भाकृअनुप
ICAR

57वीं शोधकर्ता बैठक
57th Research Workers Meet

अखिल भारतीय समन्वित गेहूँ एवं जौ अनुसंधान परियोजना

AICRP on Wheat and Barley

उन्नत तकनीकियों द्वारा किसानों की अधिक आय

Improved Technologies for Higher Income of Farmers

कार्यवाही, संस्तुति एवं कार्ययोजना

PROCEEDINGS, RECOMMENDATIONS AND WORK PLAN 2018-19

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 2018-19)

57th All India Wheat & Barley Research Workers' Meet
Held at
Birsa Agricultural University, Ranchi (Jharkhand)
(August 24-26, 2018)

Organised By
BAU Ranchi & ICAR-IIWBR, Karnal

Issued by
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Foreword

The 57th All India Wheat and Barley Research Workers' meet held at the Birsa Agricultural University, Kanke, Ranchi, Jharkhand during 24-26 August, 2018 was jointly organized by the ICAR-Indian Institute of Wheat and Barley Research, Karnal and BAU Kanke, Ranchi. The meet was inaugurated by the Honourable Governor of Jharkhand Smt Droupadi Murmu ji, while Dr. Trilochan Mohapatra, DG ICAR and Secretary DARE, Government of India was the Guest of Honour. Dr. AK Singh, DDG (CS), ICAR was the special guest while Prof. Parminder Kaushal, Vice Chancellor, BAU, Ranchi, chaired the inaugural session. The meeting reviewed the results of previous year experiments and based on the deliberations, the programme for ensuing crop season 2018-19 was finalized. Apart from this, emerging issues in wheat production were also discussed by eminent speakers during various special sessions.

On behalf of the wheat and barley fraternity, I express my sincere gratitude to Her Excellency Smt Droupadi Murmu ji, Governor of Jharkhand, for kind acceptance to grace the occasion as chief guest. I express my deep sense of gratitude to Dr T Mohapatra, Secretary DARE and DG, ICAR for guidance and continuous support. I also express gratitude to Dr AK Singh, DDG (CS), ICAR for guidance and encouragements. I also place on record my sincere thanks to Prof P Kaushal, Vice Chancellor BAU Ranchi for his unfailing help and dedicated support; Dr AK Singh VC, BAU, Sabour for joining the discussions and sharing experiences. Suggestions provided by eminent personalities like Dr Hans J Braun, Dr Ravi P Singh from CIMMYT, Dr Ronnie Coffman from BGRI, Dr. Baidya Nath Mahto from Nepal, Dr AK Joshi, Dr. BS Mahapatra and zonal coordinators for fine tuning the programme are gratefully acknowledged.

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

I wish all the best for the ensuing season.

(GP Singh)

Welcome and Presentation of Progress Report

August 24, 2018 **Chairman** **:** Dr. P Kaushal
Rapporteurs **:** Dr BS Tyagi

Presentation of Progress Report for 2017-18: Dr. GP Singh

Dr DN Singh, Director Research, Birsa Agriculture University, Ranchi, welcomed the delegates. Dr. GP Singh, Director, ICAR-IIWBR welcomed the scientist in the 57th All India Wheat & Barley Research Workers' Meet and congratulated them for the marked achievements in wheat & barley research. Wheat production in the country is upbeat, as a consequence of the hard work, and country is attaining new heights during past two years crossing 98 mt. (fourth estimate) wheat production during 2017-18. He attributed this success to the hard work of scientists of ICAR & SAUs, policy level decisions of DoAC, International cooperation with CIMMYT, ICARDA and farmers faith in new production technology. The director stressed to take it to new height for social reasons. He informed the house that seven new varieties of wheat (K1317, DBW168, DBW173, UAS375, HI1612, MACS4028 (d) and HI8777) and one variety of barley (DWRB137) were released by the Central Sub-Committee on Crops Standards. Besides,

During the year 2017-18, fourteen genetic stocks of wheat namely QBP12-11, HI8751, HIKK10 (NP4+Lr13), HIKK11 (NP4+Lr18), HIKK12(NP4+Lr19), HIKK13(NP4+Lr26), HI8765, HSRBW2, HSRDW2, LBPY11-2, FLW31, FLW32, FLW33 and FLW18 were registered for traits like differential races, leaf rust, disease resistance to rusts and head scab, early maturing and soft grain with NBPGR and several new donors were identified by churning huge germplasm in the form of national and international nurseries. The genetic resources unit of the ICAR-IIWBR, Karnal multiplies the seeds of these registered genetic stock and supplies to breeder across the country for use in wheat improvement. Dr. G P Singh expressed satisfaction over the research efforts being laid on resource conservation technology, weed control, cropping systems and water use efficiency.

He informed the house that Uttar Pradesh retains its first position in terms of wheat production with a total record output of 31.99 mt (32%), followed by Punjab (17.61 mt: 18%), Madhya Pradesh (15.91 mt: 16%), Haryana (11.31 mt: 11%), Rajasthan (9.53 mt: 10%) and Bihar (4.58 mt: 5%). These top six states hold a share of about 92 per cent in total wheat production. Barring Bihar, Chhattisgarh, Haryana, Himachal Pradesh, Jharkhand, Madhya Pradesh, Maharashtra, Telengana, Uttarakhand and West Bengal, the rest of the states registered an increase in production during 2017-18 in comparison to 2016-17. During the crop season 2017-18, a total of 24 series of trials comprising AVTs, NIVTs, IVTs and Special trials were laid out in the different zones under four major production conditions viz. timely sown irrigated, late sown irrigated, timely sown restricted irrigation and timely sown rainfed condition. This year altogether 315 test entries were evaluated along with a total of 57 check varieties in different trials. In all, 373 trial sets were supplied to 123 centres out of which 361 trials were actually conducted. Dr P Kaushal stressed the need to emphasize for minimizing the yield gaps and develop varieties in accordance with changes occurring in the climate. He stressed about the new technologies of wheat and barley cultivation in NEPZ to get further boost production. Dr. Kaushal emphasized upon pre-breeding for biotic & abiotic stresses, bio-fortification and molecular breeding. He was optimistic about the industrial demand of barley and emphasized a strong public-private partnership.

The session was concluded with the thanks to the chair.

Session I- Principal Investigators' Reports-Research Review Meeting

August 24, 2018	**Chairman**	**:**	Dr. AK Singh, Vice Chancellor, BAU, Sabour
	Co-Chairman	**:**	Dr. RK Singh, ADG (FFC)
	Rapporteurs	**:**	Drs. Ratan Tiwari and Mamrutha HM

At the outset, chairman Dr AK Singh, V.C., BAU, Sabour welcomed delegates to the first session and invited PI, Crop Improvement Dr R Chatrath for his presentation. Dr Chatrath while initiating his presentation informed the house that this is the first ever wheat researcher group meeting in which minimum use of paper was done, since most of the jobs were executed in soft copies through online mode. He presented the list of released varieties during 2017-18 and genetic stocks registered for the various traits.

He also listed different trials proposed and conducted. He informed that although the success rate of trial conducted has been increasing but still during 2017-18, 72 trials were not reported due to various reasons and 12 trials were not conducted. A centre wise summary report about allocation, conduct and reporting of trials along with the reasons for trial having not been reported was presented. Principal Investigator informed the house that out of 123 centers, monitoring team could cover 100 centers during the crop season. A route map of various teams along with the date of visit was presented before the house. He gave the details of all 21 trials rejected by the monitoring team along with the reasons. Subsequently Dr Chatrath listed the promising genotypes which are likely to get promoted to the next stage on the basis of their performances. While showing the list of different national nurseries that were conducted at different centers, he invited participating centers to place their indent in case any additional nursery is required by them.

Coming to the breeder's seed production, the PI crop Improvement informed the house that seed production was more than the target. While listing the top ten varieties based on the indent received and production of breeder's seed during 2017-18, was conceived about some of the old varieties still receiving substantial indent may be withdrawn and the indent should get replaced by higher yielding newer varieties recommended for the specific zone. He showed his concern about seeds of some varieties being produced even without any indent. In cases where there was deficit in seed production, reasons were put forth such as non-lifting of seed in time, older varieties etc. Towards end of his presentation, Dr Chatrath listed various trainings offered during the year and different issues for discussion point. Initiating the interaction from the audience, Dr Sanjay Kumar, IARI, New Delhi drawing attention to the breeder's seed production showed his anxiety about the 30 odd very old varieties whose indents are still being entertained. He was of the opinion that if these indents are solely from the private seed companies, there is urgent requirement to stop their production.

In the chairman's observation, Dr AK Singh, V.C.BAU, Sabour was critical about rejection of 21 trials and 72 trials that could not be reported due to various reasons. He was of the opinion that, the In-charges of the centers whose trials got rejected should own the responsibility and strive hard to see that the same should not be repeated in the future. Co-chairman, ADG (CC & FFC) Dr RK Singh was highly concerned about the trials for which data could not be reported. He suggested informing the Vice-Chancellors/Authorities of centers whose trials did not find place in the reported data due to controllable reasons.

The Chairman thanked Dr Chatrath and invited Dr RK Sharma, PI, Resource Management to make his report presentation. Dr RK Sharma informed the house that out of the total 31 trials proposed only 1 trial was rejected due to the poor crop stand. While making details of various trials etc, his major concern was regarding weed management. He also informed the house about various chemicals and their combinations being tested as probable weedicides for controlling wheat weeds like *Avena fatua*, Foxtail, Jungali Palak, Rumex and Chinopodium. He also made a mention regarding validation of nutrient expert.In alignment with the government "more crop per drop" mission, Dr Sharma presented the findings about the water management using micro irrigation methods. He informed the house that there is water saving to the tune of 10.44% while there is a yield gain of slightly above 3%. Findings of the experiments on growth regulators and application of Hydrogel were also made. During the interaction after the presentation, concerns were raised about cost benefit ratio of applying Hydrogel. Chairman asked the PI to come up with one page write-up of Hydrogel and their cost benefit along with suitable area for using of this hydrogel in wheat cultivation.

Dr.DP Singh, 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, CCN and ear cockle disease management. Dr. AN Mishra from IARI, Indore expressed his concern for postulating new + genes along with different rust genes. Dr. Ravi Singh from CIMMYT suggested that genome sequencing may help in designing new markers for postulating new rust genes. Dr. SC Bharadwaj, IIWBR, regional station, Shimla supplemented that due to evolution of more number of pathotypes it would be possible in future to identify hitherto unknown genes. Dr.Yadav raised the query that why there is drastic reduction in some pathotype's appearance such as that of 70S84 within one year. Dr. Bharadwaj mentioned that this reduction is attributed to the recent varietal development programmes which used other than PBW 343 entries.

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. Quality in released wheat varieties is increasing over decades due to change of PBW 343 in breeding programme. Identified the soft wheat grain genotype DBW 168 for biscuit making quality. Promising genotypes were identified for yellow pigment content also. He asked the centers working on durum wheat to improve the yellow pigment content in them. Nutrition quality has been increased in all zones and micro level tests were standardized for different quality parameters at IIWBR. He also emphasized that quality traits should be considered in breeding programmers of different zones. He was inquisitive to know whether or not data from grains needs to be generated at all on the genotypes / centers where very low hectoliter weight is observed? Director, IIWBR also endorsed the improvement of wheat quality and yield advantage over decades in wheat coordination programme.

Dr.AS Kharub, PI, Barley presented the progress of barley coordination programme. He presented on production, productivity and quality in barley, new varieties and genetic stocks released, Interaction with companies for sending materials to them, barley germplasm activities, working on competing with international standards of malt barley, finding entries for host resistance, new chemicals identified for insect and weeds control. At the end he emphasized that as barley gives same remuneration as that of wheat it should be promoted for cultivation in large area.

Dr. Satyavir Singh, PI, Social sciences presented on number of FLD's conducted and high yielding entries identified at different zones. Almost in all the zones there were centers / varieties which showed close to 30% yield advantage. Technology transfer like happy seeder and zero tillage were also included in the demonstrations. He explained about constraints and action taken points in different extension activities.

Dr. Vikrant Singh from Directorate of Wheat Development (DWD) presented on different national food security mission programmes undertaken by DWD at 11 different states and 126 different districts. Different programmes undertaken at five north eastern states to bring second green revolution. Introduced cafeteria of intervention for block demonstration of wheat and listed different programmes under this. He explained about FLD's demonstrated, new challenges like wheat rust, wheat blast and need of nutri rich varieties. New intitiatives undertaken for GPS system implementation and enrollment of NFSM beneficiary through mobile applications.

At the end from the audience during general discussion, Shri Gulab Singh Lodhi, farmer from MP expressed his concern on spread of Karnal bunt disease. He said that recently there is some insect pest which is causing holes in ripened spikes which need to be addressed by the scientists. He also said that much emphasis should be given for the spread of newly released varieties.

Dr. RPS Verma from ICARDA said that the implications of FLD's should be analysed for the impact analysis of any technology and delegate from DAC also supported the impact analysis of FLD's and their paper publication in suitable journals for both acceptance and rejection of technologies.

While wrapping-up the session, Chairman Dr AK Singh opined that a document should be prepared highlighting the impact of various technologies developed by the scientists. He also emphasized that due to some reasons area this year in NEPZ under rice has been low therefore wheat sowing might be little early. Varieties suited to the timely sown conditions may be made available to those farmers. Co-chairman Dr RK Singh emphasized and invited the scientists for solving problems of farmers and to come out with farmer friendly recommendations before the completion of 57^{th} wheat and barley worker's meet.

Sessions II & III - Research Planning Meetings and Finalization of Work Plan

August 25, 2018	**Chairman**	**:**	Dr AK Singh, DDG (CS & Hort)
4.00 PM-6.00 PM	**Co-Chairman**	**:**	Dr RK Singh, ADG (FFC) Dr GP Singh, Director, IIWBR
	Rapporteurs	**:**	Drs. SK Singh & K Gopalareddy

The session to finalise work plan and recommendations was opened by Chairman of the session, Dr AK Singh, DDG (CS & Hort), ICAR, New Delhi and he welcomed all the participants and invited the Principal investigators of different disciplines to present the work plan and recommendations for crop season, 2018-19. Dr Ravish Chatrath 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 workplan of NIVTs, AVTs of all five zones and Special trials on salinity, dicoccum and very late sown conditions (NWPZ/NEPZ). The details of different AVT trials in NHZ (AVT- ES-RF-TAS, AVT-TS-RF-TAS, AVT-RI-LS-TAS), NWPZ (AVT-IR-TS-TAS, AVT-IR-LS-TAS, AVT-RI-TS-TAS), NEPZ (AVT-IR-TS-TAS, AVT-RI-TS-TAS), CZ (AVT-IR-TS-TAD, AVT-IR-LS-TAD, AVT-RI-TS-TAD), PZ (AVT-IR-TS-TAD, AVT-IR-LS-TAD, AVT-RI-TS-TAD) were presented. It was finalised to continue the proposed work plan except for AVT- ES-RF-TAS trial of the NHZ which was merged with AVT-TS-RF-TAS trial. Dr Lakshmi Kant, Zonal Coordinator of NHZ requested to include the promoted entries of AVT-ES-RF-TAS to the AVT-TS-RF-TAS trial. Constitution of new trial for high yield potential of 8t/ha was also finalised with 15 entries including check varieties. He requested to put same set of entries for breeding as well as agronomical trials for high yield potential of 8t/ha which was agreed by the Chair.

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 RK Singh of BHU, Varanasi raised the issue of enhancing the contingency for which he was informed about uniform provision of contingency based on allocated trials at all the centres. DDG (CS & Hort) Dr AK Singh advised to make impact assessment studies of FLDs conducted over the years so that the spread of new varieties and technologies may be documented and asked to present the results of this study in next workshop. Dr RK Singh, ADG (FFC) and Dr GP Singh, Director, ICAR-IIWBR also opined for impact assessment studies of new varieties, technologies and role of collaborating institutes in spread of technologies to farm level and thereby increases in income to farmers in view to document success stories to face financial reforms at ICAR level.

Dr DP Singh presented the workplan and recommendations for Crop Protection and informed the identification of new chemical combinations for aphid control. Sri Bhagwan Das, a progressive farmer from Punjab, asked about the measures for control *Phalaris minor* for which it was informed that new chemicals have been evaluated and recommendations will be made to farmers after procedural approval from the ICAR and DAC&FW.

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 RK Singh, ADG (FFC) stressed to recommend varieties suitable to various products and nutritional parameters for use by farmers, industry and breeders for further utilization. Dr Ravi P Singh from CIMMYT, Mexico advised to use AVT data for identification and release of variety in order to get good quality varieties in future.

Dr AS Kharub presented the workplan and recommendations of Barley programme for 2018-19 in which he informed about all the breeding, agronomical, pathological and quality related experimentations.

Chairman Dr AK Singh asked all the Principal Investigators of the various programmes under AICRP on Wheat & Barley to re-frame the recommendations in accordance to their direct role in raising a good crop and enhanced profitability to farmers in order to step towards doubling the farmers' income. The session ended with thanks to the Chair, Co-chair and Rapporteurs by the Organizing Committee.

