

प्रगति प्रतिवेदन
PROGRESS REPORT
2018-19



अखिल भारतीय समन्वित
गेहूँ एवं जौ अनुसंधान परियोजना

**AICRP on
Wheat and Barley**



सामाजिक विज्ञान
SOCIAL SCIENCES

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ICAR-Indian Institute of Wheat and Barley Research, Karnal



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All India Coordinated Research Project on Wheat and Barley

**PROGRESS REPORT
2018-19**

SOCIAL SCIENCES

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Correct Citation

ICAR-IIWBR 2019. Progress Report of AICRP on Wheat and Barley 2018-19, Social Sciences. Eds: Satyavir Singh, Anuj Kumar, Sendhil R and GP Singh. ICAR-Indian Institute of Wheat and Barley Research, Karnal, India. P. 41.

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Issued on the occasion of 58th All India Wheat and Barley Research Workers' Meet held at ICAR-Indian Agricultural Research Institute, Regional Station, Indore, Madhya Pradesh during August 24-26, 2019.

ACKNOWLEDGEMENT

I wish to express my deep sense of gratitude to Dr. G.P. Singh, Director, ICAR-IIWBR, Karnal for his continuous encouragement, support and guidance in coordinating the activities under the AICRP on wheat and barley and during the preparation of this report.

Financial assistance provided by the Department of Agriculture, Cooperation & Farmers Welfare, Ministry of Agriculture & Farmers Welfare, Government of India, New Delhi to coordinate wheat and barley front line demonstrations is duly acknowledged.

I thankfully acknowledge the whole hearted support of each one of the co-operators whose sincere efforts helped in successful execution of front line demonstrations (FLDs) during 2018-19.

Appreciation and thanks are due to Dr. Mangal Singh and Dr. Ramesh Chand in extension activities, compilation, analysis and preparation of the report; Sh. Harinder Kumar for his support to the Social Sciences Programme; Mr. Naveen Kumar, Mr. Parveen Kumar and Mr. Navish Kumar for their help in typing this manuscript. I am thankful to Mr. P. Chandra Babu for the help rendered in smooth functioning of the computers required for analysis of data and preparation of the progress report. I am thankful to Mr. Yogesh Sharma for type setting and giving final shape to this report.

Thanks are due to the officers and staff of the Administration, Finance and Farm Section, particularly Sh. Madan Lal for their cooperation and support to the Social Sciences Programme.

The help rendered for the multiplication of adequate number of copies and binding of this report by Dr. Ajay Verma and his team consisting of Dr. Poonam Jasrotia, Dr. Hanif Khan, Dr. Vikas Gupta, Sh. Bhim Sain and Sh. Ronak Ram is duly acknowledged.

In the end, it is stated that although utmost care has been taken to avoid any error in presentation of the results in this report, any error/omission is unintended and may please be brought to the notice of the undersigned.



(Satyavir Singh)
Principal Investigator
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Dated : 5th August, 2019

CONTENTS

S.No.	Particulars	Page
1.	Frontline Demonstrations (FLDs) 2018-19	1
2.	Wheat Frontline Demonstrations (FLDs) 2018-19	2
3.	Centre wise distribution of wheat FLDs	2
4.	State wise distribution of wheat FLDs	5
5.	Zone wise distribution of wheat FLDs	6
6.	Centre wise performance of improved wheat varieties	6
7.	State wise performance of improved wheat varieties	9
8.	Performance of improved timely sown wheat varieties	10
9.	Performance of improved late sown wheat varieties	12
10.	Zone wise productivity under wheat FLDs	12
11.	Highest wheat variety yield attained in various zones	13
12.	Yield gain through bio-fertilizer	13
13.	Performance of improved durum/dicoccum varieties	13
14.	Performance of improved varieties under rainfed/restricted irrigation	14
15.	Performance of zero tillage/Happy Seeder	15
16.	Performance of rotavator	15
17.	Suggestions by cooperating centres	16
18.	Farmers' perception about FLDs	16
19.	Monitoring of Frontline Demonstrations (FLDs)	17
20.	Improved and check wheat varieties at farmers' field	23
21.	Zone wise popular wheat varieties	23
22.	Wheat FLDs at ICAR-IIWBR, Karnal centre	24
23.	Constraints analysis in different wheat producing zones of India	24
24.	Barley Frontline Demonstrations (FLDs) 2018-19	27
25.	Constraints analysis in different barley producing zones of India	31
26.	Costs and returns for wheat and barley FLDs vis-à-vis check plots	34
27.	Technology outreach programme	38
28.	Annexure-I : Categorywise number of wheat FLDs farmers	i-viii
29.	Annexure-II : Categorywise number of barley FLDs farmers	i-ii
30.	Annexure-III : Information on wheat varieties demonstrated in FLDs during 2018-19	i-viii
31.	Annexure-IV : Information on barley varieties demonstrated in FLDs during 2018-19	i
32.	Annexure-IV : Information on barley varieties demonstrated in FLDs during 2018-19	i

Frontline Demonstrations (2018-2019)

In the realm of foodgrains, wheat and barley hold the position of first and fourth in terms of global cereals acreage. The the nutri-rich cereals altogether have been under cultivation in 270.74 million hectares (mha) with an estimated production of 932.89 million tonnes (mt) for the period 2018-19. In India, these *Rabi* cereals are grown in 30.22 million hectares (24.35% of total crop acreage) accounting for 36.32 per cent of the total foodgrains produced during 2018-2019. Wheat has been under cultivation in 29.55 mha and barley covered 0.66 mha during 2018-2019 (Source: III Advance Estimates, Directorate of Economics and Statistics, Ministry of Agriculture and Farmers Welfare, India). The current year wheat production has touched a landmark output of 101.20 mt with a record national average productivity of 3424 kg/ha. The past year wheat output was also relatively higher (99.87 mt) and hence the incremental production over the previous season, i.e 2017-18 was marginal, but significant in terms of crossing the 100 mt target. The additional output over the recent past has been estimated at 1.33 mt. Similarly, barley registered 1.73 mt during 2018-2019 from 0.66 mha with an average national productivity of 2617 kg/ha.

