar application of zinc (0.5 % Zinc sulphate at heading and early milk stage)
5. T2+T4
6. T3+T4

B. Sub Plot: Varieties: NWPZ: BH 946, DWRB123 NEPZ: DWRB137, HUB 113

NHZ: BHS 400, VLB118 and CZ: DWRB137, RD2899

Design: Split Plot, **Replication:** 3

Centers: NWPZ: Agra, Durgapura, Hisar, Karnal, Ludhiana; NEPZ: Varanasi, Kumarganj, Kanpur; NHZ: Bajaura, Malan; CZ: Udaipur

6. Barley agronomy experiment no. Spl-6

Title: Enhancing productivity and quality of barley using Silicon in low moisture areas.

Objectives: To evaluate the performance of barley cultivars under Silicon application

Treatments

Main Plots: Irrigation levels (3)

I1: No irrigation

- I2: One irrigation (between 30-35 DAS)
I3 : Two irrigations (30-35 DAS and 80-85 DAS)
I4 : Three irrigations (30-35 DAS, 60-65DAS and 90-95 DAS)

Sub Plot: Silicon (4)

Control (No silicon), Silicon @ 100 kg ha-1, Silicon @ 150 kg ha-1 Silicon @ 200 kg ha-1

Design: Split Plot; **Replication:** 3 **Varieties:** BH 946

Centres: NWPZ: Agra, Durgapura, Hisar; CZ: Udaipur

7. Barley agronomy experiment no. Spl-7

Title: Enhancing yield and quality through sowing methods and seeding rate in different barley varieties

Objectives: To evaluate the performance of barley cultivars under sowing methods and seeding rate

Treatments: Sowing Method and Seed rate (6)

Main Plots: Sowing Method

T1: Sowing at 23cm with 75 kg seed per ha

T2: Sowing in paired row (23cm: skip one row after two rows) with 75 kg seed per ha

T3: Sowing at 23cm with 87.5 kg seed per ha

T4: Sowing in paired row (23cm: skip one row after two rows) with 100 kg seed per ha

T5: Sowing at 23cm with 87.5 kg seed per ha

T6: Sowing in paired row (23cm: skip one row after two rows) with 100 kg seed per ha

Sub plot: Seeding rate (3)

Variety: DWRB137, Design: Split plot, Replications: Three

Centres: NWPZ: Agra, Ludhiana, Hisar, Karnal, Durgapura

RECOMMENDATIONS

60th All India Wheat & Barley Research Workers' Meet
(August 23-24, 2021: Virtual Mode)

General Recommendations

1. Targeted research for product specific quality, biofortification and export quality of wheat and barley be emphasized. Barley varieties with improved malting quality to curtail import of barley be identified. Bench mark needs to be set for quality traits.
2. Varietal development through MAS, genomic selection and through that of gene pyramiding should also be promoted for testing.
3. Faster breeding in wheat for quicker generation advancement be explored.
4. Development of input use efficient varieties including WUE and NUE varieties.
5. It was suggested that varietal mosaic is important instead of monoculture or maximum area under few varieties to combat stress and rust menace.
6. Research on drought and heat tolerance needs to be strengthened along with international collaborations.
7. Digitization of whole AICRP data at ICAR-IIWBR with good computational information is to be developed in a time period.
8. It was also suggested that the industrial partnerships for product sharing under Public-private partnership be taken as priority.
9. Celiac disease and anti-nutritional traits need to be addressed.
10. Human resources development in wheat/barley research is the needed for upgrading to young scientists through training. Identify leaders and build schools to train youngsters in their labs.
11. There is a large yield gap between Punjab and Chhattisgarh in productivity. This gap must be checked with yield demonstration and if the productivity is too low then area extension in those areas should be avoided.
12. ICAR- NBAIM, Mau institute had made consortium of micro organisms and that can be extended to wheat/barley for improving nutrients use efficiency as there is a need for improving biofertilizer in wheat.
13. Use of nano-fertilizers in wheat/barley need to be explored and experiments should be designed for validating their application in wheat.
14. Production and protection technologies are also needed to be released with certificates to recognize the personnels under these activities.

Discipline Wise Recommendations

CROP IMPROVEMENT

1. Newly released varieties will be taken up in seed chain for cultivation. Also, 30 new genetic stocks will be shared with cooperators.
2. The newly identified varietal proposals will now be put up to CVRC for release and notification as soon as possible.
3. A total of 433 new trial sets to be executed during 2021-22 as a part of work plan. Constitution & dispatch of all coordinated trials will be done by ICAR-IIWBR, Karnal. Work plan for national nurseries (NGSN, SSN) and international nurseries was also finalized for execution.
4. High fertility early sown trial now will be a national trial: NIVT 6A (NWPZ & NEPZ) and 6B (CZ / PZ).
5. NHZ trial (RI-LS) has been extended for one year in view of the promotion and will be reviewed accordingly.
6. Based on ecological and geographical locations the following centres will be shifted to different zones w.e.f. 2022-23 crop season: Dhaulakuan – NWPZ; Gwalior – NWPZ; Durgapura – CZ.
7. SPL-Dic trials/ nurseries, MLHT, DHTSN and SDN be discontinued from this crop season.

8. For promotion of durable rust resistant materials, limit of ACI has been revised to 20.0 under both natural and artificial conditions.
9. Under HRD, One Orientation Course on AICRP activities for new incumbents is proposed to be started from 2021-22 season. Key areas for Capacity Building of young scientists will be identified.
10. As an initiative to strengthen research for wheat improvement, trait/problem specific programs will be proposed at major centres from coming crop season.
11. Digitalization in AICRP will be further strengthened. All the proposals, yield trial data should be submitted as a soft copy.
12. The suggestions made by DG - ICAR, DDG (Crop Science) will be translated into action points by respective programmes.