Work Plan - Crop Improvement
National Initial Varietal Trials
NIVT-1A-IR-TS-TAS, 2018-19

Conducting centres

Zone	No.	Centres
NWPZ	9	Delhi, Jammu, Ludhiana, Gurdaspur, Hisar, Karnal, Bulandshahr, Pantnagar, Durgapura
NEPZ	9	Kanpur, Faizabad, Varanasi, IARI-Pusa, Sabour, Ranchi, Kalyani, Manikchak (Malda), Coochbehar
Total	**18**	

Details of trial entries

SN	Contributing Centres	No. of Entries	Name of entries
1.	IARI	6	HD3318, HD3319, HD3320, HD3321, HD3322, HD3323
2.	Ludhiana	4	PBW802, PBW803, PBW804, PBW805
3.	IIWBR-Karnal	4	DBW281, DBW282, DBW283, DBW284
4.	Hisar	4	WH1255, WH1256, WH1257, WH1258
5.	Pantnagar	4	UP3025, UP3026, UP3027, UP3028
6.	Durgapura	3	Raj4537, Raj4538, Raj4539
7.	Faizabad	1+1	NW7067, NW7060
8.	Kanpur	1	K1801
9.	Varanasi	1	HUW 833
10.	NABI, Mohali	3	NABIMG 09, NABIMG 10, NABIMG 11
	Checks	**4**	**HD3086, DBW88, HD2967, K1006**
Total		**36 (32+4)**	

Experimental details

Design	:	Simple Lattice
Replication	:	Two
Plot size	:	**Gross:** 6 x 1.20m (6 rows); **Net:** 6 x 0.80m (4 middle rows)
Fertilizer dose (kg/ha)	:	150:60:40 (N:P:K)
Time of sowing	:	**NWPZ:** November 1-15; **NEPZ**: November 15-25
Seed requirement	:	7.0 kg per entry

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

National Initial Varietal Trial
NIVT-1B-IR-TS-TAS, 2018-19

Conducting centres

Zone	No.	Centres
NWPZ	7	Delhi, Ludhiana, Gurdaspur, Hisar, Karnal, Pantnagar,Durgapura
NEPZ	11	Kanpur, Faizabad, Varanasi, Sabour, IARI-Pusa, RPCAU Pusa, Ranchi, Kalyani, Burdwan, Coochbehar, Shillongani
Total	**18**	

Details of trial entries

SN	Contributing centres	No. of Entries	Name of entries
1.	IARI	5	HD3324, HD3325, HD3326, HD3327, HD3328
2.	Kanpur	3	K1803, K1804, K1805
3.	Faizabad	2+1	NW7057, NW7064, NW7075
4.	Varanasi	2	HUW834, HUW835
5.	Durgapura	2	Raj4540, Raj4541
6.	Ludhiana	2	PBW807, PBW808
7.	Hisar	2	WH1259, WH1260
8.	Pantnagar	2+1	UP3029, UP3030, UP3031
9.	Karnal	5	DBW285, DBW286, DBW287, DBW288, DBW 305
12.	Sabour	2	BRW3838, BRW3829
13.	CSSRI, Karnal	2	KRL423, KRL429
14.	Nuziveedu Seeds Ltd.	1	NWS2106
	Checks	**4**	**HD3086, DBW88, HD2967, K1006**
Total		**36 (32+4)**	

Experimental details

Design	**:**	Simple Lattice
Replication	**:**	Two
Plot size	**:**	**Gross:** 6 x 1.20m (6 rows); **Net:** 6 x 0.80m (4 middle rows)
Fertilizer dose (kg/ha)	**:**	150:60:40 (N: P: K)
Time of sowing	**:**	**NWPZ:** November 1-15, **NEPZ**: November 15-25
Seed 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, 2018-19

Conducting centres

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

Details of trial entries

SN	Contributing Centres	No. of Entries	Name of entries
1.	IARI	5+1	HI1636, HI1637,HI1638, HI1639, HI1640, HW 1904
2.	Dharwad	2	UAS3005, UAS3006
3.	Vijapur	2	GW513, GW514
4.	Niphad	2	NIAW3584, NIAW3592
5.	Powarkheda	3	MP1359, MP1360, MP1361
6.	Pune	3	MACS6745, MACS6747, MACS6742
7.	Jabalpur	2	MP3521, MP3522
8.	Bilaspur	1	CG1031
9.	Durgapura	1	Raj4542
10.	Karnal	1	DBW289
11.	Ludhiana	1	PBW810
12.	Hisar	1	WH1262
13.	Pantnagar	1	UP3032
14.	Gwalior	2	RVW4266, RVW4265
15.	BARC	2	TAW153, TAW155
16.	Nuziveedu Seeds Ltd.	2	NWS2118, NWS2108
	Checks	**4**	**GW322, HI1544, MACS6222, MACS6478**
Total		**36 (32+4)**	

Experimental Details

Design	**:** Simple Lattice
Replication	**:** Two
Plot size	**:** **Gross:** 6 x 1.20m (6 rows); **Net:** 6 x 0.80m (4 middle rows)
Fertilizer dose (kg/ha)	**:** 120:60:40 (N: P: K)
Time of sowing	**:** November 10-20
Seed 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, 2018-19

Conducting centres

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

Details of trial entries

SN	Contributing centres	No. of Entries	Name of entries
1.	IARI	6	HD3329, HD3330, HD3331, HD3332, HD3333, HD3334
2.	Ludhiana	3+1	PBW811, PBW812, PBW813, PBW814
3.	Pantnagar	3	UP3033, UP3034, UP3035
4.	Karnal	4+1	DBW290, DBW291, DBW292, DBW293, DBW294
5.	Hisar	3+1	WH1263, WH1264, WH1265, WH1266
6.	Durgapura	2	Raj4543, Raj4544
7.	Kanpur	2	K1807, K1808
8.	Faizabad	2	NW7053, NW7062
9.	Ranchi	1+2	JKW261, JKW267, JKW268
10.	Jammu	1	JAUW 673
	Checks	**4**	**HD3059, DBW173, HI1563, DBW107**
Total		**36 (32+4)**	

Experimental Details

Design	**:** Simple Lattice
Replication	**:** Two
Plot size	: **Gross:** 6 x 1.08m (6 rows); **Net:** 6 x 0.72m (4 middle rows)
Fertilizer dose (kg/ha)	**:** 120:60:40 (N: P: K)
Time of sowing	**: NWPZ:** December, 10-25; **NEPZ:** December 15 - 25
Seed 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, 2018-19

Conducting centres

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

Details of trial entries

SN	Contributing centres	No. of Entries	Name of entries
1.	IARI	4	HI1641, HI1642, HI1646, HD3344
2.	Ludhiana	1	PBW815
3.	IIWBR- Karnal	1	DBW295
4.	Powarkheda	1	MP1362
5.	Pune	2	MACS6749, MACS6752
6.	Niphad	2	NIAW3583, NIAW3578
7.	Junagadh	1	GW519
8.	Jabalpur	2	MP3514, MP3516
9.	Bilaspur	1	CG1032
10.	Dharwad	1	UAS3008
11.	Lok Bharti	1	Lok75
12.	Hisar	1	WH1267
13.	BARC	1	TAW154
14.	Gwalior	2	RVW4276, RVW4281
15.	Vijapur	1	GW518
16.	Akola	1	AKAW 4927
	Checks	**2**	**HD2864, HD2932**
Total		**25 (23+2)**	

Experimental Details

Design	**:** Simple Lattice
Replication	**:** Two
Plot size	**: Gross:** 6 x 1.08m (6 rows); **Net:** 6 x 0.72m (4 middle rows)
Fertilizer dose (kg/ha)	**:** 90:60:40 (N: P: K)
Time of sowing	**: CZ:** December 5-15; **PZ**: December 1-10
Seed 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, 2018-19

Conducting centres

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

Details of trial entries

SN	Contributing Centres	No. of Entries	Name of entries
	IARI	5	HI8818, HI8819, HI8820, HI8821, HI8822
	Vijapur	2	GW1351, GW1352
	Powarkheda	2+1	MPO1364, MPO1365, MPO1366
	Niphad	2+1	NIDW1302, NIDW1316, NIDW1293
	Pune	2	MACS4091, MACS4090
	Dharwad	2	UAS470, UAS471
	Ludhiana	1	PDW356
	Karnal	2	DDW50, DDW51
	Hisar	1	WHD964
	Kota	1	RKD339
	Checks	**3**	**HI8713, HI8737, MACS3949**
Total		**25(22+3)**	

Experimental Details

Design	**:**	Simple Lattice
Replication	**:**	Two
Plot size	:	**Gross:** 6 x 1.20m (6 rows); **Net:** 6 x 0.80m (4 middle rows)
Fertilizer dose (kg/ha)	**:**	120:60:40 (N: P: K)
Time of sowing	**:**	**CZ:** November 10-20; **PZ:** November 5-15
Seed 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, 2018-19 (NWPZ & NEPZ)

Conducting centres

Zone	No.	Centres
NWPZ	9	Jammu, Balachaur, Gurdaspur,Ludhiana, Hisar, Delhi, Karnal, Diggi, Pantnagar
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.	IARI	5	HD3335, HD3336, HD3337, HD3338, HD3339
2.	Karnal	4	DBW296, DBW297, DBW298, DBW299
3.	Ludhiana	2	PBW816, PBW817
4.	Hisar	2	WH1268, WH1269
5.	Pantnagar	2	UP3036, UP3037
6.	Kanpur	2	K1809, K1810
7.	Faizabad	1	NW7069
8.	Varanasi	1	HUW838
9.	Sabour	1	BRW3847
10.	Jammu	1	JAUW672
	Checks	**4**	**WH1142, PBW644, HD2888, K1317**
Total		**25 (21+4)**	

Experimental Details

Design	**:**	Simple Lattice
Replication	**:**	Two
Plot size	:	**Gross:** 6 x 1.20m (6 rows); **Net:** 6 x 0.80m (4 middle rows)
Irrigations	:	Two (pre-sowing & one irrigation at 45-50 DAS)
Fertilizer dose (kg/ha)	**:**	90:60:40(N:P:K)
Time of sowing	**:**	**NWPZ:** Oct. 25 - Nov. 5; **NEPZ:** Oct. 25 - Nov. 10
Seed requirement	**:**	7.0 kg per entry

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

National Initial Varietal Trial
NIVT-5B-RI-TS-TAD, 2018-19 (CZ & PZ)

Conducting centres

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

Details of trial entries

SN	Contributing Centres	No. of Entries	Name of entries
1.	IARI	5(3A+2D)	HI1643, HI1644, HI1645, HI8823(d), HI8824(d)
2.	Powarkheda	3(2A+1D)	MP1356, MP1358, MPO1357(d)
3.	Vijapur	2(1A+1D)	GW520, GW1353 (d)
4.	Jabalpur	1(1A)	MP3512
5.	Bilaspur	1(1A)	CG1033
6.	Pune	2(1A+1D)	MACS6736, MACS4087(d)
7.	Dharwad	3(2A+1D)	UAS3009, UAS3010, UAS472(d)
8.	IIWBR- Karnal	2(1A+1D)	DBW300, DDW52 (d)
9.	Niphad	2(2A)	NIAW3643, NIAW3624
	Checks	**4 (2A+2D)**	**DBW110, HI1605, HI8627(d), UAS446(d)**
Total		**25 (21+4)**	

Experimental Details

Design	**:**	Simple Lattice
Replication	**:**	Two
Plot size	**:**	Gross:6 x 1.20m (6 rows); Net: 6 x 0.80m (4 middle rows)
Irrigations	**:**	Two (1 pre-sowing & one irrigation at 40-45 DAS) (Limit of 3 Irrigations 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, 2017-18
AVT-TS-RF-TAS

Trial conducting centres

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

Details of test entries

Contributing Centres	No. of entries	Name of entries
IARI, Shimla	1	HS652
Checks	**4**	**VL907, HS507, HPW349, HS562**
Total	**5 (1+4)**	

Experimental details

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

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

Northern Hills Zone
Advance Varietal Trial, 2018-19
AVT-RI-LS-TAS

Trial conducting centres

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

Details of test entries

Contributing Centres	No. of entries	Name of entries
CSKPHKV, Malan	2	HPW467, HPW468
IARI, RS, Shimla	2	HS673, HS674
VPKAS, Almora	3	VL3019, VL3020, VL3021
GBPUA&T, Pantnagar	1	UP3041
Checks	**2**	**VL892, HS490**
Total	**10 (8+2)**	

Experimental details

Design	:	R.B.D.
Replications	:	Six
Plot size	:	**Gross**: 3.5 x 1.08m (6 rows); **Net**: 3.5 x 0.72m (4 rows)
Fertilizer dose (kg/ha)	:	90:60:40 (N:P:K)
Time of sowing	:	December 1-15
Seed rate (kg/ha)	:	125
Seed requirement	:	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, 2018-19
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
Total	**8**	

Details of test entries

Contributing Centres	No. of entries	Name of entries
IARI, Shimla	4	HD3340, HS667, HS668,HS669
CSKHPKV, Malan	4	HPW462, HPW463, HPW466, HPW464
VPKAS, Almora	4	VL2035, VL2036, VL2037, VL2038
GBPUA&T, Pantnagar	2	UP3038, UP3039
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, 2018-19
AVT-IR-TS-TAS

Trial conducting centres

State	No.	Centres
Punjab	6	Ludhiana, Gurdaspur, Bathinda, Kapurthala, Rauni, Faridkot
Haryana	5	Hisar, Karnal, Bawal, Rohtak, Shikohpur
Rajasthan	4	Durgapura, Sriganganagar, Tabiji, Alwar
Uttar Pradesh	4	Nagina, Bulandshahr, Bareilly, KVK-Rampur
Uttarakhand	3	Pantnagar, Kashipur, Dhakrani
J & K	1	Jammu
Delhi	1	Delhi
Total	**24**	

Details of test entries

Contributing Centres	No. of entries	Name of entries
IIWBR, Karnal	01	DBW 221*, DBW 222*
NDUAT, Faizabad	01	NW 7049
PAU, Ludhiana	02	PBW820^{M}, PBW821^{M}
Checks	**7**	**HD2967, WH1105, HD3086, DBW88, DPW621-50, PBW550, HD3226(I)**
Total	**11 (4+7)**	

*** denotes final year entry, ^{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	:	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, 2018-19
AVT-IR-LS-TAS

Trial conducting centres

State	No.	Centres
Punjab	5	Ludhiana, Gurdaspur, Bathinda, Kapurthala, Faridkot
Haryana	5	Hisar, Karnal, Rohtak,Bawal, Shikohpur
Rajasthan	4	Durgapura, Sriganganagar, Tabiji, Alwar
Uttar Pradesh	6	Nagina, Bulandshahr, Bareilly, Ujhani, KVK-Rampur, Sahajahanpur, Pilibhit
Uttarakhand	2	Pantnagar, Kashipur
Jammu & Kashmir	1	Jammu
Delhi	1	Delhi
Total	**24**	

Details of test entries

Contributing Centres	No. of entries	Name of entries
PAU, Ludhiana	01	PBW 771*
Checks	**5**	**HD3059, DBW173, WH1021, WH1124, PBW752(I)**
Total	**6 (1+5)**	

*** denotes final year entry**

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	:	30 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, 2018-19
AVT-RI-TS-TAS

Trial conducting centres

State	No.	Centres
Punjab	4	Ludhiana, Gurdaspur, Kapurthala, Balachaur
Haryana	3	Hisar, Bawal, Karnal
Uttar Pradesh	1	Bulandshahr
Uttarakhand	1	Pantnagar
Rajasthan	3	Sriganganagar, Diggi, Bharatpur
J&K	1	Jammu
Delhi	1	Delhi
Total	**14**	

Details of test entries

Contributing Centres	No. of entries	Name of entries
BAU, Sabour	01	BRW 3806*#
ARS, Niphad	01	NIAW 3170*
IARI-RS, Indore	01	HI 1628*
PAU, Ludhiana	01	PBW 796
Checks	**6**	**WH1080, PBW644, HD3043, WH1142, HD3237(I), HI1620(I)**
Total	**10 (4+6)**	

*** denotes final year entry; # highly resistant to wheat blast,**

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, 2018-19
AVT-IR-TS-TAS

Trial conducting centres

State	No.	Centres
Uttar Pradesh	8	Kanpur, Araul, Allahabad, Faizabad, Amethi, Varanasi, KVK-Basti, Gorkhpur
Bihar	6	IARI-Pusa, Sabour, Purnea, Bikramganj, Banka, RPCAU Pusa
West Bengal	4	Coochbehar, Kalyani, Burdwan, Majhian
Jharkhand	3	Ranchi, Chianki, Dumka
Assam	2	Shillongani, Bishwanath
Total	**23**	

Details of test entries

Contributing Centres	No. of entries	Name of entries
PAU, Ludhiana	01	PBW 781
RARI, Durgapura	01	RAJ 4529
IIWBR, Karnal	01	DBW 257
CCSHAU, Hisar	01	WH 1239
IARI, Delhi	02	HD 3277, HD3249*$^{\#Q}$
Checks	**5**	**HD2733, K0307, DBW39, HD2967, DBW187(I)**
Total	**11 (6+5)**	

*** denotes final year entry, # highly resistant to wheat blast, ^{Q} denotes superior quality**

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	: 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 Eastern Plains Zone
Advance Varietal Trial, 2018-19
AVT-RI-TS-TAS

Trial conducting centres

State	No.	Centres
Uttar Pradesh	6	Varanasi, Faizabad, Kanpur, Deegh, Ghaghraghat, Maharajganj
Bihar	4	IARI-Pusa, Sabour, Purnea, RPCAU Pusa
West Bengal	3	Kalyani, Burdwan, Coochbehar
Jharkhand	5	Ranchi, Chianki, Dumka, KVK-Gumla, Goriakarma
Assam	2	Shillongani, Bishwanath
Total	**20**	

Details of test entries

Contributing Centres	No. of entries	Name of entries
IARI, Delhi	01	HD 3293
IIWBR, Karnal	02	DBW 273, DBW 252*#
Checks	**5**	**HD2888, K8027, HD3171, K1317, HI1612**
Total	**8 (3+5)**	

 # highly resistant to wheat blast,

Experimental details

Design	: R.B.D.
Replications	: Four
Plot size	: **Gross**: 6 x 2.40m (12 rows); **Net**:6 x 2.0m (10 middle rows)
Irrigations	: Two (pre-sowing & one irrigation at 45-50 DAS)
Fertilizer dose (kg/ha)	: 90:60:40 (N:P:K)
Time of sowing	: Oct. 25 – Nov. 10
Seed rate (kg/ha)	: 100
Seed requirement	: 20kg 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, 2018-19
AVT-IR-TS-TAD

Trial conducting centres

State	No.	Centres
Gujarat	5	Vijapur, SK Nagar, Anand, Amreli, Junagarh
Madhya Pradesh	11	Gwalior, Jabalpur, Powarkheda, Bhopal, Indore, Sagar, Shahdol, KVK-Ujjain, KVK-Ratlam, Morena, Tikamgarh
Chhattisgarh	3	Bilaspur, NIBSM Raipur, IGKV Raipur
Rajasthan	4	Kota, Udaipur, Banswara, Mandor
Total	**23**	