Frontline demonstrations (FLDs) conducted across regions also witnessed a similar kind of trend. The improved varieties and technologies demonstrated at farmers' field through the FLD programme showed that yield registered in FLDs is significantly higher than check plots. However, there existed yield gaps across regions which should be bridged through need based interventions by identifying the locations specific constraints. The ICAR-IIWBR strives to make continuous efforts to popularize the regions specific superior varieties as well as micro level strategies to enhance the wheat and barley productivity. Despite several outreach programmes, there exists the need for increasing the productivity of wheat and barley through different scientist-farmer interface activities with more emphasis on seed as well as variety replacement, integrated nutrient management (INM), efficient water management, integrated crop management (ICM) integrated pest management (IPM), weed management, incorporation/ retention of crop residues and soil health management. The farm advisory services through WhatsApp group, MANAGE portal and rigorous training of field level extension functionaries or subject matter specialists by the institute has also played a key role in taking contingent management measures, particularly against yellow rust. Several other programmes have been initiated as well at the institute level to transfer the efficient technologies to farmers' fields.

Creation of awareness through mass and print media on seed treatment, seed and variety replacement, and crop management helped to increase the farmers' livelihood and welfare. Procurement by different authorized agencies has also motivated the farmers to retain the same or allot more area under the respective crop. Developing storage facilities both at farm level and national level is the need of the hour and it warrants for some policy interventions. The report highlights the outcome of wheat and barley FLDs, yield gain due to FLDs, costs and returns as well as constraints in wheat and barley production.

Wheat Frontline Demonstrations

During the wheat crop season 2018-19, 1500 Wheat Frontline Demonstrations (WFLDs) of one acre each were allotted to 83 cooperating centres across the country of which 1499 were conducted through 83 cooperating centers. The technologies such as improved wheat (*T.aestivum*, *T.durum* and *T. dicoccum*) varieties with complete package of practices, rotavator, zero tillage/happy seeder and bio-fertilizer were demonstrated in the selected farmers' fields. These WFLDs covered 1503.34 hectares area of 1562 farmers in 19 states. The maximum number of WFLDs were conducted in UP (192) followed by Bihar (142), MP (137), Rajasthan (114), HP (104), Maharashtra (100), Assam (91), Haryana (89), Karnataka (75), Punjab (73), Jharkhand (65), Gujarat & West Bengal (50), J&K (49) & Tamil Nadu (49), Chhattisgarh (43), Delhi & Uttarakhand (36) and Manipur (5). The details of centre wise and state wise WFLDs are given in Tables 1a, 1b, 2a and 2b.

Table 1a: Centre wise distribution of wheat FLDs during rabi 2018-19 (in acres)

S.No.	Zone and Name of Centre	WFLDs Allotted	WFLDs Conducted	Area Sown	No. of Farmers/ Locations
NHZ					
1.	VPKAS, Almora (Uttarakhand)	18	18	18	63
2.	CSKHPKV, HAREC, Bajaura, Kullu (HP)	12	12	12	27
3.	CSKHPKV, RWRC, Malan, Kangra (HP)	12	12	12	23
4.	KVK (CSKHPKV) and RSS, Berthin, Bilaspur (HP)	11	11	11	11
5.	CSKHPKV, HAREC, Dhaulakuan, Sirmour (HP)	10	10	10	11
6.	IARI, RS, Amartara Cottage, Shimla (HP)	12	12	12	12
7.	ICAR-IIWBR, RS, Flowerdale, Shimla (HP)	12	12	12	12
8.	KVK (Dr.YSPUH&F), Chamba at Saru, Chamba (HP)	10	10	10	11
9.	MRCFC, SKUAST-K, Khudwani, Anantnag (J&K)	12	12	12	18
10.	RARS, SKUAST-Jammu, Tandwal, Rajouri (J&K)	12	12	12	12
11.	KVK (CSKHPKV), Bara, Hamirpur (HP)	12	12	12	26
12.	AICW&BIP Sub-Centre, CAU, Imphal (Manipur)	5	05	05	03
NEPZ					
13.	NDUA&T, Kumarganj, Faizabad (UP)	18	18	18	18
14.	CSAUA&T, Kanpur (UP)	20	20	20	20
15.	BHU, Varanasi (UP)	20	20	20	38
16.	KVK, Sohna, Sidharthnagar (UP)	25	25	25	25
17.	Kamla Nehru KVK, Sultanpur (UP)	12	12	12	12
18.	KVK (NDUA&T), Katiya, Banjariaya Farm, Basti (UP)	10	10	10	10
19.	BCKV, Kalyani, Nadia (West Bengal)	25	25	25	39
20.	UBKV, Pundibari, Coochbehar (West Bengal)	25	25	25.58*	18
21.	RARS, AAU, Shillongani, Nagaon (Assam)	25	25	25	25
22.	KVK (AAU), Chirakuta, (Jamduar Pt.II) Dhubri (Assam)	24	24	24.76*	48
23.	KVK (AAU), Napam, Tejpur, Sonitpur (Assam)	18	18	18	18
24.	KVK (AAU), Kajalgaon, Chirang (Assam)	24	24	24	25
25.	IARI, RS, Pusa, Samastipur (Bihar)	25	25	25	16
26.	KVK (Gram Nirman Mandal), Sokhodeora, Nawadah (Bihar)	15	15	15	15
27.	KVK (RAU), Hariharpur, Vaishali (Bihar)	24	24	25*	24
28.	KVK (Vanvasi Seva Kendra), Adhaura, Kaimur, Bhabua (Bihar)	18	18	18	20
29.	KVK (SKCET), Chanpura-Basaith, Madhubani (Bihar)	12	12	12	12
30.	KVK (RAU), Pipra Kothi, East Champaran (Bihar)	18	18	18	18
31.	KVK (RAU), Madhopur, West Champaran (Bihar)	18	18	18	20
32.	KVK (Samta Seva Kendra-Sitamarhi), Sitamarhi (Bihar)	12	12	12	12
33.	BAU, Kanke, Ranchi (Jharkhand)	20	20	20	20
34.	KVK (Ramakrishna Mission), Morabadi, Ranchi (Jharkhand)	25	25	25	25
35.	KVK (BAU), Jagannathpur, West Singhbhum (Jharkhand)	20	20	20	20