RESOURCE MANAGEMENT

1. Sowing from 25th Oct to 5th Nov. is recommended for maximizing wheat grain yield in NHZ and NWPZ.
2. Sowing from 5th to 15th Nov. is recommended for maximizing wheat grain yield in NEPZ, CZ and PZ
3. Application of 150% recommended dose of NPK+ 15 t/ha FYM+ growth regulator (CCC @0.2% + tebuconazole @0.1% of commercial product dose at first node and flag leaf stages) produces the maximum wheat grain yield across the zones.
4. Surface seeding of 150kg seed/ha primed with 1% KNO₃ is recommended for maximizing wheat grain yield, especially in wetland of NEPZ
5. New experiments on nano fertilizer as well as bio NPK on wheat to enhance nutrient use efficiency should be planned as per the suggestion of Secretary, DARE and DG, ICAR.

CROP PROTECTION

1. It is recommended to cultivate newly released yellow rust resistant varieties like DBW303, DBW187, WH1270, DBW 222, PBW 771, HD 3226, PBW 752, HD 3237, HI 1620, DBW 173, WB 02, HD 3096, DBW 90, WH 1124, WH 1080, and WH 1142 etc. in view of current pathotype prevalence in Haryana, Punjab, Himachal Pradesh and Jammu.
2. Newly released blast resistant variety HD 3293 (restricted irrigation and timely sown) should also be deployed in NEPZ more specifically in West Bengal along with already blast resistant varieties recommended *viz.*, DBW 187, HD 3249 and HD 2967 (irrigated and timely sown); DBW 252 and HD 3171 (restricted irrigation and timely sown).
3. Strict monitoring for wheat blast in NEPZ specially areas bordering to Bangladesh. Use of preventive measures i.e. quarantine, adoption of alternate crop plan, seed treatment etc. in disease prone areas.
4. It is recommended to use Tebuconazole 50 % + Trifloxystrobin 25 % WG @ 0.06% for the effective management of yellow rust on appearance of disease and repeat after 15 days, if needed.
5. Seed treatment with pre-mixed insecticide Imidacloprid 18.5%+ Hexaconazole 1.5% FS @ 2 ml/Kg seed is recommended for management of termites in wheat.
6. Application of ZnSO₄ @ 0.5% found compatible with Thiamethoxam 25 WG @ 50 g/ ha and found effective for management of aphids without any phytotoxic effects on wheat.
7. Training to scientist recently associated with crop protection programme for diseases and insect pest scoring, recording and reporting to further improving effectiveness of the programme.

WHEAT QUALITY

1. Wheat quality group and Crop Improvement should work in a complementary mode for improving industrial and nutritional uses alongwith yield. This has become necessary as per the requirements of domestic and international market.
2. Large variations are there in protein, Fe and Zn content among centres. That may be because of variation in soil quality and other environmental conditions. It was therefore

recommended that centres conducting trials should generate data on nitrogen, Fe, Zn content in soils before sowing the trial and after the harvest. Standard common agronomic practices should be followed by each centre.

3. Because of Covid-19 crisis, samples from Mandi/Farmers' field could not be collected during this year, but will be collected and evaluated during season 2021-22 for quality to compare with trial results in different zones.
4. *Dicoccum* should be evaluated for nutritional quality traits as recommended during last workshop which could not be accomplished due to covid-19 crisis.

BARLEY IMPROVEMENT

1. The co-operators must ensure that germination percentage of the entry supplied for testing is not less than 85%.
2. A letter of *consent to conduct trials* should be taken for willingness to conduct trials from non-funded centres.
3. Promotions and retention of entries should only be based on statistical significance or the numerically superior than the best check test entry with advantage of some speciality trait viz. important grain quality parameters.
4. All the centres should adhere to the technical programme sent to them and should follow the plot size mentioned for each trial.
5. The centres should ensure that AUC of their centre is sent to ICAR-IIWBR well in time for timely disbursement of funds to the centre.
6. The vacant positions at funded centers should be filled immediately.
7. The SAUs must consult ICAR-IIWBR authorities before transferring their staff engaged in AICRP activities of wheat and barley crops.

SPECIAL SESSION
Varietal Identification Committee Meeting

	Chairman	: Dr. TR Sharma, DDG (CS)
August 23, 2021	Member Secretary	: Dr. GP Singh, Director, ICAR-IIWBR
	Rapporteurs	: Drs. Satish Kumar, Gopalareddy K & Shri Om Prakash

The meeting of Varietal Identification Committee of Wheat & Barley was held on 23 August 2021 during 60th AGM of All India Coordinated Research Project (AICRP) on Wheat & Barley under the Chairmanship of Dr. T R Sharma, DDG (CS). The following members participated in the meeting:

1. Dr. T R Sharma, DDG (CS), ICAR, Krishi Bhavan, New Delhi (*Chairman*)
2. Dr. Y P Singh, ADG (FFC), ICAR, Krishi Bhawan New Delhi
3. Dr. D K Yadav, ADG (Seed), ICAR, Krishi Bhawan New Delhi
4. Dr. B S Mahapatra, VC, BCKV, Mohanpur, WB
5. Dr. A K Singh, Director, ICAR – IARI, New Delhi
6. Dr. Sanjay Kumar, Director, ICAR-IISS, Mau Nath Bhanjan
7. Dr. Pankaj Tyagi, NSC, New Delhi
8. Dr. Mohinder Prashar, MAHYCO, R&D, Jalna (Pvt. Representative)
9. Dr. S C Mishra, Ex Head, Plant Genetics Division, ARI, Pune
10. Dr. G P Singh, Director, ICAR-IIWBR, Karnal (Member Secretary)

