



56वीं अखिल भारतीय गेहूं एवं जौ शोधकर्ता बैठक
56th All India Wheat and Barley workers' meet

कार्यवाही, संस्तुति एवं कार्ययोजना
Proceedings, Recommendations and Work Plan 2017-18

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ICAR – Indian Institute of Wheat and Barley Research, Karnal



PROCEEDINGS



56th All India Wheat & Barley Research Workers' Meet

**Research Review, Plan of Work 2017-18
&
Recommendations**

held at

Banaras Hindu University, Varanasi

during August 25-28, 2017

By

BHU, Varanasi & ICAR – IIWBR, Karnal

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FOREWORD

The 56th All India Wheat and Barley Research Workers' Meet, held at the Banaras Hindu University, Varanasi from August 25-28, 2016, was jointly organized by the ICAR-Indian Institute of Wheat & Barley Research, Karnal and Banaras Hindu University, Varanasi. The meet was inaugurated by Hon'ble Union Minister of Agriculture and Farmers' Welfare Sh. Radha Mohan Singh ji on 27th August, 2017. The occasion was marked with presence of several dignitaries viz., Dr AK Srivastava, Chairman, ASRB; Dr AK Singh, DDG (Horticulture & Crops); Dr HS Gupta, Former Director, IARI& DG, BISA; Dr AK Singh, Vice Chancellor, BAU, Sabour; Dr. NP Singh, Director, NIASM, Baramati; Dr. Brijendra Singh, Director, IIVR, Varanasi, Dr IS Solanki, ADG (FFC), Dr PK Chakrabarty, ADG (PP&B); Dr. PK Joshi, Director, IFPRI, South Asia.

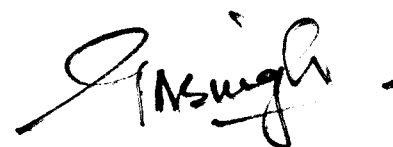
The meeting reviewed the results of previous year experiments and based on the deliberations, the programme for ensuing crop season 2017-18 was finalized. A panel discussion on "Enhancing productivity & profitability in wheat based cropping system in Eastern India and strategies to double farmers' income by 2022" was also held wherein research, institutional and policy issues were discussed by eminent panelists.

I express my deep sense of gratitude to Dr T Mohapatra, Secretary DARE and DG, ICAR for guidance and continuous support. I also express gratitude to Dr AK Singh, DDG (Horticulture & Crop Science), ICAR for guidance and encouragement.

I also place on record my sincere thanks to Dr GC Tripathi, Vice Chancellor BHU, Varanasi for his unfailing help and dedicated support. Suggestions provided by eminent personalities like Dr RM Singh, Dr (Ms) S Nagarajan, Dr JP Tandon, Dr. Ravi Singh, Dr. Robert Park, Dr AK Joshi and zonal coordinators for fine tuning the programme are gratefully acknowledged.

I would also take this opportunity to thank Dr A Vaishampayan, Director, Institute of Agricultural Science and all the members of the organizing committee of BHU, Varanasi, for the hard work they have done in making this programme a grand success. I would also appreciate all the Principal Investigators and staff for timely preparation of Annual Progress reports and this proceeding. Thanks to the Chairmen and rapporteurs of various technical sessions for smooth conduct and recording of proceedings.

I wish all the best for the ensuing season.



(GP Singh)

INTRODUCTION

The 56th All India Wheat and Barley Research Workers' meet held at Banaras Hindu University, Varanasi from August 25-28, 2017 was jointly organized by the ICAR-Indian Institute of Wheat & Barley Research, Karnal and Banaras Hindu University, Varanasi. The meet was inaugurated by Hon'ble Union Minister of Agriculture and Farmers' Welfare ShRadha Mohan Singh Ji on 27th August, 2017. Several national and international dignitaries also graced the function.

The meet was attended by the wheat and barley researchers from the national and international organizations (CIMMYT, ACIAR, ICARDA and BISA *etc.*). The meet is an annual event of the AICRP on Wheat and Barley and provides a platform to discuss emerging issues related to wheat and barley production in the country. Based on deliberations and discussions during various technical sessions, plan of research for the ensuing crop season 2017-18 was finalized.

A panel discussion on "Enhancing productivity & profitability in wheat based cropping system in Eastern India and strategies to double farmers' income by 2022" was also held wherein research, institutional and policy issues were discussed by eminent panelists.

The proceedings and recommendations in respect of different technical sessions along with the plan of work were finalized for implementation during ensuing crop season 2017-18. The compiled information is being presented herein for information and record by all concerned.

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Inaugural Session

August 27, 2017

Chief Guest : Sh Radha Mohan Singh, Union Minister for Agriculture and Farmers Welfare, GOI

The 56th All India Wheat and Barley Research Workers' meet held at BHU, Varanasi was inaugurated by Sh Radha Mohan Singh, Union Minister for Agriculture and Farmers Welfare, GOI. The other dignitaries who graced the occasion were Dr AK Singh, DDG (Crops and Horticultural Science), Prof. (Dr) A.K. Srivastava, Chairman (Additional Charge), ASRB, New Delhi, Dr. Girish Chandra Tripathi, Vice-Chancellor, BHU, Varanasi, Dr. US Gautam, Director, ICAR-ATARI, Kanpur.

Union Minister for Agriculture and Farmers Welfare Shri Radha Mohan Singh inaugurated the wheat workshop alongwith the "New India Manthan- Sankalp se Sidhhi" program organized by ICAR-Agricultural Technology Application Research Institute, Kanpur at Swatantrata Bhavan, BHU, Varanasi. The programme was attended by more than 300 participants including scientists of AICRP on Wheat and Barley and farmers of the region. In his inaugural address the honourable Minister asked the people to make a pledge to construct a New India and double farmers' income by the year 2022. He further elaborated the origin and evaluation of concept of Sankalp Se Siddhi campaign by linking it with the Quit India Movement led by Sh Mahatma Gadhi. After Prime Minister Narendra Modi's clarion call, people have come forward to build a New India. On the occasion, a special program to showcase advanced farming techniques was also taken up.

The Union Minister said that all the centers of All India Wheat and Barley Research Project are making efforts to deal with various biotic and abiotic stresses affecting wheat and also to make wheat rich in nutrition. The Union Minister further asked famers to adopt integrated farming practices, which are eco-friendly and economically sustainable. He said that there has been an unprecedented growth in wheat agricultural productivity over the last five decades due to the efforts of AICRP on Wheat and Barley. The Wheat research program has contributed to enhancing average yield per hectare from 0.91 tonnes in 1964-65 to 3.22 tonnes in 2016-17. In 2016-17, we produced 275.68 million tonnes of food grain and a record production of wheat at 98.38 mt at 3216 kg productivity. This has been possible due to the hard-work of farmers. He also appreciated concerted efforts by policy makers, agricultural officers, extension workers and the scientific community and said they are the backbone of the project.

He said that we acquired the status of self-sufficient in food grain in the 1970s and during the same period we became wheat exporter too and that is why we can manage the volatility in food stocks or fluctuations year after year so easily.

The Union Minister said establishment of the All India Coordinated Research Project on Wheat in 1965 by the ICAR was an important milestone in attaining self-sufficiency. Adoption of innovative techniques, technical interventions and policy reforms made Green Revolution successful. He also reiterated that such sustained efforts resulted in an increase in production and productivity. For this, he gave credit to dwarf variety developed under this project.

The Union Minister said that AICRP on wheat and Barley has so far developed 421 wheat and 92 barley varieties, which is being cultivated in different parts of the country. He also listed some of the achievements of AICRP on Wheat and Barley for the year:

- India's first zinc fortified variety WB2 was developed in the year 2016.
- Production of breeder seeds and capacity building of farmers to produce seeds.
- The draft sequence of Karnal bunt fungus has been a big achievement.
- To fulfil our objective of Per Drop More Crop, development work on deep-rooted wheat variety has started to ensure judicious use of water

The inaugural session ended with honoring of scientists involved in developing improved wheat and barley varieties during the previous year by the Union Minister.

Welcome and Presentation of Progress Report

August 25, 2017	Chairman	: Prof. A Vaishampayan, Director, IAS, BHU, Varanasi
09.00 to 10.30 hours	Rapporteur	: Dr Ravish Chatrath

Prof. A. Vaishampayan, Director, I.A.S., BHU, Varanasi expressed pleasure in welcoming delegates of the 56th All India Wheat & Barley Research Worker's Meet. He wished the wheat and barley workers a happy stay in BHU, Varanasi. He invited Dr GP Singh, Director, ICAR-IIWBR, Karnal to make presentation on the present scenario and the achievements made during the year 2016-17. Dr GP Singh expressed satisfaction at the front of production, productivity and the rate of production gain. He thanked the wheat workers for their efforts in achieving a record harvest of 98.38MT wheat during the year 2016-17. He also expressed his gratitude to the wheat community and particularly the staff of IIWBR for being awarded Sardar Patel Outstanding ICAR Institution during 2016. He informed that eight wheat varieties were notified by CVRC and eight by SVRC during the last year. 20 new genetic stocks were registered with ICAR-NBPGR. He informed the house that sufficient quantity of breeder seed (35174.91q) had been produced to ensure quality seed to the farmers. He expressed satisfaction as far as wheat coordinated trial conduct across all the zones with a trial conduct percentage of 96.7%. Dr Singh thanked the Indian team of molecular biology; especially the IIWBR group who have come up with a database of 369 wheat genotypes using SNP genotyping platform and are in the process of developing barcodes for each variety. He also highlighted the basic research being carried out in the areas of lodging tolerance and conservation agriculture. He complimented the physiology group who has been working to find new genetic resources for heat tolerance.

Dr GP Singh mentioned that continuous vigil is on to search the new pathotypes and the survey teams have been doing wonderful job to keep close watch on disease occurrence. He felt that although the new genotypes of built-in resistance do keep coming but the diversity for yellow rust resistance is very narrow. He assured that the programme is proactive to handle any problem related to blast occurrence in wheat and continuous watch will be there on the Indo-Bangladesh border to check its spread. Dr Singh informed that new techniques are being followed in conservation agriculture and some new approaches have been taken for lodging and yield maximization during nutrient expert. He assured that more attention will be paid for efficient water use management. Dr Singh was highly satisfied with the progress in wheat quality. Varieties specific for the end-products and genetic resources for various quality components are available.

Dr Singh informed that the extension group is providing good information about the yield gap in different parts of the country. Returns per rupee of investment by the farmers varies in different parts of the country; therefore, he urged to make strategy for increasing profit of the farmer and also bring uniformity in pre rupee returns across the country. Dr GP Singh expressed satisfaction about the progress in barley programmes. Four barley varieties were released by CVRC and three new genetic stocks were registered during 2016-17. Cooperation with ICAR has benefited the barley programme and new strategies are being formulated through these interactions to enhance barley productivity and the profit farmers make by barley cultivation. While concluding the session, Prof.Vaishampayan complimented Dr GP Singh for the presentation. He wished to minimize the gap between the release of variety and its adoption by the farmers. The session ended with vote of thanks to the chair.

SESSION - I
Research Review Meetings - Crop Improvement

August 25, 2017	Chairman:	Dr Vinod Tiwari
10.30 -15.15	Rapporteurs:	Drs. SK Singh & GS Mavi

The session on Research Review Meeting of the Crop Improvement programme was organized on 25.8.2017 to discuss the results, issues and problems in conducting the coordinated trials and nurseries during crop season 2016-17. The session included discussions on conduction of zone-wise coordinated trials, special trials, national and international nurseries/trials, seed production, physiology trials and PGR activities. Chairman Dr. Vinod Tiwari welcomed the participants and in his initial remarks emphasised on making concerted efforts for improving the conduction and management of experiments with precision for maintaining the required growth level even under crunching financial resources.

Dr. Lakshmi Kant presented the report and issues related to Northern Hills Zone and informed that trial conduction and reporting was 91.5% and 61%, respectively. Three trials, i.e., AVT-RF-VHA (2) and AVT-RI-LS (1) were not conducted and 14 trials from 5 trial series were not found suitable for reporting. He also informed about the non-conduction of VHA trial and instead the adaptive trial with 5 wheat and 1 barley variety grown under large plots of 100m² was planted during 2017 summer season. Chairman raised the issue of non-expansion of NHZ released varieties in the zone and showed concern on more popularization of NWPZ varieties that may enhance yellow rust inoculum in the NHZ. The issue of separate testing of rainfed entries under early sown and timely sown conditions was discussed in detail and it was agreed to continue the evaluation of rainfed entries in separate trials for few more years for critical observation on their individual utility. It was also agreed to discontinue testing of rainfed entries under irrigated condition and it may be incorporated during evaluation in agronomical trials.

Dr VS Sohu presented the report of NWPZ which had 100% conduction and 80% reporting. He suggested that in case of AVTs with large number of entries, the replications may be split into tiers for precision in trial conduction. Chairman appreciated the zonal programme. He also suggested searching more locations for AVT trials so that the locations at KVKs may be minimised.

The report on NEPZ was presented by Dr SV Singh which showed 93% conduction and 66% reporting. The trial conducting centres at KVKs in Assam were reported to be non-responsive and it was suggested that new non-KVK centres may be identified for trial conduction. The proactive role of Kalyani centre was appreciated for taking measures to keep abreast the blast disease of wheat in West Bengal. With respect to the problems in trial conduction, suggestions were made regarding scheduling of irrigations in RI trials, data reporting by scientific staff only

and timely submission of AUC by voluntary centres. Director, Dr GP Singh showed his concern over non-performing centres in the zone and advised all the centres for making sincere efforts in trial conduction.

Dr SV Saiprasad presented the report of CZ in which all the trials were conducted but reporting was only 73%. The experimentations and research efforts in bread as well as durum wheat improvement were appreciated. Director, IIWBR stressed on making more efforts to incorporate variability from indigenous sources in order to strengthen national wheat breeding program. He also emphasized that the site mean yield below state mean yield levels were not acceptable.

The report of peninsular zone was presented by Dr SS Dodake and DA Gadekar where all the trials were conducted but reporting was only 66% due to various reasons among which low site mean was prominent due to prevailing water stress conditions during the crop season in Karnataka. It was emphasised to identify promising lines under rainfed conditions even in the case of trial rejections and contribute them to drought tolerance screening nursery. Request was made for arranging training to the newly recruited staff at cooperating centres so as to improve the efficiency.

Dr M Sivasamy presented the report of SHZ where all the trials were conducted except at Munnar. Discussion was made regarding the continued failure of coordinated trials in the zone for the past many years and it was decided to discontinue the trial conduction. The IARI-Wellington centre will continue its mandated activities as a strategic centre for rust evaluation and off-season facility and continue to develop dicoccum wheat lines. The house appreciated the contribution of Dr Siwasamy and his team at Wellington.

Dr CN Mishra presented report on special trial on salinity/alkalinity and informed the house about conduction of all the trials except at 2 locations. It was suggested to search new locations in place of Vanasthali and Bawal as these centres have reclaimed the soils. The special trial on Dicoccum was presented by Dr BK Honrao which had 100% conduction with 69% reporting. It was emphasized to focus on strategic research for yield enhancement in dicoccum wheat due to its increasing demand. Dr GS Mavi presented the progress of special trial on Triticale. The house expressed concern over almost nil adoption of triticale varieties in the target areas. It was decided to discontinue the special trial on triticale and PAU, Ludhiana was asked to continue the research work in view of its scientific importance. The house acknowledged the contribution of Dr GS Mavi in coordinating special trial on triticale.

Dr Ratan Tiwari presented report of special trial on MABB. He also presented the proceedings of the meeting regarding setting of guidelines on MABB trial held at IIWBR, Karnal on August 1, 2017. The house approved the proceedings for implementation. Dr K Venkatesh presented the progress of special trial on very late sown condition (VLS) in which 100% trial conduction was observed.

The report on national/international trials/nurseries was presented by Dr V Tiwari in which he listed promising entries in various trials and nurseries. He also emphasised on timely submission of data booklets by the cooperating centres in hard as well as soft copy, supply of utilization and feedback report about national nurseries. He stressed on making efforts by cooperating centres for timely submission of proposals for registration of varieties with the PPV&FRA.

Dr (Mrs) HM Mamrutha presented results on physiological experiments DTSN, MLHT-I, MLHT-II and informed that RW5, DBW136 and DBW166 were promising drought tolerant genotypes. She also presented results on temperature induction response in wheat. The stress intensity analysis (Mann Kendall's coefficient) of 14 centres using 10 years weather data for drought and heat stress and combined drought and heat stress indices was also presented which indicated Ranchi, Indore, Dharwad, Niphad, Faizabad, Ludhiana, Pune and Junagadh as stable centres for screening material for tolerance to drought and heat stress.

Dr Raj Kumar presented the breeder seed production scenario and informed about production of 35174.91q breeder seed of 157 varieties, having surplus of 13029.2q, against an indent of 23492.17q breeder seed of 185 wheat varieties. He informed that in the DAC indent, one de-notified (HD 2009) and 27 un-notified entries were not allocated for production as per policies. He also informed about production of 1610.97q nucleus seed against total allocation of 1006.00q of 163 varieties with surplus quantity of 604.97q nucleus seed. The house stressed on ensuring availability of required quantity of nucleus seed with breeder seed producing centres before making allocation of the breeder seed indent.

The PGR activities at NBPGR were presented by Dr (Mrs) Jyoti Kumari. She informed about acquisition of 1239 exotic wheat and 657 exotic barley accessions and supply of 611 wheat germplasm lines to other countries in addition to national research centres. She also presented the characterization status of wheat and barley accessions and listed the promising accessions for different traits. She also informed the house about registration of 21 wheat and 3 barley genetic stocks for different traits during the crop season 2016-17. Chairman acknowledged the support of NBPGR regarding wheat and barley germplasm related activities.

In the end, Chairman Dr Vinod Tiwari made an overview of the crop improvement programme and discussed the general issues. He informed the house about changes made in the promotion criteria, consideration of limit of site mean, restructuring trial size, coding of entries in all the trials, merging of MABB trials with AVT-NWPZ, discontinuation of YCSN and fresh allocation of IPPSN slots based on NIVT quota and their coding, etc. The proceedings of the brainstorming session on coordinated experiments under AICRPW&B held at IIWBR, Karnal in 27th January 2017 were approved by the house for implementation during the crop season 2017-18.

The session ended with the thanks to chair and rapporteurs by the organizing committee.

Research Review Meeting- Resource Management

25 th August, 2017	Chairman	:	Dr JS Bohra
10:30 AM to 3:15 PM	Co-Chairman	:	Dr RK Sharma
	Rapporteurs	:	Drs SC Tripathi & S Manuja

The Research Review Meeting of the Resource Management group was held under the Chairmanship of Dr JS Bohra, Head Agronomy, BHU with Dr RK Sharma, PI, Resource Management, as the Co-Chairman of the session. At the outset, Dr RK Sharma welcomed the Chairman and introduced to the delegates and requested the chairman to conduct the session. The Chairman welcomed the delegates coming from different parts of the country and exhorted them to work for the development of technologies that are helpful in reducing the cost of production as well as in enhancing the productivity of the wheat crop in the country.

After the opening remarks, the results of the coordinated experiments conducted during the year 2016-17 were presented. The highlights of the work done during 2016-17 were presented by Dr RS Chhokar and the zone-wise presentations by Dr Sandeep Manuja for the NHZ, Dr HR Saharan for the NWPZ, Dr RK Singh for NEPZ, Dr KI Patel for the Central Zone, Dr (Mrs) T Sudha for the PZ followed by discussions.

In Northern Hills Zone, four experiments namely broadleaved weeds management, lodging and yield maximization, leaf colour chart (LCC), and precision nutrient management were conducted to evaluate the performance of new molecules for weed control, control of lodging and yield maximization, LCC and nutrient expert system on wheat crop. Weed free treatment produced the highest grain yield which was closely followed by the treatment having combination of Halauxifen methy + florasulam + carfentrazone + surfactant or Metsulfuron + Carfentrazone + S. Among broad leaved herbicides, Halauxifen methyl + florasulam + carfentrazone + surfactant (10.21 + 20 g a.i. + 750 ml/ha) was found the best treatment in controlling broad leaf weeds density and dry weight. Yield maximization trial result showed that increasing fertiliser doses enhanced grain yield significantly. Application of 150% RDF has increased the grain yield (50.45 q/ha) to the tune of 10.0% over RDF (45.40 q/ha). The application of 145 kg/ha nitrogen in treatment LCC -apply 55 kg N/ha if LCC<4 and 45 kg N/ha if LCC ≥4 recorded the highest yield (45.78 q/ha) which was significantly higher than all other treatments. In NHZ, 150% RDF gave maximum and significantly higher grain yield (49.59 q/ha) and biomass (118.69 q/ha) as compared to other treatments.

In North Western Plains Zone, varietal evaluation trial (irrigated late sown *aestivum*) was conducted to evaluate the performance of new genotypes compared the checks. Test entry DBW 173 was as good as check. Results of special trial namely broadleaved weed management, yield maximization and lodging control, leaf colour chart, micro irrigation,

evaluation of hydrogel, yield maximization under CA, organic manure and mulching and precision nutrient management were presented and discussed.

In North Eastern Plains Zone, restricted irrigation trial was conducted to evaluate the performance of new genotypes at different irrigation regimes. Entry HI 1612 recorded significantly higher yield than all the checks. Special trial namely broadleaved weed management, yield maximization and lodging control, preharvest sprouting, mulch with irrigation in wheat, organic manure and mulching and precision nutrient management were presented and discussed.

In Central Zone, result of special trials like broad leaved weeds management, lodging and yield maximization, micro-irrigation, evaluation of hydrogel in wheat, organic manures and mulching, planting methods and varieties and precision nutrient management were presented and discussed.

In Peninsular Zone, two coordinated trials for evaluation of new genotypes for various growing conditions (irrigated timely sown *diccocum* and rainfed conditions) were conducted. Under rainfed condition, the test entry UAS 375 gave numerically higher yield as compared to the other test entries as well as checks. The results of special trial like broadleaved weeds management, lodging and yield maximization, nutrient management in maize/soybean-wheat, evaluation of hydrogel in wheat, planting methods and varieties precision nutrient management were presented and discussed.

The results of the special coordinated experiments on weed management, maximizing wheat yield and control of lodging, leaf colour chart, precision nutrient management, control of preharvest sprouting, micro irrigation, residue management and evaluation of hydrogel are summarized here as under:

- Among broad leaved herbicides, Halauxifen methyl + florasulam + carfentrazone + surfactant (10.21 + 20 g a.i. + 750 ml/ha) was found the best treatment in controlling broad leaf weeds density and dry weight.
- Two spray of Chloromequat chloride (Lihocin) 0.2 % + tebuconazole (Folicur 430 SC) 0.1% produced maximum grain yield and reduced plant height.
- It was found that maximum wheat equivalent yield (131.63 q/ha) was obtained in maize-wheat system with 125% of recommended dose of fertilizers (RDF) for both the crops in PZ.
- In comparison to RDF, LCC based N application (55 kg N/ha if LCC<4 and 45 kg N/ha if LCC ≥4) produced similar (NWPZ) or higher (NHZ) yield.
- In NWPZ and CZ, the highest yield was recorded in drip irrigation.

- On mean basis, significantly highest yield (59.52 q/ha) was recorded where six irrigations were applied at critical growth stages of wheat.
- Application of 0.2 % KCl produced higher grain yield than all other treatments.
- Highest grain yield was recorded with 150 % RDF.

During the discussion that followed the presentations, Dr RK Sharma, PI, Resource Management asked the wheat workers to be more careful in conducting the experiments as well as in the reporting the results of the experiments. Dr JS Bohra, Head Agronomy, BHU, Varanasi emphasized the need of inclusion of economics so that finding will be more relevant to the end users. He was of the view that sometime yield may be at par but economics will be on beneficial side as it happens in many experiments where resource conservation technologies were included. The house also agreed over this. Dr RK Sharma, PI (RM) directed all the cooperators to include economic aspect in each experiment.

To end the session, Dr RK Sharma, on behalf of the Institute and the RM group proposed a sincere vote of thanks to the Chair for smooth conduct and valuable suggestions during the proceedings as well as all the wheat workers for their valuable contributions.