S.No.	Zone and Name of Centre	WFLDs Allotted	WFLDs Conducted	Area Sown	No. of Farmers/ Locations
NWPZ					
36.	KVK (CSKHPKV), Una (HP)	13	13	13	09
37.	KVK (SKUAST-Jammu), Rajhani, Kathua, Jammu (J&K)	25	25	25	25
38.	PAU, Ludhiana (Punjab)	25	25	25	25
39.	PAU, RRS, Gurdaspur (Punjab)	18	18	18	18
40.	KVK (PAU), Haveli Kalan, Rupnagar (Punjab)	15	15	15	12
41.	KVK (PAU), NagKalan-Jahangir, Amritsar (Punjab)	15	15	15	08
42.	RBS College, Bichpuri, Agra (UP)	15	15	15	15
43.	KVK, Baghara, Muzaffarnagar (UP)	15	15	15	15
44.	ZARS, Nagina, Bijnor (UP)	12	12	12	12
45.	KVK, Khajuri Bagh, New Gopal Nagar, Saharanpur (UP)	12	12	12	12
46.	ICAR-IIFSR, Modipuram, Meerut (UP)	18	18	18	18
47.	Amity Centre for Extension Services, Noida (UP)	15	15	15	15
48.	GBPUA&T, Pantnagar, US Nagar (Uttarakhand)	18	18	18	18
49.	CATAT, ICAR-IARI, New Delhi	18	18	18	18
50.	KVK (NHRDF), Ujwa, New Delhi	18	18	18	18
51.	ICAR-IIWBR, Karnal (Haryana)	20	20	20	20
52.	ICAR-CSSRI, Karnal (Haryana)	18	18	18	18
53.	CCSHAU, Hisar (Haryana)	15	15	15	8
54.	KVK (CCSHAU), Bhiwani (Haryana)	12	12	12	12
55.	KVK (SCHE), Tepla, Ambala (Haryana)	12	12	12	12
56.	KVK (CCSHAU), Peoda Road, Kaithal (Haryana)	12	12	12	12
57.	RARI (SKNAU-Jobner), Durgapura, Jaipur (Rajasthan)	14	14	14	14
58.	KVK (SKNAU-Jobner), Ajmer (Rajasthan)	12	12	12	12
59.	KVK (Banasthali Vidyapeeth), Tonk (Rajasthan)	12	12	12	12
60.	ARS (SKRAU-Bikaner), Karni Road, Sriganganagar (Rajasthan)	12	12	12	12
61.	KVK (AU-Kota), Sawai Madhopur (Rajasthan)	12	12	12	12
CZ					
62.	RCOA (MPUA&T), Udaipur (Rajasthan)	18	18	18	18
63.	ARS (MPUAT-Udaipur), Borwat Farm, Banswara (Rajasthan)	16	16	16	16
64.	ARS (AU-Kota), Ummedganj Farm, Kota (Rajasthan)	18	18	18	18
65.	WRS (JAU), Junagarh (Gujarat)	25	25	25	25
66.	CERW (SDAU), Vijapur, Mehsana (Gujarat)	25	25	25	25
67.	JNKVV, Jabalpur (MP)	25	25	25	10
68.	ICAR-IARI, RWRS, Indore (MP)	25	25	27*	20
69.	KVK (JNKVV), Purushottampur, Panna (MP)	18	18	18	14
70.	KVK (Kalukhera Shiksha Samiti), Kalukhera, Ratlam (MP)	25	25	25	25
71.	KVK (RVSKVV), Pipersama, Neemuch (MP)	12	12	12	12
72.	KVK (RVSKVV), COH, Mandasour (MP)	12	12	12	12
73.	KVK (RVSKVV), M.L.Nagar, Ujjain (MP)	10	10	10	10
74.	KVK (JNKVV), Sudamanagar, Indore road, Harda (MP)	10	10	10	10
75.	KVK (IGKV-Raipur), RRS, Bastar (Chhattisgarh)	18	18	18	18
76.	BTC College of Agri & RS (IGKV-Raipur), Bilaspur (Chhattisgarh)	25	25	25	25
PZ					
77.	Dr. PDKV, Krishi Nagar, Akola (Maharashtra)	25	25	25	25
78.	ARS, Niphad, Nasik (Maharashtra)	25	25	25	25
79.	MAU, Parbhani (Maharashtra)	25	25	25	24
80.	ARI, MACS, Agharkar Road, Pune (Maharashtra)	25	25	25	25
81.	UAS, Dharwad (Karnataka)	50	50	50	50
82.	BIRDS KVK, Tukkanatti, Gokak, Belgaum (Karnataka)	25	25	25	25
83.	ICAR-IARI, RS, Wellington (Tamil Nadu)	49	48	48	21
Total		1500	1499	1503.34	1562

* Area covered more than allotted which is restricted to area equal to allotted FLDs.