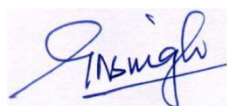
The committee considered all 13, wheat (12) and barley (1) varietal proposals submitted for identification and area extension and after detailed deliberations, gave the following recommendations unanimously, as indicated against each proposal:

SN	Name of Variety	Production conditions	Recommendations
WHEAT			
North Western Plains Zone (NWPZ): Punjab, Haryana, Delhi, Rajasthan (excluding Kota and Udaipur division), Western Uttar Pradesh (except Jhansi division), Jammu and Kathua district of Jammu & Kashmir, Paonta Valley and Una district of Himachal Pradesh and Tarai region of Uttarakhand.			
1	JKW 261	IR-LS	The variety was identified based on its yield and resistance to rusts. This genotype will provide diversity and may act as an option for replacement of old varieties.
2	DBW 296	RI-TS	Both the genotypes were considered together and both were identified based on their superiority in yield. Both the genotypes have shown resistance to the rusts and also has superior grain quality.
3	HUW 838	RI-TS	
Central Zone (CZ): Madhya Pradesh, Gujarat, Rajasthan and Chhattisgarh states.			
4	GW 513	IR-TS	Both the genotypes were considered together and were identified based on their yield gains and resistance to black and brown rusts.
5	HI 1636	IR-TS	
6	HI 8823(d)	RI-TS	The variety was identified based on its yield advantage and high level of resistance to black rust.
Peninsular Zone (PZ): Maharashtra, Karnataka and plains of Tamil Nadu			
7	MP 1358	RI-TS	The variety was identified based on its yield, disease resistance and grain quality.

North Western Plains Zone (NWPZ): Punjab, Haryana, Delhi, Rajasthan (excluding Kota and Udaipur division), Western Uttar Pradesh (except Jhansi division), Jammu and Kathua district of Jammu & Kashmir, Paonta Valley and Una district of Himachal Pradesh and Tarai region of Uttarakhand.			
8	DBW 327	HF-ES	All three genotypes were considered together and based on high yield potential and resistance to rusts, DBW327 and DBW332 were identified for release.
9	DBW 332	HF-ES	
10	WH 1252	HF-ES	Since WH1252 had no yield advantage than the best check, hence not identified .
Proposals for Area Extension (Wheat)			
1	DBW 222	NEPZ IR-TS	The variety was recommended for area extension in UP, West Bengal, Bihar, Jharkhand and Assam states.
2	DBW 187	CZ HF-ES	The variety was recommended for area extension in MP, Gujarat, Rajasthan and Chattisgarh states.
BARLEY			
3	DWRB 137	NWPZ IR-TS	The barley variety was recommended for area extension in states of Punjab, Haryana, Rajasthan and West UP.

After the deliberation on framing of uniform guidelines for consideration of proposals for area extension, it was proposed to set up as committee at ICAR and across all crops.

At the end, the Member Secretary proposed a formal vote of thanks to the Chairman and members of the committee.



Gyanendra Pratap Singh
(Member Secretary)

SESSION III: INTERNATIONAL COLLABORATIONS FOR WHEAT & BARLEY IMPROVEMENT

August 24, 2021	Chairman	: Dr. TR Sharma, DDG (CS), ICAR, New Delhi
	Co-Chairman	: Dr. Alison Bentley, Director of CIMMYT's Global Wheat Program & CGIAR Research Program on Wheat, CIMMYT, Mexico
	Rapporteurs	: Drs. OP Gupta and Sneha Adhikari

This session was synthesized with a series of lectures by five eminent and leading wheat researchers of global repute representing four geographical regions, i.e. Mexico, Australia, Japan and Morocco. The session started with the opening remarks of chairman Dr. TR Sharma. He emphasized the importance of this international collaboration and urged the organizer to share the video lectures among various stakeholders, especially UG and PG students and scientists of different agricultural universities. After the first presentation, the chairman requested co-chairman to chair the remaining session.

Presentation 1: “Accelerating Genetic Gains for Wheat Improvement” by Dr. Alison Bentley, Director of CIMMYT's Global Wheat Program & CGIAR Research Program on Wheat, CIMMYT, Mexico

Dr. Bentley highlighted CIMMYT's role in the global wheat breeding program partnership by emphasizing the release of 216 varieties by 24 partners countries in the last five years (2015-2020) and introduced IWIN (international wheat improvement network) functioning. Emphasis was made on the market and demand-oriented breeding and the improvement of genetic gain by reducing breeding cycles by adopting new methods and technologies (speed breeding, high throughput genotyping and phenotyping, genomic selection, novel trait introgression) and pre-breeding. She further described the working pipeline for a faster breeding approach using the “New One CGIAR partnership model” and extensive use of GS for population improvement.

Dr. Bentley further highlighted CIMMYT's work progress on nutritional quality, including Fe, Zn and dietary fibre. Wider variation for Fe⁺² (29.35-48.90ppm) and Zn⁺² (33.04-59.11ppm) content has been reported in core breeding pipelines. Among high Zn⁺² lines, the average Zn⁺² gain is 0.8-1.0 ppm with an average yield gain of 1-2% over Borlaug 100. There is significant natural variation among CIMMYT wheat germplasm for dietary fibres (arabinoxylan), and respective genomic regions have been identified for further DF improvement. Dr. Bentley concluded her presentation by introducing the “modern plant breeding triangle”, which has three key components, i.e. genomics, phenomics and enviromics and urged to deploy these developments to the farmers rapidly.

