

58वीं अखिल भारतीय समन्वित गेहूँ एवं जौ
अनुसंधान शोधकर्ता बैठक



58th All India Wheat and Barley Research Workers Meet

अखिल भारतीय समन्वित
गेहूँ एवं जौ अनुसंधान परियोजना

**AICRP on
Wheat and Barley**



कार्यवाही, संस्तुति एवं कार्ययोजना
PROCEEDINGS, RECOMMENDATIONS AND WORK PLAN

भा.कृ.अनु.प.-भारतीय गेहूँ एवं जौ अनुसंधान संस्थान, करनाल
ICAR-Indian Institute of Wheat and Barley Research, Karnal



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PROCEEDINGS
(Research Review, Recommendations & Plan of Work 2019-20)

58th All India Wheat & Barley Research Workers' Meet, Indore
(August 24-26, 2019)

Organised By
ICAR-IIWBR, Karnal & IARI-Regional Station, Indore

Issued by
Dr. Gyanendra Pratap Singh
Director



ICAR- Indian Institute of Wheat & Barley Research
Karnal-132001, India



Correct Citation:

ICAR-IIWBR. 2019. Proceedings of the 58th All India Wheat and Barley Research Workers Meet held at Indore during August 24-26, 2019. Ed(s): SK Singh and K Gopalareddy. All India Coordinated Research Project on Wheat and Barley, ICAR- Indian Institute of Wheat & Barley Research, Karnal-132001, Haryana. Pages 69.

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Issued by: The Director,
ICAR-Indian Institute of Wheat and Barley Research,
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Foreword

The 58th All India Wheat and Barley Research Workers' Meet has been organized at Indore jointly by ICAR-Indian Agricultural Research Institute, Regional Station, Indore and the ICAR-Indian Institute of Wheat and Barley Research, Karnal during August 24-26, 2019.

It is a matter of great pride that the country has harvested record wheat production of over 102.19 million tons during 2018-19 due to the concerted efforts of our farmers, researchers, extension workers and policy makers. Although the ever-highest wheat productivity of 3.4 t/ha is self-satisfying looking into the risks and challenges in wheat production, I am confident that the wheat & barley research fraternity will continue their efforts in increasing wheat productivity.

The All India Coordinated Research Project (AICRP) on Wheat and Barley is one of the flagship programs under the aegis of Indian Council of Agricultural Research (ICAR) which has contributed significantly from Green Revolution era to present in strengthening national as well as global food security and I am confident that it will promote the agenda of doubling the farmer's income by 2022. During 2018-19, Indian wheat programme has been awarded with BGRI Gene Stewardship Award and Ch Devi Lal Outstanding AICRP Award that explain the success story of national wheat and barley research programme.

The 58th All India Wheat & Barley Research Workers Meet has been successful in reviewing the results of previous year and making workplan for the next crop season 2019-20. This meet has provided an effective platform for meaningful deliberations on further increasing the production and productivity of wheat and barley in the country to ensure food and nutritional security for one and all in the society. The brainstorming on speed breeding during this meet has provided insight for newer technologies in the direction of faster crop improvement strategies. The identification of 17 new wheat varieties and 2 barley varieties is another achievement in providing diversified varietal options to the farmers in different agro-ecological conditions.

I am fully confident that the recommendations emerging from this meeting will contribute to further strengthen the national wheat & barley improvement programme that will make India a front runner in wheat & barley production and empower our agricultural economy.

I wish a very successful crop year 2019-20.

Dated: October 19, 2019
Place: Karnal



(Gyanendra Pratap Singh)

Acknowledgements

The 58th All India Wheat and Barley Research Workers' Meet was jointly organized by the ICAR-Indian Institute of Wheat and Barley Research, Karnal and ICAR-IARI Regional Station, Indore Madhya Pradesh during 24-26 August, 2019. The meet was inaugurated by Dr. Trilochan Mohapatra, Secretary, DARE & Director General, ICAR, MoA&FW, Government of India. Dr. AK Singh, DDG (CS), ICAR and Dr Ronnie Coffman, Vice Chair, BGRI, USA were the Guests of honour while Sh Ashwani Kumar, Joint Secretary (Seed), MoA&FW, Govt of India was the Special guest. The meeting reviewed the results of previous year experiments and based on the deliberations, the programme for ensuing crop season 2019-20 was finalized and emerging issues in wheat production were discussed. Apart from this, a special session Brainstorming on Speed Breeding was organized jointly by the ISGPB-New Delhi, ICAR-IIWBR-Karnal and SAWBAR-Karnal during the workshop in which Dr Lee Hickey, University of Queensland, Australia briefed the speed breeding. On this occasion, Dr Trilochan Mohapatra also delivered VS Mathur Memorial Lecture and conferred with VS Mathur Memorial Award, 2019.

On behalf of the wheat and barley fraternity, we express our sincere gratitude to Hon'ble Sh Narendra Singh Tomar ji, Union Minister for Agriculture & Farmers Welfare, Rural development and Panchayati Raj, Govt of India for his kind consent for inauguration of the workshop. We express our deep sense of gratitude to Dr Trilochan Mohapatra, Secretary DARE and DG, ICAR for his guidance and continuous support that shows his affection to the wheat and barley programme. We also express gratitude to Dr AK Singh, DDG (CS), ICAR for guidance and encouragements and place on record our sincere thanks to Dr. AK Singh, DDG (Extension) and Director, ICAR-IARI, New Delhi for his dedicated support in organizing this workshop. Dr AK Singh VC, BAU, Sabour and Dr SK Rao, VC, RVRSUA&T, Gwalior are also being acknowledged for joining the discussions and sharing experiences. We are grateful for constructive deliberations and support from Dr Dinesh Kumar, ADG (FFC), ICAR and Dr DK Yadav, ADG (Seed), ICAR, New Delhi.

We would also take this opportunity to thank Dr SV Saiprasad, Head, IARI-RS, Indore and all the members of the organizing committee for all the hard work they have done in making this programme a grand success. The support from Dr Sanjay Singh, Secretary, ISGPB, New Delhi is also acknowledged for organizing Brainstorming on Speed Breeding. We gratefully acknowledge the contributions of all the Principal Investigators, Scientists and associated staff of the IIWBR for timely preparation of Annual Progress reports and this proceeding. Thanks to the Chairmen, Co-chairmen and Rapporteurs of various technical sessions for smooth conduct and recording of proceedings. We appreciate the efforts made by scientific, technical and administrative staff for coming out with the summary proceedings during plenary session.

We wish all the best for the ensuing season.

Editors

Session I- Presentation of Director's Report

August 24, 2019

Chairman : **Dr. AK Singh**, Vice Chancellor, BAU, Sabour

Co-Chairman : **Dr. SK Rao**, Vice Chancellor, RVRSKVV, Gwalior

Dr AK Singh, Vice Chancellor, Bihar Agriculture University, Sabour, expressed pleasure in welcoming delegates of the "58th All India Wheat & Barley Research Workers Meet". He invited Dr GP Singh, Director, ICAR-IIWBR, Karnal to make presentation on the present scenario and the achievements made during the year 2018-19. Dr 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 102.19MT of wheat during the year 2018-19. He also expressed his gratitude to all the wheat and barley workers of AICRP for being awarded Chaudhary Devi Lal Outstanding All India Coordinated Research Project Award 2018. He informed the house that six wheat varieties namely PBW 752, PBW 757, HD 3226 (Pusa Yashasvi), HD 3237 (Pusa wheat 3237), HI 1620 (Pusa wheat 1620) and DBW 187 (Karan Vandana) were notified by CVRC. He further informed that during last year 11 varieties namely, AAIW-10 (SHIATS-W 10), AAIW-9 (SHIATS-W 9), UP 2844, UP 2855, UP 2865, VL Gehun 967, VL Gehun 2014, VL Gehun 3004, JAUW 584, Chhattisgarh Amber Wheat (CG 1018) and Unnat PBW 550 were notified by SVRC. During the year 2018-19, a total of 21 novel genetic stocks of wheat were registered by the Plant Germplasm Registration Committee for traits like rust, loose smut, multiple diseases and pest, spot blotch, heat tolerance, high sedimentation value, soft grain, high protein content and drought tolerance. He informed delegates that breeder seed production during 2018-19 was 28361.7q as against the indent of 20321.8 q. He expressed satisfaction from the outcome of high yield potential trials as the site mean ranged from 65.7 q/ha (Gurdaspur) to 89.0q/ha (Karnal). Dr Singh thanked the Indian team of molecular biology; who have come up with model web-server for crop variety identification using high throughput SNP genotyping platform. He also appreciated the work being done on CRISPR-based genome editing in wheat at ICAR-IIWBR, Karnal. He listed the promising genotypes identified for different traits under abiotic stress conditions, and also water and nutrient use efficient genotypes. Dr 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 threat related to blast occurrence in wheat and continuous watch will be there on the Indo-Bangladesh border to check its spread. Dr Singh was highly satisfied with the progress in wheat quality programme. 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. Two barley varieties were released by CVRC and five new genetic stocks were registered during 2018-19. While concluding the session Chairman and Co-chairman complimented Dr GP Singh for leading wheat and barley programme successfully. The session ended with vote of thanks to the chair.

Session II- Principal Investigators' Reports-Research Review Meeting

August 24, 2019

Chairman : **Sh. Ashwani Kumar**, JS (Seed)
Co-Chairman : **Dr. Dinesh Kumar**, ADG (FFC)
: **Dr. DK Yadav**, ADG (Seed)
Rapporteurs : **Drs. Gopalareddy K and GS Mavi**

Chairman Sh. Ashwani Kumar welcomed the delegates to the first session and invited Dr. Gyanendra Singh, PI, Crop Improvement for his presentation. He presented the list of released varieties during 2018-19 and genetic stocks registered for the various traits. Centre wise summary report about allocation, conduction and reporting of trials along with the reasons for trial having not been reported was presented. He emphasised that although the trial conduction in NEPZ and PZ was 100%, the trial data reporting was highest in NHZ and NWPZ. He expressed concern over gaps in data reporting and suggested to improve. He also explained the gathering about the precautionary measures being taken to screen the advanced breeding materials against wheat blast in Bangladesh. The research work on thrust areas like nitrogen use efficiency and breeding for quality improvement is underway and as a result identified nitrogen use efficient wheat genotypes and DDW 47 (a very high yellow pigment content and pasta acceptability). Emphasis should be given for machine sowing of trials in all the centres. It is suggested that concerned breeder needs to send pure seed of check varieties for including in trials. He presented the status report of national and international germplasm evaluation. He informed the house that IIWBR arranged a field day in the month of March at Karnal and breeders from various parts of the country were participated and selected the useful material. As far as breeder's seed production is concerned, the PI informed the house that the production was more than the target. This year's breeder seed indent is less than last year's indent. While listing the top varieties based on the indent received and production of breeder's seed during 2018-19, HD 2967 and HD 3086 are the top varieties in the breeder seed indent chart. State wise Madhya Pradesh ranks first for breeder seed indent for various released varieties. Dr Gyanendra Singh presented the analysis of variation in the sowing dates of different centres and draw attention that many centres take up the sowing one or two days before the end of the scheduled sowing window. He suggested the gathering not to delay sowing till last days of the sowing window, as too much variation in sowing dates among the centres is not advisable. Now onwards the trait specific MABB entries with pedigree to support marker will be included in the regular breeding trials rather than separate MABB trial. PI also presented the work carried out at NBPGR under CRP on agro-biodiversity platform component-II. The works of NBPGR and NIPB under NICRA project also presented. Lastly the work components of IIWBR to be undertaken in recently approved ICAR-BMGF project was presented.

After the PI Crop Improvement presentation the chairman Sh. Ashwani Kumar welcomed the gathering for discussion. He expressed the concern about the state governments which show lack of interest in seed production of central released varieties. He emphasised the importance of KVKs in popularisation of CVRC released varieties and suggested to distribute the mini kits to around 100 KVKs in each district. He also draws attention that timely sowing of the variety is very critical. He cautioned that non performing centres will not be encouraged in the future. Co-chairman Dr. Dinesh Kumar suggested that the centres should activate the PFMS system for timely disbursal of money. He also emphasised the importance of varieties in value chain. All the centres must generate breeding material and contributed to the national varietal evaluation system. He asked the scientists to give more focus on the development of heat tolerance, disease resistance

and nutrient rich wheat varieties. He also expressed the concern for not coming with the varieties in recent past by the centres located in central zone except Indore centre. He acknowledges the contribution of wheat workers for achieving the unique feat of 100MT of wheat production. Co-chairman Dr. DK Yadava expressed serious concern about poor reporting of trials data. He also expressed concern about presence of large variation between centres as well as within the centre. Sowing of the trials at the end of sowing window is very serious issue and should be avoided. He also cautioned that the non performing centres may drop in the near future.

Dr. RK Sharma, PI, Resource Management presented the report and informed the house that a total of 62 trials were proposed, of which 58 were conducted during 2018-19. Four trials were rejected by the monitoring team and the overall trial conduction was 93.5%. The performance of test entries against check varieties were presented. He also presented various special coordinated trials on optimizing phosphorous usage, enhancing grain content in wheat, identifying optimum spacing and seed rate for dicocum, precision nitrogen management using NDVI sensor, quantifying yield losses due to delayed sowing, and validation of nutrient expert in wheat. Chairman Sh. Ashwani Kumar asked PI about the feasibility of using happy seeders in heavy soil and the PI informed that if the moisture in the residue is absent then there will not be any issue in heavy soils. Dr. Sanjay Kumar from IARI raised a query regarding the varieties of one zone are performing better in other zones and suggested that there is a need to re design the wheat growing regions of the country. Co-chairman Dr. DK Yadava mentioned that the reorganisation of the centres in all the crops is very important from time to time. He expressed the concern over the poor conduction of trials and cautioned that this will not be accepted in future. Residue burning is also an important issue and must educate farmers against the practice. Emphasised the importance of agronomic biofortification. Also suggested to start trials on conservation agriculture.

Dr. Sudheer Kumar, PI, Crop Protection presented the significant achievements of different trials and nurseries conducted under crop protection coordination programme. The major highlights were on rust and other wheat disease survey and surveillance, new pathotypes identified in different rusts, post harvest crop health monitoring specially in concern to Karnal bunt disease. Leaf rust and brown rust status in CZ and PZ zones, APR and SRT conducted, strategies for control of blast like disease in India, number of new chemicals identified for control of aphids. Chairman Sh. Ashwani Kumar enquired about the possibility of seed treatment in wheat for various diseases. PI informed the house that for karnal bunt seed treatment is not advised and foliar spray will serve the purpose. Co-chairman Dr DK Yadava informed the house that there is an excellent system exists in wheat for preliminary screening of the material in pathological nurseries. He expressed concern about the wheat holiday which was not followed properly. Dr. GP Singh Director IIWBR informed the gathering about quick deployment of resistant varieties is more viable solution than that of wheat holiday for disease like wheat blast. All KVKs in Bihar and West Bengal should be provided seeds of resistant varieties for faster breeding and spread. Dr. Bharadwaj presented the research highlights of the Shimla station.

Dr. Sewa Ram, PI, Wheat Quality presented the highlights of wheat quality work of coordination programme. He explained about promising genotypes identified for different wheat products, processing and nutritional quality. He informed about the steps taken to increase the bioavailability of the mineral elements and presented the results of phytase levels in advanced breeding lines and found some lines with very high levels. He emphasised the importance of high yellow pigment in durum wheat varieties and draw attention that IIWBR has developed a very high yellow pigment durum genotype DDW 47. He asked the centers working on durum wheat to improve the yellow pigment content as it is one of the most important quality parameter in durum wheat. He presented the results of various quality parameters of colored wheat and concluded that

there is no extra advantage of coloured wheat over regular amber grained wheat for quality parameters and therefore these should not be promoted. Co-chairman Dr Dinesh Kumar suggested to workout the reasons for large variation in quality attributes. He also suggested to prepare a documentary of quality attributes over time period. After critical observation of the Dr. Sewa Ram presentation regarding nutritional status of the coloured wheat, the house was agreed that the colored wheat is not nutritionally superior over the amber wheat and therefore should not be promoted. Farmers asked to provide the certificate for biofortified wheat varieties to get premium price in the market.

Dr. AS Kharub, PI, Barley Improvement presented production, productivity, quality in barley, new varieties and genetic stocks released, development of linkage with companies, germplasm activities, working on competing with international standards of malt barley, finding entries for host resistance. Co-chairman Dr. Dinesh Kumar asked about the suitability of France barley varieties for industries and PI told that those varieties are highly susceptible to diseases as well as low yield under Indian conditions. Co-chairman Dr. DK Yadava expressed the serious concern for reduction of barley area.