Table 1b: Centre wise distribution of wheat FLDs during *rabi* 2018-19 (in hectares)

S.No.	Zone and Name of Centre	WFLDs Allotted	WFLDs Conducted	Area Sown	No. of Farmers/ Locations
NHZ					
1.	VPKAS, Almora (Uttarakhand)	7.2	7.2	7.2	63
2.	CSKHPKV, HAREC, Bajaura, Kullu (HP)	4.8	4.8	4.8	27
3.	CSKHPKV, RWRC, Malan, Kangra (HP)	4.8	4.8	4.8	23
4.	KVK (CSKHPKV) and RSS, Berthin, Bilaspur (HP)	4.4	4.4	4.4	11
5.	CSKHPKV, HAREC, Dhaulakuan, Sirmour (HP)	4.0	4.0	4.0	11
6.	IARI, RS, Amartara Cottage, Shimla (HP)	4.8	4.8	4.8	12
7.	ICAR-IIWBR, RS, Flowerdale, Shimla (HP)	4.8	4.8	4.8	12
8.	KVK (Dr.YSPUH&F), Chamba at Saru, Chamba (HP)	4.0	4.0	4.0	11
9.	MRCFC, SKUAST-K, Khudwani, Anantnag (J&K)	4.8	4.8	4.8	18
10.	RARS, SKUAST-Jammu, Tandwal, Rajouri (J&K)	4.8	4.8	4.8	12
11.	KVK (CSKHPKV), Bara, Hamirpur (HP)	4.8	4.8	4.8	26
12.	AICW&BIP Sub-Centre, CAU, Imphal (Manipur)	2.0	2.0	2.0	03
NEPZ					
13.	NDUA&T, Kumarganj, Faizabad (UP)	7.2	7.2	7.2	18
14.	CSAU&T, Kanpur (UP)	8.0	8.0	8.0	20
15.	BHU, Varanasi (UP)	8.0	8.0	8.0	38
16.	KVK, Sohna, Sidharthnagar (UP)	10	10.0	10.0	25
17.	Kamla Nehru KVK, Sultanpur (UP)	4.8	4.8	4.8	12
18.	KVK (NDUA&T), Katiya, Banjariaya Farm, Basti (UP)	4	4	4	10
19.	BCKV, Kalyani, Nadia (West Bengal)	10	10	10	39
20.	UBKVV, Pundibari, Coochbehar (West Bengal)	10	10	10.23*	18
21.	RARS, AAU, Shillongani, Nagaon (Assam)	10	10	10	25
22.	KVK (AAU), Chirakuta, (Jamduar Pt.II) Dhubri (Assam)	9.6	9.6	9.90*	48
23.	KVK (AAU), Napam, Tejpur, Sonitpur (Assam)	7.2	7.2	7.2	18
24.	KVK (AAU), Kajalgaon, Chirang (Assam)	9.6	9.6	9.6	25
25.	IARI, RS, Pusa, Samastipur (Bihar)	10	10	10	16
26.	KVK (Gram Nirman Mandal), Sokhodeora, Nawadah (Bihar)	6	6	6	15
27.	KVK (RAU), Hariharpur, Vaishali (Bihar)	9.6	9.6	10	24
28.	KVK (Vanvasi Seva Kendra), Adhaura, Bhabua (Bihar)	7.2	7.2	7.2	20
29.	KVK (SKCET), Chanpura-Basaith, Madhubani (Bihar)	4.8	4.8	4.8	12
30.	KVK (RAU), Pipra Kothi, East Champaran (Bihar)	7.2	7.2	7.2	18
31.	KVK (RAU), Madhopur, West Champaran (Bihar)	7.2	7.2	7.2	20
32.	KVK (Samta Seva Kendra-Sitamarhi), Sitamarhi (Bihar)	4.8	4.8	4.8	12
33.	BAU, Kanke, Ranchi (Jharkhand)	8	8	8	20
34.	KVK (Ramakrishna Mission), Morabadi, Ranchi (Jharkhand)	10	10	10	25
35.	KVK (BAU), Jagannathpur, West Singhbhum (Jharkhand)	8	8	8	20
NWPZ					
36.	KVK (CSKHPKV), Una (HP)	5.2	5.2	5.2	09
37.	KVK (SKUAST-Jammu), Rajhani, Kathua, Jammu (J&K)	10	10	10	25
38.	PAU, Ludhiana (Punjab)	10	10	10	25
39.	PAU, RRS, Gurdaspur (Punjab)	7.2	7.2	7.2	18
40.	KVK (PAU), Haveli Kalan, Rupnagar (Punjab)	6	6	6	12
41.	KVK (PAU), NagKalan-Jhangir, Majitha Road, Amritsar (Punjab)	6	6	6	08
42.	RBS College, Bichpuri, Agra (UP)	6	6	6	15
43.	KVK, Baghara, Muzaffarnagar (UP)	6	6	6	15
44.	ZARS, Nagina, Bijnor (UP)	4.8	4.8	4.8	12
45.	KVK, Khajuri Bagh, New Gopal Nagar, Saharanpur (UP)	4.8	4.8	4.8	12
46.	ICAR-IIFSR, Modipuram, Meerut (UP)	7.2	7.2	7.2	18
47.	Amity Centre for Extension Services, Noida (UP)	6.0	6.0	6.0	15
48.	GBPUA&T, Pantnagar, US Nagar (Uttarakhand)	7.2	7.2	7.2	18
49.	CATAT, ICAR-IARI, New Delhi	7.2	7.2	7.2	18
50.	KVK (NHRDF), Ujwa, New Delhi	7.2	7.2	7.2	18
51.	ICAR-IIWBR, Karnal (Haryana)	8.0	8.0	8.0	20
52.	ICAR-CSSRI, Karnal (Haryana)	7.2	7.2	7.2	18
53.	CCSHAU, Hisar (Haryana)	6.0	6.0	6.0	8.0
54.	KVK (CCSHAU), Bhiwani (Haryana)	4.8	4.8	4.8	12