Research Review Meetings - Crop Protection

August 25, 2017	Chairman : Dr Ramesh Chand
	Co-Chairman: Dr DP Singh, IIWBR, Karnal
10.30 am-3.15 pm	Rapporteurs : Drs. PL Kashyap & KK Mishra

The session was chaired by Prof. Ramesh Chandra, BHU and co-chaired by Dr. D. P. Singh, PI, Crop Protection, IIWBR, Karnal. The meeting began with introduction of participants to the house. Dr. Singh, PI, Crop Protection appreciated and congratulated all the co-operators for successful crop health management of wheat during 2016-17. He presented the highlights of report of Plant Protection 2016-17 and stated the strategies of crop protection programme undertaken for successful management of yellow rust in NHZ and NWPZ and threat of NEPZ. He made the detailed account of first occurrence yellow rust at different strategic locations in NHZ and NWPZ and finally emphasized that this year there is no loss due to yellow rust in NWPZ was reported this year. Then, he categorically emphasized the wheat blast threat was effectively averted in West Bengal close to Bangladesh border. He concluded that there was no wheat blast incidence in India so far but wheat blast like symptoms were recorded by him and a team of scientists initially on 4th Feb. 2017 in Nadia and Murshidabad districts in West Bengal near Bangladesh borders.

He further informed that strict quarantine regulation and 3 year wheat holiday period in bordering districts such as Nadia and Murshidabad are in place. He presented results of screening of 40 Indian wheat entries in Bolivia and USA and informed that five having 2 NS translocations were found resistant to wheat blast in Bolivia as well as in USA. In WDMN (SAARC) a set of 7 entries were tested against wheat blast at hot spot locations, Jessore and Rajshahi locations in Bangladesh. Out of these, HP 1633 was highly resistance against wheat blast. Dr. Singh informed the group that during 2016-17 transparency of data of PPSN and IPPSN was enhanced and location wise data were uploaded on IIWBR web page at appropriate time for the use of wheat breeders. The group felt that leaf blight score maximum limit may be fixed for promotion and identification of entries of yield trials in NEPZ. Dr. Singh informed that Karnal bunt was low during 2016-17 as compared to 2015-16 crop season. PI (CP) lauded the role of female scientists and young scientists in monitoring of crop health, supply of digital images of affected crop and use of mobiles for fast communication.

Dr. R.S. Kanwar, senior wheat nematologist, presented the progress report of Nematode, 2016-17. During his presentation he finally concluded that all the entries in AVT were susceptible to CCN. Out of 2137 market samples collected for ear cockle evaluation, none was positive to ear cockle nematode. Dr. Poonam Jasrotia, presented the detail report of Entomological nurseries and trials. She emphasized on the bio-efficacy trials of toxicants against store grain pests also. The chairman suggested testing those chemicals which are registered by CIB. PI (CP) asked the

Entomology group to conclude chemical trials and work more on evolving IPM modules at Zonal level to minimize pest damage and use of pesticides. Dr. S.C. Bhardwaj presented the rust pathotypes distribution and postulation of rust resistant genes in AVT entries. During his presentation he specifically mentioned the predominant pathotypes of yellow rust like 46S119 and 110S119.

It was also disclosed that 25 brown rust Pts were found from the samples of 12 states with maximum frequency of Pt. 77-9. Likewise, pathotype, 40A and 104-A were most dominant among black rust pathotypes. Prof. Robert Park of Australia made his remarks on the significance of pre-breeding in breeding for rust resistance in wheat. Dr. Prashar suggested that susceptible varieties like HD 2896 should not be planted repeatedly because it creates abundant inoculum and ultimately led to the evolution of new races. Initially foci should be contained in case of yellow rust. Dr. Jaspal Kaur, Wheat Pathologist, PAU emphasized on the integrated management of stripe rust using resistant varieties like PBW 725 and HD 3081. She suggested that October sowing should be discouraged. She also suggested the use of trifloxistrobin + tebuconazole @ 120 g/acre for effective management of yellow rust. Dr. K.K. Mishra, Wheat Pathologist, Powarkheda, M.P. presented the overview of diseases in central zone during last five years. He informed that black and brown rusts are major threat for wheat cultivation and also suggested effective strategies to manage these. Dr Ashok Patel of Vijapur gave detailed account of the Entomological problems in central zone. Dr. Vaibhav K. Singh presented detailed aspects of management of wheat blast. He also highlighted the possible strategies to stop the migration of disease from Bangladesh to bordering areas of West Bengal, India. Finally the chairman concluded the session with the statement that inoculum management is must for achieving big success in control of rusts and other diseases of wheat in India and urge the group to keep working in a coordinated way for securing good crop health under changing climate in years to come.

Research Review Meeting: Wheat Quality

August 25, 2017	Chairman	:	Prof. Rama Devi
	Co-Chairman	:	Dr. Sewa Ram
	Rapporteur	:	Dr. Anil Kumar

The meeting to review wheat quality work was chaired by Prof. Rama Devi, Dean Faculty of Veterinary and Animal Science, BHU Varanasi. About 15 delegates attended this meeting to take an account of the progress made in wheat quality during 2016-17. As Dr R K Gupta, P.I., Wheat Quality, IIWBR, Karnal could not attend the meeting; Dr. Sewa Ram Pr. Scientist, ICAR-IIWBR acted as Co-chairman and presented an overview of wheat quality of 2016-17. He mentioned the genotypes available for good product making and other important quality parameters. The variability in quality traits and nutritional parameters was presented. The work related to use of molecular marker technology approach for the improvement of wheat quality was also presented. He also briefly touched the work done at different centres for quality improvement and stressed the need to work with more zeal by associating themselves with breeders in quality improvement activities.

Presentations from different centres were made on bread and durum wheat NIVT'S covering characteristics like grain appearance, test weight, grain protein content and sedimentation value in *T. aestivum* and also yellow berry & yellow pigments in case of *T. durum* and *T. dicoccum*. Dr. (Mrs.) Harinderjeet Kaur (NIVT1A), Dr. S.K. Goyal (NIVT 1B), Dr. A.K. Patel (NIVT 2), Dr. Anil Kumar (NIVT 3), Dr. Renu Munjal (NIVT 5A and Salinity/ Alkalinity trials) and Dr. Suma Biradar (NIVT 5B & Special *T.dicoccum* trial) presented the results of respective NIVTs. Dr. R.S. Gaikwad (NIVT 4) could not attend the meeting. Some new promising lines were identified for all the quality traits in each trial. Dicocum flakes, new products of wheat, were exhibited by Dr. Suma Biradar for possible replacement of corn flakes because of better nutritional quality traits. Kanpur centre did not supply NIVT 3 samples for analysis because of rejection of trial. The Sewa Ram also informed that presentation of Quality Component Screening Nursery (QCSN) will be made by Dr. Vinod Tiwari, PI (Crop Improvement), ICAR-IIWBR, Karnal made in the crop improvement session. Henceforth, the nursery would be conducted in crop improvement programme by Dr. Gopalareddy K., Scientist, Plant Breeding, ICAR-IIWBR, Karnal with appropriate modifications and the analysis would be carried out in quality programme at ICAR-IIWBR, Karnal.

Chairman, Prof. Rama Devi, Dean Faculty of Veterinary and Animal Science, BHU, Varanasi concluded the session by showering appreciation for the good work on wheat quality. She also emphasised to undertake work related to bio-availability and also the fibre content in wheat germplasm.

The meeting ended with a vote of thanks to the chairman.

Research Review Meeting: Barley Network

August 25, 2017	Chairman :	Prof. RM Singh
10.30 AM-3.13 PM	Co-Chairman:	Dr. AS Kharub
	Rapporteurs :	Drs. Dinesh Kumar & PK Gupta

The research review session of barley network during 56th AICW&BIP was chaired by Professor RM Singh and co-chaired by Dr. AS Kharub. The meeting was also attended by Dr. R.P.S. Verma, ICARDA, Morocco, company representatives: Clement Jaffre, Agronomy Manager, Soufflet Malt India and Dr. Munender Singh, Limma grain India. The chairman & co chairman welcomed the scientists of cooperating centres, international delegates, and representatives from industry that participated in the meeting and wished that their interaction will help in improving barley programme in India and also help augmenting barley cultivation in the country. The chairman requested participants to provide their valuable inputs in the discussion after the various presentations in order to achieve the goal of the program.

Dr. Vishnu Kumar, ICAR-IIWBR, Karnal presented the progress report on the conduct of coordinated varietal yield trials during 2016-17 crop season. He informed the house that four varieties were released during the year, three by CVRC and one by SVRC and three genetic stocks were also registered with the ICAR-NBPGR, New Delhi. A total of 13 trials were conducted which included 8 AVTs and 5 IVTs. Under these trials 116 new entries were evaluated which included 33 checks at 47 locations. The promising entries under different trials were enlisted. Dr Vishnu Kumar also presented the report barley crop protection and reported the disease resistant entries in different pathological nurseries and barley entomological trials. He subsequently discussed about seed production scenario and informed that a total of 1140.75q DAC indent was received and 1521.86q was produced. The highest quantity of breeder seed indent was from the Rajasthan state followed by SAI. However, there was no indent from Punjab and a decrease in Haryana was noticed. On the other hand indent from Madhya Pradesh has increased. He requested all co-operators to take up/report seed production in time, so that there is no deficit in achieving the indented quantity. Dr Vishnu Kumar also made a brief presentation on the DUS activities. He informed that a total of 96 reference varieties are being maintained and 12 candidate varieties were received for characterization.

Dr. AS Kharub presented the results of coordinated trials of Barley Resource Management and also shared the information that 1.736 m t of barley has been produced by the country this year as per 4th estimate with a productivity of 2607 kg/ha. The major barley producing states are Rajasthan, Uttar Pradesh and Madhya Pradesh which contributes 80% in area and production. He presented the results of varietal evaluation and special trials. The results of integrated nutrient management including biofertiliser, FYM and ZnSo₄, source of potash (MOP & SOP),

seed and spacing, plant growth regulators for maximizing yield and sustainability of system. Results on hydrogel and irrigation scheduling were also presented. Plant growth regulators lowers plant height and prevent lodging which increased the productivity level. Zero tillage yielded at par with conventional but saves input cost so gave more returns.

Dr. Dinesh Kumar presented the results of coordinated trials on barley quality and discussed the grain and malt characteristics of AVT and IVT entries for timely as well as late sown conditions. The results of barley quality component nursery consisting of hulless barley and feed barley were also presented. Promising entries of different traits and of hulless barley were identified.

Dr Chuni Lal presented the report for international/national trials and nurseries. The presentation included IBYT, INBYT, 4th GSBYT, EIBGN and NBGSN, selections during field day and he also presented the germplasm utilization details by NARS.

The Chairman suggested that mechanism should be devised to save the land and other resources in case of limited number of entries. He raised number of issues like pre-breeding activities in barley, a correlation between seedling resistance test and field resistance, planning of resource management experiments keeping in view the practical applicability at farmer's field, promotion of barley under changing climatic conditions. Dr Verma suggested identification of sources of foliar blight in international and local germplasm, disease scoring in nurseries, micronutrient content in huskless barley.

The meeting was ended with thanks to the chair and the participants.

SESSIONS II and VI
Research Planning Meeting and recommendations - Crop Improvement

August 25 & 26, 2017	Chairman :	Dr Vinod Tiwari
	Rapporteurs :	Drs CN Mishra & K Venkatesh

On 25.8.2017, the Crop Improvement group scientists deliberated and reviewed the results of various wheat varietal evaluation trials, germplasm nurseries, physiological investigations and status of seed production during the crop season 2016-17. The meeting for trial constitution of AVTs and special trials was organized in the afternoon session of the same day on the basis of norms for yield and incidence of rusts and other diseases.

The finalization of workplan was carried out in the evening session VI on 26.8.2017. The entries and locations for various AVT trial series in different zones viz., NHZ (3), NWPZ (3), NEPZ (2), CZ (2) and PZ (2) and Special trials (2) were decided in the session. From the proposals received from different wheat breeding centres, the composition of 8 National Initial Varietal Trials and one Initial Varietal Trial in NHZ were finalized during the meeting. The entries and locations for physiological investigations (2) were also decided. The allocation of breeder seed production programme at different centres in the country during 2017-18 crop season was made as per the indent for different wheat varieties received from DAC, MoA, GOI.

Finalization of Work Plan and Recommendations:

The finalization of Work Plan 2017-18 and recommendations of Crop Improvement programme was done in the meeting attended by all breeders on 26.8.2017. The details of various breeding yield trials, physiological investigations and breeder seed production in wheat during 2017-18 crop season is given here under.

**National Initial Varietal Trial
NIVT-1A-IR-TS-TAS, 2017-18**

Conducting centres

Zone	No.	Centres
NWPZ	10	Delhi, Jammu, Ludhiana, Gurdaspur, Hisar, Karnal, Modipuram, Bulandshahr, Pantnagar, Durgapura
NEPZ	9	Kanpur, Faizabad, Varanasi, IARI-Pusa, Sabour, Ranchi, Kalyani, Manikchak (Malda), Coochbehar
Total	19	

Details of trial entries

SN	Contributing Centres	No. of Entries	Name of entries
1.	IARI	6	HD3276, HD3277, HD3278, HD3279, HD3280, HD3281
2.	Ludhiana	4+1	PBW781, PBW 782, PBW783, PBW784, PBW785
3.	Karnal	4+1	DBW253, DBW254, DBW255, DBW256, DBW257
4.	Hisar	4	WH1237, WH1238, WH1239, WH1240
5.	Pantnagar	4	UP3001, UP3002, UP3003, UP3004
6.	Durgapura	3	RAJ4527, RAJ4528, RAJ4529
7.	Faizabad	1+1	NW7041, NW7037
8.	Kanpur	1+1	K1701, K1702
9.	Varanasi	1	HUW826
	Checks	4	HD3086, DBW88, HD2967, K1006
	Total	36 (32+4)	

Experimental details

Design	: Simple Lattice
Replication	: Two
Plot size	: Gross: 6 x 1.20m (6 rows); Net: 6 x 0.80m (4 middle rows)
Fertilizer dose (kg/ha)	: 150:60:40 (N:P:K)
Time of sowing	: NWPZ: November 1-15; NEPZ: November 15-25
Seed rate (kg/ha)	: 100
Seed requirement for trial	: 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, 2017-18**

Conducting centres

Zone	No.	Centres
NWPZ	8	Delhi, Ludhiana, Gurdaspur, Hisar, Karnal, Modipuram, Pantnagar, Durgapura
NEPZ	10	Kanpur, Faizabad, Varanasi, Sabour, IARI-Pusa, Ranchi, Kalyani, Burdwan, Coochbehar, Shillongani
Total	18	

Details of trial entries

SN	Contributing centres	No. of Entries	Name of entries
1.	IARI	5	HD3282, HD3283, HD3284, HD3285, HD3286
2.	Kanpur	3	K1703, K1704, K1705
3.	Faizabad	2+1	NW7028, NW7047, NW7049
4.	Sabour	1	BRW3814
5.	Varanasi	2+1	HUW827, HUW828, HUW829
6.	Durgapura	2+1	RAJ4530, RAJ4531, RAJ4536
7.	Ludhiana	2+1	PBW786, PBW787, PBW788
8.	Hisar	2+1	WH1241, WH1242, WH1243
9.	Pantnagar	2+1	UP3005, UP3006, UP3007
10.	Karnal	4+1	DBW258, DBW259, DBW260, DBW261, DBW262
	Checks	4	HD3086, DBW88, HD2967, K1006
Total		36 (32+4)	

Experimental details

Design	: Simple Lattice
Replication	: Two
Plot size	: Gross: 6 x 1.20m (6 rows); Net: 6 x 0.80m (4 middle rows)
Fertilizer dose (kg/ha)	: 150:60:40 (N: P: K)
Time of sowing	: NWPZ: November 1-15, NEPZ: November 15-25
Seed rate (kg/ha)	: 100
Seed requirement for trial	: 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, 2017-18**

Conducting centres

Zone	No.	Centres
CZ	10	Indore, Powarkheda, Gwalior, Sagar, Jabalpur, Bilaspur, Junagadh, Vijapur, Kota, Udaipur
PZ	7	Niphad, Pune, Akola, Parbhani, Dharwad, UgarKhurd, Nippani
Total	17	

Details of trial entries

SN	Contributing Centres	No. of Entries	Name of entries
1.	IARI	5	HI 1629, HI 1630, HI 1631, HI 1632, HP 1968
2.	Dharwad	2+1	UAS 398, UAS 399, UAS 3001
3.	Vijapur	2	GW 505, GW 506
4.	Niphad	2	NIAW 3270, NIAW 3390
5.	Powarkheda	3	MP 1348, MP 1349, MP 1350
6.	Pune	3	MACS 6722, MACS 6727, MACS 6729
7.	Junagadh	2	GW 507, GW 508
8.	Jabalpur	2	MP 3493, MP 3495
9.	Akola	1+1	AKAW 5077, AKAW 5078
10.	Bilaspur	1	CG 1028
11.	Sagar	1	JWS 154
12.	Durgapura	1	Raj 4532
13.	Karnal	2	DBW 263, DBW 264
14.	Ludhiana	1	PBW 789
15.	Hisar	1	WH 1244
16.	Pantnagar	1	UP 3008
	Checks	4	GW322, HI1544, MACS6222, MACS6478
Total		36 (32+4)	

Experimental Details

Design	: Simple Lattice
Replication	: Two
Plot size	: Gross: 6 x 1.20m (6 rows); Net: 6 x 0.80m (4 middle rows)
Fertilizer dose (kg/ha)	: 120:60:40 (N: P: K)
Time of sowing	: November 10-20
Seed rate (kg/ha)	: 100
Seed requirement for trial	: 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, 2017-18**

Conducting centres

Zone	No.	Centres
NWPZ	9	Delhi, Ludhiana, Gurdaspur, Jammu, Hisar, Karnal, Modipuram, Pantnagar, Durgapura
NEPZ	8	Kanpur, Faizabad, Varanasi, IARI-Pusa, Sabour, Ranchi, Kalyani, Coochbehar
Total	17	

Details of trial entries

SN	Contributing centres	No. of Entries	Name of entries
1.	IARI	6	HD 3287, HD 3288, HD 3289, HD 3290, HD 3291, HP 1969
2.	Ludhiana	3+2	PBW 790, PBW 791, PBW 792, PBW 793, PBW 799
3.	Pantnagar	3	UP 3009, UP 3010, UP 3011
4.	Karnal	4+1	DBW 265, DBW 266, DBW 267, DBW 268, DBW 269
5.	Hisar	4	WH 1245, WH 1246, WH 1247, WH 1248
6.	Durgapura	2+1	Raj 4533, Raj 4534, Raj 4535
7.	Varanasi	2	HUW 830, HUW 831
8.	Kanpur	2	K 1707, K 1708
9.	Faizabad	2	NW 7033, NW 7034
	Checks	4	HD3059, DBW90, HI1563, DBW107
Total		36 (32+4)	

Experimental Details

Design	: Simple Lattice
Replication	: Two
Plot size	: Gross: 6 x 1.08m (6 rows); Net: 6 x 0.72m (4 middle rows)
Fertilizer dose (kg/ha)	: 120:60:40 (N: P: K)
Time of sowing	: NWPZ: December, 10-25; NEPZ: December 15 - 25
Seed rate (kg/ha)	: 125
Seed requirement for trial	: 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, 2017-18**

Conducting centres

Zone	No.	Centres
CZ	10	Indore, Gwalior, Powarkheda, Jabalpur, Bilaspur, Raipur, Junagadh, Vijapur, Udaipur, Kota
PZ	5	Dharwad, Niphad, Pune, Parbhani, Akola
Total	15	

Details of trial entries

SN	Contributing centres	No. of Entries	Name of entries
1.	IARI	4+1	HD 3300, HI 1633, HI 1634, HI 8807, HI 8808
2.	Ludhiana	1	PBW 794
3.	IIWBR- Karnal	2	DBW 270, DBW 271
4.	Powarkheda	2	MP 1351, MP 1352
5.	Vijapur	2	GW 509, GW 510
6.	Pune	1+1	MACS 6726, MACS 6732
7.	Niphad	2+1	NIAW 3354, NIAW 3523, NIAW 3525
8.	Junagadh	1	GW 511
9.	Jabalpur	2	MP 3497, MP 3503
10.	Bilaspur	1	CG 1029
11.	Dharwad	1	UAS 3002
12.	Akola	1	AKAW 5023
	Checks	2	HD2864, HD2932
Total		25 (23+2)	

Experimental Details

Design	: Simple Lattice
Replication	: Two
Plot size	: Gross: 6 x 1.08m (6 rows); Net: 6 x 0.72m (4 middle rows)
Fertilizer dose (kg/ha)	: 90:60:40 (N: P: K)
Time of sowing	: CZ: December 5-15; PZ: December 1-10
Seed rate (kg/ha)	: 125
Seed requirement for trial	: 6.0 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, 2017-18**

Conducting centres

Zone	No.	Centres
CZ	6	Powarkheda, Indore, Junagadh, Vijapur, SK Nagar, Kota
PZ	6	Dharwad, Ugar Khurd, Nippani, Niphad, Pune, Akola
Total	12	

Details of trial entries

SN	Contributing Centres	No. of Entries	Name of entries
1.	IARI	5	HI8809, HI8810, HI8811, HI8812, HI8813
2.	Vijapur	2	GW1348, GW1349
3.	Powarkheda	2+1	MPO1353, MPO1354, MPO1355
4.	Kota	1	RKD331
5.	Niphad	2	NIDW1158, NIDW1171
6.	Pune	2	MACS4083, MACS4085
7.	Akola	1	AKDW5079
8.	Dharwad	2	UAS468, UAS469
9.	Ludhiana	1	PDW355
10.	Karnal	1+1	DDW48, DDW49
11.	Hisar	1	WHD963
	Checks	3	HI 8713, HI8737, MACS3949
Total		25(22+3)	

Experimental Details

Design	: Simple Lattice
Replication	: Two
Plot size	: Gross: 6 x 1.20m (6 rows); Net: 6 x 0.80m (4 middle rows)
Fertilizer dose (kg/ha)	: 120:60:40 (N: P: K)
Time of sowing	: CZ: November 10-20; PZ: November 5-15
Seed rate (kg/ha)	: 100
Seed requirement for trial	: 6.0 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, 2017-18**

Conducting centres

Zone	No.	Centres
NWPZ	9	Jammu, Balachaur, Gurdaspur, Ludhiana, Hisar, Delhi, Karnal, Diggi, Pantnagar
NEPZ	8	Faizabad, Kanpur, IARI-Pusa, Varanasi, Sabour, Ranchi, Kalyani, Coochbehar
Total	17	

Details of trial entries

SN	Contributing Centres	No. of Entries	Name of entries
1.	IARI	5	HD 3292, HD 3293, HD 3294, HD 3295, HS 649
2.	Karnal	4	DBW 272, DBW 273, DBW 274, DBW 275
3.	Ludhiana	2	PBW 795, PBW 796
4.	Hisar	2	WH 1250, WH 1251
5.	Pantnagar	2+1	UP 3012, UP 3013, UP 3018
6.	Kanpur	2	K 1710, K 1711
7.	Faizabad	1	NW 7030
8.	Varanasi	1	HUW 832
9.	Sabour	1	BRW 3823
	Checks	4	WH1142, PBW644, HD2888, K1317
Total		25 (21+4)	

Experimental Details

Design	: Simple Lattice
Replication	: Two
Plot size	: Gross: 6 x 1.20m (6 rows); Net: 6 x 0.80m (4 middle rows)
Irrigations	: Two (pre-sowing & one irrigation at 45-50 DAS)
Fertilizer dose (kg/ha)	: 90:60:40(N:P:K)
Time of sowing	: NWPZ: Oct. 25 - Nov. 5; NEPZ: Oct. 25 - Nov. 10
Seed rate (kg/ha)	: 100
Seed requirement for trial	: 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, 2017-18**

Conducting centres

Zone	No.	Centres
CZ	12	Indore, Powarkheda, Sagar, Jabalpur, Bilaspur, Kota, Udaipur, Vijapur, Junagadh, Dhandhuka, Arnej, Tanchha
PZ	6	Dharwad, Bagalkot, Nippani, Niphad, Pune, Akola
Total	18	

Details of trial entries

SN	Contributing Centres	No. of Entries	Name of entries
1.	IARI	5 (3A+2D)	HP 1970, HD 3297, HD 3296, HI 8814(d), HI 8815(d)
2.	Powarkheda	3 (2A+1D)	MP 1345, MP 1346, MPO 1347(d)
3.	Vijapur	2 (1A+1D)	GW 512, GW 1350(d)
4.	Jabalpur	1 (A)	MP 3507
5.	Bilaspur	1 (A)	CG 1030
6.	Niphad	2 (1A+1D)	NIAW 3386, NIDW 1149(d)
7.	Pune	2 (1A+1D)	MACS6719, MACS4075(d)
8.	Akola	1 (A)	AKAW 5082
9.	Dharwad	2 (1A+1D)	UAS 3003, UAS 470(d)
10.	IIWBR- Karnal	2 (A)	DBW276, DBW 277
	Checks	4 (2A+2D)	DBW110, HI1605, HI8627(d), UAS446(d)
Total		25 (21+4)	

Experimental Details

Design	: Simple Lattice
Replication	: Two
Plot size	: Gross: 6 x 1.20m (6 rows); Net: 6 x 0.80m (4 middle rows)
Irrigations	: Two (1 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	: CZ: Oct. 25 – Nov. 10; PZ: Nov. 1-10
Seed rate (kg/ha)	: 100
Seed requirement for trial	: 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

**Northern Hills Zone
Advance Varietal Trial, 2016-17
AVT- ES-RF-TAS**

Trial conducting centres

State	Centres	Name of the centres
Himachal Pradesh	4	Malan, Shimla, Bajaura, Bara
Uttarakhand	2	Almora, Majhera
J&K	1	Khudwani
Total	7	

Details of test entries

Contributing Centres	No. of entries	Name of entries
CSKPHKV, Malan	2	HPW450, HPW451
IARI, Shimla	3	HS664, HS665, HS666
VPKAS, Almora	3	VL1014, VL1015, VL1016
GBPUA&T, Pantnagar	1	UP3016
Checks	3	HPW251, HS542, VL829
Total	12 (9+3)	

Experimental details

Design	: R.B.D.
Replications	: Six
Plot size	: Gross: 3.5 x 1.20m (6 rows); Net: 3.5 x 0.80m (4 rows)
Fertilizer dose (kg/ha)	: 60:30:20 (N:P:K)
Time of sowing	: October 1-10
Seed rate (kg/ha)	: 100
Seed requirement for trial	: 8 kg per entry

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

**Northern Hills Zone
Advance Varietal Trial, 2016-17
AVT-TS-RF-TAS**

Trial conducting centres

State	Centres	Name of the centres
Himachal Pradesh	6	Malan, Shimla, Bajaura, Akrot, Berthin, Dhaulakuan,
Uttarakhand	3	Almora, Majhera, Ranichauri
J&K	2	Khudwani, Wadura
Centres conducting trial under Irrigated trial conditions also		
Malan, Shimla, Bajaura, Almora		
Total	11 RF & 4 Irr.	