Presentation 2: “Indo-Australian Collaboration on rust resistance” by Dr. Robert Park, Director, University of Sydney, Australia

Dr. Park highlighted the Indo-Australian collaboration on rust resistance research in the form of two collaborative cereal rust research projects (1984-1991, 2005-2009) and awarded a PhD degree to about 20 Indian students in rust pathology and genetics University of Sydney. One collaborative project is going on (2017-2022), i.e. “Mitigating the effects of stripe rust on wheat production in South Asia and Eastern Africa” to understand the effectiveness of minor gene (APR) resistance to stripe rust across diverse environments in India, Nepal, Pakistan and Ethiopia with particular focus on genetic characterization of stripe rust resistance in local wheat cultivars, stripe rust surveillance and training.

He further described the effect of major and minor genes in APR and ASR durability. Phenotyping of minor genes can be noisy due to the difference between scoring material,

time of scoring, and expression change due to environment, inoculums load, and pathotypes. Discussed the significance of developing new near-isogenic lines with minor genes for resistance that will enable assessment of specific APR genes in a different environment, the virulence of different stripe rust races on APR genes, the performance of specific combinations of APR genes. Different NIL materials are at different stages of generation at the University of Sydney. They have developed 90 major gene NIL stocks in the Avocet background, and eight minor gene NILs stocks are either existing or are under development. Dr. Park finished his presentation with emphasis on continued collaboration to check stripe rust.

Presentation 3: “BNI-wheat technology development and its importance for improving NUE” by Dr. G. V. Subba Rao, JIRCAS, Japan

Dr. Rao started his presentation with an introduction on “BNI: Biological nitrification inhibitor technology-A genetic mitigation strategy” and how it could significantly be utilized to improve wheat's NUE, which will reduce the environmental nitrogen contamination, which has significantly increased by tenfold since 1960. Global nitrogen fertilizer consumption is expected to reach 200Tg by 2050. Cereal NUE of different countries (world-35%; USA-41%; China-30% and India-21%) is alarmingly on the lower side, which might be due to uncontrolled. Nearly 70% of the N-fertilizer applied to farmlands is lost due to the rapid generation of soil nitrate (nitrification), leading to environmental pollution, especially water bodies.

The BNI-Capacity of older and new varieties (1940-2020) are more or less the same and has not been increased over five decades of wheat breeding. Sonora 64 and Chinese spring released during 1960 have higher BNI activity. Wild relatives have more significant potential to be used as a genetic source for BNI trait, and ~30 wild species of wheat were tested and of which only one species *Leymus racemosus* is discovered to have high BNI capacity. BNI activity is controlled by the short arm of 3B chromosome (*Lr#n*) as demonstrated by developing several translocation lines with varying lengths of short arms of 3B by crossing between *L. racemosus* and cultivated wheat (Chinese spring) that resulted in developing BNI-MUNAL elite line. This trait can be introduced and expressed in the cultivated wheat genetic background without compromising the agronomic traits, yield, nutritional and processing quality of wheat. BNI-MUNAL lines are environmentally friendly and reduce the leaching of nitrate and nitrous oxide emissions.

Presentation 4: “Indo-Japan collaborative efforts to introduce BNI technology into Indian wheat production system” by Dr. Tadashi Yoshihashi, JIRCAS, Japan

Dr. Yoshihashi discussed the importance of the BNI project (started in 1983) in improving NUE in wheat to minimize N fertilizer application and environmental pollution, especially water bodies caused by excess N application. He further stressed the functioning of JIRCAS and showed a timeline of different stages of development of BNI from discovery to proof-of-concept. Indo-Gangetic plains of India are the project's main focal point as 80% of total Indian wheat production is contributed by this area. In India, BISA, IIWBR, IARI and IISSR are the Indian partners and JIRCAS, CIMMYT, NARO, and Tottori are international partners in this project. In addition to wheat, JIRCAS is also implementing BNI technology in sorghum, maize and *Brachiaria*.

Presentation 4: “Research initiative of ICARDA for Indian wheat and Barley research” by Dr. Michael Baum, ICARDA, Morocco

Dr. Baum emphasized upon the agreement of a new product profile between ICAR and ICARDA that covers the major barley agroecologies in the country and the progress on ICAR and ICARDA collaborative research on barley. New crosses between ICARDA and Indian

lines are made and advanced through speed breeding and genomic selection. In 2021, 500 new ICARDA elite barley genotypes were tested in (Amlaha) India, and 180 were selected and transferred for planting in 2022. Out of 500, 176 genotypes are issued from crosses between ICARDA elite lines and Indian varieties and have shown high performance, including disease resistance in India. He stated that >200 India-ICARDA crosses targeting the product profile are in the pipeline, and a global durum wheat panel (2700 lines) has been sent to India. Around 60 crosses are made using ICARDA and ICAR-IARI parents for drought tolerance and high-quality characters.