S.No.	Zone and Name of Centre	WFLDs Allotted	WFLDs Conducted	Area Sown	No. of Farmers/ Locations
55.	KVK (SCHE), Tepla, Ambala (Haryana)	4.8	4.8	4.8	12
56.	KVK (CCSHAU), Peoda Road, Kaithal (Haryana)	4.8	4.8	4.8	12
57.	RARI (SKNAU-Jobner), Durgapura, Jaipur (Rajasthan)	5.6	5.6	5.6	14
58.	KVK (SKNAU-Jobner), Ajmer (Rajasthan)	4.8	4.8	4.8	12
59.	KVK (Banasthali Vidyapeeth), Tonk (Rajasthan)	4.8	4.8	4.8	12
60.	ARS (SKRAU-Bikaner), Karni Road, Sriganganagar (Rajasthan)	4.8	4.8	4.8	12
61.	KVK (AU-Kota), Sawai Madhopur (Rajasthan)	4.8	4.8	4.8	12
CZ					
62.	RCOA (MPUA&T), Udaipur (Rajasthan)	7.2	7.2	7.2	18
63.	ARS (MPUAT-Udaipur), Borwat Farm, Banswara (Rajasthan)	6.4	6.4	6.4	16
64.	ARS (AU-Kota), Ummedganj Farm, Kota (Rajasthan)	7.2	7.2	7.2	18
65.	WRS (JAU), Junagarh (Gujarat)	10.0	10.0	10.0	25
66.	CERW (SDAU), Vijapur, Mehsana (Gujarat)	10.0	10.0	10.0	25
67.	JNKVV, Jabalpur (MP)	10.0	10	10	10
68.	ICAR-IARI, RWRS, Indore (MP)	10.0	10	10.8*	20
69.	KVK (JNKVV), Purushottampur, Panna (MP)	7.2	7.2	7.2	14
70.	KVK (Kalukhera Shiksha Samiti), Kalukhera, Ratlam (MP)	10.0	10	10	25
71.	KVK (RVSKVV), Pipersama, Neemuch (MP)	4.8	4.8	4.8	12
72.	KVK (RVSKVV), COH, Mandsour (MP)	4.8	4.8	4.8	12
73.	KVK (RVSKVV), M.L.Nagar, Ujjain (MP)	4.0	4.0	4.0	10
74.	KVK (JNKVV), Sudamanagar, Indore road, Harda (MP)	4.0	4.0	4.0	10
75.	KVK (IGKV-Raipur), RRS, Bastar (Chhattisgarh)	7.2	7.2	7.2	18
76.	BTC College of Agri & RS (IGKV-Raipur), (Chhattisgarh)	10	10	10	25
PZ					
77.	Dr. PDKV, Krishi Nagar, Akola (Maharashtra)	10	10	10	25
78.	ARS, Niphad, Nasik (Maharashtra)	10	10	10	25
79.	MAU, Parbhani (Maharashtra)	10	10	10	24
80.	ARI, MACS, Agharkar Road, Pune (Maharashtra)	10	10	10	25
81.	UAS, Dharwad (Karnataka)	20	20	20	50
82.	BIRDS KVK, Tukkanatti, Gokak, Belgaum (Karnataka)	10	10	10	25
83.	ICAR-IARI, RS, Wellington (Tamil Nadu)	19.6	19.2	19.2	21
Total		600	599.6	601.34	1562

* Area covered more than allotted which is restricted to area equal to allotted FLDs.

The wheat FLDs data received from the cooperating centers which were not reported properly as per FLDs guidelines were not included for analysis.

Table 2a: State wise distribution of wheat FLDs during rabi 2018-19 (in acres)

State	No. of centers	WFLDs Allotted	WFLDs Conducted	Area Sown	No. of Farmers/ Locations
Uttarakhand	2	36	36	36	81
HP	9	104	104	104	142
J&K	3	49	49	49	55
Manipur	1	5	05	05	03
UP	12	192	192	192	210
West Bengal	2	50	50	50.58	57
Assam	4	91	91	91.76	116
Bihar	8	142	142	143	137
Jharkhand	3	65	65	65	65
Punjab	4	73	73	73	63
Delhi	2	36	36	36	36
Haryana	6	89	89	89	82
Rajasthan	8	114	114	114	114
Gujarat	2	50	50	50	50
MP	8	137	137	139	113
Chhattisgarh	2	43	43	43	43
Maharashtra	4	100	100	100	99
Karnataka	2	75	75	75	75
Tamil Nadu	1	49	48	48	21
Total	83	1500	1499	1503.34	1562

Table 2b: State wise distribution of wheat FLDs during Rabi 2017-18 (in hectares)

State	Number of centers	WFLDs Allotted	WFLDs Conducted	Area Sown	No. of Farmers/ Locations
Uttarakhand	2	14.4	14.4	14.4	81
HP	9	41.6	41.6	41.6	142
J&K	3	19.6	19.6	19.6	55
Manipur	1	2	2	2	03
UP	12	76.8	76.8	76.8	210
West Bengal	2	20	20	20.23	57
Assam	4	36.4	36.4	36.70	116
Bihar	8	56.8	56.8	57.2	137
Jharkhand	3	26	26	26	65
Punjab	4	29.2	29.2	29.2	63
Delhi	2	14.4	14.4	14.4	36
Haryana	6	35.6	35.6	35.6	82
Rajasthan	8	45.6	45.6	45.6	114
Gujarat	2	20	20	20	50
MP	8	54.8	54.8	55.6	113
Chhattisgarh	2	17.2	17.2	17.2	43
Maharashtra	4	40	40	40	99
Karnataka	2	30	30	30	75
Tamil Nadu	1	19.6	19.2	19.2	21
Total	83	600	599.6	601.34	1562

Table 3a: Zone wise distribution of wheat FLDs during rabi 2018-19 (in acres)