Details of test entries

Contributing Centres	No. of entries	Name of entries
CSKPHKV, Malan	2	HPW441, HPW442
IARI, Shimla	1	HS634
Checks	4	VL907, HS507, HPW349, HS562
Total	7 (3+4)	

Experimental details

Design	:	R.B.D.
Replications	:	Six
Plot size	:	Gross: 3.5 x 1.20m (6 rows); Net: 3.5 x 0.80m (4 rows)
Fertilizer dose (kg/ha) (N:P:K)	:	RF: 60:30:20 IR: 120: 60:40
Time of sowing	:	RF: October 15 – 31; IR: Nov. 1-15
Seed rate (kg/ha)	:	100
Seed requirement for trial	:	10 kg per entry

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

**Northern Hills Zone
Advance Varietal Trial, 2016-17
IVT/AVT-RI-LS-TAS**

Trial conducting centres

State	Centres	Name of the centres
Himachal Pradesh	5	Shimla, Malan, Bajaura, Dhaulakuan, Una
Uttarakhand	3	Almora, Majhera, Ranichauri
W. Bengal	1	Kalimpong
Sikkim	1	Gangtok
Manipur	1	CAU, Imphal
Total	11	

Details of test entries

Contributing Centres	No. of entries	Name of entries
CSKPHKV, Malan	1	HPW459
IARI, Shimla	3	HS660, HS661, HS662
VPKAS, Almora	3	VL3016, VL3017, VL3018
GBPUA&T, Pantnagar	1	UP3017
Checks	2	VL892, HS490
Total	10 (8+2)	

Experimental details

Design	: R.B.D.
Replications	: Six
Plot size	: Gross: 3.5 x 1.08m (6 rows); Net: 3.5 x 0.72m (4 rows)
Fertilizer dose (kg/ha)	: 90:60:40 (N:P:K)
Time of sowing	: December 1-15
Seed rate (kg/ha)	: 125
Seed requirement for trial	: 11 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, 2017-18
IVT-RF-TS-TAS**

Trial conducting centres

State	Centres	Name of the centres
Himachal Pradesh	4	Bajaura, Malan, Shimla, Dhaulakuan
Uttarakhand	2	Almora, Ranichauri
J& K	2	Wadura, Khudwani
Total	8	

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Details of test entries

Contributing Centres	No. of entries	Name of entries
IARI, Shimla	4	HS650, HS651, HS652, HS653
CSKHPKV, Malan	3	HPW453, HPW454, HPW455
VPKAS, Almora	4	VL2031, VL2032, VL2033, VL2034
GBPUA&T, Pantnagar	2	UP3014, UP3015
IIWBR, Shimla	1	DBW279
Checks	2	HS 507, HS 562
Total	16 (14+2)	

Experimental details

Design	: R.B.D.
Replications	: Four
Plot size	: Gross: 4.0 x 1.20m (6 rows); Net: 4.0 x 0.80m (4 rows)
Fertilizer dose (kg/ha)	: 60:30:20 (N:P:K)
Time of sowing	: Oct. 15 - 31
Seed rate (kg/ha)	: 100
Seed requirement for trial	: 5 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, 2017-18
AVT-IR-TS-TAS**

Trial conducting centres

State	No.	Centres
Punjab	6	Ludhiana, Gurdaspur, Bathinda, Kapurthala, Rauni, Faridkot
Haryana	4	Hisar, Karnal, Bawal, Rohtak
Rajasthan	8	Durgapura, Sriganaganagar, Tabiji, Bikaner, Hanumangarh, Kotputli, Alwar, Jodhpur
Uttar Pradesh	5	Modipuram, Nagina, Bulandshahr, Bareilly, KVK-Rampur
Uttarakhand	3	Pantnagar, Kashipur, Dhakrani
J & K	1	Jammu
Delhi	1	Delhi
Total	28	

Details of test entries

Contributing Centres	No. of entries	Name of entries
IARI, Delhi	1	HD3226 ^Q
PAU, Ludhiana	4	PBW763, PBW766, PBW800 ^M , PBW801 ^M
IWBR, Karnal	3	DBW221, DBW222, DBW233
GBPUA&T, Pantnagar	1	UP2981
BAU, Sabour	1	BRW3792
Checks	5	HD2967, WH1105, HD3086, DBW88, DPW621-50
Total	15 (10+5)	

^M MABB entries ^QEntry having high protein content

Experimental details

Design	: R.B.D.
Replications	: Four
Plot size	: Gross: 6 x 2.40m (12 rows); Net: 6 x 2.0m (10 middle rows)
Fertilizer dose (kg/ha)	: 150:60:40 (N:P:K)
Time of sowing	: November 1-15
Seed rate (kg/ha)	: 100
Seed requirement for trial	: 30 kg per entry

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

**North Western Plains Zone
Advance Varietal Trial, 2017-18
AVT-IR-LS-TAS**

Trial conducting centres

State	No.	Centres
Punjab	5	Ludhiana, Gurdaspur, Bathinda, Kapurthala, Faridkot
Haryana	3	Hisar, Karnal, Rohtak
Rajasthan	6	Durgapura, Sriganganagar, Tabiji, Hanumangarh, Kotputli, Alwar
Uttar Pradesh	6	Modipuram, Nagina, Bulandshahr, Bareilly, Ujhani, KVK-Rampur
Uttarakhand	2	Pantnagar, Kashipur
Jammu & Kashmir	1	Jammu
Delhi	1	Delhi
Total	24	

Details of test entries

Contributing Centres	No. of entries	Name of entries
PAU, Ludhiana	3	PBW752*, PBW771, PBW773
IWBR, Karnal	1	DBW237
Checks	5	HD3059, DBW90, WH1021, WH1124, DBW173 (I)
Total	9 (4+5)	

Experimental details

Design	: R.B.D.
Replications	: Four
Plot size	: Gross: 6 x 2.16m (12 rows); Net: 6 x 1.80m (10 middle rows)
Fertilizer dose (kg/ha)	: 120:60:40 (N:P:K)
Time of sowing	: December 10-25
Seed rate (kg/ha)	: 125
Seed requirement for trial	: 30 kg per entry

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

**North Western Plains Zone
Advance Varietal Trial, 2017-18
AVT-RI-TS-TAS**

Trial conducting centres

State	No.	Centres
Punjab	4	Ludhiana, Gurdaspur, Kapurthala, Balachaur
Haryana	3	Hisar, Bawal, Uchani
Uttar Pradesh	2	Modipuram, Bulandshahr
Uttarakhand	1	Pantnagar
Rajasthan	5	Sriganganagar, Diggi, Dausa, Hanumangarh, Bharatpur
J&K	1	Jammu
Delhi	1	Delhi
Total	17	

Details of test entries

Contributing Centres	No. of entries	Name of entries
IARI	3	HD3237* HI1620*, HI1628
IWBR, Karnal	1	DBW252
BAU, Sabour	1	BRW3806
MPKV, Niphad	1	NIAW3170
Checks	4	WH1080, PBW644, HD3043, WH1142
Total	10 (6+4)	

Experimental details

Design	: R.B.D.
Replications	: Four
Plot size	: Gross: 6 x 2.40m (12 rows); Net: 6 x 2.0m (10 middle rows)
Irrigations	: Two (pre-sowing & one irrigation at 45-50 DAS)
Fertilizer dose (kg/ha)	: 90:60:40 (N:P:K)
Time of sowing	: October 25 - November 5
Seed rate (kg/ha)	: 100
Seed requirement for trial	: 20 kg per entry

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

*Final year entry

**North Eastern Plains Zone
Advance Varietal Trial, 2017-18
AVT-IR-TS-TAS**

Trial conducting centres

State	No.	Centres
Uttar Pradesh	9	Kanpur, Araul, Faizabad, Barabanki, Varanasi, Baharaich, Ghazipur, KVK-Basti, Gorakhpur
Bihar	5	IARI-Pusa, Sabour, Purnea, Bikramganj, Banka
West Bengal	5	Coochbehar, Kalyani, Burdwan, Manikchak, Majhian
Jharkhand	3	Ranchi, Chianki, Dumka
Assam	3	Shillongani, Dhubri, Bishwanath
Total	25	

Details of test entries

Contributing Centres	No. of entries	Name of entries
IIWBR, Karnal	4	DBW187*, DBW221, DBW223, DBW233
PAU, Ludhiana	2	PBW762, PBW769
IARI, New Delhi	2	HD3249, HD3254
CCSHAU, Hisar	1	WH1218
CSAUA&T, Kanpur	1	K1601
Checks	5	HD2733, K0307, DBW39, K1006, HD2967
Total	15 (10+5)	

Experimental details

Design	: R.B.D.
Replications	: Four
Plot size	: Gross: 6 x 2.40m (12 rows); Net: 6 x 2.0m (10 middle rows)
Fertilizer dose (kg/ha)	: 150:60:40 (N:P:K)
Time of sowing	: November 15-25
Seed rate (kg/ha)	: 100
Seed requirement for trial	: 27 kg per entry

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

*Final year entry

**North Eastern Plains Zone
Advance Varietal Trial, 2017-18
AVT-RI-TS-TAS**

Trial conducting centres

State	No.	Centres
Uttar Pradesh	6	Varanasi, Faizabad, Kanpur, Deegh, Ghaghraghat, Tissuhi
Bihar	3	IARI-Pusa, Sabour, Purnea
West Bengal	4	Kalyani, Burdwan, Manikchak, Coochbehar
Jharkhand	2	Ranchi, Chianki
Assam	3	Shillongani, Bishwanath, Gosaigaon
Total	18	

Details of test entries

Contributing Centres	No. of entries	Name of entries
BAU, Sabaur	1	BRW3806
IIWBR, Karnal	1	DBW252
CCSHAU, Hisar	1	WH1235
IARI, Indore	1	HI1628
JNKVV, Powarkheda	1	MP1331
Checks	5	HD2888, K8027, HD3171, K1317, HI1612 (I)
Total	10 (5+5)	

Experimental details

Design	: R.B.D.
Replications	: Four
Plot size	: Gross: 6 x 2.40m (12 rows); Net: 6 x 2.0m (10 middle rows)
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. 10
Seed rate (kg/ha)	: 100
Seed requirement for trial	: 20 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, 2017-18
AVT-IR-TS-TAD**

Trial conducting centres

State	No.	Centres
Gujarat	5	Vijapur, SK Nagar, Anand, Amreli, Junagarh
Madhya Pradesh	7	Gwalior, Jabalpur, Rewa, Powarkheda, Bhopal, Indore, Sagar
Chhattisgarh	1	Bilaspur
Rajasthan	3	Kota, Udaipur, Banswara
Total	16	

Details of test entries

Contributing Centres	No. of entries	Name of entries
JAU, Junagadh	1	GW495
SDAU, Vijapur	1	GW1339 (d)
JNKVV, Powarkheda	1	MPO1343 (d)
UAS, Dharwad	1	UAS465 (d)
PDKV, Akola	1	AKAW4924
Checks	4	HI1544, GW322, HI8737(d), HI8713(d)
Total	9 (5+4)	

Experimental details

Design	: R.B.D.
Replications	: Four
Plot size	: Gross: 6 x 2.40m (12 rows); Net: 6 x 2.0m (10 middle rows)
Fertilizer dose (kg/ha)	: 120:60:40 (N:P:K)
Time of sowing	: Oct. 25 - Nov. 10
Seed rate (kg/ha)	: 100
Seed requirement for trial	: 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, 2017-18
AVT-RI-TS-TAD**

Trial conducting centres

State	No.	Centres
Gujarat	6	Vijapur, Amreli, Dandhuka, Sanosara, Junagarh, Anand
Madhya Pradesh	7	Gwalior, Sagar, Jabalpur, Rewa, Powarkheda, Bhopal, Indore
Chhattisgarh	1	Bilaspur
Rajasthan	3	Udaipur, Banswara, Pratapgarh
Total	17	

Details of test entries

Contributing Centres	No. of entries	Name of entries
JNKVV, Powarkheda	1	MP1331
MPKV, Niphad	1	NIAW3170
UAS, Dharwad	1	UAS 466 (d)
IWBR, Karnal	1	DDW47 ^Q (d)
Checks	3	HI8627(d), MP3288, DBW110
Total	7 (4+3)	

Experimental details

Design	: R.B.D.
Replications	: Four
Plot size	: Gross: 6 x 2.40m (12 rows); Net: 6 x 2.0m (10 middle rows)
Irrigations	: Two (pre-sowing & one irrigation at 40-45 DAS (Limit of 3 Irrig. in Gujarat))
Fertilizer dose (kg/ha)	: 120:60:40 (N:P:K)
Time of sowing	: Oct. 25 - Nov. 10
Seed rate (kg/ha)	: 100
Seed requirement for trial	: 20 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, 2017-18
AVT-IR-TS-TAD**

Trial conducting centres

State	No.	Centres
Maharashtra	9	Niphad, Pravaranagar, Pune, Akola, Parbhani, Nasik, Karad, Mahabaleshwar, Kolhapur
Karnataka	7	Dharwad, Ugarkhurd, Arbhavi, Kalloli, Mudhol, Nippani, Mandya
Total	16	

Details of test entries

Contributing Centres	No. of entries	Name of entries
ARI, Pune	1	MACS6709
PDKV, Akola	1	AKAW4924
IARI, Indore	3	HI1624, HI1625, HI8800 (d)
SDAU, Vijapur	3	GW491, GW492, GW493
JNKVV, Powarkheda	1	MP1338
JAU, Junagadh	1	GW495
IWBR, Karnal	1	DBW235
PAU, Ludhiana	1	PBW770
Checks	5	MACS6478, MACS6222, UAS428 (d), MACS3949 (d), DBW168 (l)
Total	17 (12+5)	

Experimental details

Design	: R.B.D.
Replications	: Four
Plot size	: Gross: 6 x 2.40m (12 rows); Net: 6 x 2.00m (10 middle rows)
Fertilizer dose (kg/ha)	: 120:60:40 (N:P:K)
Time of sowing	: November, 5-15
Seed rate (kg/ha)	: 100
Seed requirement for trial	: 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, 2017-18
AVT-RI-TS-TAD**

Trial conducting centres

State	No.	Centres
Maharashtra	6	Pune, Niphad, Nashik, Akola, Parbhani, Savalivihir
Karnataka	4	Dharwad, Nippani, Bagalkot, Bailahongal
Total	10	

Details of test entries

Contributing Centres	No. of entries	Name of entries
MPKV, Niphad	1	NIAW3170
ARI, Pune	4	MACS6695, MACS6696, MACS4058 (d), MACS4059 (d)
JNKVV, Powarkheda	1	MPO1336 (d)
IARI, Indore	2	HI8802 (d), HI8805 (d)
SDAU, Vijapur	1	GW1346 (d)
Checks	4	DBW93, HI1605, AKDW2997-16(d), UAS446(d)
Total	13 (9+4)	

Experimental details

Design	: R.B.D.
Replications	: Four
Plot size	: Gross: 6 x 2.40m (12 rows); Net: 6 x 2.00m (10 middle rows)
Irrigations	: Two (pre-sowing & one irrigation at 40-45 DAS)
Fertilizer dose (kg/ha)	: 60:30:20 (N:P:K)
Time of sowing	: October, 15-31
Seed rate (kg/ha)	: 100
Seed requirement for trial	: 12 kg per entry

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

**Special Trial (Dicoccum), 2017-18
SPL-DIC-IR-TS**

Trial conducting centres

State	No.	Centres
Maharashtra	5	Pune, Karad, Kolhapur, K-Digraj, Mahabaleshwar
Karnataka	6	Dharwad, Arbhavi, UgarKhurd, Kalloli, Mudhol, Mandya
Tamil Nadu	1	Wellington
Total	12	

Details of test entries

Contributing Centres	No. of entries	Name of entries
ARI, Pune	1	MACS5051
UAS, Dharwad	1	DDK1054
IARI, Wellington	1	HW4110
Checks	3	HW1098, DDK1029, MACS6222(aest.)
Total	6 (3+3)	

Experimental details

Design	: R.B.D.
Replications	: Four
Plot size	: Gross: 6 x 2.40m (12 rows); Net: 6 x 2.0m (10 middle rows)
Fertilizer dose (kg/ha)	: 120:60:40 (N:P:K)
Time of sowing	: PZ: Nov. 1-15, SHZ: Nov. 10-25
Seed rate (kg/ha)	: 100
Seed requirement for trial	: 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 – Very Late Sown (January) Trial, 2017-18
SPL-VLS-TAS

Conducting centres

Zone	No.	Centres
NWPZ	8	Delhi, Ludhiana, Hisar, Karnal, Pantnagar, Bulandshahr, Nagina, KVK-Rampur
NEPZ	7	Kanpur, Faizabad, Barabanki, Varanasi, IARI-Pusa, Sabour, Coochbehar
Total	15	

Details of test entries

Contributing centres	No. of Entries	Name of entries
PAU, Ludhiana	3	PBW757*, PBW777, PBW797
IARI, Delhi	3	HD3271, HI1621, HD3298
IWBR, Karnal	1	DBW278
Checks	3	WR544, DBW14, DBW71
Total	10 (7+3)	

Experimental Details

Design	: RBD
Replication	: Four
Plot size	: Gross: 6 x 2.16m (12 rows); Net: 6 x 1.80m (10 middle rows)
Fertilizer dose (kg/ha)	: 100:50:25 (N: P: K)
Time of sowing	: January1-15
Seed rate (kg/ha)	: 125
Seed requirement for trial	: 22kg per entry

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

*Final year entry

Wheat Physiology work plan, 2017-18

I. Drought Tolerance Screening Nursery (DTSN)

*No. of entries:*25

Treatments: 2 (Timely sown Drought & Irrigated) Both treatments to be sown on same date.

Design: Simple lattice *Replications:*2

Plot size: 3m x 0.60m (3 rows of 3m length spaced 20cm apart)

Centres: 15 (Karnal, Hisar, Kanpur, Ranchi, Indore, Kota, Sagar, Jabalpur, Bardoli, Junagadh Akola, Pune, Parbhani, Niphad & Dharwad)

Observations to be recorded: Germination%, Days to heading, Days to anthesis, Days to maturity, Plant height (cm), Total biomass per plot at harvest (g), Productive tillers in one full row length, Grain yield per plot (g), 1000-grains weight (g), Grain number per spike, Grain weight per spike,

Observations to be recorded by centres having instrument facilities: Two recordings of NDVI at 15 days after sowing and again at 21 days after anthesis. Canopy temperature at 15 days and 21 days after anthesis, Chlorophyll fluorescence at 15 days and 21 days after anthesis, Chlorophyll content at 15 days and 21 days after anthesis.

II. Multilocation Heat Tolerance Trial (There will be two trials: MLHT-1 and MLHT-2)

MLHT-1 (Set 1): AVT-I entries of TS & LS from NWPZ and TS of NEPZ

Centres: 9 (Ludhiana, Karnal, Hisar, Pantnagar, Durgapura, Faizabad, Kanpur, Ranchi, Malda). *Entries:* 25. *Treatments:* 2 (timely & late sown with minimum 21 days difference between the two sowings)

Design: Simple lattice *Replications:*2

Plot size: 3m x 1.20m (6 rows of 3m length spaced 20cm apart)

MLHT-1 (Set 2): AVT-I entries of TS from CZ & PZ

*Centres:*6 (Indore, Junagadh, Niphad, Parbhani, Pune and Dharwad)

Entries: 16. *Treatments:* 2 (timely & late sown with minimum 21 days difference between the two sowings). *Design:* Simple lattice *Replications:* 2

Plot size: 3m x 1.20m (6 rows of 3m length spaced 20cm apart)

Observations to be recorded: Germination%, Days to heading, Days to anthesis, Days to maturity, Plant height (cm), Total biomass of each net plot at harvest (kg), Productive tillers of

one full row length, Grain yield of each net plot (g), 1000-grains weight (g), Grain number per spike, Grain weight per spike,

Observations to be recorded by centres having instrument facilities: Two recordings of NDVI at 15 days after sowing and again at 21 days after anthesis. Canopy temperature at 15 days and 21 days after anthesis, Chlorophyll fluorescence at 15 days and 21 days after anthesis, Chlorophyll content at 15 days and 21 days after anthesis.

MLHT-2: MLHT-1 (2016-17) entries

Plot size, Design, Replications, Treatments, Centres: Same as in MLHT-1

Observations to be recorded: Same as in MLHT-1

Allocation of Breeder Seed, 2017-18

The DAC has indented for 22012.79q breeder seed of 149 wheat varieties for production during 2017-18. This year the highest indent was received for the following varieties:

SN	Variety	Notification year	Indent 2017-18
1.	HD 2967	2014	2893.84
2.	HD 3086	2014	1327.60
3.	RAJ 4238	2013	1119.50
4.	WH 1105	2013	847.90
5.	Lok 1	1982	810.37
6.	Raj 4079	2011	716.00
7.	GW 322	2002	564.20
8.	PBW 725	2015	557.20
9.	HI 1544 (<i>Purna</i>)	2008	549.90
10.	PBW 723 (<i>Unnat PBW 343</i>)	2017	468.00

The breeder seed allocation made in the Research Planning Meeting of Crop Improvement during the 56th Wheat & Barley Workers' Meet held at BHU, Varanasi is given below. Low breeder seed indent (<10q) of old varieties was not allocated for production.