Dr. Satyavir Singh, PI, Social sciences presented on number of FLD's conducted and high yielding entries identified at different zones. In case of wheat FLDs the yield gain due to improved varieties over checks was highest in NEPZ followed by NHZ, PZ, CZ and NWPZ. The profit per hectare in FLDs was highest in Haryana followed by Punjab and Madhya Pradesh. Improved barley varieties demonstrated in FLDs gave around 25% more returns as compare to checks. Dignitaries on the dais appreciated the impact analysis of FLDs. While wrapping-up the session, Chairman Sh. Ashwani Kumar suggested to come up with seed treatment formulations for policy makers. Co-chairman Dr. Dinesh Kumar asked the PI social sciences to analyse how many farmers adopted the demonstrated technologies.

The session ended with thans to the chair, co-chair and rapporteurs.

Session III & IV - Research Planning Meetings and Finalization of Work Plan

August 24, 2019 **Chairman** : **Dr. SK Rao**, Vice Chancellor , RVRSKVV, Gwalior
 Co-Chairman : **Dr. Dinesh Kumar**, ADG (FFC)
 Rapporteurs : **Drs. CN Mishra & Pradeep Shekhawat**

The session to finalise work plan and recommendations was opened by Chairman of the session, Dr SK Rao and invited the principal investigators of different disciplines to present the work plan and recommendations for crop season, 2019-20. Dr Gyanendra Singh presented the work plan for crop improvement program and informed about constitution of trials and nurseries, physiological experiments and seed production programme. He presented the work plan of NIVTs, AVTs and Special trials. The details of different AVT trials in NHZ (AVT- TS-RF-TAS, AVT-TS-IR-TAS, AVT-RI-LS-TAS), NWPZ (AVT-IR-TS-TAS, AVT-IR-LS-TAS, AVT-RI-TS-TAS), NEPZ (AVT-IR-TS-TAS, CZ (AVT-IR-TS-TAD, AVT-IR-LS-TAD, AVT-RI-TS-TAD), PZ (AVT-IR-TS-TAD, AVT-IR-LS-TAS, AVT-RI-TS-TAD) were presented. Also presented constitution of NIVT-1A, NIVT 1B, NIVT 2, NIVT 3A, NIVT 3B, NIVT 4, NIVT 5A, NIVT 5B and IVT. Special trials includes SPL-DIC-IR-TS-PZ, SPL-HYPT, 2019-20 and CI-HYT (IR-ES), 2019-20. It was finalised to continue the proposed work plan.

Dr RK Sharma presented the work plan and recommendations for resource management and social sciences. He presented the constitution of agronomical experiments for final year test entries as well as special trials aimed at fine tuning the production technologies on nutrient, weed and water management. He also presented the work plan for conduct of FLDs across the country.

Dr Sudheer Kumar presented the workplan and recommendations for crop protection. The work plan for quality programme was presented by Dr Sewa Ram in which he also informed about identification of product specific promising genotypes. Dr AS Kharub presented the work plan and recommendations of barley network in which he informed about all the breeding, agronomical, pathological and quality related experimentations.

Work Plan- Crop Improvement

National Initial Varietal Trial

NIVT-1A-IR-TS-TAS, 2019-20

Conducting centres

Zone	No.	Centres
NWPZ	10	Delhi, Jammu, Ludhiana, Gurdaspur, Hisar, Karnal, Bulandshahr, Pantnagar, Durgapura, Modipuram
NEPZ	11	Kanpur, Faizabad, Varanasi, Sabour, IARI-Pusa, RPCAU-Pusa, Ranchi, Kalyani, Coochbehar, Manikchak, Shillongani
Total	21	

Details of trial entries

SN	Contributing Centres	No. of Entries	Name of entries
1.	Delhi	6	HD3348, HD3349, HD3350, HD3351, HD3352, HD3353
2.	IWBR, Karnal	5	DBW306, DBW307, DBW308, DBW309, DBW334
3.	Durgapura	3	RAJ4546, RAJ4547, RAJ4548
4.	Faizabad	1	NW7079
5.	Hisar	4	WH1271, WH1272, WH1273, WH1284
6.	Kanpur	1	K1901
7.	Ludhiana	5	PBW826, PBW827, PBW828, PBW829, PBW841
8.	Pantnagar	4	UP3051, UP3052, UP3053, UP3054
9.	Varanasi	1	HUW839
10.	CSSRI, Karnal	1	KRL1810
11.	SHUATS, Prayagraj	1	AAI-W29
	Checks	4	DBW 187, HD3086, HD2967, K1006
Total entries		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 requirement	: 7.0 kg per entry

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

This trial data will be recorded using digital devices as per ICAR-BMGF collaborative project.

National Initial Varietal Trial

NIVT-1B-IR-TS-TAS, 2019-20

Conducting centres

Zone	No.	Centres
NWPZ	10	Delhi, Jammu, Ludhiana, Gurdaspur, Hisar, Karnal, Bulandshahr, Pantnagar, Durgapura, Modipuram
NEPZ	11	Kanpur, Faizabad, Varanasi, Sabour, IARI-Pusa, RPCAU-Pusa, Ranchi, Kalyani, Coochbehar, Manikchak, Shillongani
Total	21	

Details of trial entries

SN	Contributing centres	No. of Entries	Name of entries
1.	Delhi	4	HD3354, HD3355, HD3356, HD3357
2.	IIWBR, Karnal	4	DBW310, DBW311, DBW312, DBW313
3.	CSSRI, Karnal	2	KRL1803, KRL1808
4.	Durgapura	2	RAJ4549, RAJ4550
5.	Faizabad	3	NW7088, NW7093, NW7094
6.	Hisar	2	WH1274, WH1283
7.	Kanpur	3	K1903, K1904, K1905
8.	Ludhiana	2	PBW830, PBW831
9.	Pantnagar	3	UP3055, UP3056, UP3057
10.	Ranchi	2	JKW275, JKW277
11.	Sabour	2	BRW3869, BRW3877
12.	Varanasi	2	HUW840, HUW841
13	SHUATS, Prayagraj	1	AAI-W22
	Checks	4	DBW187, HD3086, HD2967, K1006
Total entries		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 requirement	: 7.0 kg per entry

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

National Initial Varietal Trial

NIVT-2-IR-TS-TAS, 2019-20

Conducting centres

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

Details of trial entries

SN	Contributing Centres	No. of Entries	Name of entries
1.	Delhi	6	HI1647, HI1648, HI1649, HI1650, HD3359, HD3376
2.	IWBR, Karnal	2	DBW314, DBW315
3.	Bilaspur	1	CG1034
4.	Dharwad	2	UAS3011, UAS3012
5.	Durgapura	1	RAJ4551
6.	Gwalior	2	RVW4301, RVW4304
7.	Hisar	1	WH1275
8.	Jabalpur	2	MP3526, MP3535
9.	Ludhiana	1	PBW832
10.	Niphad	2	NIAW3882, NIAW3889
11.	Pantnagar	1	UP3058
12.	Powarkheda	3	MP1369, MP1370, MP1371
13.	Pune	3	MACS6764, MACS6765, MACS6768
14.	Akola	1	AKAW5099
15.	Vijapur	2	GW521, GW522
16.	Junagadh	1	GW523
17.	Nuziveedu Seeds	1	NWS2176
	Checks	4	GW322, HI1544, MACS6222, MACS6478
Total entries		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 requirement	: 7.0 kg per entry

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

National Initial Varietal Trial

NIVT-3A-IR-LS-TAS, 2019-20

Conducting centres

Zone	No.	Centres
NWPZ	10	Delhi, Jammu, Ludhiana, Gurdaspur, Hisar, Karnal, Bulandshahr, Pantnagar, Durgapura, Modipuram
NEPZ	10	Kanpur, Faizabad, Varanasi, Sabour, IARI-Pusa, RPCAU-Pusa, Ranchi, Kalyani, Coochbehar, Shillongani
Total	20	

Details of trial entries

SN	Contributing centres	No. of Entries	Name of entries
1.	Delhi	6	HD3360, HD3361, HD3362, HD3363, HD3364, HD3365
2.	IIWBR, Karnal	5	DBW316, DBW317, DBW318, DBW319, DBW335
3.	Durgapura	3	RAJ4552, RAJ4553, Raj4554
4.	Faizabad	2	NW7092, NW8000
5.	Hisar	3	WH1276, WH1277, WH1278
6.	Kanpur	2	K1907, K1908
7.	Ludhiana	4	PBW833, PBW834, PBW835, PBW836
8.	Pantnagar	4	UP3059, UP3060, UP3061, UP3065
9.	Ranchi	2	JKW270, JKW278
10.	Varanasi	1	HUW842
	Checks	4	HD3059, DBW173, HI1563, DBW107
Total entries		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 requirement	: 7.0 kg per entry

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

National Initial Varietal Trial

NIVT-3B-IR-LS-TAS, 2019-20

Conducting centres

Zone	No.	Centres
CZ	9	Indore, Gwalior, Powarkheda, Jabalpur, Bilaspur, Raipur, Junagadh, Vijapur, Udaipur
PZ	8	Dharwad, Niphad, Pune, Parbhani, Akola, Karad, Nippani, Kolhapur
Total	17	

Details of trial entries

SN	Contributing centres	No. of Entries	Name of entries
1.	Delhi	4	HD3366, HD3367, HI1651, HI1652
2.	IWBR, Karnal	1	DBW320
3.	Akola	1	AKAW5080
4.	Bilaspur	2	CG1035, CG1037
5.	Dharwad	1	UAS3013
6.	Gwalior	1	RVW4309
7.	Hisar	1	WH1279
8.	Jabalpur	2	MP3527, MP3529
9.	Junagadh	1	GW527
10.	Lok Bharti	1	LOK77
11.	Ludhiana	1	PBW837
12.	Niphad	2	NIAW3895, NIAW3898
13.	Powarkheda	1	MP1372
14.	Pune	2	MACS6774, MACS6769
15.	Vijapur	1	GW525
16.	Nizuvedu Seeds	1	NWS2180
	Checks	2	HD2864, HD2932
	Total entries	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 requirement	: 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, 2019-20

Conducting centres

Zone	No.	Centres
CZ	7	Powarkheda, Indore, Junagadh, Vijapur, SK Nagar, Kota, Udaipur
PZ	6	Dharwad, Ugar-Khurd, Nippani, Niphad, Pune, Akola
Total	13	

Details of trial entries

SN	Contributing Centres	No. of Entries	Name of entries
1.	Delhi	5	HI8825, HI8826, HI8827, HI8828, HI8829
2.	IIWBR, Karnal	2	DDW53, DDW54
3.	Dharwad	2	UAS473, UAS474
4.	Hisar	1	WHD965
5.	Ludhiana	1	PDW360
6.	Niphad	2	NIDW1345, NIDW1348
7.	Powarkheda	3	MPO1373, MPO1374, MPO1375
8.	Pune	2	MACS4100, MACS4106
9.	Vijapur	2	GW1354, GW1355
10.	Udaipur	1	PWU5
11.	Parbhani	1	PBND4812
	Checks	3	HI8713, HI8737, MACS3949
Total entries		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 requirement	: 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, 2019-20

Conducting centres

Zone	No.	Centres
NWPZ	9	Jammu, Balachaur, Gurdaspur, Ludhiana, Hisar, Delhi, Karnal, Pantnagar, Modipuram
NEPZ	9	Faizabad, Kanpur, IARI-Pusa, RPCAU-Pusa, Varanasi, Sabour, Ranchi, Kalyani, Coochbehar
Total	18	

Details of trial entries

SN	Contributing Centres	No. of Entries	Name of entries
1.	Delhi	4	HD3368, HD3369, HI1653, HI1654
2.	IWBR, Karnal	4	DBW321, DBW322, DBW323, DBW324
3.	Faizabad	1	NW7096
4.	Hisar	2	WH1280, WH1281
5.	Jammu	1	JAUW683
6.	Kanpur	1	K1910
7.	Ludhiana	3	PBW838, PBW839, PBW848
8.	Pantnagar	2	UP3062, UP3063
9.	Sabour	1	BRW3863
10.	Varanasi	1	HUW843
11.	Kalyani	1	BCW5
	Checks	4	WH1142, PBW644, HD3171, K1317
Total entries		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 requirement	: 7.0 kg per entry

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

National Initial Varietal Trial
NIVT-5B-RI-TS-TDM, 2019-20

Conducting centres

Zone	No.	Centres
CZ	11	Powarkheda, Indore, Sagar, Jabalpur, Bilaspur, Udaipur, Vijapur, Junagadh, Dhandhuka, Arnej, Tanchha
PZ	9	Dharwad, Bagalkot, Nippani, Niphad, Pune, Akola, Ugar-Khurd, Kolhapur, Parbhani
Total	20	

Details of trial entries

SN	Contributing Centres	No. of Entries	Name of entries
1.	Delhi	5	HD3371, HD3372, HI1655, HI8830(d), HI8831(d)
2.	IWBR, Karnal	3	DBW325, DBW326, DDW55(d)
3.	Akola	1	AKAW5088
4.	Bilaspur	1	CG1036
5.	Dharwad	2	UAS3014, UAS3015
6.	Jabalpur	1	MP3523
7.	Niphad	2	NIAW3851, NIAW3855
8.	Powarkheda	2	MP1367, MP1368
9.	Pune	2	MACS6755, MACS6753
10.	Vijapur	2	GW528, GW1356(d)
	Checks	4(2A+2D)	DBW110, HI1605, HI8627(d), UAS446(d)
	Total entries	25 (21+4)	

Experimental Details

Design	: Simple Lattice
Replication	: Two
Plot size	: 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	: Oct. 25 – Nov. 10
Seed requirement	: 7.0 kg per entry

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

Northern Hills Zone
Advance Varietal Trial, 2019-20
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
Total	11	

Details of test entries

Contributing Centres	No. of entries	Name of entries
IARI, Shimla	1	HS668
VPKAS, Almora	1	VL2036
Checks	4	VL907, HS507, HPW349, HS562
Total	6 (2+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)	: 60:30:20
Time of sowing	: October 15-31
Seed rate (kg/ha)	: 100
Seed requirement	: 8 kg per entry

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

Northern Hills Zone
Advance Varietal Trial, 2019-20
AVT-TS-IR-TAS

Trial conducting centres

State	Centres	Name of the centres
Himachal Pradesh	3	Malan, Shimla, Bajaura
Uttarakhand	1	Almora
Total	4	

Details of test entries

Contributing Centres	No. of entries	Name of entries
IARI, Shimla	1	HS668
VPKAS, Almora	1	VL2036
Checks	4	VL907, HS507, HPW349, HS562
Total	6 (2+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)	: 120:60:40
Time of sowing	: Nov. 1-15
Seed rate (kg/ha)	: 100
Seed requirement	: 4 kg per entry

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

Northern Hills Zone
Advance Varietal Trial, 2019-20
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
Meghalaya	1	Umiam
Manipur	1	CAU-Imphal
Total	11	

Details of test entries

Contributing Centres	No. of entries	Name of entries
CSKPHKV, Malan	2	HPW473, HPW474
IARI, RS, Shimla	3	HS679, HS680, HS681
VPKAS, Almora	3	VL3022, VL3023, VL3024
GBPUA&T, Pantnagar	1	UP3069
Checks	2	VL892, HS490
Total	11 (9+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	: 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
Initial Varietal Trial, 2019-20
IVT-RF-TS-TAS

Trial conducting centres

State	Centres	Name of the centres
Himachal Pradesh	4	Bajaura, Malan, Shimla, Dhaulakuan
Uttarakhand	2	Almora, Ranichauri
Jammu & Kashmir	2	Wadura, Khudwani
Meghalaya	1	Umiam
Total	9	

Details of test entries

Contributing Centres	No. of entries	Name of entries
IARI, Shimla	4	HS675, HS676, HS677, HS678
CSKHPKV, Malan	4	HPW469, HPW470, HPW471, HPW472
VPKAS, Almora	4	VL2039, VL2040, VL2041, VL2042
GBPUA&T, Pantnagar	1	UP3064
SKUAST-K, Khudwani	1	SKW356
Checks	2	HS507, HS562
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	: 4 kg per entry