Zone	Number of centers	WFLDs Allotted	WFLDs Conducted	Area Sown	No. of Farmers/ Locations
NHZ	12	138	138	138	229
NEPZ	23	453	453	455.34	498
NWPZ	26	403	403	403	382
CZ	15	282	282	284	258
PZ	07	224	223	223	195
Total	83	1500	1499	1503.34	1562

Table 3b: Zone wise distribution of wheat FLDs during rabi 2018-19 (in hectares)

Zone	Number of centers	WFLDs Allotted	WFLDs Conducted	Area Sown	No. of Farmers/ Locations
NHZ	12	55.2	55.2	55.2	229
NEPZ	23	181.2	181.2	182.14	498
NWPZ	26	161.2	161.2	161.2	382
CZ	15	112.8	112.8	113.6	258
PZ	07	89.6	89.2	89.2	195
Total	83	600	599.6	601.34	1562

Table 4: Centre wise performance of improved wheat varieties during rabi 2018-19

Zone & Centre	Improved varieties/FLD Mean yield (q/ha)	Check varieties Mean yield (q/ha)	Gain (in %)
NHZ			
Almora	37.48	31.29	19.76***
Bajaura	36.15	31.61	14.35 ^{NS}
Malan Kangra	40.52	34.91	16.06***
Bilaspur	29.26	18.02	62.38***
Dhaulakuan, Sirmour	37.27	32.27	15.49***
Tutikandi, Shimla	31.14	29.08	07.08 ^{NS}

Zone & Centre	Improved varieties/FLD Mean yield (q/ha)	Check varieties Mean yield (q/ha)	Gain (in %)
Flowerdale, Shimla	35.50	24.25	46.39***
Chamba	28.08	22.05	27.38***
Khudwani, Anantnag	36.00	34.02	05.81***
Tandwal, Rajouri	30.26	24.03	25.95***
Hamirpur	18.34	15.54	18.06***
Imphal, Manipur	22.33	16.33	36.74***
NEPZ			
Faizabad	49.50	41.78	18.48***
Kanpur	47.85	41.35	15.71***
Varanasi	42.00	35.11	19.64***
Siddharthnagar	48.02	42.09	14.09***
Sultanpur	47.93	41.64	15.11***
Basti	46.91	44.99	04.27*
Kalyani, Nadia	41.03	30.80	33.22***
Coochbehar	35.63	32.54	09.51***
Shillongani	33.27	21.30	56.16***
Dhubri	22.31	17.52	27.35***
Sonitpur	27.05	23.13	16.93***
Chirang	23.23	14.80	56.98**
Samastipur	48.13	41.83	15.06***
Nawada	45.57	40.57	12.32***
Vaishali	40.00	36.50	09.59***
Adhaura, Kaimur	43.95	37.84	16.16***
Madhubani	32.58	24.88	30.94***
East Champaran	42.34	37.96	11.54***
West Champaran	50.00	42.75	16.96 ^{NS}
Sitamarhi	25.80	24.50	05.31 ^{NS}
Kanke, Ranchi	35.18	20.35	72.85***
Morabadi, Ranchi	34.52	30.33	13.80***
West Singhbhum	29.35	26.65	10.13***
NWPZ			
Una, HP	43.59	36.63	18.99***
Kathua, Jammu	58.81	46.91	25.36***
Ludhiana	56.14	55.20	01.70**
Gurdaspur	50.33	47.28	06.46***
Ropar	50.63	49.67	01.95**
Amritsar	51.13	49.21	03.88**
Bichpuri, Agra	47.47	43.87	08.21**
Muzaffarnagar	45.17	39.52	14.31***
Nagina, Bijnor	49.28	46.38	06.27***
Saharanpur	52.93	44.83	18.06***

Zone & Centre	Improved varieties/FLD Mean yield (q/ha)	Check varieties Mean yield (q/ha)	Gain (in %)
Modipuram, Meerut	46.63	43.03	08.36***
Amity Noida	53.47	48.02	11.36***
Pantnagar, US Nagar	58.49	58.06	00.74 NS
IARI, New Delhi	49.35	47.56	03.76**
Ujwa, New Delhi	49.78	45.00	10.62***
IIWBR, Karnal	57.54	54.50	05.57*
CSSRI, Karnal	40.17	38.59	04.10 NS
Hisar	55.19	54.13	01.96 NS
Bhiwani	53.96	50.10	07.69**
Ambala	57.09	56.73	00.64 NS
Kaithal	53.21	51.79	02.74***
Durgapura, Jaipur	65.04	61.52	05.72***
Ajmer	62.40	50.60	23.32***
Tonk	52.58	50.17	04.82 NS
Sriganganagar	51.58	48.17	07.09 NS
Sawai Madhopur	40.50	36.42	11.21***
CZ			
Udaipur	45.78	42.06	08.85***
Banswara	46.75	42.88	09.04***
Kota	51.15	46.91	09.03**
Junagarh	53.25	48.85	09.01*
Vijapur, Mehsana	51.89	45.33	14.45***
Jabalpur	45.20	43.40	04.15*
Indore	63.59	53.00	19.98***
Panna	42.90	37.36	14.82***
Ratlam	39.05	34.47	13.30***
Neemuch	67.14	57.08	17.62***
Mandsaur	52.41	48.95	07.06***
Ujjain	52.20	49.27	05.94**
Harda	58.47	49.04	19.23***
Jagdarpur, Bastar	20.33	17.77	14.43***
Sarkanda, Bilaspur	39.97	36.36	09.92***
PZ			
Akola	31.68	26.48	19.64***
Niphad, Nashik	36.88	33.56	09.90***
Parbhani	38.18	33.44	14.17***
Pune	43.18	35.28	22.39***
Dharwad	31.65	27.39	15.58*
Belagavi (Belgaum)	27.27	22.41	21.66***
Wellington	29.44	-	-