SESSION IV: NORTH EASTERN PLAINS ZONE PROGRESS REPORTS OF AICRP (W&B) Centers

August 24, 2021	Chairman	: Dr. B. Mishra (Ex-VC SKAUST- Jammu & Ex-Director, ICAR-IIWBR)
	Co-Chairman	: Dr. YP Singh, ADG (FFC), ICAR, New Delhi
	Rapporteurs	: Drs.CN Mishra and Vikas Gupta

Chairman, Dr B Mishra welcomed all the delegates and opined that performance of centres should be evaluated in terms of crosses attempted, trial conduction and publications made. In all there were 9 presentations from the different centres. The first presentation was made by Dr PK Gupta from Kanpur centre. Dr SR Verma suggested that the number of crosses should be improved. Dr Y P Singh also commented to improve the quality of publication from the centre. Dr Vinod Singh presented the progress of the Ayodhya centre. The Co-Chairman was particular about the two vacant positions and low utilisation of the budget at the centre. Dr GP Singh informed that though number of letters has been written to the university for filling the posts but these are still vacant. From Varanasi centre Dr RK Singh presented the progress of the station. Dr GP Singh informed that after wheat variety HUW234 that occupied 2-3 million hectares area the centre was unable to deliver the varieties. Dr YP Singh praised the performance of the centre in terms of quality publications in high impact journals. The progress of Sabour centre was presented by Dr Nitish De. Dr Satish Kuamr presented highlighted the progress of DRPCAUPusa centre. Dr YP Singh praised the performance of the centre at all the fronts. Dr GP Singh also informed that although the centre is voluntary, yet its performance is excellent. Chairman Dr B Mishra was also pleased to see the performance in terms of trial conduction, seed production and publication. The progress of five years of Ranchi centre was presented by Dr. Surya Prakash, All the panellist commented on the low utilization of the budget by the centre and vacant positions of scientific staff at the centre. The progress of Wheat research at Kalyani centre was presented by Dr Dhiman Mukerjee in which he emphasized the role of centre in screening the materials against major and minor diseases of wheat. The progress of research at Coochbehar centre was presented by Dr Saikat Das. He emphasized the role of centre in screening of breeding materials for leaf blight. Dr. GP Singh apprised the Chairman that due to the occurrence of wheat blast in Bangladesh and to avoid spread of disease, no NIVT contribution is accepted from Kalyani and Coochbehar centres. However, both these centres are making efforts in tracking and spreading awareness about this disease in the areas bordering Bangladesh. Dr PK Bordoloi, presented the highlights of Shillongani centre. The trial reporting percentage was critically low. Dr YP Singh took serious note on wrongly presenting the budget figures.

In the final remarks Dr. AN Mishra emphasized that there is need to share the good quality breeding materials with these centers. Dr SR Verma, pointed that all the centres have highlighted terminal heat as there a major problem, however breeding efforts are minimal. Dr YP Singh in his final remarks said that centres are complacent and requested the Director to take stringent action on those centres which are not performing. Dr B Mishra opined that there is urgent need to increase the productivity of the zone by all means. The coordinated efforts among the centres are needed to develop the high yielding varieties and commercialize it in the zone following the IIWBR model. At last Dr Gyanendra Singh, PI Crop Improvement thanked all the presenters and Chairman and co chairman for organising the session.

SESSION V: PLENARY SESSION

August 24, 2021	Chairman	: Dr. B. Mishra (Ex-VC SKAUST- Jammu & Ex-Director, ICAR- IIWBR)
	Co-Chairman	: Dr. YP Singh, ADG (FFC), ICAR, New Delhi
	Experts	: Dr. AN Mishra, Ex Head, IARI RS, Indore Dr. ML Lodha, Ex-Head, ICAR-IARI, New Delhi Dr. SR Verma, Ex-Barley Breeder, CCSHAU, Hisar
	Rapporteurs	: Drs. Hanif Khan, Rinki and Charulata Sharma

The plenary session of the two days' wheat and barley research workers virtual meet, was chaired by Dr B. Mishra (Ex-Director, ICAR-IIWBR) in lieu of Dr. TR Sharma, DDG (CS), ICAR, New Delhi and co-chaired by Dr YP Singh, ADG (FFC), ICAR, New Delhi. Director Dr. GP Singh welcomed chairman, co-chairman PMC members and the delegates in the online session. Dr B Mishra appreciated the efforts of the coordinated programme. He then requested to PIs to present section wise considerable research recommendation and highlights of work plan for 2021-22.

Dr. Gyanendra Singh, PI, Crop Improvement presented the recommendations and finalized plan of work of Crop Improvement for 2021-22 which included 433 trials. Some of other decisions also taken by the crop improvement group included shifting of centers, SPL-SAT/ALK for NWPZ only and discontinuation of SPL-Dicoccum trials, strengthening and digitalization of AICRP and submission of data should be through soft copy mode only.

Dr. S C Tripathi, PI, Resource management presented the recommendations and final work plan of Resource Management for 2021-22. He mentioned the ideal sowing dates in NHZ and NWPZ from 25th October to 5th November; in NEPZ, CZ and PZ from 5th to 15th November for maximizing wheat grain yield. Dr Tripathi informed the house that suggestions of DG- ICAR about experimentation on nano-fertilizers have been included in work plan. Dr Tripathi also presented FLD plan for 2021-22 wheat & barley including demonstrations under SCSP program for new varieties.

Dr. Sudheer Kumar, PI Crop Protection, ICAR-IIWBR, Karnal with the consent of Dr. S.C. Bhardwaj, Head ICAR-IIWBR, Regional Station Flowerdale, Shimla, presented recommendations and the work plan of Crop Protection for 2021-22. Dr. Sewa Ram, PI-Quality & Basic Science, presented the final work plan and recommendations for 2021-22. Quality testing of samples from Mandi/ farmers field will be evaluated in along with evaluation of *Dicoccum* for nutritional quality.

Barley network recommendations and the work plan for 2021-22 were presented by Dr. RPS Verma, PI-Barley Network, ICAR-IIWBR, Karnal. He strongly emphasized that information on germination percentage should be supplied by the centers. Dr Verma asked the cooperators to strictly adhere on technical programme sent to them.