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

North Western Plains Zone
Advance Varietal Trial, 2019-20
AVT-IR-TS-TAS

Trial conducting centres

State	No.	Centres
Punjab	6	Ludhiana, Gurdaspur, Bathinda, Kapurthala, Rauni, Faridkot
Haryana	4	Hisar, Karnal, Rohtak, Shikohpur
Rajasthan	4	Durgapura, Sriganganagar, Tabiji, Alwar
Uttar Pradesh	4	Nagina, Bulandshahr, Ujhani, Modipuram
Uttarakhand	2	Pantnagar, Kashipur
J & K	1	Jammu
Delhi	1	Delhi
Total	22	

Details of test entries

Contributing Centres	No. of entries	Name of entries
PAU, Ludhiana	2	PBW803, PBW840 ^M
Checks	7	HD2967, WH1105, HD3086, PBW550, DBW88, DBW187(I), DBW222(I)
Total	9 (2+7)	

^M denotes entries proposed under MABB

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	: 25 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, 2019-20
AVT-IR-LS-TAS

Trial conducting centres

State	No.	Centres
Punjab	5	Ludhiana, Gurdaspur, Bathinda, Kapurthala, Faridkot
Haryana	4	Hisar, Karnal, Rohtak, Shikohpur
Rajasthan	4	Durgapura, Sriganganagar, Tabiji, Alwar
Uttar Pradesh	5	Nagina, Bulandshahr, Ujhani, KVK-Rampur, Modipuram
Uttarakhand	2	Pantnagar, Kashipur
Jammu & Kashmir	1	Jammu
Delhi	1	Delhi
Total	22	

Details of test entries

Contributing Centres	No. of entries	Name of entries
Ludhiana	3	PBW811, PBW813, PBW812
IWBR Karnal	2	DBW290, DBW291
Delhi	4	HD3298*, HD3334, HD3332, HD3331 ^{#WB}
Hisar	1	WH1264
Pantnagar	1	UP3033
Ranchi	1	JKW261
Checks	5	HD3059, DBW173, WH1021, WH1124, PBW771(I)
Total	17 (12+5)	

* denotes final year entry

^{#WB} denotes entry with high wheat blast resistance

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	: 27 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, 2019-20 AVT-RI-TS-TAS

Trial conducting centres

State	No.	Centres
Punjab	4	Ludhiana, Gurdaspur, Kapurthala, Balachaur
Haryana	2	Hisar, Karnal
Uttar Pradesh	4	Bulandshahr, Modipuram, Nagina, KVK-Rampur
Uttarakhand	1	Pantnagar
Rajasthan	2	Sriganganagar, Bharatpur
J&K	1	Jammu
Delhi	1	Delhi
Total	15	

Details of test entries

Contributing Centres	No. of entries	Name of entries
IIWBR, Karnal	1	DBW296
BHU, Varanasi	1	HUW838 ^{#WB}
SKUAST – Jammu	1	JAUW672
Checks	6	WH1080, PBW644, HD3043, WH1142, NIAW3170(I), HI1628(I)
Total	9 (3+6)	

^{#WB} denotes entry with high wheat blast resistance

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	: 17 kg per entry

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

**North Eastern Plains Zone
Advance Varietal Trial, 2019-20**

AVT-IR-TS-TAS

Trial conducting centres

State	No.	Centres
Uttar Pradesh	6	Kanpur, Araul, Allahabad, Faizabad, Varanasi, Gorakhpur
Bihar	5	IARI-Pusa, Sabour, Purnea, Banka, RPCAU-Pusa
West Bengal	4	Coochbehar, Kalyani, Burdwan, Majhian
Jharkhand	3	Ranchi, Chianki, Dumka
Assam	2	Shillongani, Bishwanath
Total	20	

Details of test entries

Contributing Centres	No. of entries	Name of entries
PAU, Ludhiana	1	PBW804
Checks	5	HD2733, DBW39, K1006, DBW187, HD3249(I)
Total	6 (1+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	: 25 kg per entry

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

**North Eastern Plains Zone
Advance Varietal Trial, 2019-20**

AVT-RI-TS-TAS

Trial conducting centres

State	No.	Centres
Uttar Pradesh	5	Kanpur, Faizabad, Varanasi, Deegh, Ghaghraghat
Bihar	5	IARI-Pusa, Sabour, Purnea, RPCAU-Pusa, Dumka
West Bengal	4	Coochbehar, Kalyani, Burdwan, Majhian
Jharkhand	3	Ranchi, Chianki, Gumla
Assam	2	Shillongani, Bishwanath
Total	19	

Details of test entries

Contributing Centres	No. of entries	Name of entries
PAU, Ludhiana	1	HD3293*
Checks	5	HI1612, HD3171, K1317, HD2888, DBW252(I)
Total	6 (1+5)	

* denotes final year entry

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)
Irrigation	: 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 10
Seed rate (kg/ha)	: 100
Seed requirement	: 22 kg per entry

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

Central Zone
Advance Varietal Trial, 2019-20
AVT-IR-TS-TAD

Trial conducting centres

State	No.	Centres
Gujarat	5	Vijapur, SK Nagar, Anand, Amreli, Junagadh
Madhya Pradesh	11	Gwalior, Jabalpur, Powarkheda, Bhopal, Indore, Sagar, Shahdol, KVK-Ujjain, KVK-Ratlam, Morena, Tikamgarh
Chhattisgarh	2	Bilaspur, IGKV-Raipur
Rajasthan	4	Kota, Udaipur, Banswara, Mandor
Total	22	

Details of test entries

Contributing Centres	No. of entries	Name of entries
Vijapur	1	GW513
IARI	3	HI1636, HI1637, HD3377 ^B
ARI Pune	1	MACS6747
Powarkheda	1	MP1361
BARC	1	TAW155
Durgapura	1	RAJ4541 ^B
Checks	2	GW322, HI1544
Total	10 (8+2)	

^B denotes entries promoted from biofortification nursery

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	: Nov. 10– 20
Seed rate (kg/ha)	: 100
Seed requirement	: 24 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, 2019-20
AVT-IR-LS-TAD**

Trial conducting centres

State	No.	Centres
Gujarat	6	Anand, Bardoli, Junagarh, Vijapur, SK Nagar, Lok-Bharti
Madhya Pradesh	5	Indore, Gwalior, Jabalpur, Powarkheda, Sagar
Chhattisgarh	4	Bilaspur, Jagdalpur, Ambikapur, IGKV-Raipur
Rajasthan	3	Banswara, Udaipur, Mandor
Total	18	

Details of test entries

Contributing Centres	No. of entries	Name of entries
IGKV, Bilaspur	1	CG1029*
IARI, Indore	1	HI1634 ^Q *
Checks	3	HD2932, HD2864, MP3336
Total	5 (2+3)	

* denotes final year entry

^Q denotes superior grain quality

Experimental details

Design	: R.B.D.
Replications	: Four
Plot size	: Gross: 6m x 2.16m (12 rows); Net : 6m x 1.80m (10 middle rows)
Fertilizer dose (kg/ha)	: 90:60:40 (N:P:K)
Time of sowing	: Dec, 5-15
Seed rate (kg/ha)	: 125
Seed requirement	: 22 kg. per entry

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

Central Zone

Advance Varietal Trial, 2019-20

AVT-RI-TS-TAD

Trial conducting centres

State	No.	Centres
Gujarat	5	Vijapur, Amreli, Dhandhuka, Sanosara, Junagarh
Madhya Pradesh	6	Gwalior, Sagar, Jabalpur, Powarkheda, Bhopal, Indore
Chhattisgarh	2	Bilaspur, IGKV-Ambikapur
Rajasthan	3	Udaipur, Banswara, Pratapgarh
Total	16	

Details of test entries

Contributing Centres	No. of entries	Name of entries
UAS, Dharwad	1	UAS472(d)
Delhi	1	HI 8823(d)
Powarkheda	1	MPO1357(d)
Checks	5	HI8627(d), MP3288, DBW110, DDW47(d)(I), UAS466(d)(I)
Total	8 (3+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 40-45 DAS (Limit of 3 Irrig. In Gujarat)
Fertilizer dose (kg/ha)	: 90:60:40 (N:P:K)
Time of sowing	: Oct. 25 – Nov. 10.
Seed rate (kg/ha)	: 100
Seed requirement	: 19 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, 2019-20
AVT-IR-TS-TAD

Trial conducting centres

State	No.	Centres
Maharashtra	8	Niphad, Pravaranagar, Pune, Akola, Parbhani, Nasik, Karad, Kolhapur
Karnataka	7	Dharwad, Ugar-Khurd, Arbhavi, Kalloli, Mudhol, Nippani, Mandya
Telangana	1	Hyderabad- Millet
Total	16	

Details of test entries

Contributing Centres	No. of entries	Name of entries
IIWBR-Karnal	2	DDW48(d) ^{Q*} , DDW49(d) ^{Q*}
CCS HAU, Hisar	1	WHD964 (d)
IARI, Delhi	1	HI8818 (d)
Checks	4	MACS3949(d), UAS428(d), MACS6222, GW322
Total	8 (4+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)
Fertilizer dose (kg/ha)	: 120:60:40 (N:P:K)
Time of sowing	: November, 5-15
Seed rate (kg/ha)	: 100
Seed requirement	: 18 kg per entry

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

Peninsular Zone
Advance Varietal Trial, 2019-20
AVT-IR-LS-TAS

Trial conducting centres

State	No.	Centres
Maharashtra	8	Niphad, Pravaranagar, Pune, Akola, Parbhani, Nasik, Karad, Kolhapur
Karnataka	7	Dharwad, Ugar-Khurd, Arbhavi, Kalloli, Mudhol, Nippani, Mandya
Telangana	1	Hyderabad-Millet
Total	16	

Details of test entries

Contributing Centres	No. of entries	Name of entries
UAS, Dharwad	1	UAS3008
IARI, Indore	4	HI1633*, HI1641, HI1642, HI1646
ARI, Pune	2	MACS6752, MACS6749
JAU, Junagadh	1	GW519
Checks	3	RAJ4083, HD2932, HD3090
Total	11 (8+3)	

* denotes final year entry

Experimental details

Design	: R.B.D.
Replications	: Four
Plot size	: Gross: 6m x 2.16m (12 rows); Net : 6m x 1.80m (10 middle rows)
Fertilizer dose (kg/ha)	: 90:60:40 (N:P:K)
Time of sowing	: Dec, 1-10
Seed rate (kg/ha)	: 125
Seed requirement	: 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, 2019-20

AVT-RI-TS-TAD

Trial conducting centres

State	No.	Centres
Maharashtra	8	Pune, Niphad, Nashik, Parbhani, Savalivihir, Karad, Karjat, Baramati
Karnataka	4	Dharwad, Nippani, Bagalkot, Bailahongal
Total	12	

Details of test entries

Contributing Centres	No. of entries	Name of entries
ARI, Pune	1	MACS4087(d)
ARS, Niphad	1	NIDW1149(d)*
Powarkheda	2	MP1358, MPO1357(d) ^Q
UAS, Dharwad	1	UAS472(d)
Checks	5	HI1605, AKDW2997-16(d), UAS446(d), NIAW3170(I), HI8805(d)(I)
Total	10 (5+5)	

* denotes final year entry

^Q denotes superior grain quality

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)	: 90:60:40 (N:P:K)
Time of sowing	: Oct. 25 – Nov. 10
Seed rate (kg/ha)	: 100
Seed requirement	: 15 kg per entry

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

Special Trial (Dicoccum), 2019-20

SPL-DIC-IR-TS-PZ

Trial conducting centres

State	No.	Centres
Maharashtra	4	Pune, Karad, Kolhapur, K-Digraj
Karnataka	6	Dharwad, Arbhavi, Ugar-Khurd, Kalloli, Mudhol, Mandya
Tamil Nadu	1	Wellington
Total	11	

Details of test entries

Contributing Centres	No. of entries	Name of entries
ARI, Pune	2	MACS5054, MACS5055
UAS, Dharwad	2	DDK1058, DDK1059
Checks	3	HW1098, DDK1029, MACS6222 (aest.)
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)
Fertilizer dose (kg/ha)	:	120:60:40 (N:P:K)
Time of sowing	:	PZ: Nov. 1-15,
Seed rate (kg/ha)	:	100
Seed requirement	:	15 kg per entry

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

SPL – HYPT, 2019-20
(IR-TS-TAS-NWPZ)

Trial conducting centres

State	No.	Centres
Punjab	3	Ludhiana, Gurdaspur, Ladowal (BISA)
Haryana	2	Hisar, Karnal
Uttarakhand	1	Pantnagar
Delhi	1	Delhi
Total	7	

Details of test entries

Contributing Centres	No. of entries	Name of entries
IARI, Delhi	1	HD 3378
IWBR, Karnal/BISA	9	DBW187*, DBW303*, DBW327, DBW328, DBW329, DBW330, DBW331, DBW332, DBW333
CCSHAU, Hisar	2	WH1270*, WH1252
Checks	2	HD3086, HD2967
Total	14 (12+2)	

* denotes second year of testing

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% RFD+ FYM15 t/ha+ Growth Regulators*
Time of sowing	: October 20- November 5
Seed rate (kg/ha)	: 100
Seed requirement	: 10 Kg per entry

* Note: Two sprays as tank mix [Chlormequat chloride \(Lihocin\) @ 0.2%+ tebuconazole \(Folicur 430 SC\) @ 0.1% of commercial product dose at First Node and Flag leaf \(Tank mix application\)](#). Use 400 l/ha of water for spraying

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

CI-HYT (IR-ES), 2019-20

Trial conducting centres

State	No.	Centres
Punjab	3	Ludhiana, Gurdaspur, Ladowal (BISA)
Haryana	2	Hisar, Karnal
Uttarakhand	1	Pantnagar
Delhi	1	Delhi
Total	7	

Details of test entries

Contributing Centres	No. of entries	Name of entries
IARI, Delhi	4	HD3373, HD3374, HD3375, HD3379
PAU, Ludhiana	4	PBW843, PBW844, PBW845, PBW846
IWBR, Karnal	4	DBW281, DBW299, DBW336, DBW341
CCSHAU, Hisar	3	WH1285, WH1286, WH1287
GBPUAT, Pantnagar	3	UP3066, UP3067, UP3068
BISA, Ludhiana	4	DBW337, DBW338, DBW339, DBW340
Checks	3	DBW187, HD3086, HD2967
Total	25 (22+3)	

Experimental details

Design	: Simple Lattice (5x5)
Replications	: Two
Plot size	: Gross: 6 x 1.20m (6 rows); Net: 6 x 0.80m (4 middle rows)
Fertilizer dose (kg/ha)	: 150% RFD+ FYM15 t/ha+ Growth Regulators*
Time of sowing	: October 20- November 5
Seed rate (kg/ha)	: 100
Seed requirement	: 4 Kg per entry

* Note: Two sprays as tank mix [Chlormequat chloride \(Lihocin\) @ 0.2%+ tebuconazole \(Folicur 430 SC\) @ 0.1% of commercial product dose at First Node and Flag leaf \(Tank mix application\)](#). Use 400 l/ha of water for spraying

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

Multilocation Heat Tolerance Trial, 2019-20

Trial	Conducting centres	Test entries
NWPZ & NEPZ (MLHT-1)	Durgapura, Hisar, Karnal, Ludhiana, Kanpur, Ranchi, Sabour, RPCAU, Pusa.	MLHT-1: Final year entries of NWPZ and NEPZ
CZ & PZ (MLHT-2)	Junagadh, Udaipur, Indore, Vijapur, Pune, Parbhani, Dharwad, Niphad	MLHT-2: Final year entries of PZ and CZ

Experimental details

Design	:	RBD
Replications	:	Two
Plot size	:	Gross: 6 rows of 4m length spaced 20cm apart
Treatments	:	2 (timely and late sown with minimum 21 days and maximum 1 month difference between the two sowings)
Time of sowing	:	NWPZ & NEPZ - TS: Nov.1-15 LS: Minimum 21 days and maximum 1 month difference between two sowings CZ & PZ - TS: Nov.5-15 LS: Minimum 21 days and maximum 1 month difference between two sowings
Seed rate (kg/ha)	:	TS:100, LS:125
Checks		NWPZ & NEPZ: HD3086, HD2967, WH730, HD2932, RAJ3765, DBW150, DBW71. PZ & CZ: UAS428 (d), HI1605, AKDW2997-16(d), HI8805(d), NIAW3170(d). WH730, HD2932, RAJ3765
Seed requirement	:	4.0kg. per entry

Observations to be recorded:

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

DAC&FW breeder seed indent allocation for 2019-20

DAC&FW breeder seed indent for 2020-21 is received for 15700.59q breeder seed for 147 wheat varieties. The following breeder seed allocation is finalized production in the 58th Wheat & Barley Workers' Meet.