*** Significant at 1 percent level, ** Significant at 5 percent level, * Significant at 10 percent level, NS– Non-significant

Centre wise yield gain over check at different centres in different wheat growing zones is given in Table 4. The significant yield gain in NHZ was 62.38% per cent at Bilaspur centre followed by Flowerdale, Shimla (46.39%), Imphal (36.74%), Chamba (27.38%), Tandwal Rajouri (25.95%) and Almora (19.76%). In NEPZ, the yield gain varied from 04.27 per cent at Basti to 72.85 per cent at Kanke Ranchi. The maximum yield gain due to improved wheat varieties was 72.85% at Kanke Ranchi followed by 56.98% at Chirang, 56.16% at Shillongani, 33.22% at Kalyani Nadia, 30.94% at Madhubani, 27.35% at Dhubri and 19.64% at Varanasi. In NWPZ, the significant highest yield gain was at Kathua Jammu (25.36%) followed by Ajmer (23.32%), Una (18.99%), Saharanpur (18.06%) and Muzaffarnagar (14.31%). In CZ, the highest significant yield gain was recorded at Indore (19.98%) followed by Harda (19.23%) and Neemuch (17.62%). In PZ, the significant yield gain of 22.39, 21.66, 19.64, 15.58, 14.17 and 09.90 per cent was recorded at Pune, Belagavi, Akola, Dharwad, Parbhani and Niphad Nashik centers, respectively.

Table 5: State wise performance of improved wheat varieties during *rabi* 2018-19

State	Mean yield (q/ha)		Gain (in %)
	Improved	Check	
Assam	26.15	19.48	34.28***
Bihar	40.72	35.77	13.85***
Chhattisgarh	31.75	28.58	11.09 ^{NS}
Gujarat	52.57	47.09	11.63***
Haryana	52.21	50.18	04.06*
HP	31.85	26.53	20.07***
J&K	45.28	37.77	19.90***
Jharkhand	33.13	26.13	26.80***
Karnataka	30.12	25.64	17.45***
Maharashtra	37.41	32.14	16.39***
Manipur	22.33	16.33	36.74***
MP	52.40	46.05	13.79***
Delhi	49.56	46.28	07.10***
Punjab	52.87	51.23	03.18***
Rajasthan	51.65	47.13	09.59***
Tamil Nadu	29.44	-	-
UP	47.36	41.69	13.60***
Uttarakhand	42.03	37.10	13.31***
West Bengal	39.32	31.35	25.45***

*** Significant at 1 percent level, ** Significant at 5 percent level, * Significant at 10 percent level, NS–Non-significant

Statewise yield gain over check in different states is given in Table 5. All the improved varieties for different production conditions (timely sown, late sown, rainfed) have been included while calculating the yield gain over check/regional yield). The maximum yield gain was observed in Manipur (36.74%) followed by Assam (34.28%), Jharkhand (26.80%), West Bengal (25.45%), HP (20.07%), J&K (19.90%), Karnataka (17.45%) and Maharashtra (16.39%).

Table 6: Performance of improved timely sown wheat varieties during rabi 2018-19

Zone & Centre	Improved varieties	Mean yield (q/ha)	Check varieties	Mean yield (q/ha)	Gain (in %)
NHZ					
Almora	VL 953	37.48	VL 907	31.29	19.76***
Bajaura	HS 562	53.80	HPW 349	48.50	10.93 ^{NS}
Bajaura	HS 562	33.63	HS 507	29.20	15.17***
Bilaspur	HS 562	29.26	HPW 155	18.02	62.38***
Chamba	HS 562	28.08	HPW 236	22.05	27.38***
Dhaulakuan	HS 562	37.50	HD 2967	33.00	13.64**
Dhaulakuan	HS 562	36.67	Sonalika	30.33	20.88*
Flowerdale, Shimla	HS 562	35.50	Local	24.25	46.39***
Hamirpur	HS562	18.34	Local	15.54	18.06***
Imphal	HS 562	22.33	K 7410	16.33	36.74***
Khudwani, Anantnag	HS562	36.00	SW 2	34.02	05.81***
Malan	HS 562	41.11	HPW 155	35.56	15.63***
Malan	HS 562	40.14	HPW 349	34.50	16.36***
Tandwal, Rajouri	HS 562	30.26	VL 907	24.03	25.95***
Tutikandi, Shimla	HS 562	31.14	HS 507	29.08	07.08 ^{NS}
NEPZ					
Basti	HD 2967	47.62	HD 3086	45.88	03.79 ^{NS}
Basti	HD 2967	46.20	PBW 343	44.10	04.76**
Ranchi	HD 2967	35.18	Sonalika	20.35	72.85***
Chirang	HD 2967	23.23	HD 2967	14.80	56.98**
Dhubri	HD 2967	22.31	Sonalika	17.52	27.35***
Faizabad	HD 2967	47.00	PBW 343	41.17	14.17***
Kaimur	HD 2967	43.95	PBW 343	37.84	16.16***
Kalyani	HD 2967	41.50	PBW 343	31.70	30.91***
Kalyani	HD 2967	40.39	Sonalika	29.93	34.96***
Kalyani	HD 2967	40.22	UP 262	28.20	42.63**
Kanpur	K 1006	47.05	PBW 343	41.24	14.11***
Kanpur	K1317	52.33	PBW 343	42.00	24.60**
Morabadi, Ranchi	HD 2967	34.52	UP 262	30.33	13.80***
Nawada	HD 2967	45.33	HD 2733	40.89	10.87***
Nawada	HD 2967	46.00	PBW 343	40.00	15.00 ^{NS}
Madhubani	HD 2967	32.58	PBW 343	24.88	30.94***
Pusa, Samastipur	HD 2967	48.13	HD 2733	41.83	15.08***
Shillongani	HD 2967	36.48	Sonalika	21.54	69.40***
Siddharthnagar	HD 2967	47.44	PBW 343	43.56	08.89***
Sitamardi	HD 2967	25.80	PBW 343	24.50	05.31 ^{NS}
Sonitpur	HD 2967	27.05	Sonalika	23.13	16.93***
Sultanpur	HD 2967	47.93	PBW 343	41.64	15.11***
Vaishali	HD 2967	40.33	UP 262	36.44	10.67***
Vaishali	HD 2967	39.80	PBW 343	36.53	08.94***
Varanasi	HD 2967	41.52	HD 3086	36.24	14.59***
Varanasi	HD 2967	42.59	HUW 468	33.71	26.35***
West Champaran	HD 2967	50.00	UP 262	42.75	16.96 ^{NS}
East Champaran	HD 2967	42.34	HD 2733	37.96	11.54***
West Singhbhoom	HD 2967	29.35	K 9107	26.65	10.13***
NWPZ					
Kathua	HD 3086	58.81	HD 2967	46.91	25.36***
Agra	HD 3086	53.60	PBW 502	49.80	07.63**
Ajmer	HD 3086	62.40	Raj 3077	50.60	23.32***
Amity Noida, UP	HD 3086	55.09	HD 2967	49.44	11.42***
Amritsar	HD 3086	50.75	HD 2967	49.50	2.53 ^{NS}
Amritsar	PBW 725	51.50	HD 2967	49.00	05.10*
Bhiwani	HD 3086	51.70	WH 711	47.25	09.42 ^{NS}
Bhiwani	HD 3086	56.75	WH 1105	52.50	08.10 ^{NS}