Centre	Variety	Year	Indent (q)	Nucleus seed (q)		Breeder seed Allocation (q)
				Target	Production	
ARI, Pune	MACS 3949	2017	50.00	1.00	1.00	50.00
	MACS 6222	2010	74.00	6.00	6.00	74.00
	MACS 6478	2014	38.00	3.00	3.00	38.00
		Total				162.00
BAU, Sabour	BRW 3708 (SabourSamridhi)	2017	20.00	0.00	0.00	20.00
	DBW 107	2015	231.60	0.00	0.00	20.00
		Total				40.00
BHU,	HUW 234	1986	30.93	1.00	1.50	30.93

Centre	Variety	Year	Indent (q)	Nucleus seed (q)		Breeder seed Allocation (q)
				Target	Production	
Varanasi		Total				30.93
BISA, Jabalpur	GW 322	2002	564.20	21.00	1.00	53.20
	DBW 110	2015	359.40	0.00	0.00	180.00
						233.20
BISA, Ludhiana	HD 2967	2014	2893.84	15.00	1.00	559.60
	WB 2	2017	37.00	0.00	0.00	30.00
						559.60
BISA, Samastipur	HD 2967	2014	2893.84	15.00	1.00	300.00
	DBW 107	2015	231.60	0.00	0.00	40.00
		Total				340.00
CCS HAU, Hisar	C 306	1969	128.50	3.00	3.00	68.50
	WH 283	1985	29.20	1.50	1.50	29.20
	WH 711	2002	97.40	9.00	10.00	97.40
	WHD 943	2011	40.00	4.00	4.00	40.00
	WH 1021	2008	16.00	1.00	2.00	16.00
	WH 1025	2010	65.00	2.50	3.00	65.00
	WH 1080	2011	65.00	1.50	2.00	10.00
	WH 1105	2013	847.90	17.00	20.00	847.90
	WH 1124	2014	102.80	10.50	11.00	102.80
	WH 1142	2015	63.20	3.00	4.00	63.20
	Total				1340.00	
CSAUAT, Kanpur	DBW 39	2010	156.4	2.00	3.00	56.40
	K 0307 ^(Shatabdi)	2007	16.38	5.00	6.00	16.38
	K 0402 ^(Mahi)	2013	55.00	5.50	5.55	55.00
	K 1006	2014	58.00	2.00	6.05	58.00
	K 7903 ^(Halana)	2001	12.00	1.00	5.50	12.00
	K 9107 ^(Deva)	1996	18.04	1.00	1.55	18.04
	K 9423	2005	19.80	0.50	4.20	19.80

Centre	Variety	Year	Indent (q)	Nucleus seed (q)		Breeder seed Allocation (q)
				Target	Production	
	(UnnatHalna)					
	PBW 343	1996	304.86	5.00	7.20	39.38
		Total				275.00
CSSRI, Karnal	KRL 213	2012	28.20	1.50	3.00	28.20
	KRL 210	2012	23.60	1.50	3.00	23.60
		Total				51.80
GBPUAT, Pantnagar	CBW 38	2009	72.40	1.50	1.00	22.40
	DPW 621-50	2011	271.6	0.50	2.00	51.60
	PBW 154	1988	235.79	5.00	5.00	235.79
	PBW 343	1996	304.86	2.50	2.00	23.20
	PBW 373	1997	160.26	0.50	1.70	88.26
	PBW 502	2004	193.36	5.00	4.50	37.00
	PBW 550	2008	216.50	1.00	1.50	61.00
	UP 262	1978	24.51	0.50	1.60	24.51
	UP 2338	1995	19.20	1.00	1.35	19.20
	UP 2572	2007	10.80	2.00	2.00	10.80
	UP 2628	2010	61.00	4.50	4.50	61.00
	PBW 226	1989	80.52	0.00	1.20	80.52
		Total				715.28
HPKVV, Palampur	HPW 349	2013	65.00	3.50	3.43	65.00
	HPW 360	2016	40.00	0.00	0.00	40.00
	WH 1080	2011	65.00	2.00	2.10	40.00
	HPW 249	2010	30.00	1.50	1.74	30.00
		Total				175.00
IARI, Indore	HI 1500 ^(Amrita)	2003	10.00	0.00	17.00	10.00
	HI 1531 ^(Harshita)	2006	45.00	4.50	22.00	45.00
	HI 8663 ^(Posan)	2008	88.00	8.00	40.00	88.00
	HI 1544 ^(Puma)	2008	549.90	17.00	42.00	204.90

Centre	Variety	Year	Indent (q)	Nucleus seed (q)		Breeder seed Allocation (q)	
				Target	Production		
	HI 8737 (Pusa Anmol)	2015	254.00	2.00	30.00	100.00	
	HI 8713 (PusaMangal)	2013	288.00	12.50	35.00	100.00	
	HI 8759	2017	252.00	5.00	0.00	252.00	
	HI 1605	2017	25.00	3.00	0.00	25.00	
	HD 2987	2011	11.00	0.00	0.00	11.00	
	HD 4728	2016	32.00	0.00	5.00	32.00	
		Total					867.90
	IARI, Karnal	HD 2851 (PusaVishesh)	2005	137.40	5.50	2.08	137.40
HD 2967		2014	2893.84	17.00	15.00	660.00	
HD 3086 (PusaGautami)		2014	1327.6	17.00	12.00	338.60	
HS 542 ^(Pusa Kiran)		2015	189.00	2.00	4.00	189.00	
HS 507 (PusaSuketi)		2011	38.00	4.00	6.00	38.00	
HS 562		2016	9.00	1.00	4.35	9.00	
WR 544 (Pusa Gold)		2005	16.98	1.00	0.00	7.60	
HD 2932 (Pusa Wheat 111)		2008	111.20	0.00	9.40	111.20	
HD 3059 (PusaPachhati)		2013	106.60	1.80	4.00	56.60	
		Total					1547.40
IARI, Pusa,	HD 2733 ^(VSM)	2001	92.69	1.50	2.26	50.00	
Samastipur	HD 2967	2014	2893.84	5.00	8.21	150.00	
	HD 2985	2011	103.40	6.50	2.23	103.40	

Centre	Variety	Year	Indent (q)	Nucleus seed (q)		Breeder seed Allocation (q)
				Target	Production	
	(PusaBasant)					
	HI 1563 (PusaPrachi)	2011	262.00	5.00	0.00	100.00
	HD 3118 (PusaVatsala)	2016	119.08	2.00	0.00	44.80
		Total				448.20
IGKVV, Raipur	DBW 110	2015	359.40	1.50	5.20	150.00
	GW 366	2007	406.00	5.00	2.40	50.00
	MP(JW) 1203	2009	265.00	2.00	9.40	40.00
	CG 5016 ^(Ratan)	2009	180.00	8.50	5.20	180.00
	CG 1015 (Chhattisgarh Gehon 4)	2017	20.00	0.00	0.00	20.00
	HI 617 ^(Sujata)	1982	30.00	0.00	3.67	30.00
		Total				470.00
IIWBR, Karnal	CBW 38	2009	72.40	5.50	2.60	50.00
	DBW 17	2007	178.45	3.50	4.30	6.00
	DBW 71	2013	45.00	2.00	2.86	25.00
	DBW 88	2014	226.60	5.50	4.88	30.00
	DBW 90	2014	109.40	7.00	2.35	59.40
	DBW 110	2015	359.40	9.50	1.00	29.40
	DBW 107	2015	231.60	0.50	1.00	211.60
	HD 2967	2014	2893.84	17.00	8.02	160.00
	WB 2	2017	37.00	1.00	10.17	7.00
		Total				601.40
JAU, Junagarh	GW 366	2007	406.00	15.00	12.00	204.00
		Total				204.00
JNKVV,	GW 273	1998	65.95	6.00	15.00	65.95

Centre	Variety	Year	Indent (q)	Nucleus seed (q)		Breeder seed Allocation (q)
				Target	Production	
Jabalpur	GW 322	2002	564.20	6.50	60.00	69.00
	GW 366	2007	406.00	5.00	12.00	102.00
	MP(JW) 1201	2011	190.00	5.50	3.00	190.00
	MP(JW) 3173	2009	70.00	7.00	10.00	70.00
	MP(JW) 1203	2009	265.00	5.00	15.00	150.00
	MP(JW) 3211	2010	330.00	13.00	3.00	330.00
	MP(JW) 3336	2013	225.00	3.00	10.00	225.00
	MP(JW) 1202	2010	230.00	6.50	8.00	230.00
	MPO(JW) 1215	2010	180.00	7.00	6.25	180.00
	MP(JW) 1142 (Snehil)	2007	15.00	11.00	4.00	15.00
	MPO(JW) 1106 (Sudha)	2003	10.00	1.00	1.00	10.00
	JSW 17 (Swapnil)	1997	5.00	1.00	1.00	5.00
	JW 3020	2005	45.00	7.50	5.00	45.00
	JW 3288	2012	345.50	10.00	42.00	345.50
	MP(JW) 3382	2015	70.00	0.00	0.00	70.00
	MPO 1255	2016	10.00	0.00	3.00	10.00
		Total				
Lokbharti, Sanosara	Lok 1	1982	810.37	8.00	33.00	810.37
		Total				810.37
MPKV, Niphad	NIAW 917 (Tapovan)	2006	8.00	0.50	4.72	8.00
	NIAW 1415 (Netravati)	2011	39.50	4.00	5.40	39.50
	NIAW 301 (Trimbak)	2002	14.00	3.00	9.14	14.00
	NIAW 1994 (PhuleSamadhan)	2016	20.00	0.00	17.00	20.00
		Total				

Centre	Variety	Year	Indent (q)	Nucleus seed (q)		Breeder seed Allocation (q)
				Target	Production	
NDUA&T, Faizabad	PBW 373	1997	160.26	4.50	4.55	50.00
	NW 4018	2014	50.00	1.50	1.55	50.00
	NW 5054	2014	8.00	0.00	0.00	8.00
	DBW 17	2007	178.45	0.00	2.25	31.25
		Total				139.25
PDKV, Akola	AKAW 4210-6 (PDKV Sardar)	2016	1.00	0.00	0.00	1.00
	AKAW 4627	2012	17.80	1.50	0.31	17.80
	WSM 1472 ^{(PDKV} Washim)	2012	35.00	0.50	0.42	35.00
		Total				53.80
PAU, Ludhiana	DBW 17	2007	178.45	4.50	3.75	89.20
	DPW 621-50	2011	271.6	5.00	7.00	120.00
	HD 2967	2014	2893.84	17.00	17.00	73.00
	PBW 343	1996	304.86	4.00	4.10	242.28
	PBW 373	1997	160.26	0.50	1.00	22.00
	PBW 443	2000	47.60	3.00	3.00	47.60
	PBW 502	2004	193.36	4.00	6.00	156.36
	PBW 550	2008	216.50	10.00	10.90	155.50
	PBW 590	2009	45.80	7.00	7.60	45.80
	PBW 644	2012	94.00	5.00	5.50	94.00
	PBW 658	2015	27.20	0.50	1.50	27.20
	PBW 660	2013	41.40	0.50	3.00	41.40
	PBW 677	2015	237.00	6.00	20.00	237.00
	PBW 725	2015	557.20	6.00	19.85	557.20
	PBW 723 (Unnat PBW 343)	2017	468.00	2.50	10.00	468.00
PBW-Zn1	2017	75.00	1.00	11.00	75.00	

Centre	Variety	Year	Indent (q)	Nucleus seed (q)		Breeder seed Allocation (q)
				Target	Production	
	(HPBW 01)					
	Total					2451.54
RARI, SKNAU, Durgapura	Raj 1482	1983	205.40	5.00	1.25	205.40
	Raj 3077	1989	270.40	5.00	2.00	63.40
	Raj 3765	1996	185.60	5.50	1.80	58.60
	Raj 4037	2004	231.30	11.00	2.75	231.30
	Raj 4079	2011	716.00	17.00	15.00	716.00
	Raj 4120	2009	179.80	8.50	3.00	179.80
	Raj 4128	2013	20.00	0.00	0.00	20.00
	Raj 4229	2013	23.00	0.00	0.00	23.00
	Raj 4238	2013	1119.50	17.00	12.00	506.00
	Total					2003.50
RAU, Dholi, Muzaffarpur	DBW 39	2010	156.4	5.50	0.00	100.00
	HD 2733 ^(VSM)	2001	92.69	2.00	21.90	42.69
	HD 2967	2014	2893.84	14.00	11.30	547.25
	HI 1563 (PusaPrachi)	2011	262.00	10.00	4.40	162.00
	WR 544 (Pusa Gold)	2005	16.98	0.50	2.20	9.38
	Total					861.32
RVSKVV, Gwalior	MP(JW) 4010	2003	10.00	3.00	5.00	10.00
	MP(RVW) 4106	2012	202.00	7.00	0.00	202.00
	GW 366	2007	406.00	5.00	12.00	50.00
	MP(JW) 1203	2009	265.00	3.50	10.00	75.00
	Total					337.00
SVPUA&T, Meerut	DBW 17	2007	178.45	5.00	0.00	52.00
	DBW 71	2013	45.00	2.50	0.00	20.00
	DBW 88	2014	226.60	6.00	0.00	196.60

Centre	Variety	Year	Indent (q)	Nucleus seed (q)		Breeder seed Allocation (q)
				Target	Production	
	DBW 90	2014	109.40	2.50	0.00	50.00
	DPW 621-50	2011	271.6	2.50	0.00	100.00
		Total				418.60
SDAU, Vijapur	GW 173	1994	49.00	2.00	1.55	49.00
	GW 322	2002	564.20	17.00	44.05	442.00
	GW 496	1990	230.40	5.00	52.90	230.40
	GW 451	2016	10.00	0.00	14.60	10.00
		Total				731.40
SKUA&T Jammu	HD 2967	2014	2893.84	0.50	0.00	100.00
	WH 1080	2011	65.00	0.50	0.00	15.00
		Total				115.00
SPU, IARI, New Delhi	HD 2864 (Urja)	2005	25.00	1.00	2.50	25.00
	HD 2967	2014	2893.84	17.00	21.00	343.99
	HD 3043	2012	91.80	2.00	4.90	91.80
	HD 3059 (PusaPachhati)	2013	106.60	3.50	7.25	106.60
	HD 3086 (PusaGautami)	2014	1327.6	17.00	31.50	989.00
	HD 3090	2014	12.20	0.50	1.70	12.20
	HD 3171	2017	73.00	6.00	1.00	73.00
	HD 3118 (PusaVatsala)	2016	119.18	0.00	5.20	119.18
		Total				1760.77
UAS, Dharwad	DWR 162	1993	12.00	0.50	0.90	12.00
	UAS 304	2013	24.00	0.00	0.00	24.00
	UAS 428	2012	20.00	0.50	1.52	20.00
		Total				56.00
ARS, Kota	C 306	1969	128.50	6.00	11.60	60.00

Centre	Variety	Year	Indent (q)	Nucleus seed (q)		Breeder seed Allocation (q)
				Target	Production	
	HI 1544 (Purna)	2008	345.00	8.00	10.58	345.00
	HI 8498 (Malav Shakti)	1999	75.50	5.00	20.00	75.50
	HI 8737 (Pusa Anmol)	2015	254.00	2.00	30.00	154.00
	HI 8713 (PusaMangal)	2013	288.00	12.50	35.00	188.00
	Raj 3077	1989	270.40	0.00	12.60	207.00
	Raj 4120	2009	179.80	10.50	10.90	109.80
	Raj 3765	1996	185.60	3.00	13.90	127.00
						1266.30
VPKAS, Almora	VL 892	2008	25.00	1.00	1.75	25.00
	VL 907	2010	27.00	2.00	2.00	27.00
	VL 953	2017	25.00	0.50	2.50	25.00
		Total				77.00
	Grand Total					20534.14

Research Planning Meeting – Resource Management

August 25, 2017	Chairman	: Dr RKSharma
3.30 PM – 5.30 PM	Co-Chairman	: Dr Satyavir Singh
	Rapporteurs	: Drs Bhagat Singh & RS Chhokar

At the outset, after welcoming the participants Dr RK Sharma, PI Resource management Programme and the Chairman of the session stressed that conducting All India Coordinated varietal evaluation trials is mandatory and all the centres must conduct the allotted trials strictly as per the technical programme. The resource management group critically reviewed the results of the coordinated and special trials. The trials on genotype evaluation will be formulated after receiving the entries from the breeding group. Detailed discussions were held to formulate new experiments for addressing the zone-wise issues. Dr Sandeep Manuja from Malan centre of the NHZ proposed a trial on Zn fortification. From Pantnagar in NWPZ Dr DS Pandey proposed a trial on rhizosphere management for improving nutrient use efficiency and Dr RS Chhokar from ICAR-IIWBR, Karnal proposed a new experiment on evaluation of similar set of wheat varieties, constituted by including the ruling variety of each wheat growing zone, to fine tune the sowing time as well as to work out the effect of climate on wheat yield in different zones. For PZ and NEPZ Dr (Mrs) T Sudha proposed a trial on nitrogen management using NDVI sensor and Dr VS Baviskar from ARI Pune informed the house that the package of practices for diccocom needs to be standardised for which he proposed a trial on plant geometry and seed rate. Based on the discussions, the group decided to conclude seven special coordinated trials, continue five ongoing trials and formulated five new trials the details of which are given below:

The group decided to conclude the following special trials.

- Effect of nutrient management in maize-wheat system (SPL-3)
- Validation of Leaf Colour Chart (LCC) for different wheat varieties (SPL-4)
- Evaluation of wheat genotypes in relation to conservation agricultural practices. (SPL-7)
- Assessment of chemicals for control of pre-harvest sprouting in wheat (SPL-8)
- Evaluation of mulch and irrigation effect on wheat under various crop establishment techniques (SPL-9)
- Effect of organic manures and mulching on wheat productivity(SPL-10)
- Comparative performance of line versus dibbling in wheat (SPL-11)

The following five special trials will be continued during the year 2017-18;

SPL-1: Evaluation of herbicides for control of broadleaved weeds in wheat.

SPL-2: Management of lodging and yield maximization in wheat.

SPL-5: Efficient water management in wheat using micro-irrigation.

SPL-6: Evaluation of Pusa Hydrogel and herbal hydrogel (Gum Tragacantha i.e. Goond katrira) on in situ moisture conservation under different irrigation levels in wheat.

SPL-12: Validation of Nutrient Expert in wheat.

To address the zone-wise issues, the group formulated five new trials listed below;

- SPL-3: Agronomic management for enhancing Zn in wheat grain in NHZ
- SPL-4: Rhizosphere management for improving nutrient use efficiency in wheat
- SPL-7: Yield maximization in dicoccum wheat through various planting options and seed rates
- SPL-8: Precision nitrogen management in irrigated wheat using NDVI sensor
- SPL-9: Fine tuning the sowing time in various zones under changing climate

The details of the new trials are listed below;

Experiment 1: Agronomic management for enhancing Zn in wheat grain in NHZ (SPL-3)

OBJECTIVE: Enhancing the Zn content in wheat grain

TREATMENTS: 08

1. No zinc application
2. Soil zinc application (20 kg Zinc sulphate/ha)
3. Soil zinc application (40 kg Zinc sulphate/ha)
4. Soil zinc application (60 kg Zinc sulphate/ha)
5. Foliar application of zinc sulphate (0.5% Zinc sulphate heptahydrate) at earing and early milk stage
6. Soil zinc application (20 kg Zinc sulphate/ha) + T5
7. Soil zinc application (40 kg Zinc sulphate/ha) + T5
8. Soil zinc application (60 kg Zinc sulphate/ha) + T5

Variety: HPW 349

Design: RBD

Replication: 03

Observations:

- (I) Yield attributes
- (II) Grain and biological yield
- (III) Zinc status of soil, grain and straw

CENTRES: Malan, Bajaura, Khudwani

Experiment 2: Rhizosphere management for improving nutrient use efficiency in wheat (**SPL-4**)

OBJECTIVE: Improving nutrient use efficiency in through carbon supply into the rhizosphere

TREATMENTS: 08

Treatments	Details	N application
T1	RDF (150:60:40) – Surface application	22.5 (basal using NPK) + 63.75+ 63.75 kg N (top dress)
T2	RDF (150:60:40) – Deep placement	22.5 (basal)+ 63.75+ 63.75 kg N (top dress)
T3	75% of RDF Deep placement	16.9 (basal)+ 47.8+ 47.8 kg N (top dress)
T4	75% of RDF (150:60:40) + Vermicompost @ 2 q/ha – Deep placement	16.9 (basal)+ 47.8+ 47.8 kg N (top dress)
T5	75% of RDF (150:60:40) + Poultry manure @ 2 q/ha – Incorporated at 20 cm depth	16.9 (basal)+ 47.8+ 47.8 kg N (top dress)
T6	T4+ PSB/KSB	16.9 (basal)+ 47.8+ 47.8 kg N (top dress)
T7	T5+PSB/KSB	16.9 (basal)+ 47.8+ 47.8 kg N (top dress)
T8	Absolute control	No fertiliser

DESIGN: RBD

REPLICATIONS: 3

Locations: Pantnagar, Karnal, Delhi and Hisar

Experiment 3: Yield maximization in dicoccum wheat through various planting options and seed rates (**SPL-7**)

OBJECTIVE: Standardising the package of practices for diccocom cultivation

Treatments:

1. **Main plots: Line spacing-03**

1. 15 cm 2. 20 cm 3. 25 cm

2. **Sub plot: Seed rates-03**

1. 75 kg/ha 2. 100 kg/ha 3.125 kg/ha

Variety: MACS 2971

Locations: Dharwad, Pune, Akola

Experiment 4: Precision nitrogen management in irrigated wheat using NDVI sensor (**SPL-8**)

Objective: Improving nitrogen use efficiency in wheat by need based application.

TREATMENTS: 07

1. Absolute Control

2. 75 kg N/ha basal 37.5 kg N/ha each at CRI and tillering

3. 60 kg N/ha basal 30 kg N/ha each at CRI and tillering

4. 30 kg N/ha basal+30 kg N/ha CRI and rest using Green Seeker twice at 2nd and 3rd irrigation
5. 30 kg N/ha basal +60 kg N/ha CRI and rest using Green Seeker twice at 2nd and 3rd irrigation
6. ½ N as basal and ½ at CRI
7. 1/3rd N as basal and 1/3rd at CRI
8. Rich Plot-90 kg N/ha basal+90 at CRI

Design: RBD

Replication: 03

Observations:

- I. Yield attributes
- II. Grain and biological yield

CENTRES: Dharwad, Niphad, Pune, Ranchi

Experiment 5: Fine tuning the sowing time in various zones under changing climate (**SPL-9**)

Objective: To evaluate the performance of diverse varieties under climate change.

Treatments:

Main Plots: Dates of sowing-04

1. 5th Nov, 2. 25th Nov 3. 15th Dec 4. 5th Jan

Sub Plots: Varieties-06

1. HS 562 2. HD 2967 3. HD 3086 4. HI 1544 5. MACS 6222 6. WR 544

Design: Split Plot

Replication: 03

Observations:

- III. Yield attributes
- IV. Grain and biological yield

CENTRES: All centres in all zones

The three varietal evaluation trials finalized after receiving entries from the breeding group are listed below;

1. Performance of new wheat genotypes at different dates of sowing under irrigated conditions of North Western Plains Zone.

OBJECTIVE: To evaluate the performance of genotypes at different dates of sowing.

TREATMENTS

A. Dates of sowing (Main-plots): 03

- D₁ Normal (5th to 11th Nov)
- D₂ Late (10th Dec. to 16th Dec.)
- D₃ Very Late (1st Jan. to 7th Jan.)

B. Genotypes (Sub-plots): 09

- | | | | | |
|---------------|----------------|--------------|---------------|---------------|
| 1. HD3226 | 2. PBW752 | 3. PBW757 | 4. WH1105 (c) | 5. HD3086 (c) |
| 6. HD3059 (c) | 7. DBW 173 (I) | 8. WR544 (c) | 9. DBW71 (c) | |

DESIGN: Split-plot

REPLICATIONS: Three

PLOT SIZE: GROSS: 1.80 m x 8 m = 14.40 sq. m. (9 rows at 20 cm spacing)
NET: 1.40 m x 7 m = 9.80 sq. m. (7 inner rows x 7 m long)

FERTILISER 150:60:40 kg N, P₂O₅ and K₂O/ha. Apply 1/3rd nitrogen, full phosphorus and potash to be applied as basal dose and the remaining 2/3rd nitrogen as 1/3rd at first irrigation and 1/3rd at second irrigation.

SEED RATE: 100 kg /ha for timely sown and 125 kg /ha for late and very late sown condition (Adjust seed rate considering 1000 grains weight as 38 g).

CENTRES: Agra, Bikaner, Delhi, Durgapura, Gurdaspur, Hisar, Jammu, Karnal, Ludhiana, Pantnagar and Sriganaganagar.