Variety	Year	Nucleus seed (q)	Indent (q)	Breeder seed (q)	
				Allocation	Indenting agencies
ARI, Pune					
MACS 4028	2018	0.20	10.00	10.00	Karnataka:10
MACS 6222	2010	5.50	60.00	60.00	Maharashtra:60
MACS 6478	2014	4.00	10.80	10.80	Karnataka:2.8, Maharashtra:6, NSC:2
Total				80.80	
BAU, Sabour					
BRW 934 (Sabour Shreshtha)	2017	8.70	60.00	60.00	Bihar:60
BRW 3708 (Sabour Samridhi)	2017	9.25	110.00	110.00	Bihar:110
BRW 3723 (Sabour Nirjal)	2017	10.03	50.00	50.00	Bihar:50
Total				220.00	
BHU, Varanasi					
HUW 669 (Malviya 669)	2018	4.00	4.20	4.20	NSC:3, NSAI:1.2
Total				4.20	
BISA, Ludhiana					
HD 2967	2014	20.60	2467.25	475.00	HIL:10, J&K:10, Pub 6, Rajasthan:53, Kribhco:54, IFFDC:70, NAFED:5, NFL:27, NSAI:240
WB 2	2017	3.25	358.80	103.80	Bihar:50, Haryana:10, HP:4, Kribhco:5, IFFDC:5, NSC:3, Pub 5, Rajasthan:10, NSAI:9.8, Uttarakhand:2
Total				578.80	
BISA, Pusa					
DBW 107	2015	6.30	49.00	49.00	Jharkhand:21, NSC:6, UP:20, WB:2
HD 2967	2014	16.20	2467.25	100.00	Bihar:100
Total				149.00	
BISA, Jabalpur					
DBW 110	2015	3.50	76.00	76.00	MP:50, NSC:6, Rajasthan:20
Total				76.00	
CCS HAU, Hisar					
WH 711	2002	9.00	10.00	10.00	Uttarakhand:10
WH 1025	2010	2.50	10.00	10.00	Chhatisgarh:10
WH 1080	2011	3.50	28.80	23.80	HP:20, NSC:3, NSAI:0.8
WH 1105	2013	19.00	583.00	543.00	HP:35, IFFDC:12, NFL:5, NSC:10, Pub 10, Rajasthan:103, NSAI:153, UP:200, Uttarakhand:15
WH 1124	2014	3.00	182.60	182.60	Har:18, HP:20, Kribhco:2, IFFDC:6, NSC:8, NSAI:28.6, UP:100
WH 1142	2014	3.70	104.40	104.40	NSC:2, NSAI:2.4, UP:100
Total				873.80	
CSAUA&T, Kanpur					
K 1006	2014	2.28	134.15	134.15	Bihar:30, Jharkhand:54.15, UP:50
K 1317	2018	2.00	110.00	110.00	Bihar:100, NSC:10
K 9423 (Unnat Halna)	2005	0.00	2.80	2.80	NSAI:2.8
Total				246.95	
CSSRI, Karnal					
KRL 210	2012	2.00	9.60	9.60	NSAI:9.6
KRL 283	2018	0.00	16.00	16.00	NSC:4, NSAI:2, UP:10
Total				25.60	

Variety	Year	Nucleus seed (q)	Indent (q)	Breeder seed (q)	
				Allocation	Indenting agencies
GBPUA&T, Pantnagar					
HD 2894 (Pusa Wheat 109)	2008	1.20	11.40	11.40	Chhatishgarh:10, NSAI:1.4
PBW 154	1988	2.50	30.00	30.00	NSC:10, Uttarakhand:20
PBW 226	1989	2.20	5.00	5.00	Uttarakhand:5
PBW 373	1997	0.40	10.00	10.00	Uttarakhand:10
UP 262	1978	0.90	10.00	10.00	Uttarakhand:10
UP 2784	2016	6.00	4.00	4.00	Uttarakhand:4
Total				70.40	
HPKVV, Palampur					
HPW 349	2013	3.95	80.00	40.00	HP:30, Uttarakhand:10
HPW 360	2016	1.60	17.00	17.00	HP:12, NSC:5
HPW 368	2016	0.40	6.00	6.00	HP:6
Total				63.00	
IARI, Indore					
HD 2932 (Pusa Wheat 111)	2008	23.00	19.80	19.80	Chhatishgarh:10, NSAI:9.8
HD 2987 (Pusa Bahar)	2011	26.00	20.80	20.80	MP:20, NSAI:0.8
HD 4728 (Pusa Malwi)	2016	0.00	16.00	16.00	NSAI:16
HI 1531(Harshita)	2006	15.00	17.40	17.40	Chhatishgarh:10, MP:5, NSAI:2.4
HI 1544 (Purna)	2008	32.00	323.20	323.20	Chhatishgarh:30, IFFDC:2, MP:210, Maharashtra:7, NFL:10, NSC:6, NSAI:58.2
HI 1605	2017	17.50	11.00	11.00	Karnataka:2.8, NSC:3, NSAI:5.2
HI 8498 (Malav Shakti)	1999	22.00	10.00	10.00	MP:10
HI 8663 (Posan)	2008	24.00	29.40	29.40	IFFDC:1, MP:10, NSAI:18.4
HI 8713(Pusa Mangal)	2013	26.00	202.00	202.00	Chhatishgarh:30, MP:150, NSAI:2,UP:20
HI 8737 (Pusa Anmol)	2015	27.00	179.20	179.20	MP:150, Maharashtra:4, NSAI:5.2, UP:20
HI 8759 (Pusa Tejas)	2017	14.50	356.40	356.40	IFFDC:1, MP:300, Maharashtra:4, NSC:3, NAFED:2, NFL:10, NSAI:16.4, UP:20
HI 8777	2016	6.00	8.00	8.00	Karnataka:5, NSC:3
Total				1193.20	
IARI, Karnal					
HD 2851 (Pusa Vishesh)	2005	13.10	354.10	354.10	NSC:10, Rajasthan:10, NSAI:334.1
HD 2967	2014	13.50	2467.25	438.10	Pub 6, Rajasthan:53, NSAI:379.1
HD 3086(Pusa Gautami)	2014	13.80	1731.70	520.60	HIL:5, Haryana:45, HP:30, J&K:2, Kribhco:16.6, IFFDC:44
HD 3226	2019	0.00	286.00	158.00	IFFDC:10, NSC:30, Pub 10, Rajasthan:40, NSAI:128, UP:20, Uttarakhand:10
HD 3237 (Pusa Wheat 3237)	2019	0.00	76.40	25.00	Kribhco:5, NSC:5, UP:15
HI 1620 (Pusa Wheat-1620)	2019	0.00	12.60	12.60	NSC:5, NSAI:7.6
HS 507(Pusa Suketi)	2011	0.25	10.00	10.00	HP:10
HS 542 (Pusa Kiran)	2015	0.15	17.00	17.00	HP:10, NSAI:2, Uttarakhand:5
HS 562	2018	0.30	45.00	45.00	HP:30, J&K:5, Uttarakhand:10
Total				1580.40	
IARI, Pusa					
HD 2733 (VSM)	2001	10.27	0.80	0.80	NSAI:0.8
HD 2967	2014	12.40	2467.25	564.15	Bihar:100, Jharkhand:54.15, WB:10
HD 2985(Pusa Basant)	2011	7.99	54.00	54.00	Bihar:50, NSC:4
HD 3090(Pusa Amulya)	2014	0.00	10.40	10.40	Bihar:10, NSAI:0.4
HD 3117	2016	6.00	10.80	10.80	NSAI:10.8
HD 3118 (Pusa Vatsala)	2015	7.14	42.70	42.70	NSC:20, NSAI:2.7, UP:20
HD 3171	2017	0.00	91.29	91.29	Bihar:5, Jharkhand:66.39, NSC:10, NSAI:10
HI 1563 (Pusa Prachi)	2011	8.07	256.20	256.20	Bihar:200, Kribhco:3.2, NSC:3, UP:50
Total				1030.34	

Variety	Year	Nucleus seed (q)	Indent (q)	Breeder seed (q)	
				Allocation	Indenting agencies
IGKVV, Raipur					
CG 1013 (Chhattisgarh Gehun-3)	2018	1.75	20.00	20.00	Chhatishgarh:20
CG 1015 (Chhattisgarh Gehun-4)	2018	1.70	30.00	30.00	Chhatishgarh:30
CG 5016(Ratan)	2009	5.80	135.00	135.00	Chhatishgarh:135
HI 617(Sujata)	1982	3.20	70.00	70.00	Chhatishgarh:20, MP:50
Total				255.00	
IIWBR, Karnal					
DBW 173	2018	16.60	263.40	263.40	Bihar:50, HIL:2, Haryana:10, J&K:5, Kribhco:4, NAFED:2, NSC:5, Pub 2, Rajasthan:5, NSAI:123.4, UP:50, Uttarakhand:5
DBW 187(Karan Vandana)	2019	3.80	154.80	154.80	Bihar:30, HIL:2, Jharkhand:21, Kribhco:4, NAFED:2, NSC:15, NSAI:55.8, UP:20, WB:5
HD 2967	2014	8.25	2467.25	695.00	Uttarakhand:510, Haryana:15, NSC:170
WB 2	2017	3.25	358.80	250.00	UP:250
Total				1363.20	
JAU Junagarh					
GW 366	2007	9.20	335.20	335.20	Chhatishgarh:250, MP:80, NSAI:5.2
Total				335.20	
JNKVV, Jabalpur					
C306	1969	4.00	50.80	50.80	Har:0.8, MP:50
DL 788-2 (Vidisha)	1997	0.00	5.00	5.00	MP:5
MP (JW) 1201	2011	4.50	100.00	100.00	MP:100
MP(JW)1202	2010	7.25	80.00	80.00	MP:80
MP 1203	2009	3.40	11.00	11.00	IFFDC:1, MP:10
JW 3020	2005	2.00	10.00	10.00	MP:10
MP(JW) 3211	2010	24.80	100.00	100.00	MP:100
JW 3288	2012	25.37	200.00	200.00	MP:200
MP(JW) 3336	2013	0.00	155.00	155.00	MP:150, Rajasthan:5
MP(JW) 3382	2016	0.00	14.80	14.80	IFFDC:2, NSC:4, NSAI:8.8
MPO(JW) 1215	2010	0.00	70.00	70.00	MP:70
Total				796.60	
Lokharti, Sanosara					
Lok 1	1982	20.00	220.00	220.00	Chhatishgarh:20, MP:100, Maharashtra:90, NSC:10
Total				220.00	
MAF (AU), Kota					
HI 1500(Amrita)	2003	1.20	50.00	50.00	MP:50
HW 2004(Amar)	1997	1.35	50.00	50.00	MP:50
Total				100.00	
MPKV, Niphad					
NIAW 1415(Netravati)	2011	7.20	12.00	12.00	Maharashtra:12
NIAW 1994(Phule Samadhan)	2016	11.80	26.00	26.00	Maharashtra:25, NSC:1
Total				38.00	
NDUA&T, Faizabad					
Narendra Wheat 5054	2014	1.00	5.00	5.00	NSC:5
Total				5.00	
PAU, Ludhiana					
DPW 621-50(PBW621&DBW50)	2011	4.00	5.80	5.80	Pub 2, NSAI:3.8
PBW 1 ZN(HPBW 1)	2017	8.00	169.20	169.20	Bihar:15, NSC:5, Pub 22, Rajasthan:10, NSAI:15.2, UP:100, Uttarakhand:2
PBW 343	1996	2.50	33.00	33.00	NSC:13, Uttarakhand:20
PBW 502	2004	3.00	35.00	35.00	Uttarakhand:35
PBW 509	2006	1.00	1.00	1.00	NSAI:1
PBW 533	2006	0.50	2.00	2.00	NSAI:2

Variety	Year	Nucleus seed (q)	Indent (q)	Breeder seed (q)	
				Allocation	Indenting agencies
PBW 550	2008	5.00	124.10	124.10	Kribhco:5, NSAI:104.1, Uttarakhand:15
PBW 590	2009	2.00	13.60	13.60	NSAI:13.6
PBW 644	2012	1.50	1.00	1.00	Pub 1
PBW 658	2015	1.00	16.80	16.80	Pub 10, NSAI:6.8
PBW 660	2016	1.50	11.00	11.00	Pub 2, NSAI:4, Uttarakhand:5
PBW 677	2016	7.50	148.80	148.80	Har:7, NSC:3, Pub 40, Rajasthan:40, NSAI:58.8
PBW 723(Unnat PBW 343)	2017	41.75	1148.80	1148.80	Bihar:40, Kribhco:14, IFFDC:17.2, NFL:15, NSC:10, Pub 62, Rajasthan:100, NSAI:250.6, UP:500, Uttarakhand:140
PBW 725	2016	30.00	439.40	439.40	HIL:5, Haryana:20, HP:30, Kribhco:6.8, IFFDC:1, NAFED:5, NSC:65, Pub 60, Rajasthan:40, NSAI:150.6, Uttarakhand:56
PBW 752	2019	1.00	63.40	63.40	NSC:10, NSAI:8.4, UP:45
PBW 757	2019	1.00	37.80	37.80	Har:10, NSC:5, NSAI:12.8, UP:10
PBW 761(Unnat PBW 550)	2008	7.00	178.40	178.40	NFL:10, NSC:10, Pub 30, NSAI:123.4, Uttarakhand:5
Total				2429.10	
PDKV, Akola					
AKAW 4210-6 (PDKV Sardar)	2016	0.57	8.00	8.00	Maharashtra:8
AKAW 4627	2012	0.28	7.00	7.00	Maharashtra:7
Total				15.00	
RARI, Durgapura					
Raj 3077	1989	4.00	5.00	5.00	Rajasthan:5
Raj 3765	1996	4.90	5.00	5.00	Rajasthan:5
Raj 4037	2004	5.00	90.00	90.00	IFFDC:5, NSC:45, Rajasthan:40
Raj 4079	2011	13.00	125.80	125.80	Kribhco:6, IFFDC:3, NFL:5, Rajasthan:100, NSAI:11.8
Raj 4083	2007	4.20	1.60	1.60	NSAI:1.6
Raj 4120	2009	7.20	18.80	18.80	Bihar:10, NSAI:8.8
Raj 4238	2016	14.50	560.80	560.80	HIL:5, Kribhco:6, IFFDC:25, Rajasthan:370, NSAI:4.8, UP:50, MP:100,
Raj 6560	2005	0.70	0.40	0.40	NSAI:0.4
Total				797.40	
RPCAU, Dholi (Muzaffarpur)					
HD 2967	2014	21.55	2467.25	50.00	Bihar:50
WR 544 (PUSA GOLD)	2005	0.00	2.00	2.00	NSAI:2
Total				52.00	
SPU, New Delhi					
HD 2967	2014	32.10	2467.25	145.00	UP:145,
HD 3043	2012	7.55	61.20	61.20	J&K:60, NSAI:1.2
HD 3059 (Pusa Pachheti)	2013	9.70	95.40	95.40	NSC:15, NSAI:30.4, UP:50
HD 3086(Pusa Gautami)	2014	36.50	1731.70	1211.10	NFL:27, NSC:185, Pub 10, Rajasthan:106, NSAI:571.1, UP:640, Uttarakhand:50
HD 3226	2019	0.00	286.00	128.00	IFFDC:10, NSC:30, Pub 10, Rajasthan:40, NSAI:128, UP:20, Uttarakhand:10
HD 3237 (Pusa Wheat 3237)	2019	0.00	76.40	51.40	Kribhco:5, NSC:5, NSAI:51.4, UP:15
HDCSW 18	2016	5.55	84.00	84.00	Har:10, NAFED:5, Rajasthan:40, NSAI:29
Total				1776.10	

Variety	Year	Nucleus seed (q)	Indent (q)	Breeder seed (q)	
				Allocation	Indenting agencies
RVSKVV, Gwalior					
MP 4106 (Raj Vijay Wheat 4106)	2012	0.00	204.00	204.00	MP:200, NSC:4
			Total	204.00	
SDAU, Vijapur					
GW 11	2013	5.90	3.20	3.20	NSC:2, NSAI:1.2
GW 173	1994	15.00	2.00	2.00	NSC:2
GW 273	1998	7.80	37.00	37.00	MP:35, NSC:2
GW 322	2002	5.00	180.00	180.00	Chhatishgarh:30, MP:150
GW 451	2016	21.00	300.20	300.20	Gut:250, NAFED:2, NSC:3, NSAI:45.2
GW 463	2017	0.00	7.00	7.00	Gut:5, NSC:2
Gujrat Wheat-496	1990	41.55	98.00	98.00	Maharashtra:90, NSC:8
GDW 1255	2013	0.00	2.00	2.00	NSC:2
			Total	629.40	
SKUA&T, Jammu					
WB 2	2017	-	358.80	5.00	J&K:5
WH 1080	2011	-	28.80	5.00	J&K:5
WH 1105	2013	-	583.00	40.00	J&K:40
HPW 349	2013	-	80.00	40.00	J&K:40
			Total	90.00	
SVBPUA&T, Meerut					
DBW 17	2007	-	98.90	98.90	NSC:20, NSAI:78.9
DBW 71	2013	-	23.80	23.80	NSC:3, NSAI:0.8, UP:20
DBW 88	2014	-	53.20	53.20	NSC:20, NSAI:13.2, UP:20
DBW 90	2014	-	71.40	71.40	NSC:5, Rajasthan:40, NSAI:6.4, UP:20
			Total	247.30	
UAS, Dharwad					
UAS 304	2013	1.60	20.20	20.20	Karnataka:20.2
UAS 347	2015	0.60	5.00	5.00	Karnataka:5
UAS 375	2018	1.41	10.00	10.00	Karnataka:10
UAS 415	2009	1.30	2.80	2.80	Karnataka:2.8
UAS 428	2012	1.55	6.00	6.00	Maharashtra:6
DBW 168	2017	0.20	13.00	13.00	Karnataka:5, Maharashtra:4, NSC:2, NSAI:2
DWR 162	1993	1.50	10.00	10.00	Karnataka:10
			Total	67.00	
VPKAS, Almora					
VL 953	2016	3.00	29.00	29.00	HP:4, NSC:5, Uttarakhand:20
VL 967	2016	1.10	25.00	25.00	Uttarakhand:25
Total				54.00	
Grand Total			15700.59	15676.79	

Note: 12.80q breeder seed of un-notified variety PBW 527 & PBW 750 and 5q breeder seed of un-notified variety HD 306 was not allocated for production.