Dr Laksmi Kant proposed shifting of trial site at Ranichauri center to Gaza in Uttarakhand. Dr ML Lodha emphasized that the importance of measuring the available nitrogen in soil. Dr Lodha suggested to fix the maximum limit for Phytic acid on the basis of published findings.

Dr AN Mishra appreciated all the presentations and emphasized reduction in the 'Noise' for recoding rust reaction. He suggested strengthening rust recording of pathological nurseries in presence of joint team of breeders and pathologists. He recommended the use of diverse sources of resistance, identification of new sources of rust resistance and deployment of adult plant resistance as safeguard.

Afterward, Dr GP Singh (Director IIWBR) presented the proceedings of Varietal Identification Committee (VIC) meeting held on 23rd August, 2021. He informed the house that VIC under Chairmanship of Dr. T R Sharma, DDG (CS) has identified 12 wheat varieties out of total 13 identification proposals and has also recommended area extension of three varieties. Dr Singh informed the house that proceedings of VIC held in 60th workshop has been uploaded on <https://aicrpwheatbarley.icar.gov.in/proceedings/>

Dr YP Singh (Co-chairman) appreciated good reports of the trials and data quality from most of the centres. He underlined the remarkable achievements of AICWBIP under the leadership of Dr GP Singh. He congratulated the house for excellent coordinated work and hoped for the further progress of programme in future.

Dr B Mishra Chairman of the session showed his satisfaction and congratulated the Director IIWBR for exemplary leadership AICRP program of wheat and barley and taking the institute to the next height. He also commended the Council for providing required funds and necessary support. Dr Mishra emphasized the training programs for new incumbents. He also appreciated the Institute for delivering remarkable varieties, technologies and data despite having limited resources (manpower, budget). He stressed on the strategies to target more yield with less inputs/cost of cultivation. Dr Mishra underlined the need of improvement in some AICWBIP centres particularly in NEPZ. He also emphasized the work on soil health particularly micro-nutrients. He felt the need of research on bioavailability of Fe and Zn. Dr Mishra also underlined the importance of international collaborations and need of further enhancement of the collaborative research with focus on quality.

The session ended with the vote of thanks by Dr. BS Tyagi Organizing Secretary of the 60th All India Wheat & Barley Research Workers' Meet.

CI - Final Year Entries and Checks (2021-22)

Entry	Checks
AVT-RF-TS-TAS - North Hill Zone	
VL2041 ^{Q*}	VL907, HS507, HPW349, HS562
AVT-IR-TS-TAS - North Western Plains Zone	
PBW826*, HD3406 ^{M*}	DBW187, DBW222, HD3086, HD2967
AVT-RI-TS-TAS - North Western Plains Zone	
HD3369*, HI1653*, HI1654*	PBW644, HD3043, NIAW3170, HI1628, DBW296(I), HUW838(I)
AVT-IR-TS-TAS - North Eastern Plains Zone	
PBW826#*, HD3406 ^{M*} , HD3411 ^{M*}	HD3249, HD3086, HD2967, DBW187, HD2733
AVT-IR-LS-TAS - North Eastern Plains Zone	
DBW316#*, PBW833*, PBW835 ^{Q*}	HI1563, HI1621, DBW107, HD3118
AVT-IR-TS-TAD – Central Zone	
HI1650*, MP3535*, MACS6768*	GW322, HI1544, GW513(I), HI1636(I)
AVT-IR-LS-TAS – Central Zone	
HD3407 ^{MQ*}	HD2932, HD2864, MP3336, CG1029, HI1634
AVT-RI-TS-TAD – Central Zone	
HI8830(d)*, CG1036*, HI1655 ^{Q*} , DDW55(d) ^{Q*}	HI8627(d), MP3288, DBW110, DDW47(d), HI8823(I)
AVT-IR-TS-TAD – Peninsular Zone	
HI8826(d)*, MACS4100(d)*	MACS3949(d), DDW48(d), GW322
AVT-IR-LS-TAS – Peninsular Zone	
DBW320#*	RAJ4083, HD2932, HD3090, HI1633
SPL-HYPT-IR-ES-TAS-NWPZ/NEPZ	
DBW370*, DBW371*, DBW372#*, PBW872*	DBW187, DBW303, HD3086, DBW327(I), DBW332(I)
SPL-HYPT-IR-ES-TAS-CZ/PZ	
DBW372#*	DBW187, DBW303, GW322

Note: Varieties recommended by VIC have been included as identified checks in respective trial(s).