Details of test entries

Contributing Centres	No. of entries	Name of entries
SDAU, Vijapur	01	GW 1348 (d)
ARS, Niphad	01	NIDW 1158 (d)
IARI, Indore	02	HI 8811 (d), HI 8812 (d)
IIWBR, Karnal	02	DDW 48 (d), DDW 49 (d)
IARI, Delhi	02	HD3343^{M}, HD 3345^{B}
PAU, Ludhiana	01	PBW 822^{B}
Checks	**4**	**HI8737(d), HI8713(d), GW322, HI1544**
Total	**13 (9+4)**	

^{M} denotes entries proposed under MABB, ^{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	:	25 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, 2018-19
AVT-IR-LS-TAD

Trial conducting centres

State	No.	Centres
Gujarat	6	Anand, Bardoli, Junagarh, Vijapur, SK Nagar, Lok Bharti
Madhya Pradesh	6	Indore, Gwalior, Jabalpur, Powarkheda, Sagar, Rewa
Chhattisgarh	5	Bilaspur, Jagdalpur, Ambikapur, NIBSM Raipur, IGKV Raipur
Rajasthan	4	Banswara, Udaipur, Kota, Mandor
Total	**21**	

Details of test entries

Contributing Centres	No. of entries	Name of entries
IARI, Indore	04	HI1633, HI1634, HI8807 (d), HI8808 (d)
UAS, Dharwad	01	UAS3002
IGKV, Bilaspur	01	CG1029
Checks	**4**	**HD2932, HD2864, MP3336, MP4010**
Total	**10 (6+4)**	

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, 2018-19
AVT-RI-TS-TAD

Trial conducting centres

State	No.	Centres
Gujarat	6	Vijapur, Amreli, Dandhuka, Sanosara, Junagarh, Anand
Madhya Pradesh	7	Gwalior, Sagar, Jabalpur, Rewa, Powarkheda, Bhopal, Indore
Chhattisgarh	2	Bilaspur, NIBSM Raipur
Rajasthan	3	Udaipur, Banswara, Pratapgarh
Total	**18**	

Details of test entries

Contributing Centres	No. of entries	Name of entries
UAS, Dharwad	01	UAS 466(d)*
IIWBR, Karnal	02	DBW 277, DDW 47(d)*^{Q}
Checks	**3**	**HI8627(d), MP3288, DBW110**
Total	**6 (3+3)**	

*** denotes final year entry, ^{Q} denotes promoted on high yellow pigment**

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 Irrigations 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	:	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, 2018-19
AVT-IR-TS-TAD

Trial conducting centres

State	No.	Centres
Maharashtra	9	Niphad, Pravaranagar, Pune, Akola, Parbhani, Nasik, Karad, Mahabaleshwar, Kolhapur
Karnataka	7	Dharwad, Ugar Khurd, Arbhavi, Kalloli, Mudhol, Nippani, Mandya
Telangana	1	Hyderabad-Rice/Oilseed/Millet
Total	**17**	

Details of test entries

Contributing Centres	No. of entries	Name of entries
UAS, Dharwad	01	UAS 3001
CCS HAU, Hisar	01	WHD 963 (d)
IIWBR, Karnal	02	DDW 48 (d), DDW 49 (d)
IARI, Delhi	01	HD3343^{M}
PAU, Ludhiana	01	PBW 823^{B}
Checks	**5**	**MACS6478, MACS6222, MACS3949(d), UAS428(d), GW 322**
Total	**11 (6+5)**	

^{M} denotes entries proposed under MABB, ^{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 2.00m (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, 2018-19
AVT-IR-LS-TAS

Trial conducting centres

State	No.	Centres
Maharashtra	9	Niphad, Pravaranagar, Pune, Akola, Parbhani, Nasik, Karad, Mahabaleshwar, Kolhapur
Karnataka	7	Dharwad, Ugar Khurd, Arbhavi, Kalloli, Mudhol, Nippani, Mandya
Telangana	1	Hyderabad-Rice/Oilseed/Millet
Total	**17**	

Details of test entries

Contributing Centres	No. of entries	Name of entries
UAS, Dharwad	01	UAS 3002
IARI, Indore	02	HI1633, HI8807(d)
SDAU, Vijapur	01	GW509
Checks	**3**	**Raj4083, HD2932, HD3090**
Total	**7 (4+3)**	

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

Peninsular Zone
Advance Varietal Trial, 2018-19
AVT-RI-TS-TAD

Trial conducting centres

State	No.	Centres
Maharashtra	7	Pune, Niphad, Nashik, Parbhani, Savalivihir, Karjat, Baramati
Karnataka	4	Dharwad, Nippani, Bagalkot, Bailahongal
Total	**11**	

Details of test entries

Contributing Centres	No. of entries	Name of entries
ARI, Pune	03	MACS 6696*, MACS 6695*, MACS 4058(d)*
ARS, Niphad	02	NIAW 3170*, NIDW 1149(d)
SDAU, Vijapur	01	GW 1346(d)*
IARI-RS, Indore	02	HI 8805(d)*, HI 8802(d)*
Checks	**4**	**DBW93, HI1605, AKDW2997-16(d), UAS446(d)**
Total	**12 (8+4)**	

*** denotes final year entry**

Experimental details

Design	:	R.B.D.
Replications	:	Four
Plot size	:	**Gross**: 6 x 2.40m (12 rows); **Net**: 6 x 2.00m (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	:	12kg 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), 2018-19
SPL-DIC-IR-TS-PZ

Trial conducting centres

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

Details of test entries

Contributing Centres	No. of entries	Name of entries
ARI, Pune	02	MACS5052, MACS5053
UAS, Dharwad	02	DDK1056, DDK1057
Checks	**03**	**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 – Very Late Sown (January) Trial, 2018-19
SPL-VLS-TAS–NWPZ/NEPZ

Conducting centres

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

Details of test entries

Contributing centres	No. of Entries	Name of entries
PAU, Ludhiana	01	PBW 797
IARI, Delhi	02	HD3271*, HD3298
IARI, Indore	01	HI1621*
Checks	**04**	**WR544, DBW14, DBW71, PBW757(I)**
Total	**8 (4+4)**	

Experimental Details

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

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

* Final year entry

Special Trial (Salinity/ Alkalinity), 2018-19
SPL-AST-IR-TS-TAS-All Zones

Trial conducting centres

State	Centres	Name of the centres
UP	5	Dalipnagar, Lucknow, Faizabad, KVK-Pratapgarh, KVK Kaushambi
Rajasthan	3	Vanasthali, CAZRI-RRS Pali, Vallabhnagar
Haryana	5	Bawal, Hisar, IIWBR-Hisar, CSSRI-Karnal, Nain (Panipat)
Gujarat	8	Bharuch, CAZRI-RRS Bhuj, KVK-Chaswad, KVK-Devataj, KVK-Kheda, Mangrol, KVK-Jamnagar, KVK-Sanosara
Punjab	1	Muktsar
Total	**22**	

Details of test entries

Contributing Centres	No. of entries	Name of entries
NDUAT, Faizabad	2	NW 7060, NW 7062
CCSHAU, Hisar	2	WH1223, WH 1228
Checks	**3**	**KRL210, Kharchia65, KRL19**
Total	**7 (4+3)**	

Experimental details

Design	: R.B.D.
Replications	: Six
Plot size	: **Gross**: 4 x 2.40m (12 rows); **Net** : 4 x 2.0m (10 middle rows)
Fertilizer dose (kg/ha)	: 120:60:40 (N:P:K) + 10 kg ZnSO4
Time of sowing	: **NWPZ:** Nov. 1-15, **NEPZ:** Nov. 15-25, **CZ:** 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

SPL – HYPT, 2018-19
(IR-TS-TAS-NWPZ)

Trial conducting centres

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

Details of test entries

Contributing Centres	No. of entries	Name of entries
IARI, Delhi	02	HD3317, HD3347
IIWBR, Karnal/BISA	05	DBW187, DBW301, DBW302, DBW303, DBW304
PAU, Ludhiana	02	PBW824, PBW825
GBPUAT, Pantnagar	02	UP3042, UP3043
CCSHAU, Hisar	02	WH1254, WH1270
Checks	**02**	**HD3086, HD2967**
Total	**15 (13+2)**	

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	:	8 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)

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

Wheat Physiology Work Plan, 2018-19

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

MLHT-2 **(Set 1)**: MLHT-I entries of TS & LS from NWPZ and TS of NEPZ

Centres: 9 (Ludhiana, Karnal, Hisar, Pantnagar, Durgapura, Faizabad, Kanpur,Ranchi, Malda)

Entries: 25

Treatments: 2 (timely and late sown with minimum 21 days difference between the two sowings)

Design*:* Simple lattice *Replications:*2

Plot size*:* 3m x1.20m (6 rows of 3m length spaced 20cm apart)

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

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

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

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

Entries: 16

Treatments**:** 2 (timely and late sown with minimum 21 days difference between the two sowings)

Design*:* Simple lattice *Replications:*2

Plot size*:* 3m x1.20m (6 rows of 3m length spaced 20cm apart)

Observations to be recorded will be same as in MLHT-2 set1.

MLHT-1(Set1): AVT-I (2017-18) *e*ntries of TS & RI entries of NWPZ& NEPZ

Centres: 9 (Ludhiana, Karnal, Hisar, Pantnagar, Durgapura, Faizabad, Kanpur, Ranchi, Malda)

Entries**:** 16 (NW7049, PBW820, PBW821, PBW796, PBW781, RAJ4529, DBW257, WH1239, HD3277, HD3293, DBW273+1 promising entry from breeder+4 checks)

Treatments**:** 2 (timely and late sown with minimum 21 days difference between the two sowings)

Design*:* Simple lattice *Replications:* 2

Plot size*:* 3m x1.20m (6 rows of 3m length spaced 20cm apart)

Observations to be recorded: Same as in MLHT-2

MLHT-1**(Set 2)**: MLHT-I entries of TS,LS and RI from CZ & PZ

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

Entries**:** 16 (HD3343, HD3345, PBW822, UAS3002, CG1029, DBW277, UAS3001, PBW823, HI1633, GW509+ 2 promising entry from breeder + 4 checks)

***Treatments*:** 2 (timely and late sown with minimum 21 days difference between the two sowings)

Design: Simple lattice *Replications:*2

Plot size: 3m x1.20m (6 rows of 3m length spaced 20cm apart)

Observations to be recorded: Same as in MLHT-2

II. <u>Drought tolerance screening nursery (DTSN)</u>.

No. of entries*: 25*

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

Design*:* Simple lattice*Replications:*2

Plot size*:* 3m x0.60m (3rows of 3m length spaced 20cm apart)

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

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

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

Breeder Seed Allocation

DAC Breeder Seed Indent Allocation for 2018-19

DAC breeder seed indent for 2019-20 is received for20321.78q breeder seed for 141 wheat varieties and 827.85q breeder seed of for 29 barley varieties. This year the highest indent was received for the following varieties;

Wheat			*Barley*		
Variety	**Notification year**	**Indent (q)**	**Variety**	**Notification year**	**Indent (q)**
HD 2967	2011	2972.88	RD 2786	2013	142.00
HD 3086 (Pusa Gautami)	2014	1936.30	RD 2794	2016	97.00
PBW 723 (Unnat PBW 343)	2017	1569.40	PL 426	1996	83.25
RAJ 4238	2016	955.00	RD 2035	1994	81.40
PBW 725	2016	746.20	BH 393	2002	71.20
Lok 1	1982	600.00	Mahamana113(HUB113)	2014	60.00
HI 8713 (Pusa Mangal)	2013	462.20	DWRUB52	2007	50.90
GW 366	2007	445.00	RD 2052	1991	36.40
HI 1544 (Purna)	2008	398.80	DWRB 137	2018	30.00
GW 322	2002	386.60	RD 2849	2016	30.00

The following breeder seed allocation is finalized for its production in Session II: Research Planning Meeting: Crop Improvement – Breeder Seed Allocation 57th All India Wheat & Barley Worker's Meet held at BAU Ranchi during 24-26 August 2018.

Variety	**Year**	**Indent (q)**	**Breeder seed (q)**	
			Allocation	**Indenting agencies**
MAF (AU), Kota				
C 306	1969	65.00	45.00	RJ 2, SAI 43,
HI 8498 (Malav Shakti)	1999	45.60	45.60	MP 30, SAI 15.60
Raj 3077	1989	180.80	73.80	SAI 73.80
Raj 3765	1996	131.40	29.40	RJ 29.40
Raj 4238	2013	955.00	405.00	MP 100, RJ 205, UP 100,
Raj 1482	1983	172.60	72.60	RJ 2, SAI 70.60
Raj 4079	2011	321.60	101.60	RJ 100, SAI 1.60
Total			**773.00**	
ARI, Pune				
MACS 6222	2010	80.00	80.00	MH 80,
MACS 6478	2014	12.00	12.00	KK 6, MH 6,
Total			**92.00**	
BAU, Sabour				
BRW 3708 (Sabour Samriddhi)	2017	50.00	50.00	BI 50,
Total			**50.00**	

Variety	Year	Indent (q)	Breeder seed (q)	
			Allocation	Indenting agencies
BHU, Varanasi				
HUW 234	1986	38.54	38.54	JH 12.34 IFFDC 5, SAI 21.20
HUW 468	1999	12.34	12.34	JH 12.34
Total			**50.88**	
HUB 113 (Mahamana 113)	2014	60.00	60.00	UP 60,
Total			**60.00**	
BISA, Jabalpur				
DBW 110	2015	137.00	137.00	MP 75, NSC 12, BI 50,
GW 322	2002	386.60	286.60	CG 55, IFFDC 4, MP 150, NFL 8, NSC 10, SAI 59.60
HI 1544 (Purna)	2008	398.80	100.00	MP 100,
HI 8759	2017	323.20	100.00	MP 100,
Total			**623.60**	
BISA, Ludhiana				
HD 2967	2014	2972.88	600.00	UP 600
PBW 723	2017	1569.40	550.00	UP 550,
WB 2	2017	192.40	50.00	BI 50,
Total			**1200.00**	
BISA, Samastipur				
HD 2733 (VSM)	2001	94.00	137.00	SAI 44,
HD 2967	2014	2972.88	286.60	JH 34.38, UP 150
HD 2985 (Pusa Basant)	2011	133.00	100.00	HP 20, NAFED 3, NSC 10, UP 50,
Total			**523.60**	
CCS HAU, Hisar				
C 306	1969	65.00	20.00	MP 20,
WH 283	1985	26.20	26.20	SAI 26.20
WH 711	2002	163.20	163.20	SAI 163.20
WH 1025	2010	10.00	10.00	CG 10,
WH 1080	2011	68.00	68.00	HR 3, HP 40, JK 15, NSC 10,
WH 1105	2013	352.60	322.60	HR 14, HP 30, IFFDC 8.20, NAFED 3, NFL 10, NSC 25, PB 20, RJ 36, SAI 170.40, UK 6,
WH 1124	2014	57.50	57.50	KCO 3.50, IFFDC 10, NSC 5, RJ 5, SAI 14, UP 20,
WH 1142	2015	34.80	34.80	HR 7, NSC 5, SAI 12.80, UP 10,
Total			**742.30**	
BH 75	1985	1.50	1.50	SAI 1.50
BH 946	2014	25.00	25.00	HR 1.50, RJ 10, SAI 3.50, UP 10,
BH 393	2002	71.20	71.20	HR 0.60, SAI 70.60
BH 902	2010	9.50	9.50	HR 0.90, NSC 5, SAI 3.60

Variety	Year	Indent (q)	Breeder seed (q)	
			Allocation	Indenting agencies
BH 959	2015	25.00	25.00	NSC 15, RJ 10,
Total			**132.20**	
CSAUA&T, Kanpur				
K 0307 (Shatabdi)	2007	17.34	17.34	JH 12.34, NSC 5,
K 0402 (Mahi)	2013	50.00	50.00	UP 50,
K 0607		20.00	20.00	UP 20,
K 1006	2014	20.00	20.00	UP 20,
K 7903 (Halana)	2001	27.60	27.60	IFFDC 2, SAI 25.60
K 9107 (Deva)	1996	20.19	20.19	JH 12.19, SAI 8,
K 1317	2017	2.00	2.00	JH 2,
PBW 343	1996	261.84	12.34	JH 12.34
Total			**169.47**	
K 508 (Pragati)	1998	9.72	9.72	JH 8.22, SAI 1.50
K 560 (Haritma)	1998	8.28	8.28	JH 8.28
K 1055	2018	5.00	10.00	NSC 5, UP 5,
Total			**28.00**	
CSSRI, Karnal				
KRL 210	2012	28.60	28.60	NSC 5, SAI 3.60 UP 20,
KRL 213	2012	60.00	60.00	NSC 10, UP 50,
Total			**88.60**	
GBPUA&T, Pantnagar				
HD 2894 (Pusa Wheat 109)	2008	11.20	11.20	CG 10, SAI 1.20
PBW 154	1988	116.00	116.00	KCO 1, NFL 3, NSC 25, SAI 87,
PBW 226	1989	65.00	65.00	SAI 65,
UP 262	1978	11.30	11.30	SAI 11.30
UP 2338	1995	11.60	11.60	SAI 11.60
UP 2425	1999	8.00	8.00	SAI 8,
UP 2572	2007	7.00	7.00	NSC 5, UK 2,
UP 2628	2010	70.00	70.00	BI 50, UP 20,
UP 2784	2016	50.00	50.00	UP 50,
Total			**350.10**	
UPB 1008	2011	1.00	1.00	UK 1,
Total			**1.00**	
HPKVV, Palampur				
HPW 349	2013	76.00	46.00	HP 20, UK 26,
HPW 360	2016	40.00	40.00	HP 40,
Total			**86.00**	
IARI, Indore				
HI 1418	2000	18.00	18.00	MH 8, SAI 10,
HI 1500 (Amrita)	2003	5.00	5.00	MP 5,