Work Plan-Resource Management

At the outset, after welcoming the participants, Dr Ramesh Kumar Sharma, PI Resource management stressed that in addition to conduction of the allotted trials, the data reporting must be done carefully, sincerely and strictly as per the technical programme. It was observed that some of the centres were not serious, rather were tentative, while submitting the data. The data submitted by a few centres was not as per the desired format and we were forced to return and ask for resubmission strictly as per the desired format without making changes in the excel data sheet sent for submitting the data. Sometimes the complete information was not submitted and we were forced to send repeated emails, even phone calls in few cases to submit the complete data set. It was followed by the critical review of the results of the coordinated and special trials conducted by the resource management group and the recommendations were finalised. Subsequently, the trials on genotype evaluation were formulated based on inputs received from PI (Crop Improvement) and it was decided to modify further as per the revised inputs, if any, received from the breeding group. Thereafter, detailed discussions were held in which Dr BS Mahapatra, Professor Agronomy, GBPUA&T, Pantnagar and member of RAC of ICAR-IIWBR actively participated to formulate new experiments for addressing the zone-wise issues. Based on the discussions, the group decided to conclude four special coordinated trials, continue two ongoing trials and formulated three new special trials, the details of which are given below;

The following four varietal evaluation trials were formulated based on the entries received from the breeding group

1. Varietal evaluation trial at three dates of sowing (Timely, Late and Very Late) under irrigated conditions in CZ
2. Varietal evaluation trials at three dates of sowing (Timely, Late and Very Late) under irrigated conditions in PZ
3. Varietal evaluation trials under restricted irrigation (Zero, One and Two) conditions in PZ.
4. Evaluation of wheat genotypes targeted to achieve 8 t/ha productivity in NWPZ.

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

- SPL-3: Agronomic management for enhancing Zn in wheat grain in NHZ.
- SPL-4: Yield maximization in dicoccum wheat through various planting options and seed rates.
- SPL-6: To evaluate the performance of diverse varieties at different dates of sowing under changing climate.
- SPL-7: Validation of Nutrient Expert in wheat.

The group decided that the following two special trials will be continued during the 2019-20 crop season

- SPL-2: Exploring the role of phosphorus solubilising bacteria in improving phosphorus usage in wheat under wheat based cropping systems.
- SPL-5: Precision nitrogen management in irrigated wheat using NDVI sensor.

The following three new special trials were formulated and proposed to be conducted from the 2019-20 crop season

- SPL-1: Maximising wheat yield by early wheat sowing and higher fertilizer doses.
- SPL-3: Exploring timely sowing of wheat in NEPZ through surface seeding, seed priming and seed rate under rice-wheat system.
- SPL-4: Optimisation of nitrogen doses for high yield potential under different zones.

Work Plan of Social science

- During the Rabi season 2019-20, the wheat and barley frontline 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 thorough deliberations arrived at the following recommendations;

At the end of the session, Dr Ramesh Kumar Sharma, on behalf of the ICAR-IIWBR and ICAR-IARI-RS, Indore thanked all the participants for valuable suggestions.

Work Plan-Crop Protection

The research planning meeting of Crop Protection was held on 24th August 2019 at extension hall, ICAR-IARI, RS, Indore. Dr. Sudheer Kumar, PI (Crop Protection) welcomed the participants and appreciated for their work towards successful implementation of technical programme during 2018-19 which led to quite healthy and rust free crop season. The crop protection programme was reviewed and made detailed discussion on further strengthening of the programme. The IPPSN and PPSN entries will be continued to screen separately on different sets for stripe and leaf rust at different hot spot locations in North. Naini (Allahabad) was added as voluntary centre for leaf blight screening nursery and Murshidabad was dropped due to operational difficulty and also near to Kalyani which is already centre for leaf blight. Dr SC Bhardwaj gave the valuable suggestions for planning of the programme for 2019-20. PI also stressed that conducting All India Coordinated varietal evaluation trials are mandatory and all the centres must conduct the allotted trials strictly as per the technical programme. Based on the discussions, different disease and insect pest screening nurseries and management trial were formulated for the year 2019-20, the details of which are given below:

PROGRAMME OF WORK (2019-2020)

The programme for the crop year 2019-2020 was discussed in the 58th All India Wheat and Barley Research Workers Meet. The various activities to be executed at respective centers are given below:

PROGRAMME 1: Host resistance-IPPSN and PPSN

Adult Plant Resistance for rusts & other diseases

1. Initial Plant Pathological Screening Nursery (IPPSN)

Objectives

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

(a) Rusts

North

Yellow Rust: Gurdaspur, Dhaulakuan, Malan, Karnal, Durgapura, Ludhiana, Hisar and Jammu (8)

Leaf Rust: Delhi, Karnal, Durgapura, Ludhiana, Faizabad, Kanpur (6)

South

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

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

2. Plant Pathological Screening Nursery (PPSN)

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

(a) Rusts

North

Stripe Rust: Dhaulakuan, Gurdaspur, Malan, Bajaura, Karnal, Delhi, Ludhiana, Pantnagar, Durgapura, Jammu, Kudwani and Hisar (12)

Leaf Rust: Delhi, Hisar, Jammu, Kanpur, Karnal, Ludhiana, Pantnagar, Durgapura, Faizabad (9)

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, Faizabad, Varanasi, Sabour and Shillongani (7)

Note: The samples of leaves of AVT entries and varieties (checks) in PPSN showed resistance in the past but now showing rust severity of 40S or more at any centre, should be sent 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.

3. Monitoring of PPSN

The teams of plant pathologists and breeders will be constituted for effective monitoring and data recording in PPSN at various locations in different zones. The Plant Pathologists and Breeders of other zones will monitor PPSN during Zonal monitoring tours.

4. AUDPC based identification of slow rusters in AVT material

Leaf and Stripe rusts: Karnal, Ludhiana

Stem and leaf rusts: Mahabaleshwar

Leaf rust: Faizabad

Stem rust: Indore

PROGRAMME 2: Seedling rust resistance and rust gene postulation

1. Race specific and slow rusting

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

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

(c) **Stripe rust:** AVT entries of NWPZ and NHZ alongwith the checks of the respective zones. **Centres:** Ludhiana and 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 in North.

(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

2. Seedling Resistance Tests and postulation of Rust Resistance Genes

(a) 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.

(b) Stem and Leaf rusts: Mahabaleshwar for SRT on AVT entries of CZ, PZ and NIVT (durum).

PROGRAMME 3: Leaf Blight

Leaf Blight Screening Nursery (LBSN)

This nursery will consist of earlier identified resistant materials as well as the AVT's and NIVT's. 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 also.

Centers: 13 (Pantnagar, Ludhiana, Karnal and Hisar in **NWPZ**; Varanasi, Faizabad, IARI Pusa, Coochbehar, Shillongani, Ranchi, Kalyani and Naini (Prayagraj) in **NEPZ** and Dharwad in **PZ**)

PROGRAMME 4: Karnal Bunt

Karnal Bunt Screening Nursery (KBSN):

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

Centers: Ludhiana, New Delhi, Pantnagar, Hisar, Karnal and Jammu (6).

PROGRAMME 5: Loose Smut

Loose Smut Screening Nursery (LSSN): It will contain resistant materials identified in the past released varieties and AVT entries of NHZ, NWPZ and NEPZ

Centres: Ludhiana, Almora, Durgapura and Hisar (4)

PROGRAMME 6: Powdery Mildew

Powdery Mildew Screening Nursery (PMSN): All entries of AVT, previously identified resistant material and released varieties (NHZ, NWPZ)

Centres: Almora, Pantnagar, Shimla, Malan, Bajaura, Dhaulakuan and Jammu (8)

PROGRAMME 7: Region specific diseases

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

Foot rot: Dharwad (AVT entries)

Head scab: Delhi, Dhulakuan, Gurdaspur

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

PROGRAMME 8: Crop Health

1. Pre-harvest crop health monitoring

a. 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 2019 till the harvest of crop. Wheat Crop Health Newsletter will be issued on monthly basis by PI (CP) IIWBR, Karnal, during the crop season. Information on off season surveys will be included in first issue.

b. Monitoring of new virulences of yellow rusts in NWPZ by specially constituted teams

Specially constituted teams will visit the areas as per the need for effective monitoring of crop health in general and appearance and spread of yellow rust in particular, along the areas near the western border and foothills / sub-mountainous areas in NWPZ. Teams will be constituted as per the need for survey

c. 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. Teams will be constituted as per the need for survey. If any suspected samples of wheat blast like disease found will be analyzed at Kalyani and Coochbehar centre.

d. 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 centers are required to send the rust infected samples (natural infection) for pathotype analysis to the concerned centres according to recommended protocol.

e. 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).

- f. **Off-season Disease Monitoring Nursery (To be coordinated by IIWBR Reg. Station, Flowerdale):** This nursery will be planted in Dalang Maidan, Kukumseri, Sangla, Sarahan (HP) and Leh (J&K). High altitude varieties and one hulless barley variety will also be included in this nursery. (Inclusion of PBW 757 in place of WL 711).
- g. **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.

2. 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 PI (CP), IIWBR, Karnal for analysis.

PROGRAMME 9: Integrated disease management

1. **Elite Plant Pathological Screening Nursery (EPPSN):** The sources of resistance to three or two rusts identified in PPSN will be retested to confirm their resistance to rusts:

North: Delhi, Malan, Karnal, Ludhiana, Pantnagar, Durgapura, Hisar, Jammu and Almora (9)

South: Wellington, Mahabaleshwar, Dharwad Niphad, and Indore (5).

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

DISEASES

North

Stripe rust: Karnal, Ludhiana, Hisar, Dhaulakuan, 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, Kalyani,

Loose smut: Hisar, Durgapura, Ludhiana, Almora

Flag smut: Hisar, Durgapura, Ludhiana

Head scab: New Delhi, Dhulakuan, Gurdaspur

South

Leaf and Stem rust: Mahabaleshwar, Indore Dharwad, Niphad and Wellington

Nematodes (CCN) : Durgapura, Hisar, and Ludhiana

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

3. Chemical control

- (a) **Chemical management of stripe rust:** New chemicals will be tested at Karnal, Hisar, Ludhiana, Durgapura, Pantnagar and Jammu. The chemicals will be tested are:

Picoxystrobin 7.05% + Propiconazole 11.7% SC, Pyraclostrobin 133g/l + Epoxiconazole 50g/l SE, Tebuconazole 50% + Trifloxystrobin 25% WG, with standard chemical (Propiconazole) and without chemicals.

(b) **Chemical management of powdery mildew:**

New chemicals will be tested at Almora, Pantnagar, Shimla, Malan, Bajaura, Dhaulakuan and Jammu. The chemicals will be tested are:

Azoxystrobin 18.2% w/w + Cyproconazole 7.3% w/w SC, Azoxystrobin 18.2% w/w + Difenoconazole 11.4% w/w SC, Tebuconazole 50% + Trifloxystrobin 25% WG with standard chemical (Propiconazole) and without chemicals.

PROGRAMME 10. Entomology

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

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

- (i) Shoot fly (Centres: Dharwad, Ludhiana, Kanpur, Niphad)
- (ii) Brown wheat mite (Centres: Durgapura and Ludhiana)
- (iii) Wheat Aphids (Centres: Niphad, Ludhiana, Karnal, Shillongani and Kharibari)
- (iv) Root aphid (Centres: Karnal and Ludhiana)

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

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

- (i) Shoot fly (Centres: Dharwad, Ludhiana, Kanpur and Niphad)
- (ii) Brown wheat mite (Centres: Durgapura and Ludhiana)
- (iii) Foliar aphids (Centres: Niphad, Ludhiana, Karnal, Shillongani and Kharibari)
- (iv) Root aphid (Centres: Karnal and Ludhiana)

2. **Integrated Pest Management**

(a) **Survey and surveillance of insect-pests and their natural enemies in wheat and barley cropping systems** (*All centres*)

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

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

The effect of sowing time on the population build-up of major insect-pests of wheat will be studied at four geographical locations to better understand the insect-pest behaviour under different climatic conditions.

(c) **Evaluation of trapping efficiency of sticky traps for monitoring aphid population in wheat** (Centres: Niphad, Ludhiana, Karnal)

Studies will be conducted on evaluation of trapping efficiency of sticky traps for monitoring of aphid population in wheat. The population of alate (winged) and wingless forms of aphids captured in traps will be recorded during the season. Moreover, population of aphids will also be recorded on plants per plot basis to determine its relationship with the insect counts obtained on sticky traps.

(d) **Effect of Zinc sulphate application on aphid incidence in wheat** (Centres: Karnal, Ludhiana, Niphad)

Effect of zinc sulphate application in soil as well as foliar application will be tested to determine its effect on aphid abundance in wheat. Soil application rate of zinc sulphate will be

kept as 25 kg/ha. foliar application rate will be 0.5%. Observations will be recorded on population of aphids per plant, natural enemies (adult and grubs) per plot, yield per treatment and nutrient status of soil as well as of plants before the treatment and at the time of harvest.

- (e) **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.

- (f) **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.

- (g) **Effect of organic treatments on the incidence of major insect-pests and natural enemies** (Centres: Karnal and Ludhiana)

Keeping in view of the interest of farmers about zero budget farming, effect of organic treatments viz., Neemastra, Bramhastra, Agniastra, Deshparni, Fermented butter milk and Cow urine will be evaluated against major insect-pests of wheat and natural enemies.

- (h) **Management of aphids through foliar application of new chemical molecules** (Centres: Karnal, Kanpur, Niphad, Kharibari and Ludhiana)

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

- (i) **Management of termites, aphids and seed borne diseases of wheat through seed treatment of chemical molecules combinations** (Centres: Durgapura, Kanpur, Ludhiana and Vijapur)

Few selected insecticides and their combination with fungicides will be tested as seed treatment against termites. The observations on insect population counts before and after the treatment will be recorded along with yield in each treatment.

3. Stored Grain Pest Management

- (a) **Evaluation of different packaging bags for storage insect-pest infestation and its effect wheat seed quality (Centre: Karnal, Ludhiana, Kharibari, Niphad)**

Different types of storage bags viz., jute bags, High density polyethylene bags (HDPE) and Biaxially Oriented Polypropylene (BOPP) bags will be evaluated for storage insect-pest infestation and its effect on wheat seed quality will be determined.