AGENDA



60TH ALL INDIA WHEAT & BARLEY RESEARCH WORKERS' VIRTUAL MEET

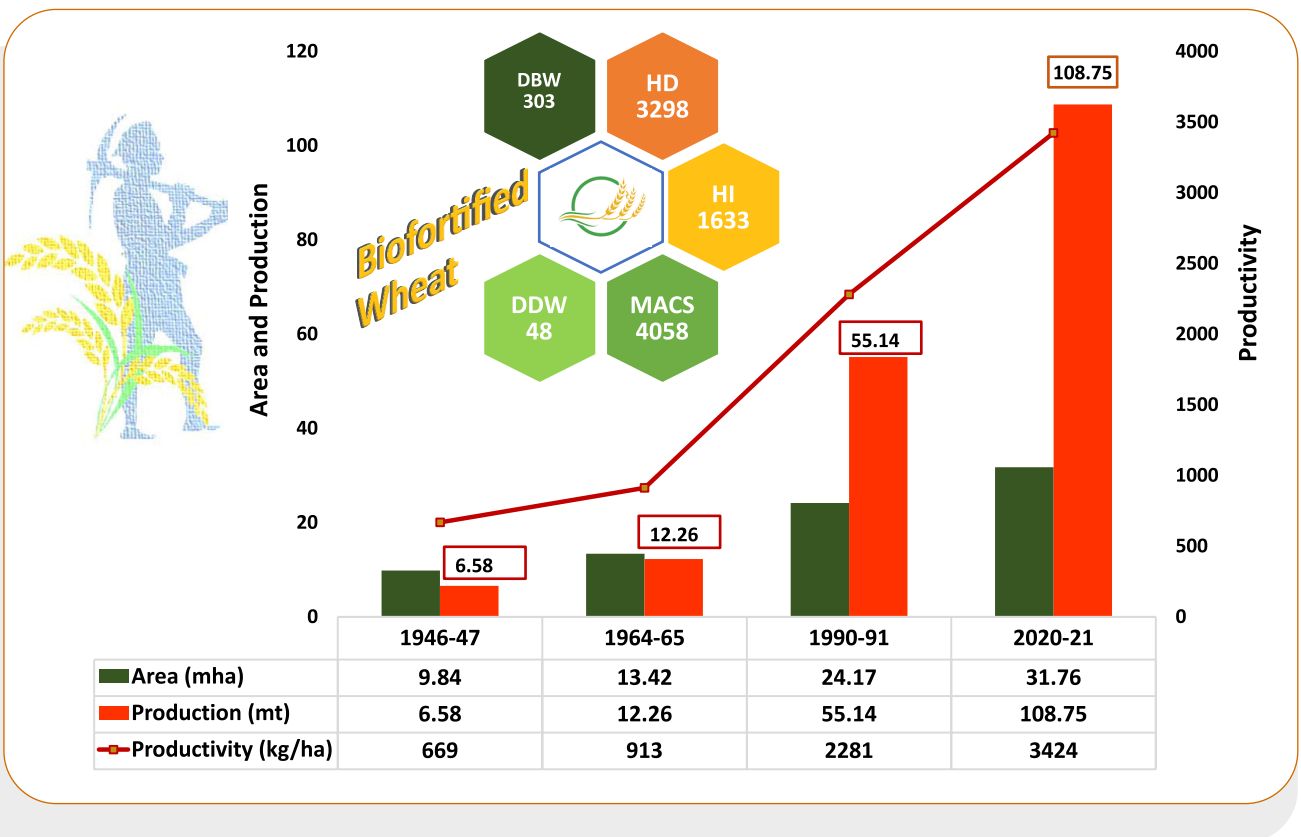
(August 23-24, 2021)

DAY-1: August 23, 2021 (Monday)

10:00–11:35	SESSION-I: INAUGURAL SESSION	
	Chairman	Dr. TR Sharma, Deputy Director General (CS), ICAR, New Delhi
	Co-Chairman	Dr. YP Singh, ADG (FFC), ICAR, New Delhi
	Chief Guest	Dr. T Mohapatra, Secretary, DARE & Director General, ICAR, New Delhi
	Rapporteurs	Drs. Gopalareddy K, Pramod Prasad & Mamrutha HM
	Session Moderator	Dr. Ratan Tiwari
10.00-10.30	Welcome address & Brief Progress Report (2020-21)	Dr. GP Singh, Director, ICAR-IWBR
10.30-10.35	Address by Co-Chairman	Dr. YP Singh, ADG (FFC), ICAR, New Delhi
10.35-10.45	Felicitation of crop variety developers, superannuating Scientists & release of publications	By the Dignitaries of the Inaugural Session
10.45-11.00	Address by Chairman	Dr. TR Sharma, DDG (CS), ICAR
11.00-11.30	Inaugural Address by Chief Guest	Dr. T Mohapatra, Secretary DARE & DG, ICAR
11.30-11.35	Vote of Thanks	Dr. Gyanendra Singh, PI Crop Improvement
11.45-13.00	SESSION-II: Discipline wise Presentation of progress report (2020-21)	
	Chairman	Dr. B. Mishra (Ex-VC SKAUST-Jammu & Ex-Director, ICAR-IWBR)
	Co-Chairman	Dr. YP Singh, ADG (FFC), ICAR, New Delhi
	Rapporteurs	Drs. Sendhil R, CN Mishra, Ravinder Kumar, RP Meena, Gopalareddy K
	Experts	Dr. BS Mahapatra (Vice Chancellor, BCKVV, Mohanpur) Dr. AN Mishra (Ex Principal Scientist, IARI RS, Indore) Dr. ML Lodha (Ex-Head, ICAR-IARI, New Delhi) Dr. SR Verma (Ex-Barley Breeder, CCSHAU, Hisar)
11.45-12.05	Crop Improvement	Dr. Gyanendra Singh
12.05-12.25	Resource Management	Dr. SC Tripathi
12.25-12.45	Crop Protection	Dr. Sudheer Kumar
12.45-13.00	Flowerdale Shimla	Dr. SC Bhardwaj
LUNCH (13.00-14.00)		
14.00-16.00	Session-II: Continued...	
14.00-14.20	Quality & Basic Sciences	Dr. Sewa Ram
14.20-14.40	Barley Improvement	Dr. RPS Verma
14.40-15.00	Social Sciences	Dr. Satyavir Singh
15.00-15.15	Discussion & Remarks	All Experts & Dr. GP Singh, Director, ICAR-IWBR
15.15-15.25	Remarks by Co-chairman	Dr. YP Singh, ADG (FFC), ICAR, New Delhi
15.25-15.40	Concluding Remarks by Chairman	Dr. B. Mishra (Ex-Director, ICAR-IWBR)
15.40-15.45	Concluding of Day-1 programme	Dr. GP Singh, Director, ICAR-IWBR
BREAK (15.45-16.00)		
16.00-17.00	Varietal Identification Committee (VIC) Meeting	
	Chairman	Dr. TR Sharma, Deputy Director General (CS), ICAR, New Delhi
	Member Secretary (VIC)	Dr. GP Singh, Director, ICAR-IWBR, Kamal
	Experts	VIC Committee members and all PIs (Non-voting members)
	Rapporteurs	Drs. Satish Kumar, Gopalareddy K & Shri Om Prakash
	Presentation of varietal proposals	Dr. GP Singh, Director, ICAR-IWBR, Kamal