Variety	Year	Indent (q)	Breeder seed (q)	
			Allocation	Indenting agencies
HI 1531 (Harshita)	2006	43.00	43.00	CG 15, MP 20, NSC 5, SAI 3,
HI 1544 (Purna)	2008	398.80	298.80	CG 30, KCO 10, IFFDC 2, MP 110, MH 10, NFL 19, NSC 10, SAI 107.80
HI 8663 (Posan)	2008	112.60	75.00	MP 75,
HI 8737 (Pusa Anmol)	2015	356.80	300.00	MP 300,
HI 8713 (Pusa Mangal)	2013	462.20	430.00	MP 430,
HI 8759	2017	323.20	200.00	MP 300,
HD 2932 (Pusa Wheat 111)	2008	70.60	45.00	MP 45,
HD 2987	2011	163.00	70.00	MP 70,
Total			**1484.80**	
IARI, Karnal				
HD 2851 (Pusa Vishesh)	2005	223.20	223.20	IFFDC 2, NSC 15, RJ 5, SAI 201.20
HD 2967	2014	2972.88	557.40	PB 10, RJ 25, SAI 522.40
HD 3086 (Pusa Gautami)	2014	1936.30	698.00	HIL 10, HR 42, HP 50, KCO 18, IFFDC 60, NAFED 5, NFL 13, NSC 250, UK 250,
HS 507 (Pusa Suketi)	2011	30.00	30.00	HP 20, UK 10,
HS 542 (Pusa Kiran)	2015	50.00	50.00	HP 30, UP 20,
HS 562	2016	60.00	60.00	HP 50, NSC 10,
Total			**1618.60**	
BH 380 (Pusa Losar)	2010	0.50	0.50	HP 0.50
BHS 400 (Pusa Sheetal)	2014	0.50	0.50	HP 0.50
Total			**1.00**	
IARI, Pusa				
HD 2733 (VSM)	2001	94.00	50.00	BI 50,
HD 2967	2014	2972.88	250.00	BI 250,
HD 2985 (Pusa Basant)	2011	133.00	50.00	BI 50
HD 3118 (Pusa Vatsala)	2016	2.90	2.90	SAI 2.90
HI 1612	2018	1.00	1.00	JH 1,
HI 1563 (Pusa Prachi)	2011	224.00	50.00	BI 50,
Total			**403.90**	
IARI, Wellington				
HW 1098 (Nilgiri Khapli)	2015	0.50	0.50	MH 0.50
Total		**0.50**	**0.50**	
IISS, Mau				
CBW 38	2009	50.40	50.40	BI 50, SAI 0.40
DBW 39	2010	120.00	100.00	BI 100,
HD 2967	2014	2972.88	50.00	UP 50,
Total			**200.40**	
IGKVV, Raipur				

Variety	Year	Indent (q)	Breeder seed (q)	
			Allocation	Indenting agencies
CG 5016 (Ratan)	2009	135.00	135.00	CG 135,
HI 617 (Sujata)	1982	60.00	60.00	CG 10, MP 50,
Total			**195.00**	
IIWBR, Karnal				
DBW 17	2007	138.98	30.00	NSC 30
DBW 71	2013	20.00	20.00	NSC 20,
DBW 88	2014	60.40	60.40	NFL 5, NSC 5, SAI 30.40, UP 20,
DBW 90	2014	48.60	48.60	NSC 30, RJ 10, SAI 8.60
DBW 93	2015	50.00	50.00	BI 50,
DBW 173	2018	37.00	37.00	HR 2, NSC 30, UP 5,
HD 2967	2014	2972.88	1004.00	NSC 250, UK 710, HR 64, JK 40,
WB 2	2017	192.40	142.40	HR 5, JK 5, NSC 10, RJ 10, SAI 12.40, UP 100,
Total			**1392.40**	
DWRB 137	2018	30.00	30.00	MP 10, NSC 5, Raj 10, UP 5,
DWRUB 52	2007	50.90	50.90	SAI 50.90
Total			**80.90**	
JNKVV, Jabalpur				
GW 273	1998	87.00	87.00	KK 1.60, MP 35, NFL 5, NSC 5, SAI 40.40
MP(JW) 1142 (Snehil)	2007	20.00	20.00	MP 20,
MP(JW) 1201	2011	250.00	250.00	MP 250,
MP(JW) 1202	2010	170.00	170.00	CG 20, MP 150,
MP(JW) 1203	2009	70.00	70.00	CG 20, MP 50,
MP(JW) 3173	2009	10.00	10.00	MP 10,
MP(JW) 3211	2010	160.00	160.00	MP 160,
MP(JW) 3336	2013	377.00	377.00	IFFDC 2, MP 350, RJ 5, UP 20
MPO(JW) 1215	2010	140.00	140.00	MP 140,
JW 3020	2005	25.00	25.00	MP 25,
JW 3288	2012	250.00	250.00	MP 250,
WH 147	1978	97.60	97.60	IFFDC 2, MP 25, SAI 70.60
WH 542	1992	4.00	4.00	SAI 4,
Total			**1660.60**	
Jawahar Barley 1 (JB 110)	2010	15.00	15.00	MP 15,
JB 58	2005	5.00	5.00	MP 5,
Total			**20.00**	
Lokbharti, Sanosara				
Lok 1	1982	600.00	600.00	CG 20, IFFDC 2, MP 100, MH 125, NFL 9, NSC 40, RJ 2, SAI 302,
Total			**600.00**	
MPKV, Niphad				

Variety	Year	Indent (q)	Breeder seed (q)	
			Allocation	Indenting agencies
NIAW 301 (Trimbak)	2002	4.40	4.40	MH 4, SAI 0.40
NIAW 917 (Tapovan)	2006	3.00	3.00	MH 3,
NIAW 1415 (Netravati)	2011	19.20	19.20	MH 19.20
NIAW 1994 (Phule Samadhan)	2016	26.00	26.00	MH 16, NSC 10,
Total			**52.60**	
NDUA&T, Faizabad				
DBW 17	2007	138.98	34.38	JH 34.38
NW 5054	2014	30.00	30.00	UP 30,
Total			**138.78**	
NB 1445	2014	20.00	20.00	UP 20,
Total			**20.00**	
PAU, Ludhiana				
DPW 621-50	2011	73.80	65.00	PB 5, UP 60
PBW 343	1996	261.84	60.00	KCO 7, SAI 53
PBW 443	2000	4.40	4.40	SAI 4.40
PBW 502	2004	145.20	60.00	KCO 1, IFFDC 5, NFL 2, SAI 52
PBW 509	2006	2.60	2.60	SAI 2.60
PBW 533	2006	6.00	6.00	SAI 6,
PBW 550	2008	60.00	60.00	KCO 2, IFFDC 2, NSC 20, PB 10, SAI 26
PBW 590	2009	26.00	26.00	KCO 1, NSC 15, PB 2, SAI 8,
PBW 644	2012	11.00	11.00	JK 10, PB 1,
PBW 658	2015	18.20	18.20	HR 3, PB 10, SAI 5.20
PBW 660	2013	17.00	17.00	NSC 15, PB 2,
PBW 677	2015	128.00	128.00	HR 3, PB 40, RJ 40, SAI 45,
PBW 725	2015	746.20	746.20	HIL 10, HR 7, KCO 4, IFFDC 5, NAFED 5, NFL 10, NSC 40, PB 60, RJ 40, SAI 135.20 UK 430,
PBW 723	2017	1569.40	1019.40	HIL 20, HR 9, IFFDC 2, NFL 20, NSC 125, PB 60, RJ 50, SAI 408.40 UK 325,
PBW 761 (Unnat PBW 550)	2017	120.00	120.00	NFL 20, PB 30, UP 70,
HPBW 01	2017	152.60	152.60	BI 50, NSC 10, PB 20, RJ 10, SAI 32.60 UP 30,
Total			**2496.40**	
PL 172	1987	7.10	7.10	SAI 7.10
PL 426	1996	83.25	83.25	PB 3, SAI 80.25
PL 807	2012	5.00	5.00	RJ 5,
Total			**95.35**	
PDKV, Akola				
AKAW 4210-6 (PDKV	2016	2.00	2.00	MH 2,

Variety	Year	Indent (q)	Breeder seed (q)	
			Allocation	Indenting agencies
Sardar)				
AKAW 4627	2012	4.00	4.00	MH 4,
Total			**6.00**	
RARI, Durgapura				
Raj 1482	1983	172.60	100.00	SAI 100
Raj 3077	1989	180.80	107.00	NSC 5, RJ 2, SAI 100
Raj 3765	1996	131.40	102.00	RJ 2, SAI 100
Raj 4037	2004	180.20	180.20	KCO 20, MH 15, NSC 30, RJ 20, SAI 95.20
Raj 4079	2011	321.60	220.00	KCO 20, IFFDC 20, NFL 5, NSC 50, RJ 25,
Raj 4120	2009	64.40	64.40	BI 50, RJ 10, SAI 4.40
Raj 4238	2013	955.00	550.00	HIL 5, IFFDC 15, NFL 5, NSC 25, RJ 500,
Raj 6560		2.00	2.00	SAI 2,
Total			**1325.60**	
RD 2052	1991	36.40	36.40	SAI 36.40
RD 2035	1994	81.40	81.40	RJ 5, SAI 76.40
RD 2660	2006	0.70	0.70	SAI 0.70
RD 2786	2013	142.00	142.00	IFFDC 2, MP 10, NSC 20, RJ 100, UP 10,
RD 2794	2016	97.00	97.00	IFFDC 2, NSC 15, RJ 70, UP 10,
RD 2849	2016	15.00	15.00	NSC 20, UP 10,
Total			**372.50**	
RPCAU, Dholi				
DBW 39	2010	120.00	20.00	UP 20,
HD 2967	2014	2972.88	150.00	UP 150,
HI 1563 (Pusa Prachi)	2011	224.00	174.00	BI 250, KCO 4, UP 20
WR 544 (Pusa Gold)	2005	26.74	26.74	JH 12.34, SAI 14.40
Total			**246.74**	
SKUA&T, Jammu				
HPW 349	2013	76.00	30.00	JK 30,
WH 1021	2008	10.00	10.00	JK 10,
WH 1105	2013	352.60	30.00	JK 30,
Total			**70.00**	
SPU, New Delhi				
HD 2967	2014	2972.88	117.10	HIL 10, KCO 66.10, IFFDC 29, NAFED 5, NFL 7
HD 3043	2012	64.80	64.80	JK 30, SAI 4.80, UP 30,
HD 3059 (Pusa Pachhati)	2013	209.40	209.40	HR 18, HP 50, NSC 30, SAI 11.40, UP 100,
HD 3086 (Pusa Gautami)	2014	1936.30	1238.30	PB 10, RJ 113, SAI 415.30, UP 700,

Variety	Year	Indent (q)	Breeder seed (q)	
			Allocation	Indenting agencies
HDCSW 18		59.00	59.00	JH 1, RJ 20, SAI 38,
Total			**1688.60**	
RVSKVV, Gwalior				
MP(RVW) 4106	2012	260.00	260.00	MP 250, NSC 10,
Total			**260.00**	
SDAU, Vijapur				
GW 173	1993	32.80	32.80	NSC 5, SAI 27.80
GW 322	2002	386.60	100.00	MP 100,
GW 451	2016	10.00	10.00	NSC 10,
GW 496	1990	206.00	206.00	MH 100, NSC 10, SAI 96,
Total			**348.80**	
JAU, Junagarh				
GW 366	2007	445.00	235.00	CG 230, NSC 5,
Total			**235.00**	
UAS, Dharwad				
DWR 162	1993	26.60	26.60	KK 16.60, NSC 10,
UAS 304	2013	20.60	20.60	KK 20.60
UAS 415	2008	3.20	3.20	KK 3.20
UAS 428	2012	8.00	8.00	MH 8,
Total			**58.40**	
VPKAS, Almora				
VL 892	2008	4.00	4.00	UK 4,
VL 907	2010	40.00	40.00	HP 10, UK 30,
VL 953	2016	26.00	26.00	NSC 10, UK 16,
Total			**70.00**	

Note:

- 42q breeder seed of un-notified variety PBW 750 was not allocated for production at PAU Ludhiana. Breeder seed production of varieties PBW 343 (189.50), PBW 373 (74.40), PBW 502 (85.20q) and PBW 550 (71.50q) indented by SAI was not accepted due to on lifting problem.
- Breeder seed production allocation of old varieties HW 2004 (Amar), HI 1479 (Swarna), DL 153-2 (Kundan), HD 2189, HD 2285 (Gobind), HD 2329 and HDR 77 was not accepted by IARI New Delhi
- Nucleus seed of old varieties K 9423 (Wheat) and Jyoti (Barley) is not available with CSAUA&T Kanpur hence breeder seed production of these varieties was not accepted.
- Breeder seed production of varieties HI 8663 (Posan), HI 8737 (Pusa Anmol), HI 8713 (Pusa Mangal), HI 8759, HD 2987, HD 2932 (Pusa Wheat 111) was accepted only for MP state indent at IARI, Indore due to non lifting problem with other indenters.
- Breeder seed production of varieties DBW 17 and DPW 621-50 was accepted for SAI indent at IIWBR Karnal due to non lifting problem.
- 210q breeder seed MP state indent of variety GW 366 was not accepted for production due to non lifting problem.

Research Plan
Resource Management

24th August, 2018

At the outset, after welcoming the participants Dr RK Sharma, PI Resource management Programme stressed that conducting All India Coordinated varietal evaluation trials is mandatory and all the centres must conduct the allotted trials strictly as per the technical programme. The resource management group critically reviewed the results of the coordinated and special trials and finalised the recommendations. The trials on genotype evaluation will be formulated after receiving the entries from the breeding group. Detailed discussions were held in which Dr B S Mahapatra, Professor Agronomy, G B Pant University of Agriculture & Technology, Pantnagar, Uttarakhand and member of RAC of IIWBR and Dr ML Jat from CIMMYT actively participated to formulate new experiments for addressing the zone-wise issues including the trial on evaluation of new genotypes targeting 8 t/ha productivity. Dr Hari Ram Saharan from PAU, Ludhiana proposed a new trial on phosphorus management in wheat based cropping systems. Based on the discussions, the group decided to conclude four special coordinated trials, continue five ongoing trials and formulated two new trials, the details of which are given below:

- The following six varietal evaluation trials were formulated after receiving the entries from the breeding group.
  - Varietal evaluation trials at three dates of sowing (Timely, Late and Very Late) under irrigated conditions in NWPZ, and NEPZ
  - Varietal evaluation trials under restricted irrigation (Zero, One and Two) conditions in NWPZ, NEPZ, CZ and PZ.
- The group decided to conclude the following special trials and come out with recommendations.
  SPL-1: Evaluation of herbicides for control of broadleaved weeds in wheat.
  SPL-2: Management of lodging and yield maximization in wheat.
  SPL-5: Efficient water management in wheat using micro-irrigation.
  SPL-6: Evaluation of Pusa Hydrogel and Herbal Hydrogel (Gum *Tragacantha i.e.* Goond katrira) on in situ moisture conservation under different irrigation levels in wheat.
- The following five special trials will be continued during the 2017-18 crop season;
  SPL-3: Agronomic management for enhancing grain yield Zn in grain
  SPL-7: Yield maximization in dicoccum wheat through various planting options and seed rates
  SPL-8: Precision nitrogen management in irrigated wheat using NDVI sensor
  SPL-9: Fine tuning the sowing time in various zones under changing climate
  SPL-10: Validation of Nutrient Expert in wheat.
- The following two new special trials were formulated;
  - Evaluation of wheat genotypes targeted to achieve 8 t/ha productivity
  - Phosphorus management in wheat based cropping systems on long term basis

Work Plan of Social science

- During the Rabi season 2018-19, the wheat and barley front line demonstrations (FLDs) will be conducted and coordinated as per the approval of the Ministry of Agriculture and Farmers Welfare, GOI, New Delhi.
- Impact assessment of Front Line Demonstrations programme in different wheat growing zones.

The Resource Management and Social Sciences groups after thorough deliberations finalized the workplan.

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

Sessions II
Research Plan-Crop Protection

August 24, 2018	**Chairman**	:	Dr. D. P. Singh
2.30 PM -6:00 P.M	**Co-Chairman**	:	Dr. S.C. Bhardwaj
	Rapporteurs	:	Dr. Poonam Jasrotia and Dr. S.P. Bishnoi

The research planning meeting of Crop Protection was chaired by Dr. D.P. Singh, PI (CP), ICAR-IIWBR and Co-Chaired by Dr. S.C. Bhardwaj. Dr Singh welcomed the participants of session and appreciated the cooperators for their work towards successful implementation of technical programme during 2017-18 which led to quite healthy crop and contributed positively in record production. Drs. D.P. Singh, S.C. Bhardwaj, gave the valuable suggestions for planning of the programme for 2018-19. Dr. Singh asked all the co-operators to contribute fully in survey and surveillance and pass the information in time for issue of wheat crop health newsletter.

For Plant Pathology the group desired to restrict IPPSN entries up to 1000 for quality data keeping in view of separate sets being planned for two rusts. The IPPSN and PPSN entries will be screened separately for stripe and leaf rust at different hot spot locations in North. For leaf rust screening of IPPSN, Faizabad and Kanpur centres are included for leaf rust screening. The checks will be reconstituted in case of leaf rust and cooperators may plant local susceptible check also besides check supplied from IIWBR Karnal in PZ. Hisar centre will also conduct PPSN for yellow rust besides leaf rust.

Teams of scientists were constituted for survey and surveillance of diseases in different zones during mid Dec. 2018 to mid Feb. 2019 for stripe rust and whole crop season for wheat blast along the Indo-Bangladesh border. Most of the ongoing experiments will continue during 2018-19. Teams were also constituted for PPSN recording.

Dr. D.P. Singh encouraged the cooperators to prepare research papers out of data generated during last crop season in Crop Protection Programme and give due authorship to those contributed and take prior permission of IIWBR before sending for publication.

Keeping in view of difficulties in recording in case of stem borer at Dharwad and non availability of Entomologist, it was proposed to send a team of Entomologist to assist in data recording.