2. Performance of new wheat genotypes under restricted irrigation conditions of North Western Plains Zone.

OBJECTIVE: To evaluate the performance of timely sown genotypes at different irrigation schedules.

TREATMENTS

A. Irrigation levels (Main-plots):03

I₁ - No Irrigation

I₂ - One irrigation at CRI (20-25 DAS)

I₃ - Two irrigations at CRI and Boot leaf (80-85 DAS)

B. Genotypes (Sub-plots): 06

1. HD3237

2. HI1620

3. WH1080 (c)

4. PBW644 (c)

5. HD3043(c)

6. WH1142(c)

DESIGN: Split-plot

REPLICATIONS: Three

PLOT SIZE: GROSS: 1.80 m x 8 m = 14.40 sq. m. (9 rows at 20 cm spacing)

NET: 1.40 m x 7 m = 9.80 sq. m. (7 inner rows x 7 m long)

FERTILISER: 150:60:40 kg N, P₂O₅ and K₂O/ha. Apply full dose of NPK as basal in I₁ and 1/3rd nitrogen, full phosphorus and potash as basal in other treatments and the remaining 2/3rd nitrogen at first irrigation.

SEED RATE: 100 kg/ha (Adjust seed rate considering 1000 grains weight as 38 g).

CENTRES: Agra, Bikaner, Delhi, Durgapura, Gurdaspur, Hisar, Jammu, Karnal, Ludhiana, Pantnagar and Sriganaganagar.

3. Performance of new wheat genotypes at different dates of sowing under irrigated conditions of North Eastern Plains Zone.

OBJECTIVE: To evaluate the performance of genotypes at different dates of sowing.

TREATMENTS

A. Dates of sowing (Main-plots): 03

D₁ Normal (5th to 11th Nov)

D₂ Late (10th Dec. to 16th Dec.)

D₃ Very Late (1st Jan. to 7th Jan.)

B. Genotypes (Sub-plots): 09

1. DBW187

2. PBW757

3. HD2733(c)

4. HD2967 (c)

5. DBW39 (c)

6. K1006 (c)

7. WR544 (c)

8. DBW14(c)

9. DBW71 (c)

DESIGN: Split-plot

REPLICATIONS: Three

PLOT SIZE: GROSS: 1.80 m x 8 m = 14.40 sq. m. (9 rows at 20 cm spacing)

NET: 1.40 m x 7 m = 9.80 sq. m. (7 inner rows x 7 m long)

FERTILISER 150:60:40 kg N, P₂O₅ and K₂O/ha. Apply 1/3rd nitrogen, full phosphorus and potash to be applied as basal dose and the remaining 2/3rd nitrogen as 1/3rd at first irrigation and 1/3rd at second irrigation.

SEED RATE: 100 kg /ha for timely sown and 125 kg /ha for late and very late sown condition (Adjust seed rate considering 1000 grains weight as 38 g).

CENTRES: Burdwan, Coochbehar, Faizabad, Kalyani, Kanpur, Ranchi, RAU Pusa, IARI Pusa, Sabour, Shillongani, Varanasi.

Work Plan of Social science

- During the Rabi season 2017-18, the wheat and barley front line demonstrations (FLDs) will be conducted and coordinated as per the approval of the Ministry of Agriculture and Farmers Welfare, GOI, New Delhi.
- Demonstrations on residue management will be initiated by the ICAR-IIWBR, Karnal centre at farmers' fields.

The Resource Management and Social Sciences groups after thorough deliberations arrived at the following recommendations;

Technical Recommendations

1. The experiment to validate the LCC in wheat was conducted at nine locations (3 in NHZ and 6 in NWPZ) for two years. Application of 50 kg N/ha along with recommended P and K at sowing and 50 kg N/ha before first irrigation followed by LCC (LCC ≥4) based 45 kg N/ha application just before 2nd irrigation was found optimum with yield gain of 1.4 to 3.7% with 3.3% saving of nitrogen.
2. The experiment on comparative performance of conventional line sowing versus dibbling was conducted for two years at 8 location in CZ and 3 locations in PZ. The results showed that dibbling at 15X15 and/or 20X15 cm has no significant yield advantage over drill sowing at 20 cm row spacing using seed rate of 100 kg/ha.
3. The experiment on straw mulch, tillage and irrigation levels was conducted in NEPZ at two locations (Coochbehar and Shillongani) for two years. The rice crop residue mulch @ 4 t/ha under limited irrigation increased productivity by about 20% as compared to no mulch.
4. An experiment with six latest wheat varieties was conducted at four locations (Hisar, Karnal, Ludhiana and Pantnagar) for two years under conventional and conservation agricultural practices. The yield obtained under CA and CT was similar for all the varieties and considering the savings on tillage costs (Rs 3000-3500/ha) the CA must be popularized.
5. The trial to mitigate the climate change was conducted at four locations in NWPZ (Hisar, Karnal, Ludhiana and Pantnagar) three locations in NEPZ (Kalyani, Ranchi and Varanasi) and one location in CZ (Udaipur) for two years. The integration of FYM @ 10 t/ha and

crop residue mulch @ 4 t/ha with recommended fertilisers may be used for higher wheat productivity in NWPZ, NEPZ and CZ.

Administrative Recommendations

The contingency for conducting special system based trials needs to be revised to Rs 30,000/- from Rs 20,000/-

At the end of the session, Dr RK Sharma, on behalf of the ICAR-IIWBR and BHU, Varanasi thanked all the participants for valuable suggestions.

Research Planning Meeting – Crop Protection

August 25, 2014	Chairman :	Dr DP Singh
3.30 PM -5:30 P.M	Co-Chairman:	Dr SC Bhardwaj
	Rapporteurs :	Drs. Ritu Bala & AA Patel

The research planning meeting of Crop Protection was chaired by Dr. D.P. Singh, PI (CP), ICAR-IIWBR and Co-Chaired by Dr. S.C. Bhardwaj. Dr. Singh welcomed the participants of session and appreciated the co-operators for their work towards successful implementation of technical programme during 2016-17. Drs. D.P. Singh, S.C. Bhardwaj, Sukhwinder Singh (CIMMYT) gave the valuable suggestions for planning of the programme for 2017-18. Dr. Singh asked all the co-operators to contribute fully and Nematology and Entomology groups to conclude some of the experiments running for last 2-3 years. Ludhiana center will do differentiation of biotypes of *Heterodera avenae* using molecular markers. Trials on eco-friendly approach to manage CCN will be conducted by taking uniform treatments across the centres. For Entomology experiments, Drs. Singh and Bhardwaj suggested to relook and conclude some the experiments. Aphid screening for NIVT entries will also be done at Ludhiana, Niphad and Karnal centres. Survey and surveillance for insect pests and their natural enemies was also suggested. For eco-friendly management of storage grain pests education of farmers and capacity building programs should be planned.

For Plant Pathology the group desired to restrict IPPSN entries up to 1000 for quality data keeping in view of separate sets being planned for two rusts. The IPPSN and PPSN entries will be screened separately for stripe and leaf rust at different hot spot locations in North. For leaf rust screening of PPSN, Ghagrahat centre (Faizabad) and Dharwad center for IPPSN screening have been added. Dr. Bhardwaj indicated that supply of rust inocula will be on payment basis to those other than AICRP W&B. There will be rider for minimum leaf blight resistance in promotion of yield trial entries in PPSN and VIC and limit may be 78 as maximum score with an average score of 56.

Dr Sukhwinder Singh from CIMMYT appreciated the programme planned for tackling the multiple diseases to curtail losses in yield.

Teams of scientists were constituted for survey and surveillance of diseases in different zones during mid Dec. 2017 to mid Feb. 2018 for stripe rust and whole crop season for wheat blast along the Indo-Bangladesh border. Most of the ongoing experiments will continue during 2017-18.

Dr. D.P. Singh encouraged the co-operators to identify the confirmed sources of resistance to be registered as genetic stocks as well as for sharing of these with breeders for breeding disease resistant varieties.

The programme for the crop year 2017-2018 was formulated in the 56th All India Wheat and Barley Research Workers Meet held at BHU, Varanasi during August 25-29, 2017. The various activities to be executed at respective centres are given below:

PROGRAMME OF WORK, 2017-2018

The programme for the crop year 2017-2018 was chalked out in the 56th All India Wheat and Barley Research Workers Meet held at BHU Varanasi during August 25-28, 2017. The various activities to be executed at respective centres are given below:

PROGRAMME 1: STATUS OF DISEASE RESISTANCE IN THE ENTRIES OF PRE COORDINATED AND COORINATED YIELD TRIALS AND RELEASED CHECK VARIETIES, IPPSN AND PPSN

Adult Plant Resistance for rusts & other diseases

i. 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:

Leaf Rust: Delhi, Hisar, Karnal, Durgapura, Ludhiana (5)

Yellow Rust: Gurdaspur, Dhaulakuan, Malan, Karnal, Durgapura, Ludhiana and Jammu (7)

South:

Stem Rust + Leaf Rust: Dharwad, Mahabaleshwar, Wellington, Powarkheda, Niphad and Indore (6)

(b) Leaf Blight: Faizabad, Pusa (Bihar), Varanasi, Kalyani, Sabour and Coochbehar (6)

ii. Plant Pathological Screening Nursery (PPSN)

Objectives: 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: Dhaulakuan, Gurdaspur, Malan, Bajaura, Karnal, Delhi, Ludhiana, Pantnagar, Durgapura, Jammu, Kudwani (Kashmir) (11)

Leaf Rust: Delhi, Hisar, Jammu, Jalna, Kanpur, Karnal, Ludhiana, Pantnagar, Durgapura, Ghagaraghat (Faizabad)(10)

South:

Leaf and Stem Rusts: Wellington, Mahabaleshwar, Niphad, Vijapur, Pune, Junagarh, Powarkheda, Dharwad and Indore (9)

(b) Leaf blight (NIVT 1A, 1B, 3A): Kalyani, Coochbehar, Pusa (Bihar), Faizabad, Varanasi, Sabour, Shillongani (7)

Note: The samples of leaves of AVT II year entries in PPSN and the varieties (checks) showing resistance in the past but now showing rust severity of 40S or more at any of the centres, should be sent immediately to the Incharge, IIWBR Regional Station Flowerdale, Shimla for pathotype analysis, with information to P.I. (Crop Protection). The rusts have to be recorded every month.

Monitoring of PPSN

The teams of Plant Pathologists and breeders were constituted during the work-planning meeting for effective monitoring and data recording in PPSN at various locations indifferent zones. The team consists of

NWPZ:

- Drs. Sudheer Kumar, Satish Kumar and M. K. Pandey will monitor PPSN at Dhaulakuan, Ludhiana, Gurdaspur and Jammu centres.
- Drs. Vaibhav K Singh, Jaspal Kaur, Anil Kumar and P.L. Kashyap will monitor PPSN at Pantnagar.
- Drs. O. P. Gangwar, Rajender Singh Beniwal, Vikram Singh and P.S. Shekhawat will monitor, Karnal, Hisar, Durgapura and Delhi centres.

CZ:

- Drs. Sudheer Kumar, K.K. Mishra, Gurvinder Singh Mavi, and I.B. Kapadia will monitor Vijapur, Junagarh, and Powarkhed
- Drs. D. P. Singh, T.L. Prakasha, Dr. S K Goyal, and S.I. Patel will monitor Indore centre

PZ:

- Drs. D. P. Singh, B. C. Game, Ajit Maruti Chavan, and B. K. Honarao will monitor PPSN at Mahabaleshwar, Pune and Niphad

- Drs. Sudheer Kumar, Dnyandeo A. Gadekar, and B.K. Honrao will monitor Dharwad centre

SHZ:

- Drs. Vaibhav K Singh, S. P. Singh, J. Nanjundan and K.K. Mishra (Almora) will monitor Wellington centre
- The Plant Pathologists and Breeders of other zones will monitor PPSN during Zonal monitoring tours.

iii AUDPC based identification of slow rusters in AVT material:

Leaf and Stripe rusts - IIWBR, Karnal

Stripe rust - Ludhiana

Stem and leaf rusts -Mahabaleshwar

Stem rust -Indore

iv. APR: Race specific and slow rusting

1. **Leaf rust:** AVT entries of NWPZ, NHZ and NEPZ, along with the check entries of the respective zones. (**Centres:** New Delhi and Ludhiana under field conditions and Flowerdale, Shimla (under glass house conditions))

2. **Stem rust:** AVT of CZ and PZ, along with the check varieties of the respective zone. (**Centres:** Indore, Pune, Powarkheda and Mahabaleshwar)

3. **Stripe rust:** AVT entries of NWPZ and NHZ along with the checks of the respective zones. (**Centres:** Ludhiana and N. Delhi under field conditions and Flowerdale (under controlled condition))

Race inoculum to be supplied by Flowerdale: Races should be the same for all the respective centres.

(i) Leaf rust: 77-5, 77-9, 104-2, 12-5

(ii) Yellow rust: 46S119, 110S119, 47S103, 110S84

(iii) Stem rust: 40A,11,42 and 117-6

v. Seedling Resistance Tests and postulation of Rust Resistance Genes

- Leaf, Stem and Yellow 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. Besides, this, identification of Rust Resistance genes to be done in selected entries of MDSN, MPSN and EPPSN.
- Stem and Leaf rusts:** Mahabaleshwar for SRT on AVT entries of CZ, PZ and NIVT (durum entries).

PROGRAMME 2: RESISTANT SOURCES TO DIFFERENT DISEASES AND THEIR UTILIZATION

- i. **Elite Plant Pathological Screening Nursery (EPPSN):** The resources of resistance to three or two rusts identified in PPSN will be retested to confirm their resistance to rusts:
North: New Delhi, Malan, Karnal, Ludhiana, Pantnagar, Durgapura, Hisar, Chattha and Almora (9)
South: Wellington, Mahabaleshwar, Dharwad and Indore, Niphad (5).

- ii. **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:
North: 14 Locations
Stripe rust: Karnal, Ludhiana, Hisar, Dhaulakuon, Malan, Pantnagar
Leaf rust: Karnal, Ludhiana, Delhi, Hisar
Karnal Bunt: New Delhi, Karnal, Ludhiana, Dhaulakuan, Pantnagar
Powdery mildew: Dhaulakuan, Almora, Pantnagar, Malan, Chattha
Foliar blights: Faizabad, Varanasi, Coochbehar, Sabour, Hisar, Murshidabad (W.B.)
Loose smut: Hisar, Durgapura, Ludhiana, Almora
Flag smut: Hisar, Durgapura, Ludhiana
Head scab: Dhaulakuan, New Delhi, Gurdaspur
South: 4 locations
Leaf and Stem rust: Mahabaleshwar, Indore Dharwad, Niphad and Wellington
Nematodes (CCN) : Durgapura, Hisar, Ludhiana and Wellington

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

iii. LEAF BLIGHT

- i. Leaf Blight Screening Nursery (LBSN): No. of Centres: 12
This nursery will consist of earlier identified resistant materials as well as the AVT's and NIVTs. It will have all the released varieties and material found resistant in preceding years. It will have entries sent to CIMMYT for screening against wheat blast like symptoms also.

NWPZ: Pantnagar, Ludhiana, Karnal and Hisar.

NEPZ: Varanasi, Faizabad, IARI Pusa, Coochbehar, Shillongani, Ranchi and Murshidabad (W.B.)

PZ: Dharwad

iv. KARNAL BUNT

Karnal Bunt Screening Nursery (KBSN): This nursery will consist of the earlier identified resistant materials, released varieties alongwith AVT entries under artificially inoculated conditions.

Centres: Dhaulakuan, Ludhiana, New Delhi, Pantnagar, Hisar, Karnal and Jammu (7).

v. LOOSE SMUT

Loose smut Screening Nursery: It will contain resistant materials identified in the past released varieties and AVT 1st year entries of NHZ, NWPZ and NEPZ

Centres: Ludhiana, Almora, Durgapura and Hisar.

vi. POWDERY MILDEW

Powdery Mildew Screening Nursery: All entries of AVT, previously identified resistant Material and released varieties (NHZ, NWPZ) Almora, Pantnagar, Shimla, Malan, Bajaura, Dhaulakuan (7)

vii. Head Scab Screening Nursery: Gurdaspur, Dhaulakuan and New Delhi (AVT entries).

viii. Flag Smut Screening Nursery: Ludhiana, Hisar, Karnal and Durgapura (AVT entries).

ix. Foot rot: Dharwad, Indore (AVT entries)

x. Hill bunt: Malan, Bajaura and Almora (AVT entries NHZ).

PROGRAMME 3: CROP HEALTH

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 2017 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 crop will also be included.

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

Team I (last week of Dec. 2017): Drs. Sudheer Kumar, Vaibabh Kumar Singh, Jaspal Kaur, & Ritu Bala

(Punjab and Haryana at strategic locations)

Team II (second week of Jan. 2018): Drs. P.L. Kashyap, O. P. Gangwar, M. K. Pandey
Karnal- Ambala-Khanna- Ludhiana-Phillaur-Jalandhar-Dhilwan-Amristsar-Batala-Gurdaspur-
Kathua-Jammu

Team III (last week of January, 2018): Drs. Sudheer Kumar, P. Prasad, R.S. Beniwal
(Karnal to Rupnagar via Indri, Ladwa, Yamunanagar, Bilaspur, Sadhaura, Naraingarh,
Panchkul and Kharar-Garhshankar, Nawanshahar, Machhiwara, Samrala, Khanna, Ambala,
Kurukshetra)

Team IV (Second week of Feb. 2018): Drs. D. P. Singh and Charan Singh (Karnal-
Muzaffarnagar, Western U. P.)

Team V (Fourth week of Feb., 2018): Drs. Poonam Jasrotia, Beant Singh and P.S.
Shekhawat (Haryana, West U. P. and Uttarakhand)

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).

Reconstitution of Wheat Disease Monitoring Nursery (WDMN): Keeping into account the changed varietal situation, the zone specific varieties of NWPZ and NEPZ will be recasted.

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.

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, Faizabad, Pantnagar and Wellington.

Foliar and spike diseases monitoring nursery: It will be planted adjoining at key locations of Indo-Bangladesh borders and different centres of NEPZ. This will help in monitoring of leaf blight, head blight / head scab and wheat blast.

Monitoring of wheat blast: The following teams are constituted to monitor wheat crop in West Bengal and Assam along the Indo-Bangladesh borders for the presence of wheat blast.

Team 1: Drs. Sudheer Kumar, A. K. Gupta and Dhiman Mukherjee

Team 2: Drs. P.L. Kashyap, Javed Bahar Khan and Satyajit Hembram

Team 3: Drs. D. P. Singh, S. S. Vaish and Dhiman Mukherjee

Leaf blight samples to be sent from all the centres to PI (CP) for pathogen monitoring from naturally infected fields.

POST- HARVEST CROP HEALTH MONITORING

Monitoring of Karnal bunt and black point in harvested grains

Post harvest monitoring will be undertaken by cooperating centres by analysing samples from grain *mandies* in each district of their respective states. Centres from C.Z. (Indore, Sagar, Powarkheda, Junagarh, Vijapur) and PZ (Pune, Niphad and Dharwad) may also supply grain samples to IIWBR Karnal for analysis to PI (CP)

PROGRAMME 4: INTEGRATED DISEASE MANGEMENT

Chemical Control of flag smut: A trial on chemical control of flag smut will be conducted at Karnal, Hisar, Ludhiana and Durgapura using commonly available system fungicides.

Chemical control of leaf and spike diseases of wheat: Chemical control of leaf and spike diseases: This will be planted in west Bengal at 4 locations in Nadia, Murshidabad and Malda districts.

Chemical control of stripe rust: New chemicals will be tested at Karnal, Hisar, Ludhiana and Jammu.

PROGRAMME 5. WHEAT NEMATOLOGY

i. Monitoring of Nematodes:

Anguina tritici & *Heterodera avenae*: Durgapura, Ludhiana and other centres

ii. Evaluation of resistance against nematodes parasitizing wheat

Heterodera avenae: Hisar, Durgapura and Delhi

Heterodera filipjevi: Ludhiana

Meloidogyne graminicola: Ludhiana and Hissar

iii. Eco-friendly management of CCN nematodes in wheat

Centres: Durgapura, Hisar, Ludhiana

(To be coordinated by Hisar centre)

iv) Differentiation of CCN biotypes of Durgapura, Ludhiana, Hissar using molecular techniques Centre: Ludhiana

PROGRAMME 6. WHEAT ENTOMOLOGY

A. 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

A1: Entomological screening nurseries (ESN)- In these nurseries, AVT I year, AVT II year along with those found resistant during previous years will be screened for

(a) Shoot fly (Centres: Dharwad, Ludhiana, Kanpur, Niphad)

(b) Brown wheat mite (Centres: Durgapura and Ludhiana)

(c) Wheat Aphids (Centres: Niphad, Ludhiana, Karnal, Shillongani, Pantnagar and Kharibari)

(d) Root aphid (Centres: Karnal and Ludhiana)

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

A2: Multiple pest screening nurseries (MPSN)- In these nurseries, the germplasm having resistance to multiple diseases and insect-pests will be screened for

(a) Shoot fly (Centres: Dharwad, Ludhiana, Kanpur and Niphad)

(b) Brown wheat mite (Centres: Durgapura and Ludhiana)

(c) Foliar aphids (Centres: Niphad, Ludhiana, Karnal, Shillongani, Pantnagar and Kharibari)

(d) Root aphid (Centres: Karnal and Ludhiana)

B. INTEGRATED PEST MANAGEMENT

B1: 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.

B2. Influence of sowing time on the incidence and population build-up of major insect pest of wheat (Centres: Karnal, Niphad, 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

B3. Evaluation of trapping efficiency of different type of insect-traps for aphids (New trial)
(Centres: Niphad, Ludhiana, Karnal)

Different types of traps viz., tray-traps, sticky-traps and pheromone lures and their placement in the crop will be tested to determine the efficiency of traps to capture aphids in the field. The criterion of trap colour, material and cost of trap will be considered for selection of traps for the experiment. The population of alate (winged) and wingless forms of aphids captured in traps will be recorded during the season.

B4. Effect of varied nitrogen fertilization on aphid and termite infestation in wheat (New trial)
(Centres: Karnal, Ludhiana, Niphad)

Impact of three different doses (low, medium & high) of nitrogen application on population abundance of foliar aphid and termites will be investigated in wheat. The nitrogen doses for NWPZ locations will be 0, 75,150 and 225 kg/ha while for PZ location, it will be 0, 60,120 and 180 kg/ha. Population of aphids per plant, natural enemies (adult and grubs) per plot, yield per treatment and nitrogen status of plants before the treatment and at the time of harvest will be recorded to determine the individual effect of each dose of Nitrogen application on aphid abundance. To know effect of nitrogen fertilization on termite infestation the observations on plant population per meter row length, per cent damaged shoots and effective tillers in each treatment will be taken at different stages of crop along with yield at harvest.

B5. 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.

B6. 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.

B7. Eco friendly management of foliar aphid (Centres: Karnal, Ludhiana, Niphad, Kharibari and Pantnagar)

New bio-pesticides and new chemicals at lower doses 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.

B8. Eco friendly management of termites (Centres: Durgapura, Kanpur, Ludhiana and Vijapur)

Few selected new chemicals along with botanicals as seed treatment will be tested against termites. The observations on plant population per meter row length, per cent damaged shoots and effective tillers will be taken at different stages of crop.

C. STORED GRAIN PEST MANAGEMENT

C1. Studies on the insecticidal treatments on seed viability during storage under ambient condition against store grain pests, *Trogoderma granarium* or *Rhizopertha dominica* (Centres: Karnal and Niphad)

Plants having toxicity effects on insects will be tested as seed protectant to wheat seed/grains against major stored grain insect pests; *Sitophilus oryzae* or *Rhizopertha dominica*

Recommendations

The Crop Protection programme was reviewed by Dr. Ramesh Chand, Professor, Department of Plant Pathology, BHU, Varanasi. Changes in the programme of work were made to make it more effective, responsive to the needs of farmers and other stakeholders as well as to minimize losses in yield and quality under changing climate. Precision phenotyping against biotic stresses will be further strengthened. Strategies have been chalked out to tackle yellow rust and wheat blast threat as well as using IPM for susceptible varieties especially in situations where one or two varieties cover high acreages in Northern Plains.