PROGRAMME 11. Nematology

1. **Monitoring of Nematodes:** *Anguina tritici*, *Tylenchus* spp. *Pretylenchus* spp. & *Heterodera avenae*: All centres of Nematology
2. **Evaluation of resistance against nematodes parasitizing wheat**
 - (a) *Heterodera avenae*: Hisar, Durgapura and New Delhi
 - (b) *Heterodera filipjevi*: Ludhiana
3. **Eco-friendly management of CCN nematodes in wheat:**
centres: Durgapura, Hisar, Ludhiana and New Delhi

Work Plan - Wheat Quality

The research planning meeting to review wheat quality work was held in IARI-RS, Indore on 24th August. The meeting was Coordinated by Dr. Sewa Ram, PI, Wheat Quality and he welcomed the participants from cooperating centres. Work plan for 2019-20 and major recommendations were finalized in session IV chaired by Dr. S.K. Rao, VC, RVRSKVV, Gwalior and presented in Plenary session on 26th August. The details of the work plan and recommendations are given below.

Work Plan

Changes in work plan: NIVT 5A samples will now be analyzed at GBPUA&T, Pantnagar instead of CCSHAU, Hisar and NIVT 3B at MPKV, Rahuri instead of GBPUA&T, Pantnagar.

- a. **NIVT 1A** (Irrigated Timely Sown) samples from Ludhiana, Hisar, Durgapura, Delhi, Pantnagar (NWPZ), Kanpur, Pusa, Varanasi and Sabour (NEPZ) will be analysed at PAU, Ludhiana.
 - b. **NIVT 1B** (Irrigated Timely Sown) samples from Ludhiana, Hisar, Durgapura, Delhi, Pantnagar (NWPZ), Kanpur, Pusa, Varanasi and Sabour (NEPZ) will be analysed at RAU, Durgapura.
 - c. **NIVT 2** (Irrigated Timely Sown) samples from Indore, Vijapur, Junagarh, Powarkheda (CZ), Dharwad, Pune, Ugar and Niphad (PZ) will be analysed at SDAU, Vijapur.
 - d. **NIVT 3A** (Irrigated Late Sown) and **NIVT 5A** (Restricted Irrigation Timely Sown) Entries from Pantnagar, Hisar, Ludhiana, Durgapura, Delhi (NWPZ) & Pusa, Sabour, Kanpur, Varanasi (NEPZ) will be analysed at GBPUA&T, Pantnagar Centre.
 - e. **NIVT 3B** (Irrigated Late Sown *T. Aestivum*) and **NIVT 4** (Irrigated Timely Sown *T. durum*) samples from Vijapur, Indore, Powarkheda, Junagarh (CZ) and Dharwad, Niphad, Pune (PZ) will be analysed by the quality laboratory at MPKV, Rahuri.
 - f. **NIVT 5B** (Restricted Irrigation Timely Sown, both durum and aestivum) samples from Vijapur, Indore, Powarkheda, Junagarh (CZ) and Dharwad, Niphad, Pune (PZ) will be analysed at UAS, Dharwad.
 - g. **Dicoccum** dehusked samples from Dharwad, Pune, Arabhavi, Kalloli and Ugar (PZ) will be analysed at UAS, Dharwad.
 - h. **AVT samples** from all the centres mentioned in NIVTs and NHZ centres such as Shimla, Almora and Malan will be analyzed by ICAR-IIWBR, Karnal for various quality parameters including baking evaluation of IInd year entries. **IVT (NHZ)** samples from Shimla, Almora and Malan will also be analysed at ICAR-IIWBR, Karnal.
 - i. **Special Trial (HYPT)** samples will be analysed at ICAR-IIWBR, Karnal.
 - j. **Quality Components and Wheat Biofortification Nursery (QCWBN)** samples will be analysed at ICAR-IIWBR, Karnal for grain appearance score, test weight, protein content, grain hardness index, sedimentation value, Fe and Zn content. Hand threshed samples using cloth should be provided for Fe and Zn analysis separately. The 10 centres conducting the nursery will be Ludhiana, Karnal, New Delhi and Pantnagar (NWPZ); Kanpur, and Varanasi (NEPZ); Indore, and Vijapur (CZ) and Dharwad and Niphad (PZ). The last dates for supplying the samples by respective centres in different zones viz., PZ (30th April 2020), CZ (15th May 2020), NWPZ & NEPZ (20th May 2020) and NHZ (15th June 2020) were finalised.
- All the wheat grain samples, duly cleaned and properly packed in polythene bags separately, enclosed in cloth bags should be sent by registered post parcel. The *T. dicoccum* samples should be sent after de-husking.
 - All the co-operators, who will analyze the wheat samples of various NIVTs and Special Trials should send the data to ICAR-IIWBR, Karnal positively by 15th July, 2020, by e-mail.

Work Plan: Barley Network

The scientists working in barley improvement discussed the trial constitution and other experiment formation. 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. The details of various breeding yield trials/ agronomical experiments and plant pathological nurseries/experiments finalized for conduction during 2019-20 crop season.

Yield Evaluation Trials

Name of Trial	AVT	
Production Condition	Rainfed	
Zone	NHZ	
No. of Trial Centres	11	
State	No.	Name of centres
Himachal	6	Bajaura, Berthein, Kangra, Katrain, Malan, Shimla
Uttarakhand	3	Almora, Ranichauri, Majhera
J&K	2	Rajauri, Khudwani
No. of varieties including checks	22	
Contributing Centres	No.	Name of varieties
IARI, RS, Shimla	5	BHS478, BHS479, BHS480, BHS481, BHS482
Pantnagar	3	UPB1083, UPB1084, UPB1085
Almora	5	VLB165, VLB166, VLB167, VLB168, VLB169
Bajaura	5	HBL864, HBL865, HBL866, HBL867, HBL868
Checks	4	HBL113, BHS352, VLB118, BHS 400

Name of Trial	AVT	
Production Condition	Irrigated Feed barley	
Zone	NWPZ	
No. of Trial Centers	8	
State	NO.	Name of centers
Haryana	2	Hisar, Karnal
Punjab	1	Ludhiana
Rajasthan	3	Durgapura, Tabiji, Udaipur
Uttarakhand	1	Pantnagar
U. P	1	Modipuram
No. of varieties including checks	8	
Contributing Centers	No.	Name of varieties
Kanpur	1	KB1707,
Durgapura	1	RD2994,
Pantnagar	1	UPB1080
Ludhiana	1	PL906,
Checks	4	BH946, RD2552, BH902, DWRB137

Name of Trial	AVT	
Production Condition	Irrigated (Malt Barley) Timely Sown	
Zone	NWPZ	
No. of Trial Centres	9	
State	No.	Name of centres
Haryana	3	Hisar, Karnal, Bawal
No. of varieties including	9	
Contributing Centres	No.	Name of varieties
Karnal	3	DWRB182, DWRB 196, DWRB 197
Ludhiana	1	PL908
Checks	5	DWRB160(I), BH902, DWRB123, RD2849, DWRB 137

Name of Trial	AVT	
Production Condition	SAL / ALK	
Zone	NWPZ / NEPZ	
No. of Trial Centers	06	
State	No.	Name of centres
U.P.	2	Dalipnagar, Faizabad
No. of varieties including	16	
Contributing Centers	No.	Name of varieties
Hisar	2	BH1032, BH1033
Kanpur	3	KB1822, KB1815, KB1845
Varanasi	2	HUB273, HUB274
Karnal	1	DWRB214
Durgapura	4	RD3015, RD3016, RD3017, RD3018
Checks	4	RD2552, NDB1173, RD2794, RD2907

Name of Trial	IVT	
Production Condition	Malt Barley	
Zone	NWPZ (Timely Sown)	
No. of Trial Centers	10	
State	NO.	Name of centres
Haryana	3	Bawal, Hisar, Karnal
No. of varieties including checks	21	
Contributing Centers	No.	Name of varieties
Hisar	3	BH1026, BH1027, BH1028
Pantnagar	2	UPB1089, UPB1090
IIWBR, Karnal	4	DWRB209, DWRB210, DWRB211, DWRB212
Durgapura	4	RD3023, RD3024, RD3025, RD3026
Ludhiana	3	PL912, PL916, PL919
AB InBev	1	ABI Kranti
Checks	4	BH946, DWRB101, DWRB123, RD2849

Name of Trial	IVT	
Production Condition	Irrigated Feed barley	
Zone	NWPZ/ NEPZ / CZ	
No. of Trial Centers	18	
State	No.	Name of centers
Haryana	2	Hisar, Karnal
Punjab	1	Ludhiana
Rajasthan	3	Durgapura, Tabiji, Udaipur
Uttarakhand	1	Pantnagar
U. P	4	Kanpur, Varanasi, Faizabad, Modipuram
M. P	2	Gwalior, Morena
Bihar	2	Pusa (CAU), Sabour
Jharkhand	1	Ranchi
Gujarat	1	Vijapur
West Bengal	1	Kalyani
No. of varieties including checks	23	
Contributing Centers	No.	Name of varieties
Kanpur	3	KB1816,, KB1817, KB1822
Varanasi	2	HUB271, HUN272
Hisar	3	BH1029, BH1030, BH1031
Durgapura	4	RD3011, RD3012, RD3013, RD3014
Pantnagar	2	UPB1087, UPB1088
Ludhiana	4	PL913, PL915, PL917, PL920
Karnal	1	DWRB215
Checks	4	BH 946, RD2552, DWRB137, RD2899

Name of Trial	IVT/AVT	
Production Condition	Irrigated Feed barley (Hulless)	
Zone	NWPZ/ NEPZ / CZ	
No. of Trial Centers	15	
State	No.	Name of centers
Haryana	2	Hisar, Karnal
Punjab	1	Ludhiana
Rajasthan	2	Durgapura, Udaipur
Uttarakhand	1	Pantnagar
U. P	5	Kanpur, Varanasi, Faizabad, Modipuram, CAU Jhansi
M. P	3	Gwalior, Morena, Tikamgarh
Gujarat	1	Vijapur
No. of varieties including checks	14	
Contributing Centers	No.	Name of varieties
Kanpur	2	KB1843, KB 1848
Ludhiana	4	PL921, PL922, PL923, PL924
Karnal	3	DWRB204*, DWRB216, DWRB217
Pantnagar	1	UPB1086
Checks	4	Karan16, NDB943, K1149, PL891(I)

Name of Trial	IVT	
Production Condition	Rainfed	
Zone	NEPZ	
No. of Trial Centers	8	
State	No.	Name of centres
UP	4	Kanpur, Varanasi, Faizabad, Saini
Bihar	2	Pusa (CAU), Sabour
Jharkhand	2	Ranchi, Chiyanki
No. of varieties including checks	14	
Contributing Centers	No.	Name of varieties
Kanpur	3	KB1815, KB1832, KB1830
Varanasi	2	HUB269, HUB270
Durgapura	4	RD3019, RD3020, RD3021, RD3022
Ludhiana	2	PL918, PL925
Karnal	1	DWRB213
Checks	2	K 603, Lakhan

Crop Protection Trials/Experiments

1. Crop health survey
2. Evaluation for status of host resistance in test entries (IBDSN, NBDSN, EBDSN and SRT)
3. Chemical control of leaf blight, leaf rust and stripe rust
4. Screening of NBDSN against foliar aphids
5. Screening of NBDSN, Elite material against CCN

Agronomy Trials/ Experiments

IR-TS-MB-NWPZ: DWRB 182 Checks: BH946, DWRB 101, DWRB123, RD2849, DWRB160 (I)

Special Trials:

1. Tillage options and varieties in NHZ
2. Tillage and nutrient options in all the zones
3. New Pusa Hdrogel and irrigation levels
4. Varieties and nutrient options in NHZ
5. Zinc application options and varieties in all the zones

Quality Evaluation

6. Evaluation of malt & feed samples for quality.
7. Barley quality screening nursery

Recommendations

Crop Improvement

1. During 2018-19, the Central Sub-Committee on Crops Standards, Notification and Release of Varieties for Agricultural Crops (CVRC) recommended the release of following 06 varieties (PBW 752, PBW 757, HD 3226, HD 3237, HI 1620 and DBW 187) of wheat for different zones and production conditions of the country.
2. In addition, 11 wheat varieties recommended by respective state for different production conditions were recommended for notification by the Central Sub-Committee on Crops Standards, Notification and Release of Varieties for Agricultural Crops.
3. During the year 2018-19, total 21 new genetic stocks of wheat have been registered with NBPGR, New Delhi for novel traits (disease resistance, chlorophyll deficient mutant, heat tolerant, drought tolerant and quality) and seeds of these registered genetic stock will be supplied to breeder across the country for use in wheat improvement.
4. Four wheat varieties namely HS 490, MPO 1215, HW 1098, and CoW 2 were registered by the PPV&FRA vide registration number 71, 76, 176 and 178 of 2018, respectively.
5. As part of anticipatory breeding, AICRP on Wheat & Barley, screened 100 wheat genotypes (released varieties, AVT and NIVT entries) against wheat blast disease at Jessore (Bangladesh) and Bolivia were again sent to Jessore (Bangladesh) during 2018-19 for confirmation. Also, another set of 353 lines (checks, AVT, NIVT and registered genetic stocks) was sent for screening against wheat blast at Jessore (Bangladesh) during 2018-19. This helped in identifying 32 genotypes as resistant against wheat blast and the information generated will be utilized for promotion of entries to next level.
6. The variety identification committee in its meeting held on August 24, 2019 recommended 17 wheat varieties for different zones and production conditions. This included two varieties (DBW 187 and HD 3086) for area extension.
7. The Research Review meeting of Crop Improvement finalized constitution 363 new trials that are proposed to be conducted across five wheat growing zones. These trials consisted of 157 NIVTs/IVTs, 188 AVTs and 18 Special trials. Also, physiological trials (MLHT) and allocations of breeder seed indents were also finalized.
8. The high yield potential trial (SPL-HYPT (NWPZ)) will be constituted from a common feeder trial under the coordinated set up. The acceptance yield level for each centre in this trial has been fixed at 65.0q/ha.
9. To streamline the coding and constitution of coordinated trials (NIVTs, IVTs, AVTs & special trials), the ICAR-IIWBR representative for each zone will facilitate first coding.
10. Nominations in the MABB (marker assisted backcross breeding) entries should be supported by supplementary data for the claim along with trait improved.
11. Promotion of test entries in NW and NE will also be based on wheat blast data from Bangladesh & Bolivia.
12. Promotion of the entries having superior quality will be streamlined. The quality group may come up with standard benchmarks for important traits, which can be used for promoting the promising entries.
13. It is recommended to discontinue the breeder seed production of wheat varieties which were released 15 years back or more.
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 during Feb-March, 2020.

Resource Management

1. Based on the trial conducted at 3-4 locations for two years in NHZ, spray application of 0.5 % ZnSO₄ at heading and early milk stage improvement in grain Zn content by about 2 ppm and soil application @ 25 kg ZnSO₄ and soil application coupled with two sprays improved the grain Zn content by 4 ppm and 6 ppm, respectively along with improvement in productivity.
2. Based on the trial conducted at three locations for two years in PZ, it was found that for dicoccum wheat 75 to 100 kg/ha seed rate and row-to-row spacing of 20 cm was optimum.
3. Based on the results from 26 locations across various wheat growing zones of the experiment conducted with ruling varieties of each zone it was observed that HS 562 was the best performer followed by MACS 6222. The highest yield in all the zones, except NEPZ, was recorded in 5th November sown wheat.
4. The Nutrient expert concept was evaluated in all the zones but it was found that 150% RDF produced maximum grain yield indicating that there is a need for upward revision of fertilizer recommendation for achieving higher productivity.