PROGRAMME OF WORK, 2018-2019

The programme for the crop year 2018-2019 was chalked out in the 57th All India Wheat and Barley Research Workers Meet held at BAU Ranchi during August 24-26, 2018. The various activities to be executed at respective centres are given below:

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

Adult Plant Resistance for rusts & other diseases

i. Initial Plant Pathological Screening Nursery (IPPSN)

Objectives

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

(a) Rusts:

North: Leaf Rust: Delhi, Hisar, Karnal, Durgapura, Ludhiana, Faizabad, Kanpur (7)

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

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

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

ii. Plant Pathological Screening Nursery (PPSN)

Objectives

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

a. Rusts:

North: Stripe Rust: Dhaulakuan, Gurdaspur, Malan, Bajaura, Karnal, Delhi, Ludhiana, Pantnagar, Durgapura, Jammu, Kudwani 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, Shillongani (7)

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

Monitoring of PPSN

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

NWPZ: Drs. Sudheer Kumar, Satish Kumar and M. K. Pandey will monitor PPSN at Dahulakuan, Ludhiana, Gurdaspur and Jammu centres.

Drs. Vaibhav K Singh, Jaspal Kaur, Anil Kumar and P.L. Kashyap will monitor PPSN at Pantnagar.

Drs.O. P. Gangwar, Rajender Singh Beniwal, Vikram Singh and P.S. Shekhawat will monitor, Karnal, Hisar, Durgapura and Delhi centres.

CZ: Drs. Sudheer Kumar, K.K. Mishra, Gurvinder Singh Mavi, and I.B. Kapadia will monitor Vijapur, Junagarh, and Powarkheda

Drs. D. P. Singh, T.L. Prakasha, Dr. S K Goyal, and S.I. Patel will monitor Indore centre

PZ: Drs. D. P. Singh, B. C. Game, Ajit Maruti Chavan, T.K. Narute will monitor PPSN at Mahabaleshwar, Pune and Niphad

Drs. Sudheer Kumar, Dnyandeo A. Gadekar, and M.A. Gud will monitor Dharwad centre

SHZ: Drs. Vaibhav K Singh, S. P. Singh, J. Nanjundan and K.K. Mishra (Almora) will monitor Wellington centre

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

iii AUDPC based identification of slow rusters in AVT material:

Leaf and Stripe rusts - IIWBR, Karnal

Stripe rust - Ludhiana

Stem and leaf rusts -Mahabaleshwar

Leaf rust: Faizabad

Stem rust -Indore

iv. APR: Race specific and slow rusting

1.**Leaf rust:** AVT entries of NWPZ, NHZ and NEPZ, along with the check entries of the respective zones.

Centres: New Delhi and Ludhiana under field conditions and Flowerdale, Shimla (under glass house conditions)

2.**Stem rust:** AVT of CZ and PZ, along with the check varieties of the respective zone.

Centres: Indore, Pune, Powarkheda and Mahabaleshwar

3.**Stripe rust:** AVT entries of NWPZ and NHZ alongwith the checks of the respective zones.

Centres: Ludhiana and N. Delhi under field conditions and Flowerdale (under controlled condition),

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

A mixture of races in case of leaf and stem rusts will be supplied from Mahabaleshwar centre in South.

v. Seedling Resistance Tests and postulation of Rust Resistance Genes

1. 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.

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

PROGRAMME 2: RESISTANT SOURCES TO DIFFERENT DISEASES AND THEIR UTILIZATION

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

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

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

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

DISEASES

North: 14 Locations

Stripe rust: Karnal, Ludhiana, Hisar, Dhaulakuon, Malan, Pantnagar

Leaf rust: Karnal, Ludhiana, Delhi, Hisar

Karnal Bunt: New Delhi, Karnal, Ludhiana, Dhaulakuan, Pantnagar

Powdery mildew: Dhaulakuan, Almora, Pantnagar, Malan, Chattha

Foliar blights: Faizabad, Varanasi, Coochbehar, Sabour, Hisar, Kalyani, Mushidabad (W.B.)

Loose smut: Hisar, Durgapura, Ludhiana, Almora

Flag smut: Hisar, Durgapura, Ludhiana

Head scab: New Delhi, Dhulakuan, Gurdaspur

South: 4 locations

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.

iii. LEAF BLIGHT

Leaf Blight Screening Nursery (LBSN): No. of Centres: 12

This nursery will consist of earlier identified resistant materials as well as the AVT's and NIVTs. It will have all the released varieties and material found resistant in preceding years. It will have entries sent to CIMMYT for screening against wheat blast also.

NWPZ:	Pantnagar, Ludhiana, Karnal and Hisar.
NEPZ:	Varanasi, Faizabad, IARI Pusa, Coochbehar, Shillongani, Ranchi, Kalyani and Murshidabad (W.B.)
PZ:	Dharwad

iv. KARNAL BUNT

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

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

v. LOOSE SMUT

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

Centres: Ludhiana, Almora, Durgapura and Hisar.

vii. POWDERY MILDEW

Powdery Mildew Screening Nursery: All entries of AVT, previously identified resistant

Material and released varieties (NHZ, NWPZ)

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

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

ix. Foot rot: Dharwad (AVT entries)

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

xi. Head scab: New Delhi, Dhulakuan, Gurdaspur

The pathogenomics of Powdery mildew samples will be done at IIWBR Karnal.

PROGRAMME 2: CROP HEALTH

PRE- HARVEST CROP HEALTH MONITORING

Crop Health Monitoring: Pre harvest surveys

- All the centres associated with Crop Protection Programme will supply information fortnightly on crop health from the areas of their jurisdiction to P.I. Crop Protection starting from November 2018 till the harvest of crop.
- 'Wheat Crop Health Newsletter' will be issued on monthly basis by PI (CP) IIWBR, Karnal, during the crop season. Information on off season crop will also be included.

Monitoring of new virulences of rusts in NWPZ by specially constituted teams:

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

Team I (last week of Dec. 2018): Drs. Sudheer Kumar, Vaibabh Kumar Singh, Jaspal Kaur, (Punjab and Haryana at strategic locations)

Team II (second week of Jan. 2019): Drs. P.L. Kashyap, O. P. Gangwar, M. K. Pandey

Route: Karnal- Ambala-Khanna- Ludhiana-Phillaur-Jalandhar-Dhilwan-Amristsar-Batala-Gurdaspur-Kathua-Jammu

Team III (last week of January, 2019): Drs. Sudheer Kumar, P. Prasad, R.S. Beniwal

Route: (Karnal to Rupnagar via Indri, Ladwa, Yamunanagar, Bilaspur, Sadhaura, Naraingarh, Panchkul and Kharar-Garhshankar, Nawanshahar, Machhiwara, Samrala, Khanna, Ambala, Kurukshetra)

Team IV (Second week of Feb. 2019): Drs. D. P. Singh and Charan Singh (Karnal-Muzaffarnagar, Western U. P.)

Team V (Fourth week of Feb., 2019): Drs. Poonam Jasrotia, Beant Singh and Sachin Upmanyu (Haryana, West U. P. and Uttarakhand)

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

Wheat Disease Monitoring Nursery (To be co-ordinated by Flowerdale, Shimla): The nursery will be planted at 38 locations including Kudwani (Srinagar), Varanasi KVK, Rampur and Yamunanagar (Haryana). Samples from this nursery should be sent regularly to IIWBR RS Flowerdale, Shimla for virulence analysis and information. Information on rust appearance to be provided at monthly intervals, starting from end of December to the P.I. (Crop Protection).

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

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

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

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

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

Team 1: Drs.Sudheer Kumar, Javed Bahar Khan and Dhiman Mukherjee
Team 2: Drs. P.L. Kashyap, Sunita Mahapatra and Satyajit Hembram
Team 3: Drs.D. P. Singh, S. P. Singh, M. K. Pandey and Dhiman Mukherjee

The samples of wheat blast like disease will be analyzed at Kalyani and Coochbehar centre.

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

POST- HARVEST CROP HEALTH MONITORING

Monitoring of Karnal bunt and black point in harvested grains

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

PROGRAMME 3: INTEGRATED DISEASE MANGEMENT

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

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

PROGRAMME 4. WHEAT NEMATOLOGY

i. Monitoring of Nematodes:

***Anguina tritici, Tylenchus spp. Pretylenchus spp. & Heterodera avenae*:** All centres of Nematology

ii. Evaluation of resistance against nematodes parasitizing wheat

***Heterodera avenae*:** Hisar, Durgapura and Delhi

***Heterodera filipjevi*:** Ludhiana

***Meloidogyne graminicola*:** Ludhiana and Hissar

iii. Eco-friendly management of CCN nematodes in wheat:

centres: Durgapura, Hisar, Ludhiana and New Delhi

(To be coordinated by Delhi centre)

PROGRAMME 5. WHEAT ENTOMOLOGY

A. HOST PLANT RESISTANCE: Entomological screening nurseries (ESN), Multiple pest screening nurseries (MPSN), National initial varietal trial nurseries (NIVT) and special screening nurseries of promising entries identified during previous season

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

(a) Shoot fly (Centres: Dharwad, Ludhiana, Kanpur, Niphad)
(b) Brown wheat mite (Centres: Durgapura and Ludhiana)
(c) Wheat Aphids (Centres: Niphad, Ludhiana, Karnal, Shillongani and Kharibari)
(d) Root aphid (Centres: Karnal and Ludhiana)

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

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

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

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

(c) Foliar aphids (Centres: Niphad, Ludhiana, Karnal, Shillonganiand Kharibari)

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

B. INTEGRATED PEST MANAGEMENT

B1: Survey and surveillance of insect-pests and their natural enemies in wheat and barley cropping systems *(All centres)*

Roving surveys will be carried out at fortnightly intervals during the cropping season in wheat and barley crops for insect-pests and their natural enemies. Population and damage levels of different insect-pests will be recorded and indicated as grades or percent damage inflicted to crop. The peak period of pest activity and its severity of damage will also be recorded. Keeping in view of the threat from fall armyworm (*Spodoptera frugiperda*), a strict vigil will be kept to check its spread in different wheat growing areas.

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

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

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

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

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

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

B5. Basic studies for development of IPM strategies (Centres: Karnal, Niphad, Ludhiana, Kharibari)

The study will be conducted to generate region-wise data on population dynamics of major insect-pests of wheat and barley for developing pest-forecasting models. Weather parameters of a location will be correlated with insect population to determine the effect of climatic variations on the pest population dynamics under changing climate scenario.

B6. Zone specific IPM modules (Centres: Karnal, Ludhiana, Niphad, Kanpur)
The integrated pest module consisting of effective cultural, physical, biological and chemical components of integrated pest management will be formulated and tested against major pests of wheat viz., foliar aphids, shootfly and termites.

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

New bio-pesticides and new chemicals at lower doses will be evaluated against foliar aphids in wheat. Insect population counts before and after the treatment will be recorded along with yield in each treatment.

B8. Eco friendly management of termites (Centres: Durgapura, Kanpur, Ludhiana and Vijapur)
Few selected new chemicals along with botanicals as seed treatment will be tested against termites. The observations on plant population per meter row length, per cent damaged shoots and effective tillers will be taken at different stages of crop.

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

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

Research Plan Meeting - Wheat Quality

The research planning meeting was Coordinated by Dr. Sewa Ram, PS and PI Wheat Quality and attended by Dr. (Mrs.) Sneh Narwal, PS, ICAR-IIWBR, Karnal, Dr. (Ms.) Harinderjeet Kaur, PAU, Ludhiana, Nitin Garg, RAU, Durgapura, Dr. A.K. Patel, SDAU, Vijapur, Dr. Anil Kumar GBPUA&T, Pantnagar, Dr. Suma S. Biradar, UAS, Dharwad, Dr. (Mrs.) Anju Mahendru, PS, IARI, New Delhi and Dr. Abhijit Scientist, BARC, Mumbai. Dr. R.S. Gaikwad, MPKV Rahuri could not attend the meeting. There was no representative from CCSHAU, Hisar. Work plan for 2018-19 were formulated for quality. The work plan and recommendations were discussed on 25th August in a session on finalization of work plan and recommendations. The session was chaired by Dr. A.K. Singh, DDG (Crops) and co-chaired by Dr. R.K. Singh, ADG (FFC) and Dr. G.P. Singh, Director, ICAR-IIWBR, Karnal and Coordinated by Dr. Sewa Ram, PS & PI, Quality. Dr. S.K. Singh and Gopal Reddy were rapporteurs. It was decided in the meeting that recommendations should be very brief and should have utility in farmers' field. Accordingly, work plan and recommendations were made and are given below.

Work plan 2018-19

It was decided to continue recording data during 2018-19 for grain appearance score, hectolitre weight, protein content and sedimentation value on all the entries of the three species, namely *T. aestivum*, *T.durum and T.diccocum*. Durum will also be analyzed for the incidence of yellow berry and yellow pigment in addition to the earlier mentioned traits. Yellow pigment will also be recorded on *diccocum*. The allocation of the work will be as under:

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

7. NIVT 5B durum and aestivum trial (Restricted Irrigation Timely Sown) samples will be analysed by the laboratory at Dharwad. The centres namely, Vijapur, Indore, Powarkheda (CZ) and Pune, Dharwad,Niphad(PZ) will send the samples to the concerned lab. All diccocum samples will also be analysed by Dharwad centre. The dehuskedmaterial will be from Dharwad, Pune, Arabhavi, Kalloli, Ugar (PZ).
8. All the AVT samples from all those zones &centres, which conduct trials in 2018-19, will be analyzed by ICAR-IIWBR Quality lab for various quality parameters and selected samples for product evaluation.
9. Grain Quality Laboratory at ICAR-IIWBR, Karnal will analyse wheat samples of Special Trials (if conducted) and Quality Components Screening Nursery (QCSN) for grain appearance score, test weight, protein content, grain hardness index and sedimentation value. The 10 centres conducting the nursery will be as follows;

   Ludhiana, Karnal, New Delhi and Pantnagar (NWPZ); Kanpur and Sabour (NEPZ): Indore and Vijapur (CZ) and Dharwad andNiphad (PZ)
10. The last dates for supplying the samples by respective centres were finalised as follows:

1.	NHZ & SHZ	15th June 2019
2.	NWPZ & NEPZ	20th May 2019
3.	CZ	15th May 2019
4.	PZ	30th April 2019

11. All the wheat grain samples, duly cleaned and properly packed in polythene bags separately, enclosed in cloth bags should be sent by registered post parcel. The *T.dicoccum* samples should be sent after de-husking.
12. All the co-operators, who will analyze the wheat samples of various NIVTs and Special Trials should send the data to IIWBR, Karnal positively by 15th July,2019 by e-mail.

Research Plan
Barley Improvement

August 24, 2018
2.30 PM – 6.00 PM

Chairman : Dr. AS Kharub
Rapporteurs : Dr. Vishnu Kumar

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 2018-19 crop season.

Yield Evaluation Trials

Name of Trial	**AVT –Rainfed-NH Zone**	
No. of Trial Centres	**10**	
State	NO.	Name of centres
Himachal	6	Bajaura, Berthein, Kangra, Katrain, Malan, Shimla
Uttrakhand	3	Almora, Ranichauri, Majhera
J&K	1	Rajauri
No. of varieties including checks	**21**	
Contributing Centres	**No.**	**Name of varieties**
IARI, RS, Shimla	5	BHS472, BHS474, BHS475, BHS476, BHS477
Pantnagar	3	UPB1076, UPB1077, UPB1078
Almora	4	VLB161, VLB162, VLB163, VLB164
Bajaura	5	HBL843, HBL845, HBL848, HBL851, HBL863
Checks	4	HBL113, BHS352, VLB118, BHS 400
Name of Trial	**AVT/ IRRIGATED/ NEPZ**	
No. of Trial Centres	**6**	
State	NO.	Name of centres
UP Bihar Jharkhand	3 2 1	Kanpur, Faizabad, Varanasi Pusa(CAU), Sabour Ranchi
No. of varieties including checks	**6**	
Contributing Centres	**No.**	**Name of varieties**
Durgapura	1	RD2969
Checks	5	RD 2552, K1055, HUB113, K508, DWRB137
Name of Trial	**AVT/ IRRIGATED (Malt Barley) Timely Sown/ NWPZ**	

No. of Trial Centres	**8**	
State	NO.	Name of centres
Haryana Punjab Rajasthan U.P. Uttrakhand	3 2 1 1 1	Hisar, Karnal, Bawal Bathinda, Ludhiana Durgapura Mathura Pantnagar
No. of varieties including checks	**8**	
Contributing Centres	**No.**	**Name of varieties**
Karnal	3	DWRB160*, DWRB182, DWRB184
Checks	5	BH902, DWRB 101, DWRB123, RD2849, DWRB 137
Name of Trial	**AVT - SAL / ALK - NWPZ / NEPZ**	
No. of Trial Centers	**07**	
State	No.	Name of centers
U.P. Haryana Rajasthan	2 2 3	Dalipnagar, Faizabad Hisar, IIWBR (Hisar) Banasthali, Kumher, Vallabhnagar
No. of varieties including checks	**17**	
Contributing Centers	**No.**	**Name of varieties**
Kanpur	2	KB1762, KB 1754
Faizabad	1	NDB1708
Varanasi	2	HUB267, HUB268
Karnal	2	DWRB201, DWRB207
Durgapura	3	RD2999, RD3000, RD3002
Checks	5	RD2552, NDB1173, NDB1445, RD2794, RD2907 (I)
Name of Trial	**IVT- Malt Barley-NWPZ (Timely Sown)**	
No. of Trial Centers	**9**	
State	NO.	Name of centres
Haryana Punjab Rajasthan U.P. Uttrakhand	3 2 2 1 1	Bawal, Hisar, Karnal Ludhiana, Bathinda Durgapura, SG Nagar Mathura Pantnagar
No. of varieties including checks	**17**	
Contributing Centers	**No.**	**Name of varieties**
Hisar	1	BH1025
IIWBR, Karnal	4	DWRB196, DWRB197, DWRB198, DWRB199