The recommendations were:

1. A strict vigil will be kept on stripe rust in NWPZ and in NHZ, leaf and stem rusts in PZ and CZ, wheat blast, leaf rust and leaf blight in NEPZ. Teams have been constituted for monitoring of rusts in different areas during crop season as well as in off season. Vigil will also be kept on all other diseases and insect pests also. The use of mobile phones, digital photos and internet in crop health monitoring will be done for fast communication and diagnosis of diseases, insect pests and nematodes. Post-harvest survey will be carried out for knowing Karnal bunt free areas and black point status for facilitating wheat export.
2. The e-crop health newsletter issues will be issued on monthly basis from Nov. 2017 to March 2018, distributed and put on web page of institute. Advisories will be issued on yellow rust.
3. Strategy planning meetings to keep wheat crop healthy and contain losses due to diseases and insect pests will be organized with DAC & FW, SAUs, and state agriculture departments.
- 4.
5. Wheat blast monitoring nurseries will be planted at five locations in Murshidabad, Nadia and Malda districts in West Bengal and in Assam. The Wheat Disease Monitoring Nursery (WDMN) will be reconstituted keeping in view of presence of wheat blast in Bangladesh.
6. The leaf blight is a most important disease of wheat in NEPZ and IPPSN and PPSN entries are being evaluated against leaf blight since 2000-01. A number of resistant sources are identified and some resistant genetic stocks are registered. It is therefore right time to fix a maximum limit of leaf blight score of 78 with an average score of 56 for

- promotion and identification of entries in yield trials and VIC for NEPZ.
7. The yellow rust susceptible varieties should be discouraged in NHZ and NWPZ. The susceptible varieties should be sprayed with propiconazole @ 0.1% at the initiation of rust symptoms in districts close to foot hills in Punjab and Jammu and Yamunanagar in Haryana.
 8. For management of foliar aphids, foliar application of bioagents like *Beauveria bassiana* @ 5 g/litre or *Metarhizium anisopliae* @ 3 g/litre at ETL of 5 aphids/shoot is recommended. Likewise, for shoot fly management, soil application of Phorate 10G @10 kg /ha is recommended. A new chemical Spiromesifen (240 SC) @ 1 ml /litre has been found very effective against brown wheat mite.
 9. There will be two sets of PPSN. One for stripe rust and one for leaf rust in North. Similarly, there will be separate set for leaf and stem rust in South. The creation of disease epiphytotics will be strengthened in IPPSN and PPSN. The PPSN data will be recorded by the teams of Plant Pathologists and Breeders. The quota of different breeding centres in IPPSN will be reviewed by a team of breeders and plant pathologists, based on past 5 years' performance of their entries and reallocation will be done. The total entries may be restricted to 1000 for improving the quality of data. The centres will be encouraged to develop arrangement to use facilities of Flowerdale Shimla, and Mahabaleshwar for evaluation of their pre-coordinated yield trial material. The NIVT entries of 1A, 1B and 3 will also be screened against leaf blight. Ghagrahat (Faizabad) is added new location for PPSN for leaf rust. NIVT entries will also be screened against foliar aphids at Ludhiana centre. The rust inocula will be supplied on charge basis to those who are not working in AICRPW&B.
 10. A set of IPPSN and PPSN entries including popular released varieties will be planted at Murshidabad in West Bengal for evaluation against leaf and spike diseases under natural conditions. A set of 100 wheat varieties and AVT entries will be screened against wheat blast in Bolivia, Bangladesh and USA.
 11. The entries of AVT 1st year belonging to NHZ, NWPZ and NEPZ will be screened against loose smut at four hot spot locations. The AVT entries will be screened against head scab at Gurdaspur, Dhaulakuan and New Delhi (Under poly house conditions).
 12. The seed multiplication of entries found resistant against insect pests at multi locations will be multiplied at Karnal and these will be retested for multiple pests in future.
 13. A total of 122 numbers of genotypes having good agronomic characters were confirmed for their resistance to multiple rusts and other diseases. Out of these 50 genotypes of bread, durum, dicoccum wheats and Triticale will be contributed along with all passport data on resistance in National Genetic Stock Nursery (NGSN), 2017-18 for their utilization

- in breeding for disease resistance at about 30 wheat breeding centres in India.
14. New chemicals for stripe rust, KB, leaf blight and spike diseases, foliar aphids and termites will be tested at multilocations.
 15. IPM modules will be developed at different centres for proper management of insect pests and diseases and insects.
 16. A skill upgradation course for identification of diseases and insect, creation of disease epiphytotics, uniform recording and their management will be organized jointly at IIWBR, Karnal and Shimla for scientists from co-operating centres. The education and training of farmers will be strengthened on identification and management of diseases and insect pests using diagnostic cards, use of mobile phones and personal visits and by analyzing their disease and insect pests infected samples free of cost. Proper advice on crop health management will be given to farmers at IIWBR and cooperating centres.

Research Planning Meeting and recommendations - Wheat Quality

August 25, 2017	Chairman	:	Dr. Sewa Ram, Pr. Scientist (Quality)
	Rapporteurs	:	Drs. (Ms) Suma Biradar & AK Patel

The Wheat Quality Group met on August 25th and 26th, 2017 and formulated the plan of work and recommendation. The group decided to continue recording data for grain appearance score, test weight, protein content and sedimentation value on all the entries of the three species, namely *T. aestivum*, *T. durum* and *T. diccicum* as well as triticales. Durum will also be analyzed for the incidence of yellow berry and yellow pigment in addition to the earlier mentioned traits. Yellow pigment will also be recorded on *diccicum*. The allocation of the work will be as under:

1. Ludhiana laboratory will analyze NIVT 1A (Irrigated Timely Sown). Samples from Ludhiana, Hisar, Durgapura, Delhi, Pantnagar (NWPZ), Kanpur, Pusa, Varanasi and Sabour (NEPZ) would be included.
2. The Quality laboratory at Durgapura will undertake the analytical work for NIVT 1B (Irrigated Timely Sown) and samples from all those centers which have been identified for Ludhiana laboratory (NIVT 1A) would be analysed.
3. NIVT 2 (Irrigated Timely Sown) samples will be analyzed by the laboratory at Vijapur for all the traits related to bread wheat. The centres to send the samples are Indore, Kota, Vijapur, Junagarh, Powarkheda (CZ), Dharwad, Pune, Ugar and Niphad (PZ).
4. NIVT 3A and 3B (both Irrigated Late Sown) work will be looked after by Pantnagar quality laboratory. The samples from Pantnagar, Hisar, Ludhiana, Durgapura, Delhi (NWPZ) & Pusa, Sabour, Kanpur, Varanasi (NEPZ) for NIVT 3A and Vijapur, Indore, Powarkheda, Junagarh (CZ) & Dharwad, Niphad, Pune (PZ) for NIVT 3B will be analyzed for the quality traits related to bread wheat.
5. The samples of irrigated timely sown *T. durum* trial NIVT 4 will be analyzed by the quality laboratory at Rahuri for the traits related to durum samples from Kota, Indore, Powarkheda, Junagarh, Vijapur (CZ) and Pune, Dharwad, Niphad, Ugar (PZ).
6. NIVT 5A (Restricted Irrigation Timely Sown) entries from Pantnagar, Hisar, Ludhiana, Durgapura, Delhi (NWPZ), Pusa, Kanpur, Sabour, Varanasi (NEPZ) will be analyzed at Hisar laboratory. It will also undertake analytical work for salinity/alkalinity trials conducted at salt affected sites.
7. NIVT 5B durum and aestivum trial (Restricted Irrigation Timely Sown) samples will be analysed by the laboratory at Dharwad. The centres namely, Kota, Dhandhuka, Indore, Powarkheda (CZ) and Pune, Dharwad, Niphad(PZ) will send the samples to the concerned lab. All diccicum samples will also be analysed by Dharwad centre. The dehusked material will be from Dharwad, Pune, Arabhavi, Kalloli, Ugar and Wellington.

8. All the AVT samples from all those zones & centres, which conduct trials in 2017-18, will be analyzed by ICAR-IIWBR Quality lab. All the AVT entries including checks will be analyzed for various quality parameters including baking evaluation.
9. Grain Quality Laboratory at ICAR-IIWBR, Karnal will analyse wheat samples of Special Trials (if conducted) viz. Triticale, MABB/NIL, Wheat Bio-fortification and Quality Components Screening Nursery (QCSN) for grain appearance score, test weight, protein content, grain hardness index and sedimentation value.
10. The last dates for supplying the samples by respective centres were finalised as follows:

NHZ & SHZ	15 th June 2018
NWPZ & NEPZ	20 th May 2018
CZ	15 th May 2018
PZ	30 th April 2018
11. 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.
12. All the co-operators, who will analyze the wheat samples of various NIVTs and Special trials should send the data to IIWBR, Karnal positively by 20th July, 2018, by e-mail.

Recommendations

1. Recently there is increased demand for product specific varieties and therefore, breeders should take quality traits into consideration while making crosses and selecting desirable segregants in the breeding programme so that the requirements of different products are met in the country especially in a situation of climate change. (Action: concerned breeders and quality scientists)
2. Concerted efforts should continue to develop linkages with wheat based industries for the benefit of producers, industry and the consumers. (Action: Quality scientists.)
3. Concerted efforts should be made by breeders for improving yellow pigment content in durum wheat to match with international standard (Durum breeders).
4. A short term training programme can be conducted at IIWBR, Karnal to evaluate quality traits for uniform results across the centres (PI, Quality).
5. The Quality Component Screening Nursery (QCSN) would now be conducted in crop improvement programme with suitable modifications and the analysis would be carried out in quality programme at ICAR-IIWBR, Karnal (PI, Crop Improvement and PI, Quality).

Research Planning Meeting and recommendations- Barley Network

August 25 , 2017	Chairman :	Dr. AS Kharub
	Co-Chairman :	Dr. AS Shekhawat
3.15 PM – 5.30 PM	Rapporteur :	Dr. Vishnu Kumar

Finalization of work plan and Recommendations

The scientists working in barley breeding, agronomy, quality and pathology disciplines deliberated and reviewed the results of each trial series. Following the set norms on yield, disease (rust diseases), and quality parameters, the desirable test entries were promoted / retained in different trials. Finally, the constitution of various trial series in NWPZ/ NEPZ/CZ/NHZ was completed with the collective wisdom. The details of various breeding yield trials/ agronomical experiments and plant pathological nurseries/experiments finalized for conduction during 2017-18 crop season are as given hereunder:

A) Yield Evaluation Trials

Name of Trial	AVT	
Production Condition	Rainfed	
Zone	NH Zone	
No. of Trial Centres	10	
State	NO.	Name of centres
Himachal	6	Bajaura, Berthein, Kangra, Katrain, Malan, Shimla
Uttarakhand	3	Almora, Ranichauri, Majhera
J&K	1	Rajauri
No. of varieties including checks	21	
Contributing Centres	No.	Name of varieties
IARI, RS, Shimla	4	BHS465, BHS466, BHS467, BHS468
Pantnagar	3	UPB1070, UPB1071, UPB1072
Almora	5	VLB155, VLB156, VLB157, VLB158, VLB159
Bajaura	5	HBL789, HBL793, HBL802, HBL812, HBL814
Checks	4	HBL113, BHS352, VLB118, BHS 400

Name of Trial	AVT	
Production Condition	IRRIGATED	

Zone	NEPZ	
No. of Trial Centres	7	
State	NO.	Name of centres
UP	3	Kanpur, Faizabad, Varanasi
MP	1	Rewa
Bihar	2	Pusa(RAU), Sabour
Jharkhand	1	Ranchi
No. of varieties including checks	8	
Contributing Centres	No.	Name of varieties
Ludhiana	1	PL892
Durgapura	1	RD2948
Kanpur	1	KB1531
Checks	5	RD 2552, Jyoti , HUB113, K508, DWRB137 (I)

Name of Trial	AVT	
Production Condition	IRRIGATED	
Zone	Central Zone	
No. of Trial Centres	7	
State	NO.	Name of centres
Rajasthan	3	Kota, Udaipur, Banswara
Gujarat	1	Vijapur
Madhya Pradesh	3	Gwalior, Morena, Sagar
No. of varieties including checks	8	
Contributing Centres	No.	Name of varieties
Ludhiana	2	PL892, PL898
Kanpur	1	KB1531
Checks	5	PL751, RD2786, BH959, RD2899 (I), DWRB137 (I)

Name of Trial	AVT	
Production Condition	SAL / ALK	
Zone	NWPZ / NEPZ	
No. of Trial Centers	08	

State	No.	Name of centers
U.P.	2	Dalipnagar, Faizabad
Haryana	3	Hisar, Bawal, IIWBR (Hisar)
Rajasthan	3	Banasthali, Kumher, Vallabhnagar
No. of varieties including checks	18	
Contributing Centers	No.	Name of varieties
Kanpur	3	KB1628, KB1632, KB1634
Faizabad	2	NDB1683, NDB1699
Varanasi	2	HUB263, HUB264
Karnal	2	DWRB187, DWRB189
Durgapura	4	RD2977, RD 2978, RD2979, RD2980
Checks	5	RD2552, NDB1173, NDB1445, RD2794, RD2907 (I)

Name of Trial	AVT (Dual Purpose Barley)	
Production Condition	Rainfed Timely Sown	
Zone	NH Zone	
No. of Trial Centers	5	
State	NO.	Name of centers
H.P.	3	Shimla, Bajaura, Palampur
Uttrakhand	2	Almora, Majhera
No. of varieties including checks	19	
Contributing Centers	No.	Name of varieties
Pantnagar	3	UPB1070, UPB1071, UPB1072
IARI, Shimla	4	BHS461, BHS462, BHS463, BHS464
Almora	5	VLB155, VLB156, VLB 157, VLB158, VLB160
Bajaura	5	HBL797, HBL804, HBL818, HBL821, HBL822
Checks	2	HBL276, BHS380

Name of Trial	IVT
Production Condition	Malt Barley
Zone	NWPZ (Timely Sown)
No. of Trial Centers	10

State	NO.	Name of centers
Haryana	3	Bawal, Hisar, Karnal
Punjab	2	Ludhiana, Bathinda
Rajasthan	2	Durgapura, SG Nagar
U.P.	2	Modipuram, Mathura
Uttrakhand	1	Pantnagar
No. of varieties including checks	20	
Contributing Centers	No.	Name of varieties
Kanpur	2	KB1634, KB1638
Durgapura	4	RD2985, RD2986, RD2987, RD2988
IWBR, Karnal	6	DWRB160 , DWRB181, DWRB182, DWRB183, DWRB184, DWRB187
Ludhiana	2	PL904, PL905
Checks	6	BH902, DWRB101, DWRB123, DWRB137(I), RD2849
Name of Trial	Initial Varietal Trial	
Production Condition	Irrigated Feed barley	
Zone	NWPZ/ NEPZ / CZ	
No. of Trial Centers	17	
State	NO.	Name of centers
Haryana	2	Hisar, Karnal
Punjab	1	Ludhiana
Rajasthan	4	Durgapura, Tabiji, Banswara, Udaipur
Uttrakhand	1	Pantnagar
U. P	3	Kanpur, Varanasi, Faizabad
M. P	3	Rewa, Gwalior, Morena
Bihar	2	Pusa (RAU), Sabour
Jharkhand	1	Ranchi
No. of varieties including checks	30	
Contributing Centers	No.	Name of varieties
Kanpur	2	KB1605, KB1606
Varanasi	3	HUB260, HUB261, HUB262
Faizabad	1	NDB1698

Hisar	2	BH1020, BH1021
Durgapura	4	RD2969, RD2970, RD2971, RD2972
Pantnagar	3	UPB1073, UPB1074, UPB1075
Rewa	2	JB357, JB360
Ludhiana	4	PL891 , PL900, PL902, PL903
Karnal	2	DWRB187, DWRB188
Checks	7	BH 946, RD2552, DWRB137(I), RD2786, RD2899(I), Karan16, NDB943

Name of Trial	IVT (Dual Purpose Barley)	
Production Condition	Irrigated Timely sown	
Zone	NWPZ /NEPZ/CEN	
No. of Trial Centres	15	
State	NO.	Name of centres
Rajasthan	6	Bikaner, Durgapura, Kota, Udaipur, Banswara, Bikaner (CSWRI)
M.P.	2	Jabalpur, Rewa
Haryana	1	Hisar
Punjab	1	Ludhiana
UP	4	Kanpur, Faizabad, Varanasi, Modipuram,
Gujarat	1	Anand
No. of varieties & checks	16	
Contributing Centres	No.	Name of varieties
Faizabad	1	NDB1682
Durgapura	4	RD2973, RD2974, RD2975, RD2976
Pantnagar	3	UPB1073, UPB1074, UPB1075
Kanpur	3	KB1636, KB1638, KB1640
Rewa	1	JB364
Checks	4	RD2035, RD2552, AZAD, RD2715

Name of Trial	IVT
Production Condition	Rainfed
Zone	NEPZ

No. of Trial Centers	9	
State	NO.	Name of centres
UP	6	Kanpur, Varanasi, Faizabad, Mirzapur, Tisuihi, Saini
MP	1	Rewa
Bihar	2	Pusa (RAU), Sabour
No. of varieties including checks	17	
Contributing Centers	No.	Name of varieties
Kanpur	3	KB1606, KB1616, KB1633
Varanasi	2	HUB253 , HUB260
Faizabad	1	NDB1680
Durgapura	4	RD2981, RD2982, RD2983, RD2984
Rewa	2	JB362, JB363
Ludhiana	1	PL905
Karnal	2	DWRB185, DWRB186
Checks	2	K 603, Lakhan

B) Crop Protection Trials/Experiments:

Crop Health survey

Evaluation for status of host resistance in test entries (IBDSN, NBDSN, EBDSN and SRT)

Chemical control of leaf blight and aphids

Screening of NBDSN against foliar aphids and CCN

C) Agronomy Trials/ Experiments

Special experiments for updating package of practices

Ongoing experiments

Integrated nutrient management in barley

Seed treatment with azotobacter, PSB, azotobacter + PSB, Biomix and control) and N levels (50, 75 and 100% of recommended) in NHZ and CZ

Maximisation of barley yield using Plant growth regulators and N levels

PGR's (Control ; CCC @2000 ppm ; ETHEPHON @2000 ppm)

Standardisation of seed rate of different barley varieties in NHZ

Varieties: VLB 118, BHS 400, HBL 113, BHS 352

Seed rate: 75, 100 and 125 kg / ha

Effect of organic manure, mulching and chemical sprays on barley productivity in NEPZ and NWPZ

Recommended dose of fertilizer, T1 + FYM @15 t/ha, T1 + mulch@ 6 t/ha,

T1 + FYM @15 t/ha + mulch@ 6 t/ha, T4+ spray of ZnSo4 @ 0.5 %,

T4 + Two spray of KCl @ 0.5 % (Flag leaf and post anthesis)

Variety: NEPZ HUB 113, NWPZ BH 946

Effect of conservation practices on barley productivity NWPZ and NHZ

Tillage options: ZT, CT and ZT+ Residue@ 6t/ha

Varieties: BH 902, BH 946, RD2786, 2552, DWRB 101, DWRUB 52

Varieties: VLB 118, BHS 400, HBL 113, BHS 352 and HBL 276

New Experiments:

Management of broad leaved weeds in barley with new herbicides (Halauxifen-methyl Ester+ Florasulam 40.85% WG + Polyglycol 26-2 N)

Experiments on hydrogel and liquid fertiliser for saving of moisture and nutrient will be conducted at one or two places (Agra/Durgapura/Karnal)for initial observations and will be replicated at other locations keeping in view of results.

D) Quality evaluation

Evaluation of malt & feed samples for quality.

Barley quality screening nursery genotypes

General Recommendations

- In case number of test entries in the AVT is one, to save the resources, group decided that the promoted entries will be evaluated in the respective IVT trials.
- In dual purpose barley trials, promotion criteria will be that the entry should be significantly superior in either of grain yield or forage yield, should also have vice versa numerical advantage for grain/forage to the best check.
- The malt barley late sown trials were discontinued as the quality is comparatively inferior under late sown conditions.
- Work should also be initiated on pre-breeding aspects in barley.
- Correlation between seedling resistance test and adult plant resistance needs to be investigated.

- Sources of foliar blight and aphid resistance need to be identified from indigenous or exotic germplasm.
- Breeder seed indents should be honoured by the respective centres and should be reported timely.
- The higher yield being reported for a particular entry at a particular location needs to be corroborated with the supporting data.
- Resource management/agronomy experiments should be formulated keeping in view the practical applicability at farmer's field and economics of the technology.
- In case of husk less barley, micronutrient content should also be investigated.
- ICARDA offered to give some special nurseries on leaf blight, rust and salinity and it was discussed that these are mapping populations therefore these should be routed through ICAR-IIWBR/ICAR-NBPGR in project mode with financial provisions from ICARDA.

Technical Recommendation:

1. The experiment conducted on row spacing in feed barley revealed that 20 cm row spacing is found to be optimum for higher yield under rainfed conditions of NHZ but in other zones (NWPZ, NEPZ, CZ) 22.5cm row spacing in feed barley is found to be optimum.
2. Seed treatment with biofertiliser (Azatobactor+PSB) should be done for added advantage in yield in Northern plains (NWPZ+NEPZ).

SESSION III
Review of Programme, 2016-17

August 26, 2017	Chairman	: Dr KV Prabhu, JDR, ICAR-IARI
	Co-Chairmen	: Dr IS Solanki, ADG FFC, ICAR Dr GP Singh, Director, ICAR-IIWBR
	Rapporteurs	: Drs K Venkatesh & VK Singh

The session to review the programmes was opened by Chairman of the session, Dr KV Prabhu and he welcomed all the participants and invited the Principal Investigators of different disciplines to present the Progress Report of the crop season, 2016-17.

Dr Vinod Tiwari presented the highlights of Crop Improvement program during 2016-17. The performance of trials in different zones and cultivation conditions were graphically compared with that of last year. The newly released varieties of wheat and genetic stocks registered were presented. Percent success in trial conduction and reporting during 2016-17 was highlighted and the overall reporting of trials was 67.2%. The reporting of data was highest in NWPZ (79.4%) followed by CZ (73.8%). The lower report rate of trials in NEPZ and PZ was noted to be a cause of concern. Varieties in the final year of testing and entries found promising in Advanced Varietal Trials were also listed. Dr Tiwari also informed that during last season 120 out of 149 centres were monitored. Enhancement in mean site yield of AVTs and NIVTs during 2016-17 was graphically presented. Promising lines identified out of screening of international and national nurseries were also listed. Highlights of conduct of a new trial (zero tillage trial) were also presented. Surplus production of breeder seed was reported and top ten varieties in seed chain were highlighted where, HD 2967 topped the list with 4319q breeder seed production. Heat tolerant genotypes identified out of MLHT1 & MLHT2 trials were also communicated. While concluding, Dr Tiwari listed the issues needs to be deliberated during the workshop.

Dr RK Sharma, PI (Resource Management) presented the status of conduction and reporting of agronomic trials along with special trials aimed at finetuning the production technologies on nutrient, weed and water management. Further Dr Sharma highlighted results of testing of new chemical compositions in weed control. Use of Leaf colour chart in enhancing nitrogen use efficiency was also presented. The trial conducted in evaluating varieties under conservation agriculture was also presented.

Dr DP Singh, PI (Crop Protection) informed the house about disease surveys being conducted and crop health advisories being issued from time to time. He mentioned that yellow rust incidence was first reported on 29.12. 2016 this year. He further listed resistant genotypes identified against multiple diseases and insect pests during previous crop season. A detailed

account of activities conducted in monitoring progress of wheat blast in regions adjoining Bangladesh in West Bengal state was presented.

Dr SC Bhardwaj, In-charge IIWBR Regional Station, Shimla presented the results of wheat rust seedling resistance tests carried out during the year. Declining predominance of 78S84 race of yellow rust was also mentioned. The resistant lines identified against yellow, brown and black rust were listed. Dr Bharadwaj also highlighted the deciphering of molecular mechanism of *Puccinia striiformis*.

Dr Sewa Ram, PS (Wheat Quality) presented list of product specific genotypes identified from AVT material. Similarly, promising genotypes identified for various quality parameters (Protein, Iron, Zinc, Gluten, Grain hardness, yellow pigment, sedimentation value, and test weight) were presented. He further presented the results of analysis of samples for quality parameters and informed that there is a continuous increase in quality attributes along with yield and disease resistance. The variability in wheat genotypes for yellow pigment content and phytase activity was also highlighted. Towards end he also listed the activities carried out by cooperating centres (IARI-New Delhi, PAU-Ludhiana, GBPUA&T-Pantnagar and UAS-Dharwad) under quality programme.