Crop Protection

1. It is recommended to cultivate newly released yellow rust varieties like HD 3226, PBW 752, HD 3237, HI 1620, DBW 173, WB 02, HD 3086, DBW 90, WH 1124, WH 1080, WH 1142 etc. in view of current pathotype prevalence in Haryana, Punjab, Himachal Pradesh and Jammu.
2. It is recommended not to apply nitrogen more than recommended dose for reducing foliar aphid damage on wheat.
3. It is recommended to deploy blast resistant cultivars like DBW 187 in NEPZ specially areas bordering to Bangladesh.
4. Strict vigil should be kept for wheat blast in NEPZ specially areas bordering to Bangladesh. Farmers are advised to treat seeds with Carboxin + Thiram (1:1) @ 2.5 g/kg and if any symptoms of blast like seen then spray of Tebuconazole (50%) + Trifloxystrobin (25%) WG @ 0.06% at boot leaf (booting) stage and repeat after 15 days if required in NEPZ specially areas bordering to Bangladesh.
5. It is recommended to use separate set of IPPSN and PPSN for effective screening of yellow and brown rust.
6. It is recommended to install yellow sticky traps at a height of 100 cm for North Western Plain Zone and 60 cm height for Central & Peninsular Zone for aphid population monitoring.
7. It recommended to use Vekhand powder @ 10 g/Kg or Vekhand powder @ 5 g/kg in combinations with Neem leaves or Jungli Imli leaves or Giloe leaves powder @ 5 g/ Kg of wheat grains for managing grain weevil (*Sitophilus oryzae*) or lesser grain borer (*Rhizopertha dominica*) in storage.

Wheat Quality

1. IInd year AVT entries PBW 771 (NWPZ-ILS) of NWPZ exhibited very good chapati characteristics and hence recommended for chapati quality.
2. IInd year AVT entries DBW221 and DBW222 (NWPZ-ITS), BRW 3806 (NWPZ-RITS), NIAW 3170 (NWPZ & PZ-RITS), HI1621 (SPL-VLS) exhibited very good quality for bread and hence recommended for bread quality.
3. IInd year AVT entries NIAW 3170* (NWPZ & PZ-RITS) exhibited very good quality for biscuit and hence recommended for biscuit quality.
4. It is recommended to put emphasis on breeding for soft and hard wheat classes separately in bread wheat and yellow pigment content in durum wheat. This is required to meet the rising

demand of baking products in the country. For this purpose bench mark of traits will be identified.

5. It is recommended to evaluate grain protein content at 12% moisture basis because it is an international practice and Indian Government also has 12 % moisture criteria for purchasing wheat for determining rates.
6. It is recommended to use 2 sprays of ZnSO₄ (each 2.0 kg/hectare with 0.5% solution in water) at the time of anthesis and early stage of seed development in Zn deficient soils for increasing Zn content in wheat grains for improving nutritional quality.
7. It is recommended to analyze Mandi/Farmers' filed samples for Hectolitre weight and grain protein content to compare with trial results in different zones. Centres involved in sending trial samples for quality analysis in different zones should also send at least 50 samples from Mandi/farmers' field in and around the centre to ICAR-IIWBR, Karnal.
8. There is no distinct advantage in coloured wheat as compared to amber wheat in terms of total antioxidant activity and processing quality traits, it is recommended NOT to have separate varieties for coloured wheat.

Barley Network

1. The malt barley programme will focus on lowering the beta glucan content in grain and wort as desired by industry.
2. Promotion of entries will also be done if it has special trait with respect to quality and disease resistance even if yield is at par.
3. To promote food barley, products will be developed in collaboration with CIPHET, Ludhiana & IIMR, Hyderabad.
4. A meeting with malt industry will be organised to address the issues related to quality.
5. ICAR-IIWBR will be nodal agency for Coding and Constitution of trials (IVTs, AVTs).
6. Varieties released by CVRC namely RD 2899 in Central Zone and RD 2907 for salinity and alkalinity in NEPZ and NWPZ should go in the package of practices of respective states of the zones
7. Maximum grain yield was realised in zero till sowing with residue retention and economics was also in favour of zero tillage with residue retention so it is recommended to practice the zero tillage with residue retention in barley.
8. In seed rate and varieties (NHZ) trial, two varieties BHS 400 and VLB gave better yield at 100 kg seed/ha and two varieties HBL 113 and BHS 352 found better with 75 kg seed/ha. So use the seed rate as per varietal recommendations.
9. A readymix of Halauxifen methyl (10.21g a.i. /ha) and Florasulam (20g/ha) with surfactant can be used to control broad leaved weeds in barley in NWPZ, NEPZ, NHZ and CZ and so incorporate in package of practices in all the zones.

Session-V: Varietal Identification Committee (VIC) Meeting

August 24, 2019

Chairman: Dr. Dinesh Kumar, ADG (FFC)

Member Secretary: Dr. GP Singh, Director, IIWBR

The meeting of Varietal Identification Committee of Wheat & Barley was held at Indore on 24th August 2019 during 58th All India Wheat & Barley Research Workers' Meet under the chairmanship of Dr. Dinesh Kumar, ADG (FFC), ICAR, New Delhi. The Varietal Identification Committee (VIC) of following attended the meeting:

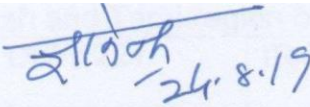
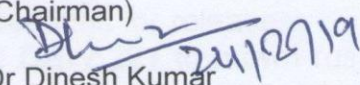
1. Dr. Dinesh Kumar, ADG (FFC), ICAR, Krishi Bhavan, New Delhi (Chairman)
2. Dr. DK Yadav, ADG (seeds), ICAR, Krishi Bhavan, New Delhi
3. Dr. BS Mahapatra, Prof., GBPUA&T, Pantnagar
4. Dr. AK Singh, Joint Director Research, ICAR – IARI, New Delhi
5. Dr. SC Mishra, Ex Head, Plant Genetics Division, ARI, Pune
6. Dr. Mohinder Prashar, Mahyco R&D, Jalna (Pvt. Representative)
7. Dr. D K Agrawal, Director, ICAR-IISR, Mau Nath Bhanjan
8. Dr. Chander Mohan, Asstt. Commissioner (Seed), DAC & FW
9. Dr. GP Singh, Director, ICAR-IIWBR, Karnal (Member Secretary)

The committee considered all 23, wheat (21) and barley (2) varietal proposals submitted for identification and after detailed deliberations, gave the following recommendations unanimously, as indicated against each proposal:

SN	Name of Variety	Production conditions	Recommendations
WHEAT			
Area Extension Proposals			
1	DBW 187	IR-TS (NWPZ)	Based on high yield and input responsiveness, the genotype was identified for release under irrigated early sown & timely sown conditions in NWPZ. This genotype has also shown resistance to wheat blast disease.
2	HD 3086	IR-TS (NEPZ)	Better performance across the years as a check in different coordinated trials and superior disease resistance and grain quality, this genotypes was identified for irrigated timely sown conditions of NEPZ.
New Proposals			
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 221	IR-TS	Both the genotypes were considered together and based on yield superiority and better disease resistance, DBW 222 was identified for release. Due to high susceptibility of DBW 221 to brown rust under natural as well as artificially inoculated conditions, this genotype could not be identified.
2	DBW222		
3	PBW 771	IR-LS	Based on superior yield and diverse resistance to wheat rusts, PBW 771 was identified.

4	BRW 3806	RI-TS	All the three genotypes were considered together. BRW 3806 was not identified due to high incidence of yellow rust. HI 1628 was identified based on superior yield and tolerance to drought. NIAW 3170 was identified based on high yield and superior grain quality.
5	HI 1628		
6	NIAW 3170		
North Eastern Plains Zone (NEPZ): Eastern UP, Bihar, Jharkhand, West Bengal (excluding hills), Odisha, Assam and plains of NE States.			
7	HD3249	IR-TS	HD 3249 was identified for release based on high yield and resistance to wheat blast.
8	DBW 252	RI-TS	DBW 252 was identified based on its resistance to wheat blast and also being drought tolerant.
Central Zone (CZ): Madhya Pradesh, Gujarat, Rajasthan and Chhattisgarh states.			
9	UAS 466(d)	RI-TS	Both the genotypes were considered together and identified based on superior yield and excellent grain quality especially yellow pigment content and pasta quality.
10	DBW 47(d)		
Peninsular Zone (PZ): Maharashtra, Karnataka and plains of Tamil Nadu			
11	MACS 6695	RI-TS	Three aestivum genotypes NIAW 3170, MACS 6695 and MACS 6696 were considered together. NIAW 3170 was identified for released due to its high yield and grain quality. MACS 6695 & MACS 6696 could not be identified due to high susceptibility to brown and black rusts.
12	MACS 6696		
13	NIAW 3170		
14	MACS 4058(d)	RI-TS	All four durum wheat proposals (MACS4058, GW1346, HI8802 & HI8805) were considered together and were identified for released based on superior yield performance over best checks.
15	GW 1346(d)		
16	HI 8805(d)		
17	HI 8802(d)		
Special - Very Late Sown (NWPZ & NEPZ)			
18	HD 3271	VLS	HD 3271 and HI 1621 were found to have merit in yield and disease resistance and hence were identified for release.
19	HI 1621		
BARLEY			
North Western Plains Zone (NWPZ)			
20	DWRB 160	IR-TS	Both the barley proposals (DWRB 160 & PL 891) were considered together and were identified for release due to their yield and grain quality.
21	PL 891		

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

 (Member Secretary) Dr G P Singh Director, ICAR – IIWBR, Karnal	(Chairman)  Dr Dinesh Kumar ADG (FFC), ICAR, New Delhi
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Session VI- International Collaborations for Wheat & Barley Improvement

August 25, 2019

Chairman : **Dr B Mishra**, Ex VC, SKUAST-J

Co-Chairman : **Dr Dinesh Kumar**, ADG (FFC)

Rapporteurs : **Drs Satish Kumar & Vaibhav K Singh**

The session was chaired by Dr B Mishra, Ex VC, SKUAST-J and co-chaired by Dr Dinesh Kumar, ADG (FFC). The session had five presentations. First presentation was by Dr Ravi Singh (CIMMYT) on Spring wheat breeding progress and plans to validate/implement new strategies to enhance genetic gain at CIMMYT. He explained in details the progress made in CIMMYT wheat breeding program across the globe. Discussing in details the impact of international collaboration on Indian wheat program he congratulated the Indian wheat family for attaining the record production of more than 100MT. He emphasized the importance of fungal diseases such as yellow rust and wheat blast and the work going on at CIMMYT for combating these threats.

Second presentation from ICARDA was made in two parts. Dr M Baum, presented wheat component while Dr RPS Verma talked on barley work going on at ICARDA. Dr Baum highlighted the significant achievements of ICARDA wheat program which focuses on rust and septoria resistance and also on heat and drought tolerance. He emphasized the need for increase in wheat yield in the background of increasing stresses. ICARDA is working on a focused identification of germplasm strategy to mitigate the impact of climate change on wheat production systems. Dr RPS Verma stressed on the impact of pre-breeding work in barley being carried out at ICARDA. Capacity building has also been a success on this collaboration with a large number of Indian scientists getting trained in International institutions.

The next presentation was by Dr Maricelis Acevedo from BGRI. She introduced BGRI as an international consortium of over 1,000 scientists from hundreds of institutions working together to reduce the world's vulnerability to wheat rusts, facilitate sustainable international partnerships to contain the threat of wheat rusts and enhance world productivity to withstand global threats to wheat security. The BGRI Gene Stewardship Award is given to wheat community annually at the BGRI Technical Workshop to recognize a researcher or team of researchers serving a national breeding program or other nationally based institution. She detailed the list of awardees since 2012. After her detailed presentation she concluded that smarter deployment of disease-resistance genes critical for safeguarding world's food supplies.

Last presentation was by Dr Parminder Virk from HarvestPlus. Starting the presentation with on micronutrient malnutrition and hidden hunger, Dr Virk emphasized the importance of biofortified crops especially wheat, maize and rice. HarvestPlus focuses on three micronutrients: Iron (Fe), zinc (Zn) and vitamin A. Using plant breeding tools HarvestPlus develops biofortified crop varieties with desirable characters (traits)-higher yield, resistance to diseases, better nutrition (higher micronutrient content). He informed the house that, biofortified crops, including zinc rich wheat, have been released in more than 30 countries and are being tested and grown.

The session ended with remarks by the chairman and co-chairman

Session VII- Brainstorming on Speed Breeding

August 25, 2019

Chairman : **Dr Trilochan Mohapatra**
Guests : **Dr SP Tiwari, Ex DDG (Crop Science)**
Dr AK Singh, DDG (Extension)

Brainstorming session on Speed Breeding was organized by the Indian Society of Genetics & Plant Breeding, New Delhi in association with ICAR-IIWBR, Karnal and SAWBAR, Karnal. Director, IIWBR, Karnal and President, SAWBAR, Dr GP Singh welcomed the Chairman, guests and participants. Dr Trilochan Mohapatra, Secretary, DARE, DG, ICAR & President, ISGPB, New Delhi welcomed the participants and delivered VS Mathur Memorial lecture in which he emphasized various newer technologies for enhancing wheat production in order to strengthen global food security.

After his lecture Dr. Lee Hickey, University of Queensland, Australia presented the concept, strategies and methodologies in speed breeding in which he presented possibility of harvesting 4-5 generation of the crop in a year under artificially controlled conditions. There are number of crop species in which the speed breeding technology may be applied for fastening the breeding cycle. There was a detailed discussion with the participants from various crop based institutes for exploring feasibility of adoption of this technology. The crops, cooperating centres, financial implications, human resource development were the major components of discussion.

Dr Trilochan Mohapatra, Chair of the session desired to go ahead with this technique in few crops and extending to more crops in line to the feedback from the adopting crops. Dr. SP Tiwari, Ex DDG, Crop Sciences and Dr AK Singh, Director, IARI were of same opinion for exploring possibility of using this technique for crop improvement. Dr Rajeev Varshney, ICRISAT opined about its utilization in pulse crops.

Afterwards, the ISGPB, New Delhi felicitated the breeders who developed landmark varieties in different crops including wheat, rice, maize, mustard, sorghum and pearl millet. In this, five wheat varieties namely DBW 17, PBW 343, HD 2967, HD 3086 and GW 322 were included as landmark varieties.

This special brainstorming on speed breeding ended with the vote of thanks proposed by Dr Tara Satyavati, Vice President, ISGPB, New Delhi.

Session VIII- Status Reports from States and Farmers Views for R&D in Wheat

August 26, 2019

Chairman : Dr BS Mahapatra, Professor (Agronomy), GBPUA&T

Co-Chairman : Dr Gyanendra Singh, PI (CI), ICAR-IIWBR

Rapporteurs : Drs RS Chhokar & AK Sharma

The special session on “Status reports from the states and farmers views for R&D in wheat” was chaired by Dr. BS Mahapatra, Ex-Director, ICAR-CRIJAF & Professor (Agronomy), GBPUA&T, Pantnagar. At the onset, Chairman welcomed the Co-Chairman, speakers, and delegates and complimented the farmers including women farmers of the country for their contribution in crossing magic figure of 100 million tons of wheat production. It was very disappointing to note that none of the state government representative turned up for this important session planned to discuss progress and issues.

The first speaker of the session was from KPMC, who presented his talk and informed that they are the manufacture of Graders, mini Dal Mill and packaging unit of different capacity. He also pointed out that they provide the small scale machines for farmers use and Govt. is providing the subsidy on these machines. At present, KPMC has Graders of capacity ranging from 6-10 q/hr. During presentation, he informed the house that when graded materials go to Mandi then chances of export for such graded grain becomes easy because of better quality. Dr Anju Mahendru from IARI, New Delhi suggested that besides graders other low cost quality (protein, Zn and Fe) testing machines are also needed, so that the produce can be sold or procured based on the quality.

The second presentation was of Sh Bahadur Singh Jaria from Fatehgarh Sahib (Punjab) who said that he is following crop diversification. He also informed that he acquired the technical knowhow of farming from the SAUs and ICAR institutes and now implementing these on his farm and getting better crop yields. He is also involved in seed production of latest HYVs of wheat and earning good profit from seed production. Besides these, he has also adopted Turbo Happy Seeder for seeding wheat to reduce cost of production and tackle the problem of residue burning.

The third presenter was a woman farmer Smt Koela Devi from Gorakhpur (UP), who narrated her success story that how she from a very small quantity of seed of DBW 187 (2.0 kg) by following the dibbling method of sowing coupled with balanced fertilization achieved a yield of 82 q/ha and house given a applause for this achievement.

Thereafter, Mr Jaideep Singh Tomar from Morena (MP) gave his presentation and said that he has under gone training in respect of soil health, modern techniques of raising field crops and seed production. Earlier, besides doing a govt job he was also looking after his farm and because of his passion for farming, he left the Govt. Job and now totally devoted to farming. His major liking is in seed production and from which he is earning 1.5 times more profit compared to simple grain production.