Durgapura	4	RD3007, RD3008, RD3009, RD3010
Ludhiana	2	PL907, PL908
Kanpur	2	KB1707, KB1743
Checks	4	BH946, DWRB101, DWRB123, RD2849
Name of Trial	**IVT- IR-FB-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
Uttrakhand	1	Pantnagar
U. P	3	Kanpur, Varanasi, Faizabad
M. P	3	Gwalior, Morena, Sagar
Bihar	2	Pusa (CAU), Sabour
Gujarat	1	Vijapur
Jharkhand	1	Ranchi
West Bengal	1	Kalyani
No. of varieties including checks	**21**	
Contributing Centers	**No.**	**Name of varieties**
Kanpur	2	KB1707, KB1713
Varanasi	1	HUB266
Faizabad	2	NDB1709, NDB1723
Hisar	2	BH1023, BH1024
Durgapura	3	RD2991, RD2992, RD2994
Pantnagar	2	UPB1077, UPB 1080
Ludhiana	2	PL906, PL909
Karnal	2	DWRB203, DWRB205
Checks	5	BH 946, RD2552, DWRB137, RD2786, RD2899
Name of Trial	**AVT/IVT-IR-Hulless barley-NWPZ/ NEPZ / CZ**	
No. of Centers	**15**	
State	NO.	Name of centers
Haryana	2	Hisar, Karnal
Punjab	1	Ludhiana
Rajasthan	2	Durgapura, Udaipur
Uttrakhand	1	Pantnagar

U. P	3	Kanpur, Varanasi, Faizabad
M. P	2	Gwalior, Morena
Gujarat	1	Vijapur
Bihar	2	Pusa (CAU), Sabour
Jharkhand	1	Ranchi
No. Of varieties including checks	**10**	
Contributing Centers	No.	Name of varieties
Kanpur	2	KB1750, KB1757
Ludhiana	1	**PL891***
Karnal	3	**DWRB188**, DWRB204, DWRB206
Uttrakhand	1	UPB1079
Checks	3	Karan16, NDB943, K1149
Name of Trial	**IVT- Rainfed- 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	**16**	
Contributing Centers	No.	Name of varieties
Kanpur	3	KB1743, KB1754, KB1762
Varanasi	1	HUB265
Faizabad	2	NDB1712, NDB1713
Durgapura	3	RD3003, RD3004, RD3005
Ludhiana	2	PL910, PL911
Karnal	3	DWRB200, DWRB202, DWRB203
Checks	2	K 603, Lakhan
Name of Trial	**AVT-DP- IR-TS- NEPZ**	
No. of Trial Centres	**6**	
State	NO.	Name of centres
UP	3	Kanpur, Faizabad, Varanasi
Bihar	2	RAU Pusa, Sabour
Jharkhand	1	Ranchi
No. of varieties & checks	**5**	
Contributing Centres	No.	Name of varieties

Pantnagar	1	UPB1074
Checks	4	RD2035, RD2552, AZAD, DWRB 137
Name of Trial	**AVT-DP- Rainfed- NH Zone**	
No. of Trial Centers	5	
State	NO.	Name of centers
H.P. Uttrakhand	3 2	Shimla, Bajaura, Malan Almora, Majhera
No. of varieties including checks	5	
Contributing Centers	No.	Name of varieties
Almora	1	**VLB155**
Checks	2	HBL276, BHS380, BHS 400, VLB 118

Barley: Crop Protection Trials/Experiments:

Crop Health survey

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

Chemical control of leaf blight, leaf rust and stripe rust

Screening of NBDSN against foliar aphids

Screening of NBDSN, Elite material against CCN

Quality evaluation

Evaluation of malt & feed samples for quality.

Evaluation of barley quality screening nursery genotypes

Barley: Agronomy Trials/ Experiments

1. IR-TS-MB-NWPZ

DWRB 160 Checks: BH902, DWRB 101, DWRB123, RD2849

2. IR-FB-NWPZ

PL891 Checks: Karan16, NDB943, K1149

Special experiments for updating package of practices

Ongoing experiments

1. Effect of conservation agricultural practices on productivity of barley (NWPZ and NHZ)

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

Varieties: NWPZ-BH902, BH946, RD2552, DWRB101, DWRUB52

NHZ-VLB 118, BHS 400, HBL 113, BHS 352 and HBL 276

2. Standardization of seed rate of different barley varieties in NHZ

Varieties: VLB118, BHS 400, HBL 113, BHS 352 Seed rate: 75,100,125 kg/ha

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

Treatments: Recommended dose of Fertilizer, T1 + FYM @5 t/ha, T1+Mulch@ 6 t/ha, T1+ FYM @5 t/ha + Mulch@ 6 t/ha, T4+ spray of ZnSo4 @ 0.5 %, T4 + Two spray of Kcl @ 0.5 %

4. **Weed management in Barley (NWPZ, NEPZ, CZ & NHZ)**

Treatments: Halauxifen-methyl Ester+ Florasulam 40.85% WG + Polyglycol 26-2 N, Metsulfuron methyl 20 WG + , Carfentrazone 40DF, 2,4-D Na (80 WP), 2,4-D E 38 EC, Metsulfuron + Carfentrazone +Surfactant, 2,4-D Na + Carfentrazone, 2,4-D E + Carfentrazone, Halauxifen methyl+Florasulam+Carfentrazone+ Surfactant, Weedy check, Weed free

5. Effect of Pusa Hydrogel in barley under different irrigation levels.

Treatments:*Main Plots-Irrigation treatments: 04*

1. No irrigation 2. One Irrigation 30-35 days after sowing 3. Two irrigation 30-35 and 60-65 days after sowing 4. Three irrigation 30-35, 60-65 and 90-95 days after sowing

Sub plots-Hydrogel treatments: 02

1. Control 2. Pusa Hydrogel 2.5 kg/.ha

New Experiments:

To study the performance of promising barley varieties under organic, inorganic and integrated nutrient management in NHZ

Objective: To identify barley varieties for organic, inorganic and integrated farming

Treatments:

A. Nutrient Management System: i) Organic (FYM 10t/ha), ii) Integrated (FYM 5t/ha) + (NPK: 30:40:30), iii) Inorganic (NPK: 60:40:30)

B. Varieties: BHS 400, BHS 352, HBL 113, HBL 713, VLB 118

Design: Strip Plot Replication: 03

Observations

1. Yield and yield attributing characters.
2. Benefit: cost ratio

CENTRES: NHZ: Bajaura, Malan, Almora

Study the effect of organics on malting quality of different varieties in Northern plains

Treatments:

A. 1. Recommended doses of fertiliser 2. FYM 10t/ha+half of the recommended doses 3. FYM 15t/ha.

B. Varieties : DWRB 101, DWRB 123, RD 2849, DWRB 92

Design Split plot Rep 3

Observations: Yield and yield attributes, Malting quality parameters

CENTRES: NWPZ- Agra, Durgapura, Hisar,

NEPZ-Kanpur, Varanasi, Faizabad,

CZ- Udaipur, Gwalior

Recommendations

Crop Improvement:

The Research Review meeting of Crop Improvement was held on Aug. 25, 2018 in which the work done during the crop season 2017-18 was presented. The constitution of different trials to be conducted during the crop season 2018-19 including AVTs, NIVTs, IVTs and special trials for various zones was decided in the meeting. The work plan for the year 2018-19 of crop improvement was finalized in the evening of Aug. 25, 2018. After detailed delibrations the following recommendations for crop improvement arised out of the discussions:

General recommendations:

1. Following seven wheat varieties as notified by CVRC may be taken up for cultivation by the farmers of the concerned area:

   DBW 173: Irrigated late sown condition in NWPZ

   HI 1612: Restricted Irrigation timely sown condition of NEPZ

   K 1317: Rainfed timely sown condition of NEPZ

   DBW 168: Irrigated timely sown condition of PZ

   UAS 375: Rainfed timely sown condition of PZ

   MACS 4028(d): Rainfed timely sown condition of PZ

   HI 8777(d): Rainfed timely sown condition of PZ

2. Similarly seven wheat varieties released for cultivation through SVRC may also be taken up for cultivation in the recommended areas:

   BRW 3723: Rainfed timely sown conditions of Bihar

   HW5207: Restricted Irrigation timely sown condition of Tamil Nadu

   GJW 463: Irrigated early/timely sown condition of Gujarat

   KRL 283: Irrigated timely sown conditionsunder Saline conditions

   HUW 669: Rainfed/Restricted irrigations of UP

   CG 1013: Irrigated timely sown condition of Chhattisgarh

   UAS 334: Irrigated timely sown condition of Karnataka

3. 14 new wheat genetic stocks registered with NBPGR during 2017-18 for various traits may be utilized by wheat breeding programs across the country.
4. It is also recommended that the identified genotypes having heat tolerance *viz.*, HD 3219, PBW 752, HI 1617, WH 1202 and DBW 187 may be utilized by breeders in their breeding programme.

Technical recommendations:

5. In finalization of the work plan 2018-19, 418 new trials were proposed to be conducted across five wheat growing zones. These trials consisted of 138 NIVTs/IVTs, 236 AVTs and 44 Special trials.
6. Out of 215 test entries thirty two (19 bread & 13 durum) NIVT/IVT entries were considered promising and promoted to AVT trials. While out of 76 test AVT entries 16 (12 bread + 4 durum) were promoted to 2nd year AVT.
7. Physiological trials MLHT and DTSN were finazlied.
8. In NHZ AVT early sown rainfed trial will be discontinued.

9. A high yield potential trial (8 t/ha) will be constituted and conducted in NWPZ during 2018-19 jointly with agronomical trial with the same constitution. A maximum of 15 entries including checks will be evaluated at 8 locations.
10. Breeder seed allocation of 20321.78q for 141 wheat varieties have been made to 31 different centres.
11. It is recommended to discontinue the breeder seed production of wheat varieties which were released 15 years back or more.
12. National nurseries will be re-constituted as per requirement. NGSN should cater to evaluation and supply of registered genetic stocks. SSN & SWSSN will be merged.
13. With a view to bring in more precision in the conduct of wheat coordinated trial, necessary modifications were made taking into account the suitability of voluntary centres.
14. The contribution of breeding lines from different centres for IPPSN will be routed through Crop Improvement, ICAR-IIWBR, Karnal.
15. The centres were advised to strengthen their breeding programmes by enhanced hybridization and making best use of nurseries for incorporation of variability and make judicious use of facilities at Dalang Maidan.
16. 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, 2019.

Resource Management

1. Based on evaluation of broadleaf herbicides at 21 locations across wheat growing zones, it is recommended to apply readymix of Halauxifen-methyl Ester+ Florasulam 40.85% WG @12.76 g a.i./ha or its reduced dose @10.21 g/ha with carfentrazone @ 20 g/ha along with 750 ml of surfactant for effective broad spectrum control of broad leaf weeds. These options are alternatives to the recommended use of metsulfuron+carfentrazone at 4+20 g/ha along with surfactant.

2. To achieve higher wheat productivity under high fertility condition (150% RFD +15 t/ha FYM) it is recommended to use 2 sprays of Chlormequat chloride (0.2%)+ tebuconazole (0.1%) at First Node and Flag Leaf stages. The yield gain of 10-20% was observed.

3. To improve the water use efficiency and productivity, micro irrigation should be applied at 3 days interval at 100% PE. Among micro irrigation systems, drip irrigation was better than sprinkler irrigation.

4. Based on two year results of 4 to 5 locations in NWPZ, the performance of both the hydrogels was at par with a yield gain of 3 to 5% compared to control.

Crop Protection Programme

The yellow rust susceptible varieties should be replaced with recently released varieties like WB 02, HD 3086, DBW 90, WH 1124, WH 1080, WH 1142, in NWPZ. Likewise in NHZ, varieties like, HPW 349, HS 507 and HS 562 are resistant and may be preferred. The susceptible varieties if grown should be sprayed with propiconazole @ 0.1% at the initiation of rust symptoms in districts close to foot hills in Punjab and Jammu and Yamunanagar in Haryana.

1. For management of aphids, foliar spray of quinalphos 25 EC @400ml/ha is recommended in wheat.
2. Seed treatment with Imidacloprid 600 FS @ 4 ml /kg, Thiamethoxam 35 FS @ 2.4 ml/kg and Fipronil 5 Sc @ 6 ml/kg is recommended for control of termites. Likewise, in standing crop, a combination of Fipronil 5 SC+Imidacloprid 40 % WG is most effective treatment in reducing termite population.
3. A soil application of 5 q neem cake/ha and presowing seed treatment with 10 ml neem oil /kg reduced CCN cysts from 40.4 to 7.2 cysts/plant and increased wheat yields by 93% over untreated control under sick plot conditions and thus recommended for use in CCN affected sandy soils of Rajasthan, Haryana, Punjab and UP.
4. The use of farmers' self grown wheat as seed should be discouraged in West Bengal. The resistant varieties like HD 2967 and DBW 187 (identified) may be grown in NEPZ. The seed treatment with carboxin+thiram (1:1) @ 2.5 g/kg and two foliar sprays of tebuconazole (50%)+ trifloxystrobin (25%) WG @ 0.3 kg/ ha, first spray at boot leaf (booting) stage and second spray at 15 days after first spray are recommended for effective management of wheat blast like disease in West Bengal and other states of NEPZ.

Wheat Quality

1. Wheat varieties WH 1124, IR LS) and DBW 71 (SPL VLS) and IInd year AVT entries HD 3237 (RITS) and PBW 757 (SPL-VLS)of NWPZ exhibited very good chapati characteristics and hence recommended for chapati quality.
2. Wheat varieties WH 1124 (ILS),HD 2967 (ITS), HD 3059 (ILS), WH 1080 (RITS) of NWPZ and HD 2733 (ITS), DBW 71(VLS) of NEPZ and IInd year AVT entries HD 3226 (ITS) and PBW752 (ILS)of NWPZ exhibited very good quality for bread and hence recommended for bread quality.
3. Wheat varieties HS 490, NHZ and DBW 168, PZ were found suitable for biscuit and hence recommended for cultivation by the farmers for this purpose.
4. Breeding for product specific varieties should be further strengthened by taking into consideration soft and hard wheat classes in bread wheat separately and yellow pigment content in durum wheat.
5. Only the genotypes having unique/distinct quality traits should be submitted for quality analysis under QCSN. QCSN and Biofortification nurseries should be combined into one nursery.

Barley Programme

1. Malting quality facility is only at ICAR-IIWBR Karnal. So all co-operators who require malting analysis of new entries before contribution to IVT are requested to send the 5-7 entries sample (having good physical parameters for malting) to IIWBR Karnal for malting analysis.
2. Keeping in view of importance and present low yield level, a focus should be given to hulless barley and so group decided to initiate a new trial on hulless barley.
3. Dual purpose barley trials: During last 8 years, there is no entry performed better than checks in grain and forage yield in any of the zone in dual purpose trial. So to save the resources, only final year feed barley entries will be evaluated for forage and grain yield in agronomy trials and if the entry is good for forage yield, it will be reflected in the variety identification proposal that it is suitable for dual purpose also..
4. More emphasis should be given to parameters like beta glucan, protein, amylose content of hulless/malt barley.
5. An interface meeting of farmers-seed growers- malting and brewing industries- Scientists will be organized at ICAR-IIWBR, Karnal to make aware of the new varieties and technologies and to promote contract farming.

Technical Recommendations - Barley:

- Following varieties released by CVRC should go in the package of practices of respective states of the zones

  DWRB 137 in North eastern plains zone and Central Zone

  RD 2899 in Central Zone

  RD 2907 for salinity and alkalinity in NEPZ and NWPZ
- Plant growth regulators, chlormequat-chlorid (CCC) @1.25 L ha^{-1} at GS_{30-31} followed by ethephon (Cerone) @1.0 L ha^{-1} at GS_{39-40} recorded significantly higher grain yield (8-10%) and reduced plant height by 8-10 cm in NWPZ and NEPZ. So this is recommended for yield maximisation.
- Azotobacter + PSB should be practised for seed treatment in barley as it decreased the nitrogen application by 25% and a significantly higher grain yield was reported in biofertilser treated plots as compared to the control treatment in North Hill Zone..
- Seed treatment with Vitavax power 2g/Kg + propiconazole spray @ 0.1% found effective in managing foliar blight in barley.
- Quinalphos 25EC @ 400 ml/ha is recommended for management of foliar aphids in barley.

Session IV- Progress of Research in NEPZ

August 25, 2018	**Chairman**	**:**	Dr. Ravi P Singh
4.00 PM-6.00 PM	**Co-Chairman**	**:**	Drs. AK Joshi & R Chatrath
	Rapporteurs	**:**	Drs. Gyanendra Singh & Vishnu Kumar

Dr. Ravi P Singh, Chairman of the session welcomed to Co-Chairman, Rapporteurs, Speakers and all the delegates participated in the session. The chairman also welcomed representatives from CIMMYT, ICARDA, Nepal and Bhutan, other state departments and wished that the deliberations and recommendations will certainly help in enhancing wheat and barley production in north eastern plains zone (NEPZ) in the country. Presentation of significant achievements and highlights of work accomplished during last five years were made by the different centres. The centre wise details are as follows-

CSAUA&T, Kanpur: Dr. PK Gupta

Dr. PK Gupta presented significant achievements and work highlights of the centre. He informed that the centre is working for wheat and barley improvement since April 23, 1970 and till date 42 wheat and 32 barley varieties have been developed by the centre. Dr. PK Gupta briefed that out of 05 sanctioned scientist posts the post of Asstt. Agronomist is lying vacant at the centre. He mentioned that the centre is maintaining 920 wheat and 937 barley germplasm lines. Dr. PK Gupta talked about the release of 04 wheat and one barley variety from the centre during last five years and stressed that the developed variety K1006 has high zinc and iron content. He also informed that all the yield trials, agronomic experiments, international wheat and barley yield trials and nurseries are being evaluated with a great success. The Chairman Dr. Ravi P Singh said to translate the research to the farmers in the area of jurisdiction by providing improved varieties for better grain yield gains. Dr. Gupta in turn reported that the varieties are being demonstrated at farmers filed and as well as the varieties like Halna and Unnat Halna are very good for late sowings after potato cultivation.

BHU, Varanasi: Dr. RK Singh

Dr. RK Singh presented the significant work highlights of the centre BHU. He interacted that out of 04 sanctioned scientist posts the post of wheat breeder is lying vacant at the centre and the post of wheat pathologist has been withdrawn. He informed that the centre is maintaining 429 wheat and 981 barley germplasm lines. Dr. RK Singh mentioned that the centre is conducting all the trials, nurseries and other material as per allocated work plan successfully. He said that the centre has recently released a wheat variety HUW669 by CVRC during 2018 after the release of barley variety HUB113 from CVRC. Every year the centre is contributing 30 entries in IPPSN and 25 entries in IBDSN for biotic stress evaluation. During the discussions the Chairman expressed the views so as to replace the wheat variety HUW234 with new varieties for cultivation and co-chairman stressed upon to release more varieties from the centre. He also highlighted for complimenting research being undertaken at BHU under coordinated and research project mode approach.