Dr AS Kharub presented the highlights of Barley Network. He presented National scenario of barley production and listed barley genetic stocks registered by NBPGR during 2016-17. He further presented that status of trial conduction and reporting of barley trials during the year. The breeders seed produced during the year was highlighted and results of experiments conducted under barley pathology and agronomy disciplines was also presented. Identification of various promising entries for malting quality traits (Test weight, beta glucan, protein, TGW, husk content, malt friability, hot water extract) was presented. Extension activities and trainings conducted were also mentioned at the end.

Dr Satyavir Singh presented the impact of FLDs in popularizing new technologies during 2016-17 and constraints in organizing FLDS. During the wheat crop season 2016-17, 543 Wheat Front Line Demonstrations (WFLDs) covering 547.4 ha area of 19 states were conducted and zone wise constraints were identified. The technologies on improved wheat varieties, rotavator, zero tillage/rotary disc drill, bio-fertilizer and drip irrigation were demonstrated. The maximum yield gain due to improved varieties over check was in West Bengal (29.25%) followed by Uttrakhand (29.25%). Among various constraints, small land holding was the most serious constraint faced by the farmers and other constraints were non-availability of seeds of new varieties, lack of knowledge among farmers about recent technologies, late sowing, temperature fluctuations, high cost of inputs, poor seed quality etc. Cost and returns on investments of wheat cultivation was also presented. The profit per hectare in FLDs was highest in Punjab (Rs 99779) followed by Uttar Pradesh (Rs 74304) and Gujrat (Rs 72024). He also presented the barley Front Line Demonstrations Report (FLDs)

and said that 100 barley FLDs were conducted during 2016-17. The highest yield gain due to improved varieties over check was in UP (25.33%). In barley erratic power supply, low price of barley, high temperature at maturity, high cost of inputs etc. was the most serious constraints. Cost and return for Barley FLDs was mentioned at the end. Punjab (Rs 6.54) followed by UP (Rs 4.30) gave highest returns per rupee investment in FLDs.

Decisions coming out from discussions in the session

1. In view of lack of interest among industries on the improved product specific wheat varieties, ICAR-IIWBR shall initiate a dialogue between industries involved in producing wheat products aimed to encourage them in buying new and improved varieties rather than importing the cheap flour from abroad.
2. Dr JP Tondon raised the issue of need for increasing the precision in conduct of coordinated trials, the centres may be helped in getting improved precision seed drills.
3. Dr IS Solanki, ADG FFC informed that the efforts should be made to replace old varieties with large seed indents and low yield with new and improved high yielding varieties. This will also help in increasing the profit of farmers.
4. Dr RPS Verma raised the issue of lack resistance to leaf blight in Indian barley germplasm and further informed the house to use resistant germplasm regularly supplied through ICARDA nurseries.
5. Dr Vinod Tiwari requested breeders of MP state to encourage state department officials to increase indent of DBW110.
6. Dr GP Singh, Director, IIWBR informed the house that a new set of 100 genotypes will be sent to Bolivia in order to screen for wheat blast.
7. He further said that ATARIs will henceforth be requested to conduct FLDs, Chairman, Dr KV Prabhusaid that, a letter in this regard may be sent as an outcome or recommendation of this workshop to ATARIs through SMD.
8. Dr Gyanendra Singh raised the need for developing a collaborative breeding programme exclusively for wheat blast.
9. Chairman, Dr KV Prabhu asked Dr RK Sharma to pursue the improvement of applicability of Nutrient Expert in wheat.

The meeting ended with thanks to the chair, co-chair and rapporteurs by the organizing committee.

SESSION- IV

General discussion on important matters of AICRP & decisions taken during the Brain Storming Meeting held at IIWBR on 27th January 2017

Chairman	:	Dr. Gyanendra Pratap Singh, Director, IIWBR
Co-Chairman	:	Drs. Vinod Tiwari & Ravish Chatrath
Rapporteurs	:	Drs. Mamrutha HM & Satish Kumar

Dr GP Singh, Director, IIWBR, Karnal welcomed the wheat and barley researchers for discussion on various issues pertaining to AICRP. The proceedings of the brainstorming meeting held at IIWBR, Karnal on 27.01.2017, which pertained to various evaluation criteria for promotion of entries in coordinated trials and other issues related to AICRP, were approved by the house. The proceedings were already circulated to all the stakeholders for their inputs and suggestions.

One of the important issues discussed was the case of distortions in the staff positions at different funded centres. Dr Ravish Chatrath presented centre wise anomalies in the staff positions and pointed out specific cases from each centre as follows:

1. Ranchi: Sanctioned position of plant pathologist has been withdrawn from Ranchi centre in the 2017-20 plan.
2. Kalyani: Sanctioned position of junior scientist (Agronomy) is occupied by a senior scientist.
3. Malan: Sanctioned position of junior scientists in Agronomy and Plant Pathology disciplines are occupied by senior scientists. No arrears can be paid. Position is now considered as vacant and not to be filled without prior permission of Director, IIWBR.
4. Dhaulakuan: Sanctioned position of junior scientist (Plant Breeding) is occupied by a principal scientist.
5. Sagar: Sanctioned position of junior scientist (Plant Breeding) is occupied by a senior scientist.
6. Niphad: Sanctioned position of junior scientist (Plant Breeding) was occupied by a senior level position with pay scale Rs. 37,400-67,000 & GP Rs. 9,000. Scientist now transferred on 12.05.2017. No arrears can be paid. Vacant position not to be filled without prior permission of Director, IIWBR. Sanctioned position of junior scientist (Agronomy) was occupied by a senior level position with pay scale Rs. 37,400-67,000

- & GP Rs. 9,000. Scientist now transferred on 31.05.2017. No arrears can be paid. Vacant position can not to be filled without prior permission of Director, IIWBR.
7. Ludhiana: Sanctioned position of junior scientist (Agronomy) has been filled with senior scientist.
 8. Vijapur: Position of junior scientist (Biochemistry) is filled with Agronomist.
 9. Dharwad: Sanctioned position of junior scientists in Plant Breeding, Agronomy and Plant Pathology disciplines are occupied by a professor level position. The concerned centre incharges were asked to rectify the problems before. At many centres the sanctioned post of junior/assistant scientist is occupied by senior scientist or principal scientist. ADG (FFC) also said that 60% budget in ICAR goes to AICRP and hence council has asked for proper setting of cadre strength in all AICRP centres. Cadre strength of each of the Wheat and Barley AICRP centres will be posted in IIWBR website for further reference and centres should take necessary measurements to correct the same. Also the scientists transferred from other AICRPs should be adjusted against the sanctioned positions.

During the session Director, IIWBR has mentioned that, the utilization certificate (UC) should be submitted by April end and AUC to be submitted by June by all centres to IIWBR including volunteer centres. 2nd fund release will be done in September by online from IIWBR and hence all necessary documents and process to be made ready by centres for online transfer of money.

The session ended with a vote of thanks to the chair.

Session V

Progress of Research in NWPZ: A Review

August 26, 2017	Chairman	:	Dr. NP Singh
1.30-03.00PM	Co-Chairman	:	Dr. KV Prabhu
	Rapporteurs	:	Drs. Gyanendra Singh & PL Kashyap

At the outset, Chairman of this session Dr NP Singh extended warm welcome to all the presenters and delegates and then Co-Chairman Dr KV Prabhu briefed about the importance of the mega zone (NWPZ) in Indian wheat programme and highlighted some of the issues/problems of the region.

In all there were seven presentations to review the progress made at different centres for the period (2012-13 to 2016-17) located in this mega zone. All the centres presented the progress in terms of staff position, budgetary details, coordinated trials allotted & conducted, summary of national & international nurseries/ trials, hybridization programme and segregating populations handled, contribution to different NIVTs and promotion to AVTs, germplasm maintenance and utilization, seed production, technology development, external research projects handled and publications made during the period of review.

The first presentation was by Dr VS Sohu from Ludhiana centre and Chairman and Co-chairmen appreciated their excellent efforts made during past five years. Dr Sohu mentioned that PAU centre has released two varieties (Unnat PBW 343 and zinc biofortified wheat variety PBW1 Zn) in 2017. Chairmen and co-chairmen expressed their concerns on the use of CIMMYT nursery/materials and pointed out that it should be used for specific purposes only.

Dr J.P. Jaiswal, presented progress at Pantnagar centre. The progress of research was not at its best level and Dr N.P. Singh opined that keeping in view the facilities, there is a need to give more emphasis on basic research and also suggested to improve upon research publications.

Dr SS Dhanda presented the progress of the Hisar centre and described basic and strategic research, coordinated activities and contributions in form of new technologies by the centre. Dr GP Singh, Director, IIWBR suggested that the centre should make concerted efforts and outcome need to be in match with staff provided to this centre. There is still scope to improve pace of the progress and utilize their potential and therefore motivated them to work hard to develop agro products and their spread among farmers for enhancing their income.

The progress of work at Durgapura centre was presented by Dr Hoshiyar Singh. He presented significant achievements made in coordinated yield trials, PPSN nurseries, agronomic trials, international nurseries and germplasm evaluation, and nuclear and breeder seed production and FLDs during past five years. He informed the house that their centre released several wheat and barley varieties during this period.

Dr Tuhina Dey presented the progress of Jammu centre. She informed about number of crosses attempted this year utilizing sources from IPPSN. Further, she told that eight varieties were released by the centre during the reporting period. Additionally, one genotype QBP12-9 was identified as genetic stock for soft grain, low protein and low sedimentation value from QCSN screening by IIWBR, Karnal.

Dr Dharendra Singh presented the activities and achievements of Dhaulakuan centre. The chairmen expressed that this centre is one of the major hot spot from wheat diseases and work done by this centre is not much reflected in the progress report due to shortage of scientific staff. Similar comment on slow progress of work at this centre was also made by the Director, IIWBR, and Karnal. Dr Prabhu suggested for strengthening collaboration with other nearby institutes like PAU, IIWBR and Delhi for better and fruitful results.

The presentation of progress at ICAR-IARI, New Delhi centre was made by Dr RK Sharma. He presented significant achievements made in coordinated yield trials, PPSN nurseries, agronomic trials, international nurseries and germplasm evaluation, and nuclear and breeder seed production during past five years. The chairmen and co-chairmen appreciated the efforts of this centres.

Recommendations

Based on the review of progress at different centres of NWPZ, and the discussion made after presentations, the following recommendations were made:

1. The efforts of CIMMYT and ICARDA in sharing their segregating material with Indian researchers were appreciated but expressed their concern to use this material for specific purpose only, and generate indigenous material to suit better for local needs.
2. There is need to give focus on basic and strategic research particularly at places (New Delhi, Ludhiana, Hisar, Pantnagar etc.) where facilities are available.
3. There is need for directed efforts for the conversion of crosses made at particular centre into final product development and also quality publications.
4. Any line showing multiple resistance against biotic and abiotic stresses needs to be intensified by sharing and discussing information among wheat workers at national and international level.
5. These centres have to be strengthened with region specific production of breeder and nucleus seed in accordance with the needs of agro-climatic features of the area.
6. Breeding objectives should be oriented towards the cropping pattern of the region/zone.
7. There is need to enhance the product oriented research that will acts as one of the boosting step for doubling the farmers income.
8. The Chairman suggested that phenomics facility for screening against abiotic stresses at NIABSM may be utilized by others involved in breeding wheat for abiotic stresses.

The session concluded with final comments from Chairman, who also thanked all the presenters and the delegates for actively participating in fruitful discussion.

SPECIAL SESSION
Varietal Identification Committee Meeting

August 26, 2017	Chairman	: Dr. AK Singh, DDG (Crops)
5.00 PM onwards	Member Secretary	: Dr. GP Singh

The meeting of Varietal Identification Committee of Wheat & Barley was held at Committee Room 1 Directors office, Institute of Agricultural Sciences, BHU, Varanasi on 26th August 2017 under the Chairmanship of Dr. A K Singh, DDG (Crops).

The following attended the meeting:

Voting Members:

1. Dr. AK Singh, DDG (Crops), ICAR, Krishi Bhavan, New Delhi (Chairman)
2. Dr. IS Solanki, ADG (FFC), ICAR, Krishi Bhavan, New Delhi
3. Dr. KV Prabhu, JDR, ICAR-IARI, New Delhi
4. Dr. US Singh, Pr Scientist, Nuziveedu Seeds, Hyderabad
5. Dr. RM Singh, Retd. Professor, BHU, Varanasi
6. Dr. A Vaishampayan, Director, Inst. Ag. Sci, BHU, Varanasi
7. Dr. GP Singh, Director, ICAR-IIWBR, Karnal (Member Secretary)

Non-Voting Members:

1. Dr. Vinod Tiwari, PI (CI), ICAR-IIWBR, Karnal
2. Dr. RK Sharma, PI (RM), ICAR-IIWBR, Karnal
3. Dr. DP Singh, PI(CP), ICAR-IIWBR, Karnal
4. Dr. SC Bhardwaj, PS & Incharge, ICAR-IIWBR RS, Flowerdale, Shimla
5. Dr. Sewa Ram, PI (QBS), ICAR-IIWBR, Karnal
6. Dr. AS Kharub, PI Barley Network, ICAR-IIWBR, Karnal
7. Dr. Satyavir Singh, PI (SS), ICAR-IIWBR, Karnal
8. Dr. Ravish Chatrath, PI, Coordination, ICAR-IIWBR, Karnal

The committee considered a total of 11 proposals (6 wheat and 5 barley) submitted for identification and after detailed deliberations, gave the following recommendations as indicated against each proposal:

	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	DBW 173	IR-LS	On the basis of superiority in yield, resistance to stripe and brown rusts along with high protein and Fe content, the variety was identified.

	Name of Variety	Production conditions	Recommendations
North Eastern Plains Zone (NEPZ): East of UP, Bihar, Jharkhand, Wet Bengal (excluding hills), Orissa, Assam and plains of NE States.			
2	HI 1612	RI-TS	The variety was identified as it was superior in yield with resistance to yellow, brown rusts and leaf blight. It also had high sedimentation value.
Peninsular Zone (PZ): Maharashtra and Karnataka			
3	DBW 168	IR-TS	The only variety proposed under irrigated timely sown conditions was found superior in yield, disease resistance and better chapatti & biscuit quality, hence identified.
4	UAS 375	RF-TS	The variety was significantly superior in yield and was resistant to rust, therefore identified.
5	HI 8777 (d)	RF-TS	Both the varieties were considered together and were identified. The varieties had diverse pedigrees and were significantly superior in yield with high Fe and Zn contents.
6	MACS 4028 (d)		
BARLEY			
1	RD 2917	IR-TS	The variety proposed for NWPZ under irrigated timely sown conditions did not had any superiority in malt quality parameters and hence not identified.
2	DWRB 137	IR-TS	The variety proposed under irrigated timely sown conditions of NEPZ and CZ had yield superiority, disease resistance and high protein content and was identified for both the zones.
3	RD 2899	IR-TS	The variety proposed for irrigated timely sown conditions of CZ was considered and identified on the basis of yield superiority, disease resistance, high protein and lodging tolerance.
5	RD 2907	Sal/Alk	The proposal was considered for Sal/Alk conditions of NWPZ and NEPZ, and was found superior for yield, disease resistance, seed characteristics such as test weight and hence identified

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



(AK Singh)
Chairman



(GP Singh)
Member Secretary

Session VII

Panel Discussion on Enhancing productivity and profitability in wheat based cropping system in Eastern India and strategies to double farmer's income by 2022

August 27, 2017	Chairman	: Dr. AK Srivastava
3.00-05.00PM	Co-Chairman	: Dr. HS Gupta
	Rapporteurs	: Drs. CN Mishra & Poonam Jasrotia

At the outset, Chairman of the session Dr AK Srivastava extended warm welcome to all the distinguished delegates and then briefed about the topic of panel discussion; the challenges and strategies for doubling the income of wheat producers by 2022, a major food security crop grown in the Eastern region of the country.

There were six distinguished guest speakers from ICAR, IFPRI, CIMMYT who gave their valuable opinions on enhancing the productivity of wheat based cropping system to double the farmer's income by 2022.

Dr. Vinod Tiwari PI Crop Improvement, IICR-Karnal in his opening remarks highlighted constraints faced by the farmers of Eastern India. He told the gathering that availability of quality seed in respect of wheat crop is an important bottleneck in harvesting the full potential of wheat crop. The sowing time option available to the farmers in wheat-based cropping system is from October to January. So the selection of variety is an important step in alongwith proper package of practices in doubling the income of farmers of eastern region of the country. Farmers are cultivating old varieties that need to be replaced properly. ICAR-IARI had developed and implemented the seed distribution through post offices; it needs to be extended to other institutes also. Educating the farmers of region regarding recent technologies and methodologies would also encourage the farmers in gaining more income.

Dr. P.K. Joshi, Director for IFPRI South Asia informed the house about the demand projections and told although there is a surplus production of 9 million tonnes but the per capita consumption is declining. His opinion was that in the era of direct cash benefit transfer food subsidies might be withdrawn. At global level India is not competing in trade of wheat crop. The yield gaps for eastern India is very high (70-150%) and 1/3rd area of wheat in Uttar Pradesh is witnessing productivity of less than 2 t/ha. He further strengthened the issue raised by Dr. Tiwari that farmers are still cultivating old wheat varieties. About 45% of area is growing PBW343 in eastern UP. UP 262 an old variety is being cultivated in 25% area of Bihar. There should be proper planning and strategy for replacement of such cultivars. He also emphasized strategies should be adopted by looking the market development in relation to APMC act. Role

of private sector cannot be ignored. Number of factors like ease of doing business that is further dependent on land lease, electrification, credit availability, value addition and crime rate affecting the presence of private sector in the region. Irrigation cost in the eastern region is also high as compared to other parts. Integrated farming approach by involving the allied sectors like horticulture, dairy etc and farmer/producer organisation would further help in increasing the income of the farmers.

Dr. P. K. Chakrabarty, Assistant Director General (Plant Protection), ICAR informed the house the annual crop losses due to diseases and insect-pests is around 225 crores and these losses need to be reduced in order to increase the crop-productivity. Presently, there are 50 institutes that are working on developing resilient varieties, resistant to biotic and abiotic stresses. The new developed varieties having known sources of resistance for pests should reach farmers for filling the yield gaps that exist at micro-level. The farmers should be made aware of role of pollinators in enhancing the yield. In cotton crop 16% enhancement in yield has been reported through pollinators. Further, he emphasized the role of crop intensification in increasing wheat productivity of Eastern region. Oilseeds and pulses should be incorporated in cropping cycle for higher system productivity.

Dr. Ravi P. Singh, Distinguished Scientist and Head of Bread Wheat Improvement, CIMMYT, Mexico quoted Dr Borlaug "there is no miracle in agricultural production." He said that there are definite reasons from growing wheat and rice and areas cannot be easily replaced by other crops like vegetables or cash crops. Problems of seed availability can be dealt by small seed producer organisations. He further suggested the popularization of seed drill for wheat sowing since large area is under rice-wheat rotation and seed drill would definitely help in timely competition of wheat sowing. He proposed to include mung bean in rice-wheat rotation as it would not only help in increasing the income but will also generate employment to the women. Proper levelling of field, judicious use of irrigation water, biofortification, post harvest management, storage and linking to the industries were other measures suggested for increasing the farmer's income in the eastern region. Policy decisions are very crucial for agriculture and the Government should launch more schemes like crop insurance which are beneficial for raising the economical status of the farmers.

Dr. A.K. Srivastava, ASRB, emphasized the role of dairy sector, he informed that in white revolution milk production has increased from 17 million tonnes to 160 million tonnes. It is time to calculate the carrying capacity of the cattle in the country. For further increasing the production good fodder and feed concentrate is required. There is a need to further increase the biomass of the crops. Through the modern technology of sexed semen the male/female calves are predetermined and would further help in meeting the farmers need. Processing of surplus milk should be left to the market. NDRI, Karnal has developed the electronic nose that

helps in detecting the heat that is further decreasing the lean period. During his talk, he also gave scientific messages for conveying to farmers for cattle disease control. For avoiding mastitis disease, the animal should not be allowed to sit for 30 minutes after milking. For FMD, vaccination is must and for brucellosis disease, one vaccination at the six months should be done.

Dr. H.S. Gupta, Ex-Director General, Borlaug Institute of South Asia (BISA) and Ex-Director, ICAR-IARI talked about the role of overall system productivity in enhancing farmer's income. In recent times, steep rise in input cost has been observed mainly due to increase in the cost of fertilizers and pesticides but at the same time, no significant rise has been observed in MSP of wheat. Therefore, the farmers are not reaping the profits as they were supposed to get in an era of globalization. To counter this, we all need to work towards bringing down the cost of cultivation through development of new technologies and innovations. It has been observed that only 40 % of the total developed technologies reach to farmers. Scientists should focus research in increasing water and nutrient use efficiency of crops and develop new irrigation systems and machinery that will benefit farmer in increasing crop productivity. Better germplasm needs to be developed that is resistant to abiotic and biotic stresses and at the same time has higher yield potential. Depending upon location, the potential of crop rotation of cereals crop with pulses can be considered for increasing productivity.

During the session, few scientists present in hall also gave their suggestions and shared their the ideas on the topic of panel discussion

Dr. Ratan Tiwari, Principal Scientist, ICAR-IIWBR, emphasized that apart from higher production, profitability from agriculture should be looked in different systems. Since the farmers are having small holdings, hand-held machines for carrying out different farm operations should be developed and made available. Besides, gene X environment factors, non-weather parameters like rhizosphere component should also be considered for research.

Dr. I.S. Solanki (ADG, FFC) told that organized markets in Bihar and Jharkhand are the need of hour and Govt. role is required for procurement and pricing of cereal crops.

Dr. J.P.Tandon, Ex-Director, ICAR-IIWBR emphasized the use of chemicals to avoid lodging and heat should be incorporated in the package and practices of wheat. He also suggested that timely sowing of crop in NEPZ will lead more productivity.

Dr. Sanjay Kumar, Scientist ICAR-IARI told that crop intensification will play a major role in doubling the farm income. He also emphasized introduction in mustard between rice and wheat will be beneficial to farmers.

Dr. V.C. Dhyani, Scientist, Pantanagar told that problems related to productivity enhancement should be identified at local level so the package and practices should be devised accordingly.

Dr. Rajeev Kumar Scientist from RAU Pusa, told that NAREGA activities should be linked to agriculture and new effective means of proper seed dissemination should be devised.

Dr. Sewa Ram, Principal Scientist, ICAR-IIWBR emphasized that there should be proper linking of private industry with the wheat breeders so that variety suitable for industrial quality should be developed.

Dr. Sai Prasad, Principal Scientist, ICAR-IARI, Regional Research Station, Indore informed the house that seed village concept would increase the availability of quality seed in Eastern region. Value addition of developed durum varieties will strengthen farmer's economical condition.

In the end, Dr. K.V. Prabhu, Joint Director ICAR-IARI summarized the views of all the presenters. In his concluding remarks he informed the house that benefits of organic agriculture in terms of monetary terms should be relooked and technology driven inputs may help the farmers in getting higher profits. Eastern sector should be divided into grids and factors for each grid should be identified separately for designing the proper policy for the region. In co-operation with railways, the seed dissemination system for the Eastern region should be strengthened.

The session concluded with final comments from the Chairman, who thanked all the presenters and the delegates for actively participating in the fruitful discussion.