DAY-2: August 24, 2021 (Tuesday)

09.00-11.00 IST SESSION III – International Collaborations for Wheat & Barley Improvement		
	Chairman	Dr. TR Sharma, Deputy Director General (CS), ICAR, New Delhi
	Co-chairman	Dr. Alison Bentley, Director of CIMMYT's Global Wheat Program & CGIAR Research Program on Wheat, CIMMYT, Mexico
	Rapporteurs	Drs. OP Gupta & Sneha Adhikari
9.05-9.30	Accelerating Genetic Gains for Wheat Improvement	Dr Alison Bentley, Director, of Global Wheat Improvement, CIMMYT, Mexico
9.30-9.55	Indo-Australian Collaboration on rust resistance	Dr. Robert Park, Director, University of Sydney, Australia
9.55-10.20	BNI-wheat technology development and its importance for improving NUE	Dr. G. V. Subba Rao, JIRCAS, Japan
10.20-10.45	Indo-Japan collaborative efforts to introduce this technology into Indian wheat production system	Dr. Tadashi Yoshihashi, JIRCAS, Japan
10.45-10.55	New Research Initiatives with ICARDA	Dr. Michael Baum, ICARDA, Morocco
10.55-11.05	Remarks by Co-chairman	Dr. Alison Bentley, Director (Wheat), CIMMYT
11.05-11.15	Concluding Remarks by Chairman	Dr. TR Sharma, DDG(CS), ICAR
SESSION IV - North Eastern Plains Zone Progress Reports of AICRP(W&B) Centres		
	Chairman	Dr. B S Mahapatra, Vice-Chancellor, BCKV, Kalyani
	Co-chairman	Dr. YP Singh, ADG(FFC), ICAR, New Delhi
	Experts	Dr. B. Mishra (Ex-Director, ICAR-IIWBR) Dr. AN Mishra (Ex Principal Scientist, IARI RS, Indore) Dr. ML Lodha (Ex-Head, ICAR-IARI, New Delhi) Dr. SR Verma (Ex-Barley Breeder, CCSHAU, Hisar)
	Rapporteurs	Drs. CNMishra & Vikas Gupta
11.15-11.20	Welcome & Introductory remarks	Dr. GP Singh, Director, ICAR-IIWBR, Karnal
11.20-11.30	Remarks by Chairman	Dr. B S Mahapatra, VC, BCKV, Kalyani
11.30-13.25	Presentation of progress of work by centers of North Eastern Plains Zone (NEPZ) (8 minutes presentation each & discussion)	CSAUA&T, Kanpur ANDUA&T, Kumarganj, Ayodhya BHU, Varanasi BAU, Sabour DRPCAUI, Pusa BAU, Ranchi BCKVV, Kalyani UBKV, Pundibari, Coochbehar AAU, Shillongini
13.25-13.35	Remarks	All Experts & Dr GP Singh, Director, ICAR-IIWBR
13.35-13.40	Remarks by Co-chairman	Dr. YP Singh, ADG(FFC), ICAR, New Delhi
13.40-13.45	Remarks by Chairman	Dr. B S Mahapatra, Vice-Chancellor, BCKV, Kalyani
LUNCH(13.45-14.30)		
14.30-17.30 SESSION V – Plenary Session		
	Chairman	Dr. TR Sharma, Deputy Director General(CS), ICAR, New Delhi
	Co-chairman	Dr. YP Singh, ADG(FFC), ICAR, New Delhi
	Experts	Dr. B. Mishra (Ex-Director, ICAR-IIWBR) Dr. B S Mahapatra, Vice-Chancellor, BCKV, Kalyani Dr. AN Mishra (Ex Principal Scientist, IARI RS, Indore) Dr. ML Lodha (Ex-Head, ICAR-IARI, New Delhi) Dr. SR Verma (Ex-Barley Breeder, CCSHAU, Hisar)
	Rapporteurs	Drs. Hanif Khan, Rinki & Charu Lata Sharma
14.30-15.30	Significant recommendations and highlights of work plan (2021-22)	Respective PIs
15.30-15.45	Report of VIC	Dr. GP Singh, Director, ICAR-IIWBR, Karnal
15.45-16.15	Discussion & Remarks	All Experts & Dr. GP Singh, Director, ICAR-IIWBR, Karnal
16.15-16.30	Remarks by Co-chairman	Dr. YP Singh, ADG(FFC), ICAR, New Delhi
16.30-17.15	Concluding Remarks by Chairman	Dr. TR Sharma, Deputy Director General(CS), ICAR, New Delhi
17.15-17.30	Vote of Thanks	Dr. Bhudeva Singh Tyagi (Organizing Secretary)



60th All India Wheat & Barley Research Workers' Meet
(August 23-24, 2021)

60^{वीं} अखिल भारतीय गेहूँ एवं जौ अनुसंधान कार्यशाला
में आयोजित गोष्ठी के दौरान जारी किया गया