BAU, Ranchi: Dr. Surya Prakash

Dr. Surya Prakash discussed the achievements and work highlights of the centre BAU, Ranchi. He informed that the mono cropping is one of the major constraints in Jharkhand and the centre is devoted to work in this area. He further discussed that only 12.73 % area is irrigated and rest of the area is based on rainfed farming in Jharkhand state. He mentioned that the centre is conducting all the wheat and barley yield trials, national and international nurseries in good manner. Every year 10 wheat entries are being contributed by the centre for screening in IPPSN. Dr. Surya Prakash reported that a wheat variety Birsa Gehun 3 (BG3) was released by SVRC from the centre. Chairman and co-chairman of the session urged to further work hard and to develop some varieties and technologies to the farmers of Jharkhand state.

BCKV, Kalyani: Dr. Dhiman Mukharjee

Dr. Dhiman Mukharjee presented the significant work highlights of the centre BCKV, Kalyani. He informed that out of 03 sanctioned scientist posts only one post is filled and 02 post are lying vacant. He informed that the allotted coordinated trials and nurseries are being at the centre successfully. In addition, he mentioned the results of promising wheat varieties under rainfed conditions and at varying nitrogen levels. He reported that the varieties HD3171 and K8027 were promising under rainfed conditions at 80kg N/ha and needs to be revalidated further. He discussed upon wheat blast like disease and informed that the centre is not sharing entries in IPPSN due to the preventive measures. The chairman of the session expressed that wheat holiday will soon end in West Bengal and also briefed about the readiness of India and CIMMYT to combat with wheat blast like disease and availability of wheat germplasm lines showing resistance to wheat blast like disease under congenial conditions of Bolivia and Bangladesh.

AAU, Shillongani: Dr. TP Saikia

Dr. TP Saikia discussed the significant work highlights of the centre AAU, Shillongani. Dr. Saikia presented the progress of the centre and briefed the trial conduction at the centre. He specially mentioned the problem of pre harvest sprouting (PHS) and informed that 03 germplasm lines under timely sown and 04 germplasm lines under late sown conditions showed tolerance for PHS. Dr. TP Saikia discussed about the spray of 5% NaCl is effective against PHS. At the end chairman, Dr. Ravi P Singh discussed on the trial conduction part at the centre. The chairman also stressed upon to develop and come out with red-grain wheat material that is more suitable for PHS tolerance and beneficial for the farmers.

BAU, Sabour: Dr. Nitish De

Dr. Nitish De presented the significant work highlights of the centre BAU, Sabour. He informed that all that is more three post of the scientists are filled at the centre. He briefed the house that all the allotted trials, nurseries are being conducted at the centre as per assigned technical programme. He further discussed the release of wheat varieties namely BRW3708, BRW934, BRW3723 from the centre by SVRC. He informed that the centre is sharing 20 entries in IPPSN for biotic stress evaluation. Chairman of the session exhorted to develop some wheat varieties from CVRC and to cater the need of Bihar state. The chairman further stressed upon to enhance productivity of Bihar to see direct jump in productivity from north eastern states.

ICAR-IARI, PUSA: Dr. TR Das

Dr. TR Das discussed the progress of the centre and informed the house that all the trials conducted at the centre were conducted. He briefed that the entry HP1963 was promoted to AVT but could not be promoted further. Dr. Das shared that the centre is producing good amount of breeder seed and during 2017-18, 1498 q wheat breeder seed was produced at the centre. He further informed that 209 germplasm lines are being maintained at the centre. Dr. GP Singh, Director, ICAR-IIWBR showed his concern for varietal release from the centre and co-chairman discussed that the layout of the trials should be executed properly at the centre.

NDUA&T, Faizabad: Dr. Vinod Singh

Dr. Vinod Singh presented the significant work highlights of the centre NDUA&T, Faizabad. He informed that all the trials, national and international nurseries are being conducted by the centre as per work plan. He shared that the centre has developed wheat varieties from CVRC and barley variety namely NDB1445 from the SVRC. This year the entry NW7049 performed very well in coordinated trial and ranked first in NWPZ. Dr. Vinod Singh mentioned that the centre is maintaining 350 wheat and 280 barley germplasm lines. He further shared that the centre is contributing 25 entries in IPPSN every year. Dr. Vinod Singh also informed that the centre has also registered genetic stock, IC252459 with ICAR-NBPGR. Dr. GP Singh, Director, ICAR-IIWBR appreciated the performance of NW7049 in NWPZ.

BKVV, Cooch Behar: Dr. Saikat Das

Dr. Saikat Das presented the achievements and progress of the centre UBKVV, Cooch Behar. He informed that out of 02 scientific positions 01 is lying vacant. He informed that all the trials, national and international nurseries are being conducted by the centre under the assigned activities. Dr. Saikat Das mentioned that the centre shared 20 entries in IPPSN during 2016-17 and after that due to the preventive measures taken to be safe from wheat blast like disease, the entries have been discontinued from the centre in IPPSN. He shared that *Polygonum spp*. is one of the major broad leaf weed at the centre and adjoining areas. Dr. Saikat Das briefed that the centre has contributed in the germplasm registration (IC064121) for leaf blight in wheat. Dr. GP Singh, Director, ICAR-IIWBR discussed that the seed from the prone area for wheat blast like disease should not be submitted in national gene bank. Dr. Dinesh Kumar, PS, FFC also shared his views and opined that the seed from such confined areas should be restricted for saving in national gene bank.

During deliberations Dr. GP Singh, Director, ICAR-IIWBR stressed upon to work hard for the realization of doubling farmer income. He said that plenty of opportunities are available for working in wheat and especially in north eastern India. He also briefed the centre reviewing policies and urged to all the centre to work hard and to contribute significantly for wheat and barley improvement and productivity enhancement. The chairman of the session also viewed that the centres should work hard to combat from wheat blast like disease, climate change, bio-fortification, water use efficiency etc. Dr. AK Joshi said that pre harvest sprouting is a serious problem and centres should take care and to be ready with solutions.

During discussions, Dr. BN Mahto stressed upon to restrict the seed movement from Nepal and India by common man, near relatives to successfully check the wheat blast like disease. He further stressed that India and Nepal will join hand and will move together to address the issues of climate change, low genetic gains and to control devastating diseases. Dr. Mahto also talked on 07 points programme of Indo-Nepal joint collaboration.

The session ended with thanks to the chairman, co-chairman, speakers, Rapporteurs and delegates.

Session V- International Linkages for Enhancing Wheat and Barley Production

August 26, 2018	**Chairman**	**:**	Dr BS Mahapatra, Ex. Director CRIJAF
	Co-Chairman	**:**	Dr Z.A. Haider
	Rapporteurs	**:**	Drs. Sindhu Sareen & Sneh Narwal Drs.

This session had seven presentations from CIMMYT, ICARDA and SAARC countries.

First, Dr. Ravi P Singh from CIMMYT gave his talk on the "Current Status and Future Prospects of Genetic Yield Gains in CIMMYT Wheat Breeding Program". He emphasized on the ways to improve the genetic gain. He said that each selection in field adds to genetic gain for more than one trait and that phenotyping is the key to breeding. Based on the six year trial of the varieties developed between 1964 to 2009, he informed the house that similar genetic gains were observed in conventional or conservation agriculture in both optimally irrigated and partially irrigated drought stress. Annual genetic gain of around 1% continues. Around 1.5% annual genetic gain was observed during 2007-2019 compared to 0.7% during 1966-2007. He suggested that the AICRP data can be used to calculate the genetic gain in Indian wheat varieties. He stressed on the need of implementing GWAS, GS, and HTP at different stages of breeding program. Profiling of all the parents should be done for GWAS markers. He finally concluded his talk with the remarks that conventional breeding approaches used at CIMMYT continue to enhance grain yield; >1% annually, in all environments; genomic selection for grain yield can be used for discarding bottom 30-40% lines and reliable markers for yield contributing genomic regions could help in selecting parents with complementary QTLs for crossing, however more work needed. He also suggested for developing varieties combining yield potential with biotic /abiotic stress.

The next presentation was by Dr G Velu on "Progress in Genetics and Breeding of Biofortified High Zinc Wheat". He informed the house that the current availability of Zn is 6 - 9µg/day and the target is to increase it to 12µg/day. The wild relatives (Spelta, *Ae. tauschii*, emmer wheat, SHW and landraces) have high Zn content which can be potentially harnessed for biofortification to develop nutrient-dense grain. In order to improve the zinc content in wheat targeted crosses are attempted and intensive field selections are made from large populations. Zinc-rich wheat trial (HPYT) has resulted in High zinc wheat in farmers' fields of South Asia in less than 10 years with 20-40% more zinc. A number of biofortified varieties have been released in India, Pakistan, Bangladesh and Nepal and some more are in pipeline. Six major QTL regions on chromosomes 2B, 3A, 4B, 5B, 6B and 7B were identified at CIMMYT using GWAS. Two markers have been identified using a magic panel from CSIRO. However, soil zinc heterogeneity is a big challenge and there is need to develop climate resistant high Zn varieties.

The 3rd presentation was by Dr. Pawan Singh, Scientist, Plant Pathology, CIMMYT. He informed the participants about the threat posed by the new disease, wheat blast that is knocking at the doorsteps of India along Indo-Bangla border. He gave an overview of the blast disease. As an immediate step, evaluation of Indian released varieties / advance wheat lines in collaboration with CIMMYT, Mexico, was carried out at the hot spot locations in Latin America (Bolivia, Brazil, Paraguay and Argentina).

Screening results also revealed that cultivars derived from CIMMYT line Milan appear to have resistance under field conditions and it possesses the 2NS segment translocation and has reported to play role in blast resistance. Screening facility has also been developed at Jessore, Bangaldesh where the Indian material will be tested every year for this purpose. Of 100 Lines from India screened during 2017, 31 were 2NS lines and 63 were Non 2NS lines. Four lines had scores of ZERO and 15 lines had scores 1-10.

The presentation by Dr Ronnie Coffman was on "10 Years of Wheat Improvement: The BGRI and Delivery of Genetic Gains in Wheat, 2008-2018". He talked about the genesis and accomplishments of BGRI. Through the DRRW and the DGGW projects, for 10 years, the BGRI has been focused on delivering rust-resistant varieties of wheat to the farmers around the world. He informed that with every 1°C increase in night temperature, there will be 10% decrease in the wheat yield. The DGGW is committed to building greater climate resilience into new varieties of wheat. During 8 years of the DRRW and 2 years of the DGGW over 140 varieties of wheat with improved agronomic traits, climate resilience and disease resistance in 11 at-risk countries have been delivered. The new technologies like Genomic Selection and high throughput phenotyping to help with speed breeding is another line of work. Since 2008, more than 700 scientists from DRRW/DGGW partner countries have been trained; much of this training was conducted in India and Nepal.

In the next presentation, Dr RPS Verma talked on "Advances in ICARDA-ICAR collaboration for barley". He informed that the global area under barley is decreasing but increasing in developed countries. ICARDA Barley Program addresses to nearly 19 million ha globally. Establishment of ICARDA, SA & China Office in New Delhi (2008) led to increased collaboration between ICARDA and ICAR resulting in increased germplasm sharing, research collaboration, exchange of visits of scientists and participation of ICARDA scientists in monitoring & annual workshop in India. ICAR-ICARDA collaborative research project (2017-21) on Diversification of germplasm and genetic enhancement of barley for biotic and abiotic stress and malting quality for different agro-ecologies has objectives to identify high yielding barley genotypes for rainfed condition with drought, heat and salinity tolerance in plains, and drought & cold tolerance in hills, high yielding genotypes of naked barley for Hills and plains and identification of closely linked molecular markers with better quality, leaf blight and aphid tolerance through association mapping.

The next presentation was on "Challenges and Opportunities for Wheat & Barley Improvement in Nepal" by Dr. Baidya Nath Mahto. Dr Mahto told that wheat is the 3rd largest cereal after rice and maize but 2nd in terms of food security (human consumption) contributing about 25% in national food security. After introduction of semi-dwarf varieties during mid 1960s area under wheat increased by 7%, production by 16% and productivity by > 2 folds in the country. However, majority of the wheat varieties (79%) are from outside. He also discussed the challenges and threats with wheat & barley cultivation in Nepal and at the same time he conveyed that there is great hope because of increased interest of private sectors, good linkage with CGIAR centers, international research and academic institutions, growing interest of donors, planned development, Agriculture Development Strategy (ADS), Prime Minister Agricultural Modernization Project (PMAMP).

The last presentation was on “Wheat Improvement in Bhutan” by Dr. Legjay. He gave an overview of the wheat programme in Bhutan. Wheat stands at 3rd position both in area and production. The major challenges before Bhutan wheat programme are the availability of improved & quality seeds, presence of alternate cash crops (Potato in high altitude/vegetables vs wheat), and premature harvest for fodder, seed exchange, and readily available imported products at affordable price. There is need for increased interaction amongst the stakeholders and improved coordination between Dzongkhags and DoA/agencies to work together as one. To strengthen the National wheat programme, all RDCs will have to work for the commodity. Introduction of improved varieties from South- Asian region countries, testing and validation of promising technologies and evaluation of germplasm are also required to strengthen the wheat research in Bhutan. CIMMYT can act as bridge for linking MoAF with other regional and international research institute.

The Chairman Dr Mahapatra called for location specific adjustments in climate change scenario. He emphasized that with climate change weather parameters should be correlated with the behavior and performance of the varieties. He suggested studying the epidemiology of yellow rust due to its starting points from the dry regions. He also emphasized to develop the varieties to combat the terminal heat stress. Dr Ratan Tiwari, Dr. Sewa Ram and Dr Hanif Khan from also participated in discussion.

The session ended with the thanks to chair, co-chair and presenters.

Session VI- Status Reports from States and Farmers Views

August 25, 2018
6.00 PM to 7.00 PM

Chairman : Dr. Baidya Nath Mahto, ED, NARC, Nepal
Co-Chairman : Dr. Ravish Chatrath,
Rapporteurs : Drs. Satyavir Singh & R.S. Chhokar

The special session on "Status reports from the states and farmers views for R&D in wheat" was chaired by **Dr. Baidya Nath Mahto**, **Executive Director & Pr. Scientist, NARC, Nepal.** At the onset, the Chairman welcomed the Co-Chairman, speakers, and delegates. The first speaker of the session was Sh. Bhagwan Dass from Patiala (Punjab), who pointed in his talk the need to increase the productivity of crops to achieve the target of doubling farmers income by 2022. He also narrated the story of green revolution and highlighted the importance of development and spread of dwarf input responsive high yielding varieties of wheat in bringing the green revolution. He also stressed the need for the improvement/reforms in the extension systems. He informed the house that presently two varieties of wheat namely HD 2967 and HD 3086 are occupying about 80 per cent area in Punjab state. He also pointed out that the cost of cultivation should be reduced to enhance the profit margin of the farmers. He informed the house that presently the farmers for wheat crop establishment are using Rotavator and are mixing seed and fertilizer as broadcast option instead of drilling. This practice is causing reduced yield along with lodging problem. This problem need to be resolved with mounting seed-cum fertilizer drill on rotavator. He informed the house that farmers' major demand is to increase minimum support price (MSP) of crops and for this suggested to include the 'rental value of land' in deciding the price. He stressed the need to establish a 'farmers fund' which can also be utilized for the welfare of the scientific community.

The second presentation was of Rao Gulab Singh Lodhi from Narsinghpur (Madhya Pradesh). He highlighted the importance of crop diversification for sustainability and higher profitability. He narrated his success story of producing higher yield of Lentil by adoption of high yielding varieties and improved agronomic practices. He informed the house that he produced a yield of 32.60 q/ha of Lentil in the demonstrations at his farm. He practices 100 per cent irrigation with sprinkler at his 72 acres farm. He also presented the success story of intercropping of wheat with sugarcane and told that in the intercropping he got 600 q/acre sugarcane plus/and 18 q/acre wheat in comparison to 800 q/acre yield of sugarcane as single crop. Last year he had grown wheat variety WB2 with sugarcane and produced 2.4 q seed with 2 kg seed. He also informed that besides crop production he is practicing Bee Keeping and this practice has increased the yields of his crops along with income. For his innovative agricultural practices, he has received the 'Best Farmer Awards'. He takes the advice on agriculture from the scientists of KVK, Narsinghpur and JNKVV, Jabalpur.

The third presentation was of Sh. Sudhir Agrawal, a seed producer from Mathura (Uttar Pradesh). He emphasized that at the time of release of HD 2967, he produced its seed in large quantity and spread this in Punjab, Haryana and Western Uttar Pradesh. He pointed that in tall variety like HDCSW 18 we can increase the wheat yield by 2 sprays of Lihocin at first node stage and boot leaf stage of crop. For better nutritional quality chelated Zinc can be sprayed for increasing the Zinc content. He also emphasized the need of diversification involving floriculture, medicinal plants and dairying for higher income of the farmers.

The fourth and last presentation was of Sh. Balbir Singh Jaria from Fatehgarh Sahib (Punjab). He informed the house that he multiplies the seed of newly released wheat varieties received in very small quantity by following Bed Planting system. He also pointed out that wheat variety HD 3086 is picking up in Punjab state. There is less lodging in this variety and it performs better than other varieties if there is more rainfall.

Session VII- Plenary Session

August 26, 2018
6.00 PM to 7.00 PM

Chairman : Dr. DN Singh
Co-Chairman : Dr.GP Singh and Dr. Dinesh Kumar
Rapporteurs : Drs. BS Tyagi & Sendhil

The important and the concluding session of the three days workshop, i.e., plenary session of wheat and barley research workers meet was chaired by Dr. DN Singh, Director (Research) and co-chaired by Dr.GP Singh, Director, ICAR-IIWBR and Dr.Dinesh Kumar, PS, ICAR. The Chairman welcomed the delegates of the meeting and appreciated the efforts of the coordinated programme in achieving the historic production target. He then requested the section wise PIs to present the significant recommendation and highlights of work plan for 2018-19.