SESSION – VIII
PLENARY SESSION

August 28, 2017	Chairman	:	Dr.HS Gupta
10.00 AM - 2.00 PM	Co-Chairman:		Dr. IS Solanki & Dr. GP Singh
	Rapporteurs :		Drs. R Chatrath & Vishnu Kumar

Dr. HS Gupta, Chairman of the session welcomed to Co-Chairman, Rapporteurs, Speakers and all the delegates participating in the session. The chairman also welcomed industry representatives and wished that the deliberations and recommendations will certainly help in enhancing wheat and barley production and as well as nutritional security in the country. Presentation of significant recommendations and highlights of work plan for 2017-18 were made by the respective Principal Investigators. The discipline wise details of which are as follows:

Crop Improvement: Dr. Vinod Tiwari

After detailed discussion the following recommendations for crop improvement during the workshop were made as-

1. The recommendations of the Brainstorming meeting held on 27th January, 2017 regarding trial conduction and promotion criteria were adopted for implementation.
2. The house agreed that coding of entries will be re-introduced in AVTs and Special-trials.
3. The constitution of all trials in NEPZ and PZ will be done at ICAR-IWBR, Karnal.
4. The conduct of coordinated wheat varietal evaluation trials in SHZ will be discontinued from 2017-18. The development of *dicoccum* lines will be continued at Wellington centre for evaluation in Special-Dicoccum trial.
5. The SPL-Triticale trial will be discontinued from 2017-18 taking into account its non-acceptance by farmers for cultivation.
6. The YCSN would not be constituted from this crop season.
7. With a view to bring in more precision in the conduct of wheat coordinated trial, necessary modifications were made taking into account the suitability of voluntary centres to the trial requirements.
8. The layout plans of AVTs with more entries would be modified by splitting the replications into tiers so as to minimize the effect of soil heterogeneity.

9. The IPPSN and PPSN pathological nurseries will also be coded from 2017-18.
10. The contribution of breeding lines from different centres for IPPSN will be routed through Crop Improvement, ICAR-IIWBR, Karnal.
11. One breeder would be included in the team undertaking the scoring of disease response in PPSN and IPPSN.
12. The centres were advised to strengthen their breeding programmes by enhanced hybridization and making best use of nurseries for incorporation of variability and make judicious use of facilities at DalangMaidan and Wellington.
13. The centres were asked to submit the utilization report of international nurseries and trials along with hard copies of data booklets.
14. The training programme on data recording and conduction of trials for the benefit of new scientists and technical staff at funded and voluntary centres would be conducted at ICAR-IIWBR, Karnal and IARI, Indore during Feb-March, 2018.

After presentation it was informed by Dr. GP Singh, Director, ICAR-IIWBR that the coding of pathological nurseries will enhance transparency. Dr. Rajvir Yadav, IARI suggested to incorporate some identifier lines after 20 lines in pathological nurseries to improve efficiency in case of lodging and the suggestion was welcomed by the house. In response to discontinuation of trials in SHZ, it was discussed that the SVRC release proposals should not suffer in want of one year coordinated data. However, Dr. KV Prabhu appraised the house that state varietal trials are sufficient for SVRC release in case of discontinuation of coordinated trials. Dr. Lakshmi Kant raised the issue of coding of NHZ trials at Almora and also for testing of AVT-RF trials under irrigated conditions simultaneously. After in depth discussion *it was decided to code NHZ trials at ICAR-VPKAS, Almora and testing of AVT-RF under irrigated conditions was also approved with one year evaluation under agronomic trials.* Dr. GP Singh discussed the trial and nurseries conduction at different centres and urged to all the co-operators for trial conduction with higher efficiency and transparency.

Dr. Ravi P Singh from CIMMYT suggested to include private partners and their locations for trial conduction and in response Dr. Dinesh Kumar, PS, FFC informed that this is a policy decision and suitable action will be conveyed after discussion at ICAR. Dr. KV Prabhu and *Dr. GP Singh also informed for two year agronomic evaluation of the advance strains under coordinated trials.* For promotion criteria of the entries in breeding trials it was decided to consider best zonal check for comparison. Dr. GP Singh informed that two committees for nucleus seed sharing and to decide quality parameters will be constituted at ICAR-IIWBR.

Scientists from NABI and BAARC discussed for IPPSN quota and the Director, IIWBR assured them for active participation and suggested to test their lines in station trials in collaboration with PAU/IARI/IIWBR for further confirmation of yield, quality and diseases. During deliberations it was opined to further substantiate pre-breeding activities and Dr. GP Singh informed that the strengthening of the centres of Karnal, Palampur and Ludhiana has been already proposed in the EFC. Dr. Ravi P Singh suggested adopting rapid breeding by using SSD methods in place of DH to cut short the financial expenditures.

Resource Management- Dr RK Sharma

The Resource Management and Social Sciences groups critically reviewed the results of the coordinated and special trials and arrived at the following recommendations:

The trials on varietal evaluation will be formulated after receiving the entries from the breeding group.

The group decided to conclude the following special trials and come out with recommendations.

- Efficient nutrient management in maize-wheat system (SPL-3)
- Validation of leaf colour chart (LCC) for different wheat varieties. (SPL-4)
- Evaluation of wheat genotypes in relation to conservation agricultural practices (SPL-7)
- Evaluation of mulch and irrigation effect on wheat under various crop establishment techniques (SPL-9)
- Effect of organic manures and mulching on wheat productivity. (SPL-10)
- Comparative performance of line versus dibbling in wheat. (SPL-11)

The following three special trials will be continued during the 2017-18 crop season;

SPL-1: Evaluation of herbicides of control of broadleaved weeds in wheat.

SPL-2: Management of lodging and yield maximization in wheat.

SPL-5: Efficient water management in wheat using micro-irrigation.

SPL-6: Evaluation of Pusa Hydrogel and herbal hydrogel (Gum Tragacanth*e*.GoondKatarira) on *in situ* moisture conservation under different irrigation levels in wheat.

SPL-12 Validation of Nutrient Expert in wheat.

To address the zone-wise issues, the group formulated five new special coordinated trials-

SPL-3: Agronomic Management for enhancing Zn in grain

SPL-4: Rhizosphere management for improving nutrient use efficiency in wheat

SPL-7: Yield maximization in *dicoccum* wheat through various planting options and seed rates

SPL-8: Precision nitrogen management in irrigated wheat using NDVI sensor

SPL-9: Fine tuning the sowing time in various zones under changing climate

Work Plan of Social science

- During the Rabi season 2017-18, the wheat and barley front line demonstrations (FLDs) will be conducted and coordinated as per the approval of the Ministry of Agriculture and Farmers Welfare, GOI, New Delhi.

The Resource Management and Social Sciences groups after through deliberations arrived at the following recommendations;

Technical Recommendations

1. The experiment to validate the LCC in wheat was conducted at nine locations (3 in NHZ and 6 in NWPZ) for two years. Application of 50kg N/ha along with recommended P and K at sowing and 50kg N/ha before first irrigation followed by LCC (LCC \geq 4) based 45 kg N/ha application just before 2nd irrigation was found optimum with yield gain of 1.4 to 3.7% with 3.3% saving of nitrogen.
2. The experiment on comparative performance of conventional line sowing versus dibbling was conducted for two years at 8 location in CZ and 3 locations in PZ. The results showed that dibbling at 15x15 and / or 20x15cm has no significant yield advantage over drill sowing at 20 cm spacing using seed rate of 100 kg/ha.
3. The experiment on straw mulch, tillage and irrigation levels was conducted in NEPZ at two locations (Coochbehar and Shillongani) for two years. The rice crop residue mulch @ 4 t/ha under limited irrigation increased productivity by about 20% as compared to no mulch.
4. An experiment with six latest wheat varieties was conducted at four locations (Hisar, Karnal, Ludhiana and Pantnagar) for two years under conventional and conservation agricultural practices. The yield obtained under CA and CT was similar for all the varieties and considering the savings on tillage costs (Rs 3000-3500/ha) the CA must be popularized.

5. The trial to mitigate the climate change was conducted at four locations in NWPZ (Hisar, Karnal, Ludhiana and Pantnagar) three locations in NEPZ (Kalyani, Ranchi and Varanasi) and one location in CZ (Udaipur) for two years. The integration of FYM @ 10t/ha and crop residue mulch @ 4 t/ha with recommended fertilizers may be used for higher wheat productivity in NWPZ, NEPZ and CZ.

Administrative Recommendations

1. The contingency for conducting special system based trials need to be revised to Rs 30,000/- from Rs 20,000/-

After presentation Dr. R K Sharma mentioned that there was not any yield advantage in dibbling experiment over line sowing and he also informed that the conservation agriculture practices should be more popularized among farmers. During discussions it was suggested to prepone sowing dates in NEPZ keeping in view of rice cultivation in Kharif and it was discussed that a trial set will be conducted under TS, LS and VLS to see varietal response under sowing dates. Dr AK Joshi and Dr.Rajvir Yadav shared experience of early sowing in NEPZ and informed that the sowing done in Oct. last week was effective with yield advantages and such kind of genetic materials are available. It was decided to relook sowing dates in NEPZ as 01-07 Nov. (no paddy in Kharif) and 07-14 Nov. when paddy as Kharif crop. Dr. HS Gupta seriously raised the issue of paddy straw burning in NWPZ and discussed to popularize conservation agriculture experiments at farmers' field to educate them to stop straw burning. Dr. AK Joshi also informed regarding the combined harvester with straw management mechanism is available in market. Dr. HS Gupta said to convene DAC&FW to allocate more FLDs under zero tillage and seeding by Happy Seeder. Dr. HS Gupta discussed to increase number of wheat and barley FLDs and it was decided to allocate 1500 FLDs of one acre each in place of 600 FLDs of one ha.

Crop Protection: Dr. DP Singh

The Crop Protection season was reviewed to make it more effective, responsive to the needs of farmers and other stakeholders as well as to minimize losses in yield and quality under changing climate. Precision Phenotyping against biotic stresses will be further strengthened. Strategies have been chalked out to tackle yellow rust and wheat blast threat as well as using IPM for susceptible varieties especially in situation where one or two varieties cover high acreages in Northern Plains.

The recommendations were as followed:

1. A strict vigil will be kept on stripe rust in NWPZ and in NHZ, leaf and stem rusts in PZ and CZ, wheat blast, leaf rust and leaf blight in NEPZ. Teams have been constituted for

monitoring of rusts in different areas during crop seasons as well as in off season. Vigil will also be kept on all other disease and insect pests also. The use of mobile phone, digital photos and internet in crop health monitoring will be done for fast communication and diagnosis of disease, insect pests and nematodes. Post-harvest survey will be carried out for knowing Karnal bunt free areas and black point status for facilitating wheat export.

2. The e-crop health newsletter issues will be issued on monthly basis from Nov. 2017 to March 2018, distributed and put on web page of institute. Advisories will be issued on yellow rust.
3. Strategy planning meetings to keep wheat crop healthy and contain losses due to disease and insect pests will be organized with DAC & FW, SAUs, and state agriculture departments.
4. Wheat blast monitoring nurseries will be planted at five locations in Murshidabad, Nadia and Malda district in West Bengal and in Assam. The Wheat Disease Monitoring Nursery (WDMN) will be reconstituted keeping in view of presence of wheat blast in Bangladesh.
5. The yellow rust susceptible varieties should be discouraged in NHZ and NWPZ. The susceptible varieties should be sprayed with propiconazole @ 0.1% at the initiation of rust symptoms in districts close to foot hills in Punjab and Jammu and Yamunanagar in Haryana.
6. For management of foliar aphids, foliar application of bio-agents like *Beauveria bassiana* @ 5 g/litre or *Metarhiziumanisopliae* @ 3 g/litre at ETL of 5 aphids/shootie recommended. Likewise, for shoot fly management, soil application of Phorate 10G @10 Kg/ha is recommended. A new chemical Spiromesifen (240SC) @ 1ml /litre has been found very effective against brown wheat mite.
7. There will be two sets of PPSN. One for stripe rust and one for leaf rust in North. Similarly, there will be separate set for leaf and stem rusts in South. The creation of disease epiphytotics will be strengthened in IPPSN and PPSN. The PPSN data will be recorded by the teams of Plant Pathologists and Breeders. The quota of different breeding centres in IPPSN will be reviewed by a team of breeders and plant pathologists, based on past 5 years' performance of their entries and reallocation will be done. The total entries may be restricted to 1000 for improving the quality of data. The centres will be encouraged to develop arrangement to use facilities of Flowerdale Shimla, and Mahabaleshwar for evaluation of their pre-coordinated yield trial material. The NIVT entries of 1A, 1B and 3 will also be screened against leaf blight. Ghagrahat (Faizabad) is added new location for PPSN for leaf rust. Keeping in view of high losses due to leaf

blight in NEPZ, the maximum limit of leaf blight score of 78 with an average score of 56 will be fixed for promotion and identification of entries in yield trials and VIC for NEPZ w.e.f. 2018-19. NIVT entries will also be screened against foliar aphids at Ludhiana centre.

8. A set of IPPSN and PPSN entries including popular released varieties will be planted at Murshidabad in West Bengal for Evaluation against leaf and spike disease under natural conditions. A set of 100 wheat varieties and AVT entries will be screened against wheat blast in Bolivia, Bangladesh and USA.
9. The entries of AVT 1st year belonging to NHZ, NWPZ and NEPZ will be screened against loose smut at four hot spot locations. The AVT entries will be screened against head scab at Gurdaspur, Dhaulakuan and New Delhi (Under poly house conditions).
10. The seed multiplication of entries found resistant against insect pests at multi locations will be multiplied at Karnal and these will be retested for multiple pests in future.
11. A total of 122 numbers of genotypes having good agronomic characters were confirmed for their resistant to multiple rusts and other disease. Out of these 50 genotypes of bread, durum, dicocccum wheat and Triticale will be contributed along with all passport data on resistance in National Genetic Stock Nursery (NGSN), 2017-18 for their utilization in breeding for disease resistance at about 30 wheat breeding centres in India.
12. New chemicals for stripe rust, KB, leaf blight and spike disease, foliar aphids and termites will be tested at multi locations.
13. IPM modules will be developed at different centres for proper management of insect pests and disease and insects.
14. A skill up gradation course for identification of disease and insect, creation of disease epiphytotics, uniform recording and their management will be organized jointly at ICAR-IWBR, Karnal and Shimla for scientist from co-operating centres. The education and training of farmers will be strengthened of identification and management of disease and insect pests using diagnostic cards, use of mobile phones and personal visits and by analysing their disease and insect pests infected samples free of cost. Proper advice on crop health management will be given to farmers at ICAR-IWBR and cooperating centres.

During discussions after presentations Director, ICAR-IWBR deliberated that the no. of 1000 lines will not be sufficient in IPPSN and at least these should be fix up to 1300 by working experiences. He also informed to use more digitization and electronic tools to keep pace with changing time to share biotic stress evaluation and management. Dr. GP Singh again

stressed that the breeders must accompanied with plant pathologist during disease data recording of IPPSN and PPSN. Dr. HS Gupta suggested that the lines identified with multiple disease resistance should also be tested for quality parameters to identify better parents for crossing programmes.

Quality and Basic Sciences: Dr Sewa Ram

Dr. Sewa Ram informed that the quality group decided to continue recording data for grain appearance score, test weight, protein content and sedimentation value on all the entries of the three species, namely *T. aestivum*, *T. durum* and *T. dicoccum* as well as *triticales*. Durum will also be analysed for the incidence of yellow berry and yellow pigment in addition to the earlier mentioned traits. Yellow pigment will also be recorded on *dicoccum*. The recommendations were as here under:

1. Recently there is increased demand for product specific varieties and therefore, breeders should take quality traits in to consideration while making crosses and selecting desirable segregants in the breeding programme so that the requirements of different products are met in the country especially in a situation of climate change. (Action: concerned breeders and quality scientists).
2. Concerned efforts should continue to develop linkage with wheat based industries for the benefit of producers, industry and the consumers. (Action: Quality scientists).
3. Concerted effort should be made by breeders for improving yellow pigment content in durum wheat to match with international standard (Durum breeders).
4. A short term training programme can be conducted at ICAR-IIWBR, Karnal to evaluate quality traits for uniform results across the centres (PI, Quality).
5. The Quality Component Screening Nursery (QCSN) would now be conducted in crop improvement programme with suitable modifications and the analysis would be carried out in quality programme at ICAR-IIWBR, Karnal (PI, Crop Improvement).

Dr. HS Gupta exhorted to develop the varieties with higher iron and zinc and to further enrich the genetic material for bio-fortified wheat and barley. He again stressed that the lines being tested for multiple diseases should also be evaluated for quality traits. Dr. IS Solanki discussed to breed varieties with high quality standards to further strengthen wheat export from India and to use balance fertilizers and proper crop management to raise the quality. Dr.Sewa Ram informed that the yellow pigment in durum wheat needs to be enhanced from existing 6 ppm to 8 ppm. Dr. JP Tandan discussed that the wheat varieties should have high hectolitre weight and Dr.Sewa Ram informed that the existing varieties are having high test wt. of 78 and it also depends upon adoption of proper crop

production technologies. During discussions it was decided that the samples of wheat variety K1006 will be collected by ICAR-IIWBR from CSAUA&T, Kanpur and will be confirmed for high iron and zinc contents.

Barley Network: Dr. AS Kharub

Dr. AS Kharub presented the barley network recommendations and are as followed-

1. In case number of test entries in the AVT is less, to save the resources, group decided that the promoted entries will be evaluated in the respective IVT trial.
2. The late sown malt barley trials were discontinued due to the lower malting quality under late sown conditions.
3. In case of dual purpose barley trials it was decided that the entry should be significantly superior in either of one (grain yield or forage yield), should also have *vice versa* numerical advantage for grain/forage over the best check.
4. Work should also be initiated on pre-breeding aspects in barley.
5. Correlation between seedling resistance test and adult plant resistance needs to be investigated.
6. The research emphasis should be given on foliar blight and aphid resistance.
7. Breeder seed indents should be honoured by the respective centres and should be reported timely.
8. The higher yield being reported for a particular entry at a particular location needs to be corroborated with the supporting data.
9. Resource management/agronomy experiments needs to be formulated keeping in view the practical applicability at farmer's field and economics of the technology.
10. In case of husk less barley, micronutrient content should also be investigated.
11. ICARDA offered to give some special nurseries on leaf blight, rust and salinity at the centres, and it was discussed that these are mapping populations and should be routed through ICAR-IIWBR/ICAR-NBPGR in project mode or with financial provisions from ICARDA.

Technical Recommendation:

1. The experiment conducted on row spacing in feed barley revealed that 20 cm row spacing is found to be optimum for higher yield under rainfed conditions of NHZ but in other zones (NWPZ, NEPZ, CZ) 22.5cm row spacing in feed barley is found to be optimum.
2. Seed treatment with bio-fertilizer (Azatobactor+PSB) should be done for added advantage in yield in Northern plains (NWPZ+NEPZ).

Dr. AS Kharub informed the house that new experiments on the management of broadleaved weeds have been formulated and experiments will also be conducted for use of hydrogel to

keeping in mind of climate change. Dr. GP Singh discussed the conduct of ICARDA special nurseries at Varanasi, Kanpur and Durgapura and said that any barley international nursery should be routed through ICAR-IWBR in future.

After presentations from different Principal Investigators, Dr. GP Singh announced the VIC proceedings held on Aug. 26, 2017 under the Chair of Dr. AK Singh (DDG, Hort. & Crop Sci.). He informed that in all there were 06 wheat and 05 barley proposals and all the proposals were cleared except, RD2917 proposed for irrigated timely sown malt conditions in barley. He congratulated all the scientists from all the centres for this success.

During the plenary session 04 publications namely, 56th wheat and barley workshop souvenir, Indian wheat varieties at a glance Vol. II, barley varieties and genetic stocks at a glance and Hindi annual report (2016-17) were released. This was followed by launching of ICAR-IWBR official website by the dignitaries.

On this occasion the superannuating wheat and barley scientists namely, Dr. SS Dhanda, Dr. Honrao, Dr. RK Gupta, Dr. Vinod Tiwari, Dr. IS Solanki etc. were felicitated by the Chairman, Co-Chairman and Dr. GP Singh with many heartily best wishes.

After honouring superannuating scientists the proposal of venue to host next wheat and barley workshop during 2018 was invited and two proposals from Pune and Palampur were received and Dr. GP Singh informed to finalize the venue after discussions.

In his concluding remarks, Dr. GP Singh, Director, ICAR-IWBR congratulated all wheat and barley workers' to achieve an ever high production with strong vigil on yellow rust and wheat blast. He informed the house that due to all hard work of ICAR-IWBR and cooperating centres IWBR bagged ICAR best institute award. He stressed upon to work transparently for trial conduction and data recording to all the cooperating centres. Dr. GP Singh exhorted all the centres to remove cadre strength anomalies and also informed regarding limited financial resources. He appreciated all the efforts made by BHU to organize 56th wheat and barley workshop at Varanasi. He thanked to all the dignitaries namely, Hon'ble Minister of Agriculture and Farmers Welfare, DG ICAR and Secretary DARE, DDG (Horti and CS), Hon'ble VC BHU, Hon'ble VC NDUAT, Director, IAS, BHU, Director IIVR, Director ATAARI, Kanpur, faculty members of BHU and organizing secretary of ICAR-IWBR and BHU for the successful conduction of 56th wheat and barley workshop. He also thanked to press and media.

Dr. IS Solanki, Co-Chairman commended all the work done by wheat and barley workers' and congratulated the teams whose varieties were identified during 56th wheat and barley workers' meet. Dr. IS Solanki urged that the varieties with higher yield, disease resistance and quality traits are required for food and nutritional security. He stressed upon to breed quality wheat to enhance export of the wheat. He said that in addition to grain yield the varieties should also have better NUE, WUE and climate resilience. He further emphasized that some need based

agronomic experiments other than sowing dates, fertilizers and irrigation should be formulated. He urged to all the wheat and barley workers to make wheat and barley cultivation more profitable to double farmers' income by 2022. He also substantiated the remarks of Director IIWBR to remove cadre anomalies at different cooperating centres. He thanked Director, IIWBR, DDG (Hort. & CS), Chairman, rapporteurs, different delegates, organizers and press and media.

Dr. HS Gupta, Chairman of the session in his concluding remarks addressed several issues for wheat and barley improvement and nutritional security. He emphasized that now we have increased wheat production by 12 folds than 1950's, where we were importing wheat from other countries. Though we have achieved self-sufficiency and we should redesign our breeding programmes to eradicate malnutrition. He showed his concern of production limiting factors viz., shrinking natural resources, water scarcity, soil health, climate change and changed disease and pest dynamics. He urged to all wheat and barley scientific fraternity to develop sustainable technologies, input responsive varieties with high iron and zinc and other quality parameters with buffering capacity to climate change. He stressed upon to reduce post-harvest losses and to develop better storage facilities at on farm and to develop some more profitable means by use of secondary agriculture. He indicated that the use of value addition in raw grains will be certainly helpful for doubling farmers' income by 2022. Dr. HS Gupta exhorted to involvement of state functionaries to transfer technologies at farmers' field and more and more emphasis from lab to land and translational research. He was of opinion to increase wheat and barley FLDs under conservation agriculture, residue retention etc. to check the practice of straw burning. Dr. HS Gupta once again appreciated the efforts made by wheat and barley researchers and urged that we still have to work hard to produce more. Finally, he thanked to all the ICAR dignitaries, Director, IIWBR, ADG (FFC), workshop organizers, rapporteurs, delegates, press and media etc.

The session ended with a vote of thanks by Dr Ravish Chatrath, Organizing Secretary, 56th All India Wheat and Barley Research Workers' Meet.

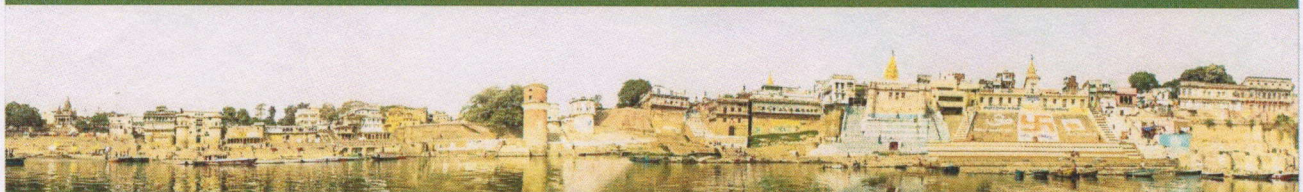
List of final year entries & check varieties, 2017-18

Trial	Final year entries	Checks
North Western Plains Zone		
AVT-IR-TS-TAS	HD 3226	HD 2967, WH 1105, HD 3086, DBW 88
AVT-IR-LS-TAS	PBW 752	HD 3059, DBW 90, WH 1021, WH 1124, DBW 173 (I)
AVT-RI-TS-TAS	HD 3237, HI 1620	WH1080, PBW 644, HD 3043, WH 1142
North Eastern Plains Zone		
AVT-IR-TS-TAS	DBW 187	HD 2733, K 0307, DBW 39, K 1006, HD 2967
NWPZ&NEPZ		
SPL-VLS-TAS	PBW 757	WR 544, DBW 14, DBW 71



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