Next presenter was Sh Raghuvinder Singh Chandel from Bilaspur (Chhattisgarh), who informed that he is taking even three crops in a year from a field and has a cropping intensity of 250-300% on his farm. He is growing the Zaid moong on large area without any fertilizer and getting better yields along with better soil health. Also, he is adopting line sowing instead of broadcast sowing and getting the yield benefits and also involved in seed production on large scale.

Sh Sunil Kalra, Kurukshetra (Haryana) also presented his experience on seed production marketing of latest varieties in different part of the country. His major emphasis is on enhancing seed & varietal replacement rates of different crops.

Besides, these invited progressive farmers, Sh. Gulab Singh Lodhi from Narsinhpur, MP and Sh Sudhir Agrawal, a seed grower from Mathura (UP), highlighted the importance of crop diversification and strategic adoption of villages for seed production of latest wheat varieties

After the presentations by all the speakers, co-chairman Dr Gyanendra Singh, summarized the main points from all the presenters and appreciated their efforts in adopting and popularising the latest technologies especially the seed production and spread of latest wheat varieties. At the end, Chairman Dr. BS Mahapatra complimented the all the presenters and also the organizers for honouring the farmers and keeping such farmers' interactive session in the meet.

Session IX - Plenary Session

August 26, 2019

Chairman : Dr. Ravi Prakash Singh, CIMMYT, Mexico
Co-Chairman : Dr. Dinesh Kumar, ADG (FFC)
Dr. GP Singh, Director, IIWBR, Karnal
Rapporteurs : Drs Poonam Jasrotia & Sendhil R

The plenary session of the three days workshop, i.e., wheat and barley research workers meet was chaired by Dr. Ravi Prakash Singh, Distinguished Scientist and Head of Global Wheat Improvement, CIMMYT and co-chaired by Dr.GP Singh, Director, ICAR-IIWBR and Dr.Dinesh Kumar, PS and Acting ADG(FFC), ICAR. The Chairman welcomed the delegates of the meeting and appreciated the efforts of the coordinated programme in achieving the historic wheat production target of 102.19 MT during 2018-19. He then requested the section wise PIs to present the significant recommendation and highlights of work plan for 2019-20.

The recommendations and plan of work for Crop Improvement was presented by Dr Gyanendra Singh, PI, Crop Improvement and were based on the Research Review meeting of Crop Improvement while the composition of different trials including AVTs, NIVTs, IVTs, HYPT and special trials for various zones to be conducted during the crop season 2019-20 that were finalized in the Work Plan meetings. There was a discussion on narrowing down the intervention of DAC&FW and a request was put forth for two years' performance to conclude trails like HYPT. A set of guidelines to be developed for quality parameters has also been suggested by Dr. Anju from IARI.

Dr RK Sharma, PI, Resource management presented the recommendations and plan of work for 2019-20 crop season. The Resource Management and Social Sciences groups after thorough deliberations arrived at the general and specific recommendations including the proposal for special trials. After the present ation, Dr. Mahapatra questioned about the application of Zn SO₄ and Dr. Dinesh Kumar discussed about sowing time in trails. Dr. GP Singh suggested for carrying out trails meant for Zn SO₄ application in all the zones (SPL-3) and the need for special trials on sowing time.

Crop Protection's recommendations and the work plan for 2019-20 were presented by Dr Sudheer Kumar, PI-Crop Protection, ICAR-IIWBR, Karnal. He informed that the programme has led to development for new chemicals for control of yellow rust and organic treatment for the aphids' management. There was a discussion on higher dose of 'N' and Zn SO₄ will lead to increase in the incidence of insects' pest and hence it was suggested to do research on managing pests and diseases when the nutrients doses are increased. Dr. Dinesh Kumar suggested to work on storage pests using botanicals.

Wheat quality group formulated the plan of work and recommendations based on the discussion with their group members and Dr Sewa Ram, PI-Quality Improvement presented the section recommendations. After the presentation by the PI, there was a suggestion to develop candidate varieties for quality program.

Barley network recommendations and the work plan for 2019-20 were presented by Dr AS Kharub, PI-Barley Network, ICAR-IIWBR, Karnal. Post presentation by the PI, it was suggested for documentation of special trials with traits. Further, for setting the barley quality parameters, a meeting has to be convened with private stakeholders at the earliest.

Following the presentations made by the PIs of all units, Dr. Ravi P Singh said that national interest should be the top priority and a strong national program will facilitate the CG centres to work together. Dr. Dinesh Kumar suggested the coordinating centres to infuse new ideas into the AICRP. Subsequently, Dr. GP Singh presented the Varietal Identification Committee (VIC) report. Of 21 wheat proposals, 17 were

recommended and of 2 barley proposals, two were recommended by the VIC. Further, there were two proposals for area extension *viz.*, DBW 187 in the NWPZ and HD 3086 in the NEPZ and both of them got recommended by the VIC.

Following the VIC report presentation, there was felicitation of researchers who are to be superannuated in 2019-20. Subsequently, Dr.GP Singh invited proposals regarding the venue for the next workshop. There were three proposals *viz.*, Pantnagar, Udaipur and Srinagar. It was decided that the proposals will be sent to the Council for final approval of the venue.

Dr.GP Singh in his remarks congratulated the workers on coordinated research and requested to adapt with the situation based on the changing requirements and demand. He stressed for disruptive technologies, commercialization of prototype of machinery for residue burning, efficient genotypes for water as well as nutrition. He also thanked the farmers from different parts of the country who have participated in the workshop. He also thanked DG, DDG, ADG, and local Organizing Secretary for the successful conduct the workshop in Indore.

The session ended with the vote of thanks by Dr.SK Singh, Organizing Secretary of the 58th workshop.

List of Final Year Entries, 2019-20

Entry	Checks
AVT-IR-LS-TAS - North Western Plains Zone	
HD3298	HD3059, DBW173, WH1021, WH1124, PBW771(I)
AVT-RI-TS-TAS - North Eastern Plains Zone	
HD3293	HI1612, HD3171, K1317, HD2888, DBW252(I)
AVT-IR-LS-TAD – Central Zone	
CG1029, HI1634	HD2932, HD2864, MP3336, MP4010
AVT-IR-TS-TAS – Peninsular Zone	
DDW 48, DDW49(d)	MACS6222, MACS6478, MACS3949(d), UAS428(d)
AVT-IR-LS-TAS – Peninsular Zone	
HI1633	HD2932, HD3090, Raj4083
AVT-RI-TS-TAD – Peninsular Zone	
NIDW1149(d)	HI1605, AKDW2997-16(d), UAS446(d), NIAW3170(I), HI8805(d)(I)
SPL – HYPT	
DBW187, DBW303, WH1270	HD3086, HD2967

**58thAll India Wheat & Barley Research Workers' Meet, Indore
24-26 August, 2019**

Day 1: August 24, 2019

8.30 AM- 9.00 AM

REGISTRATION

Session I: Director's Report

Venue: Ravindra Auditorium, RNT Marg

Time: 9.00AM-10.00 AM

Chairman : Dr. AK Singh, Vice Chancellor, BAU, Sabour
Special Guest : Dr. SK Rao, Vice Chancellor, RVRSKVV, Gwalior

Presentation of Director's Report: Dr GP Singh, Director, ICAR-IIWBR, Karnal

Tea Break: 10.00-10.15 AM

Session II: Research Review Meeting

Venue: Ravindra Auditorium, RNT Marg

Time: 10.15AM-01.00 PM

Chairman : Dr. Ashwani Kumar, JS (Seed), DAC&FW
Co-Chairman : Dr Dinesh Kumar, ADG (FFC), ICAR
Dr DK Yadav, ADG (Seed), ICAR
Rapporteurs : Dr(s) Gopalareddy K & GS Mavi

Disciplines

Crop Improvement
Resource Management
Crop Protection
Flowerdale
Wheat Quality
Barley Programme
Impact of FLDs & constraints analysis

Speaker

Dr Gyanendra Singh
Dr RK Sharma
Dr Sudhir Kumar
Dr SC Bhardawaj
Dr Sewa Ram
Dr. AS Kharub
Dr. Satyavir Singh

Lunch: 01.00-02.00 PM

SESSION-III: Research Planning Meeting (Concurrent sessions)

Time: 02.00PM- 3.30PM

Disciplines	Venue
Crop Improvement including Breeder Seed Allocation	Ravindra Auditorium, RNT Marg
Resource Management	Committee Room, CoA
Crop Protection	Committee Room 1: IARI-RS
Wheat Quality	Committee Room 2: IARI-RS
Barley Network	Extension meeting room, CoA

Tea Break: 3.30 – 03.45 PM

SESSION –IV: Finalization of work plan and recommendations

Time: 03.45 PM – 06.00PM

Chairman	:	Dr SK Rao , VC, RVRSKVV, Gwalior
Co-Chairman	:	Dr. Dinesh Kumar , ADG (FFC)
Rapporteurs	:	Drs. CN Mishra & Pradeep Shekhawat

Discipline	Coordinator
Crop Improvement	Dr Gyanendra Singh
Resource Management	Dr RK Sharma
Crop Protection	Dr Sudheer Kumar
Wheat Quality	Dr Sewa Ram
Barley Network	Dr AS Kharub

SESSION-V: Varietal Identification Committee Meeting

Time: 06.00 PM onwards

Venue: Conference Room, Hotel Lemon Tree, Indore

Chairman	:	Dr. Dinesh Kumar , ADG (FFC), ICAR
Member Secretary	:	Dr. GP Singh , Director, ICAR-IIWBR, Karnal

Dinner: 7.30PM onwards

Day II: August 25, 2019

INAUGURAL SESSION

Ravindra Auditorium, RNT Marg, Indore

Date: 25 August, 2019

Time: 9.30 AM-11.30 AM

9.30-9.35	ICAR Song
9.35-9.40	Welcome of the Dignitaries
9.40-9.45	Lighting of the Lamp
9.45-9.55	Welcome Address & Research Highlights 2018-19 by Dr. GP Singh , Director, ICAR-IIWBR, Karnal
9.55-10.05	Remarks by Sh. Ashwani Kumar , JS (Seed)
10.05-10.15	Remarks by Dr. Ronnie Coffman , Vice Chair, BGRI
10.15-10.25	Remarks by Dr. AK Singh , DDG (Extension) and Director IARI
10.25-10.35	Awards & Release of publications by the Chief Guest and Dignitaries on Dias
10.35-11.20	Address by the Chief Guest Dr. Trilochan Mohapatra , Secretary, DARE & DG, ICAR
11.20-11.30	Vote of Thanks

Press Conference & Visit to Exhibition of the Chief Guest

High Tea 11.30 AM- 12.00 PM

SESSION-VI: International Collaborations for Wheat & Barley Improvement

Ravindra Auditorium, Time: 12.00 Noon -01.30PM

Chairman : Dr B Mishra, Ex VC, SKUAS&T-J
Co-Chairman : Dr Dinesh Kumar, ADG (FFC)
Rapporteurs : Dr Satish Kumar & Dr. Vaibhav K Singh

Topic	Speaker
Spring wheat breeding progress and plans to validate/implement new strategies to enhance genetic gain at CIMMYT	Dr. Ravi Singh, CIMMYT
India –ICARDA collaboration for wheat & barley improvement	Drs. M Baum & RPS Verma
Global challenges require global solutions: Responsible gene stewardship	Dr. Maricelis Acevedo, BGRI
Potential of bio-fortified wheat to address human zinc deficiency	Dr Parminder Virk, Harvest Plus

Lunch Break 1.30 PM-2.30 PM

Special Session VII: Brainstorming on Speed Breeding

Venue: Ravindra Auditorium

Time: 2.30 PM-5.30 PM

VS Mathur Memorial Lecture & Award Ceremony

Chairman : **Dr. Trilochan Mohapatra**, President ISGPB
Guests : **Dr. SP Tiwari**, Ex DDG (CS), ICAR
Dr. AK Singh, DDG (Extension) & Director, IARI
Co-Chair : **Dr GP Singh**, President SAWBAR
Dr Tara Satyavathi, Vice President, ISGPB

2.30-2.40	Welcome	Dr GP Singh , President, SAWBR
2.40-3.20	VS Mathur Memorial Lecture	Dr. Trilochan Mohapatra , Secretary, DARE & DG, ICAR
3.20-4.00	Speed Breeding	Dr Lee Hickey , The University of Queensland, Australia
4.00-5.00	Discussions	All
5.00-5.20	Felicitation for Landmark Varieties	Dr Sanjay Singh , Secretary, ISGPB
5.20-5.30	Vote of Thanks	Dr Tara Satyavati , Vice President , ISGPB

Dinner: 7.30 onwards

Day III: August 26, 2019

SESSION- VIII: Status reports from states and farmer's views for R&D in Wheat

Venue: Ravindra Auditorium

Time: 09.30-11.30AM

Chairman : Dr BS Mahapatra, Professor (Agronomy), GBPUA&T
Co-Chairman : Dr Gyanendra Singh, PI (CI), ICAR-IIWBR
Rapporteurs : Dr (s) RS Chhokar & Amit Sharma

- Transferring new technologies to fields -new initiatives : Dr BK Srivastava, Director, DWD
- Status reports/ specific inputs : Director, Agriculture of different states
- Inputs from progressive farmers : Sh Bahadur Singh Jaria, Punjab
Sh Sunil Kalra, Haryana
Smt Koila Devi, UP
Sh Jaydeep Singh Tomar, MP
Sh Raghavendra Singh Chandel, CG

Tea break: 11.30-11.45AM

SESSION- IX : Plenary Session

Venue: Ravindra Auditorium

Time: 11.45AM – 01.45 PM

Chairman : Dr. Ravi Prakash Singh, CIMMYT, Mexico
Co-Chairman : Dr. Dinesh Kumar, ADG (FFC), ICAR
Dr. GP Singh, Director, IIWBR, Karnal
Rapporteurs : Dr(s) Poonam Jasrotia & Sendhil R

Presentation of significant recommendations and highlights of work plan for 2019-20

Crop Improvement	Dr. Gyanendra Singh
Resource Management	Dr. RK Sharma
Crop Protection	Dr. Sudhir Kumar
Wheat Quality	Dr. Sewa Ram
Barley Network	Dr. AS Kharub

Report of Varietal Identification Committee

Presentation of mementoes for release of varieties by the CVRC

Felicitating superannuating wheat & barley researchers

Proposal for venue of 2020 workshop

Remarks by Director, IIWBR

Remarks by ADG (FFC), ICAR

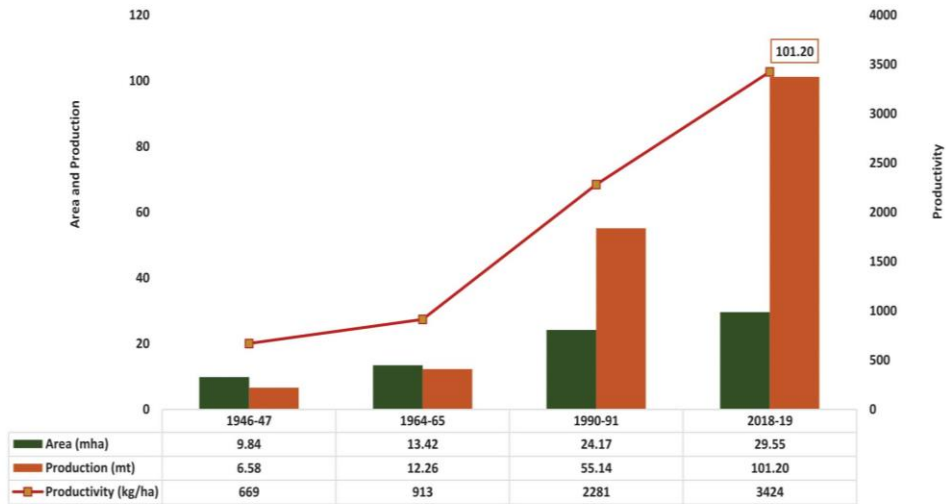
Chairman's Remarks

Vote of Thanks

Dr. GP Singh
Dignitaries on dias
Dignitaries on dias
All Participants
Dr. GP Singh, Director, IIWBR
Dr. Dinesh Kumar, ADG (FFC)
Dr. AK Singh, DDG
Dr. SK Singh, Organizing Secretary



LAND MARK PRODUCTION DURING 2018-19 (>100 MT)



58वीं अखिल भारतीय गेहूँ एवं जौ अनुसंधान कार्यशाला
 भा.कृ.अनु.प. - भारतीय कृषि अनुसंधान संस्थान,
 क्षेत्रीय केन्द्र, इन्दौर में आयोजित गोष्ठी के उपरांत जारी किया गया