Crop Improvement: The recommendations and plan of work for Crop Improvement was presented by Dr Ravish Chatrath, PI, Crop Improvement and were based on the Research Review meeting of Crop Improvement while the composition of different trials including AVTs, NIVTs, IVTs and special trials for various zones to be conducted during the crop season 2018-19 were finalized in the Work Plan meetings.

Resource Management: Dr RK Sharma, PI, Resource management presented the recommendations and plan of work for 2013-14 crop season. The Resource Management and Social Sciences groups after thorough deliberations arrived at the following recommendations. After the presentation, it was suggested that the special trial to be conducted should be only one and on collaborative mode. Dr.GP Singh, Co-Chairman suggested Dr.Satyavir Singh that an impact study on FLDs has to be done at the earliest considering top 10 varieties based on the seed indent. The house also discussed on the application of phosphorus in experimental trials and Dr.GP Singh told that it can be applied either on one of the crops under the Rice-Wheat System. Long-term fertilizer experiment has to be carried out and Dr.Mahapatra suggested to use PSB to enrich the availability of 'P' from soil as application of nutrient as such will be too costly and will not be economical.

Crop Protection: Crop Protection's team recommendations and the work plan for 2018-19 were presented by Dr DP Singh, PI-Crop Protection, ICAR-IIWBR, Karnal. He informed that the programme was reviewed in presence of all the scientists from Co-operating centers.

Wheat Quality: 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 followings. After the presentation by the PI, there was a query raised whether there is a need for separate breeding programme for quality improvement followed by a suggestion came up for combining the bio-fortified trials (QCSN and BF). The house agreed to the suggestion and Chairman recommended for merging the two bio-fortification trials.

Barley Network

Barley network recommendations and the work plan for 2018-19 were presented by Dr AS Kharub, PI-Barley Network, ICAR-IIWBR, Karnal. He informed the house that 11 trials were constituted and research on hulless barley will be initiated. Further, he added that trial on dual purpose barely will be discontinued. Post presentation by the PI, Dr.Mahapatra suggested for hydrogel trials in barley. To supplement the suggestion, Dr.GP Singh suggested implementing the trials in moisture stress regions will help to get the expected results. Dr.RPS Verma thrusted on location specific PGR. With respect to barley seed production, Dr.Raj Kumar requested for additional two more centres for which, Dr.GP Singh denied.

Following the presentations made by the PIs of all units, Dr. GP Singh presented the Varietal Identification Committee (VIC) report. In total 6 proposals (wheat) were received and all were considered by the VIC Chaired by Dr. AK Singh, DDG (CS) and 8 members nominated by the Council for the year 2018-19. There was no proposal from barley group.

After the VIC report presentation, there was felicitation of researchers who are to be superannuated in 2018-19. Subsequently, Dr.GP Singh invited proposals regarding the venue for next workshop. Dr.Sai Prasad proposed Indore as the next venue and for that Dr.GP Singh replied that the final decision will be taken subject to Council approval. Dr.GP Singh, Co-Chairman in his remarks insisted on immediate attention of research activities as many posts have been curtailed along with a steep fall in the level of contingencies. He pointed that for some major centers like Durgapura and Ludhiana, the cost and resource cut were more. Accordingly four centres have been closed this year which were evaluated based on performance. He also mentioned that only few centres like IARI, PAU, Durgapura and IIWBR plays a major role in variety release which warrants for immediate attention. With respect to financial commitment, he said that first instalment will be released after providing the Utilisation Certificate (UC), and the second instalment will be released after furnishing the Audit Utilisation Certificate (AUC). He also cautioned that atleast 50% of the expenditure has to be met by September or else proportionate budget cut will be there. He requested to submit the AUC at the earliest so that the funds shall be released by September 20. Dr.GP Singh also thanked the Vice-Chancellor, Local Organising Committee Chairman and the 29 Centres for their contribution in successful conduct of the workshop. He also appreciated the efforts of Dr.Sewa Ram in quality improvement and plant pathologists team especially in West Bengal for restraining wheat blast into Indian border. Further, he iterated that in every Workshop, representatives of DAC&FW, Director of State Governments should participate and to the minimum extent, State officials from the Workshop where it has been organised. He also instigated the resource management team to revise the package of practice. For social sciences, he advised to do impact assessment studies and to prepare an action plan for solving major problems. He also thanked the farmers from different parts of the country who have participated in the workshop. Dr.GP Singh also announced that from next year onwards, there will "Best Innovative Farmer Award" who brought significant changes in the agriculture. He also remembered his two years of journey heading the AICRP on wheat and barley resulting in historic production and he wished for another successful record production for the forthcoming season.

The Chairman, Dr. DN Singh in his remarks appreciated the achievements of the five major research groups who laid the stone for successful wheat production since 1950. He also pointed that researchers should contribute for higher production despite a chance of area declining to 25mha. He compared the Australian population and wheat production with India and appreciated the efforts of researchers. He also thanked DG, DDG, ADG, Director for giving an opportunity to conduct the workshop in BAU, Ranchi.

The session ended with the vote of thanks by Dr.BS Tyagi, the organizing Secretary.

Recommendations of Varietal Identification Committee Meeting

August 25, 2018 **Chairman:** Dr. A K Singh, DDG (Crops)

Member Secretary: Dr. GP Singh, Director, IIWBR

The meeting of Varietal Identification Committee of Wheat & Barley was held at Board Room of Vice Chancellors office, Birsa Agricultural University (BAU, Ranchi on 25th August 2018 under the Chairmanship of Dr. AK Singh, DDG (Crops) and following members attended the meeting:

1. Dr. AK Singh, DDG (Crops), ICAR, Krishi Bhavan, New Delhi (Chairman)
2. Dr. RK Singh, ADG (FFC), ICAR, Krishi Bhavan, New Delhi
3. Dr. DN Singh, Director Research, BAU, Ranchi
4. Dr. BS Mahapatra, Prof., GBPUA&T, Pantnagar
5. Dr. RP Singh, Director Seeds, BAU, Ranchi
6. Dr. SC Mishra, Ex Head, Plant Genetics Division, ARI, Pune
7. Dr. Mohinder Prashar, Mahyco R&D, Jalna (Pvt. Representative)
8. Dr. U S Singh, Nuziveedu Seeds, (Pvt. Representative)
9. Dr. GP Singh, Director, ICAR-IIWBR, Karnal (Member Secretary)

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

Variety	Production conditions	Recommendations
WHEAT		
North Western Plains Zone (NWPZ): Punjab, Haryana, Delhi, Rajasthan (excluding Kota and Udaipur division), Western Uttar Pradesh (except Jhansi division), Jammu and Kathua district of Jammu & Kashmir, Paonta Valley and Una district of Himachal Pradesh and Tarai region of Uttarakhand.		
HD 3226	IR-TS	With high levels of resistance to rusts and superior grain quality (Protein 12.6% & sedimentation value of 62.1 cc) the genotype was identified. It also has diverse source of resistance to leaf rust.
PBW 752	IR-LS	On the basis of superiority in yield, resistance to stripe and brown rusts along with better grain quality, the variety was identified. This genotype is also having stripe rust resistance gene *Yr10*.
HD 3237	RI-TS	Both the proposals were considered together and on the basis of high yield advantage and resistance to yellow and brown rusts, both were identified.
HI 1620	RI-TS	
PBW 757	SPL-VLS	PBW 757 was proposed under very late sown conditions of NWPZ. This genotype had yield advantage under very late sown conditions along with superior grain quality (Protein 13.0% & sedimentation value of 63.3 cc), hence identified. This genotype is also having stripe rust resistance genes *Yr15* and *Yr36*.
North Eastern Plains Zone (NEPZ): East of UP, Bihar, Jharkhand, West Bengal (excluding hills), Orissa, Assam and plains of NE States.		
DBW 187	IR-TS	DBW 187 had high yield advantage (upto 9 %) over the checks along with resistance to rusts and other foliar diseases. It also had superior grain quality (Protein 11.5 % & Sedimentation value of 63.5 cc) and was identified.

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

Annexure - I

List of Final Year Entries & Checks, 2018-19

Trial	Final year entries	Checks
North Western Plains Zone		
AVT-IR-TS-TAS	DBW221, DBW222	HD2967, WH1105, HD3086, DBW88, DPW621-50, PBW550, HD3226(I)
AVT-IR-LS-TAS	PBW771	HD3059, DBW173, WH1021, WH1124, PBW752(I)
AVT-RI-TS-TAS	BRW3806, NIAW3170, HI1628	WH1080, PBW644, HD3043, WH1142, HD3237(I), HI1620(I)
North Eastern Plains Zone		
AVT-IR-TS-TAS	HD3249	HD2733, K0307, DBW39, HD2967, DBW187(I)
AVT-RI-TS-TAS	DBW252	HD2888, K8027, HD3171, K1317, HI1612
Central Zone		
AVT-RI-TS-TAD	UAS466(d), DDW47(d)	HI8627(d), MP3288, DBW110
Peninsular Zone		
AVT-RI-TS-TAD	MACS6696, MACS6695, NIAW3170, MACS4058(d), GW1346(d), HI8805(d), HI8802(d)	DBW93, HI1605, AKDW2997-16(d), UAS446(d)
SPL Trials		
SPL-VLS	HD3271, HI1621	WR544, DBW14, DBW71, PBW757(I)

Annexure – II

Agenda
57th All India Wheat & Barley Research Workers' Meet
BAU, Ranchi (24-26 August, 2018)

August 24, 2018 – Day 1

8.30 AM- 9.30 AM **REGISTRATION**

Venue: Auditorium

09.30 AM – 10.30 AM

Chairman : Dr. P Kaushal, Vice Chancellor, BAU, Ranchi

Co-Chairman : Dr. RK Singh ADG (FFC)

Rapporteur : Dr. BS Tyagi & Ajay Verma

Welcome & Presentation of Progress Report for 2017-18 Dr. GP Singh, Director, ICAR-IIWBR

SESSION – I : Principal Investigators' Reports-Research Review Meeting

Venue: Auditorium

Chairman : Dr. AK Singh, VC BAU, Sabour

Co-Chairman : Dr. RK Singh, ADG (FFC), ICAR, New Delhi

Rapporteurs : Drs. R Tiwari & Mamrutha HM

Timings: 10.30 AM-01.30 PM including Tea Break

Disciplines	Speaker
Crop Improvement	Dr R. Chatrath
Resource Management	Dr RK Sharma
Crop Protection	Dr DP Singh
Wheat Quality	Dr Sewa Ram
Barley Programme	Dr. AS Kharub
Impact of FLDs & constraints analysis	Dr. Satyavir Singh
Transferring new technologies to fields -New Initiatives	Dr. Vikrant Singh (DWD)

(Lunch break from 1.30PM – 2.30 PM)

SESSION-II: Research Planning Meeting

2.30 PM – 6.00PM including tea break

Disciplines	Venue
Crop Improvement	Auditorium
Breeder Seed Allocation	Auditorium
Resource Management	Seminar Hall, Deptt. of Agriculture Engineering
Crop Protection	Conference Hall, Faculty of Agriculture
Wheat Quality	Smart Class Room, Deptt. of Extension
Barley Network	Dr. R. B. Prasad Hall, Deptt. of GPB)

6.00 PM: General Body Meeting – SAWBAR
General Secretary SAWBAR

August 25, 2018 – Day 2

INAUGURAL SESSION

Venue: Auditorium

	Chief Guest	**:**	**Hon. Governor of Jharkhand Smt Droupadi Murmu**
Timings	**Chairman**	**:**	**Dr. T Mohapatra, Secretary DARE & DG, ICAR**
10 AM onwards	**Guest of Honour**	**:**	**Dr. AK Singh, DDG (Crops)**
	Guest of Honour	**:**	**Dr. P Kaushal, Vice Chancellor, BAU, Ranchi**

10.00-10.05	Lighting of Lamp	:	All dignitaries
10.05-10.10	Prayer	:	-
10.10-10.15	Welcome of the Dignitaries	:	
10.15-10.20	Welcome Address	:	Dr. DN Singh, Director Research, BAU Ranchi
10.20-10.30	Research Highlights 2017-18	:	Dr. GP Singh, Director, ICAR-IIWBR, Karnal
10.30-10.40	Address by Guest of Honour	:	Dr. AK Singh, DDG (Crops), ICAR, New Delhi
10.40-10.50	Address by Guest of Honour	:	Dr. P Kaushal, VC BAU, Ranchi
10.50-11.20	Address by Chairman	:	Dr. T Mohapatra, Secretary (DARE & DG, ICAR)
11.20-11.50	Awards & Release of publications	:	Chief Guest and Dignitaries on Dias
11.50-12.50	Address by the Chief Guest	:	Hon. Governor of Jharkhand, Smt Droupadi Murmu
12.50-13.00	Vote of Thanks	:	Dr. Z Ahmad Haider, BAU Ranchi

National Anthem

(Lunch break from 1.00 PM – 2.00 PM)

August 25, 2018 – Day 2

SESSION –III: Finalization of work plan and recommendations

Venue: Auditorium

Timing: 2.00 PM – 4.00 PM (including tea break)

Chairman	**:**	Dr. AK Singh, DDG (Crops)
Co-Chairman	**:**	Dr. RK Singh, ADG (FFC)
		Dr. GP Singh, Director, IIWBR, Karnal
Rapporteurs	**:**	Drs. SK Singh & Gopal Reddy

Discipline	**Coordinator**
Crop Improvement	Dr R Chatrath
Resource Management	Dr RK Sharma
Crop Protection	Dr DP Singh
Wheat Quality	Dr Sewa Ram
Barley Network	Dr AS Kharub

SESSION –IV: Progress of Research in NEPZ
Venue: Auditorium

4.00 PM – 6.00 PM *(Including Tea)*

Chairman : **Dr. Ravi P Singh, CIMMYT, Mexico**
Co-Chairman : **Dr. AK Joshi, CIMMYT**
Dr. R Chatrath, IIWBR
Rapporteurs : **Drs. Gyanendra Singh & Vishnu Kumar**

Centre	Speaker	Centre	Speaker
CSA, Kanpur	Dr. PK Gupta	BAU, Sabour	Dr. Nitish De
BHU, Varanasi	Dr. RK Singh	IARI RAS, Pusa	Dr. TR Das
BAU Ranchi	Dr. Surya Prakash	NDAUT, Faizabad	Dr. Vinod Singh
BCKVV, Kalyani	Dr. Dhiman Mukherjee	UBKVV Cooch Behar	Dr. Saikat Das
AAU Shillongani	Dr. TP Saikia		

Varietal Identification Committee Meeting
Venue: Committee No 1 (Director's Office)

6.00 PM onwards	**Chairman**	**:**	Dr. AK Singh, DDG (Crops), ICAR
	Member Secretary	**:**	Dr. GP Singh, Director, ICAR-IIWBR, Karnal

August 26, 2018 SESSION- V: International Linkages: CIMMYT, ICARDA

Venue: Auditorium

9.00 AM – 11.00 AM

Chairman : **Dr. BS Mahapatra, GBPUA&T**
Co-Chairman : **Dr. ZA Haider, BAU Ranchi**
Rapporteurs : **Drs. Sindhu Sareen and Sneh Narwal**

Topic	Speaker
Genetic yield gains in CIMMYT Wheat Breeding Program- current status and future prospects"	Dr. Ravi Singh, CIMMYT
Progress in genetics and breeding for biofortified wheat at CIMMYT	Dr. G. Velu, CIMMYT
Wheat blast-current status and progress in phenotyping	Dr. Pawan K Singh, CIMMYT
BGRI and the delivering of genetic gains in wheat	Dr. Ronnie Coffman
Advances in ICARDA-ICAR collaboration for wheat &barley	Dr. RPS Verma
Challenges and opportunities for wheat improvement in Nepal	Dr. Baidya Nath Mahto, Nepal
Wheat improvement in Bhutan	Dr. Legjay, Bhutan

Tea break from 11.00 AM – 11.30 AM

SESSION- VI : Status reports from states and farmers views for R&D in Wheat

Venue: Auditorium

11.30 AM – 1.00 PM	**Chairman**	**:**	**Dr. BN Mahto, Executive Director -NARC, Nepal**
	Co-Chairman	**:**	**Dr. GP Singh, Director, IIWBR**
	Rapporteurs	**:**	**Drs. Satyavir Singh & RS Chhokar**

Status reports/ specific inputs Presentations by Directors of Agriculture	**NWPZ:** Punjab, Haryana, Rajasthan, Uttar Pradesh **NEPZ:** Bihar, Jharkhand, West Bengal, Assam **CZ & PZ:** MP, Gujarat, Karnataka, Maharashtra
Inputs from progressive farmers	Shri Bhagwan Das, Shri Gulab Singh Lodhi, Shri Sudhir Agrawal, Shri Balbir Singh Jaria

(Lunch break from 1.00 PM – 2.00 PM)

SESSION- VII : PLENARY SESSION

Venue: Auditorium

2.00 PM – 04.00 PM	**Chairman**	**:**	Dr. DN Singh, Director Research
	Co-Chairman	**:**	Dr. Dr. GP Singh, Director, IIWBR and Dr. Dinesh, ICAR
	Rapporteurs	**:**	Drs. BS Tyagi & R Sendhil

Presentation of significant recommendations and highlights of work plan for 2018-19

Crop Improvement	Dr. R Chatrath
Resource Management	Dr. RK Sharma
Crop Protection	Dr. DP Singh
Wheat Quality	Dr. Sewa Ram
Barley Network	Dr. AS Kharub

Report of Varietal Identification Committee	Dr. GP Singh
Felicitating superannuating wheat & barley researchers	Chair and Co-Chair
Proposal for venue of 2019 workshop	All Participants
Remarks of Director, IIWBR	Dr. GP Singh, Director, IIWBR
Chairman's Remarks	Dr. DN Singh
Vote of Thanks	Dr. BS Tyagi, Organizing Secretary

हर कदम, हर डगर
किसानों का हमसफर
भारतीय कृषि अनुसंधान परिषद

Agrisearch with a human touch

Issued on the occasion of 57th All India Wheat and Barley Research Workers' Meet held at Birsa Agricultural University, Ranchi (Jharkhand) during August 24-26, 2018.