Zone & Centre	Improved varieties	Mean yield (q/ha)	Check varieties	Mean yield (q/ha)	Gain (in %)
Bhiwani	HD 3086	55.10	WH 711	52.00	05.96**
Durgapura	HD 3086	65.04	Raj 4079	61.52	05.72***
Gurdaspur	HD 3086	51.00	PBW 725	47.8	06.69**
Gurdaspur	HD 3086	50.00	PBW343	50.00	00.00 ^{NS}
Gurdaspur	PBW 725	50.14	HD 2967	45.86	09.35***
Gurdaspur	PBW 725	50.00	HD 3086	47.00	06.38*
IIWBR Karnal	HD 3086	61.04	WH 1105	57.50	06.16 ^{NS}
Modipuram, Meerut	HD 3086	47.55	HD 2967	43.90	08.31***
Modipuram, Meerut	HD 3086	45.90	PBW 502	42.00	09.29**
Modipuram, Meerut	DBW 173	46.50	DBW 16	43.13	07.81***
Muzaffarnagar	HD 3086	47.03	PBW 502	40.23	16.90***
Ropar	HD 3086	50.92	PBW343	49.33	03.21 ^{NS}
Ropar	PBW 725	50.63	HD 3086	50.00	01.25 ^{NS}
Ropar	PBW 725	50.40	PBW343	49.6	01.61 ^{NS}
Saharanpur	HD 3086	52.93	PBW 550	44.83	18.06***
Sawai Madhopur	HD 3086	40.50	Raj 1482	36.42	11.21***
Sriganganagar	HD 3086	51.58	HD 2967	48.17	07.09 ^{NS}
Tonk	HD 3086	52.58	Raj 4120	50.17	04.82 ^{NS}
Ujwa, New Delhi	HD 3086	49.78	WH 711	45.00	10.62***
Una	HD 3086	43.59	WH 1105	36.63	18.99***
CZ					
Harda	DBW 110	56.98	GW 322	48.95	16.40***
Mandsaur	DBW 110	52.41	Lok 1	48.95	07.06***
Ratlam	DBW 110	37.76	Lok 1	33.63	12.28***
Indore	HI 1544	69.00	Lok 1	44.50	55.06 ^{NS}
Jabalpur	MP 3382	45.20	GW 322	43.40	04.15*
Junagarh	GJW 463	46.08	Lok 1	42.33	08.86
Junagarh	GJW 463	64.00	GW 496	58.63	09.17***
Kota	DBW 110	50.81	Raj 4037	47.06	07.97 ^{NS}
Neemuch	DBW 110	67.14	GW 322	57.08	17.62***
Panna	DBW 110	42.74	Lok 1	37.36	14.40***
Ujjain	DBW 110	52.20	Lok 1	49.27	05.94**
Vijapur	GW 451	52.32	GW 496	45.49	14.99**
PZ					
Akola	DBW 168	31.68	Lok 1	26.48	19.64***
Dharwad	UAS 304	40.92	DWR 162	35.60	14.94***
Dharwad	DWR 168	40.29	DWR 162	34.66	16.24***
Niphad	DBW 168	36.99	HD 2189	33.41	10.72***
Parbhani	DBW 168	38.43	NIAW 301	33.24	15.60***
Belagavi	DBW 168	26.78	DWR 162	21.33	25.55***
Belagavi	HI 1605	27.47	DWR 162	22.87	20.13***
Parbhani	HI 1605	38.08	NIAW 301	33.52	13.58***
Pune	DBW 168	42.60	HD 2189	35.40	20.34 ^{NS}
Pune	MACS 6478	49.82	HD 2189	33.61	48.23***
Pune	HI 1605	40.71	HD 2189	32.40	25.65**

*** Significant at 1 percent level, ** Significant at 5 percent level, * Significant at 10 percent level, NS- Non-significant

The variety wise mean yield data has revealed that variety HS 562 gave higher yield of 53.80 q/ha at Bajaura center in NHZ although non-significant followed by VL 953 (37.48 q/ha) at Almora center which was significantly higher than the check variety (Table 6). In NEPZ, the highest significant average yield was recorded by K1317 variety at Kanpur (52.33 q/ha) followed by HD 2967 at West Champaran (50.00q/ha). In NWPZ, the highest significant average yield was recorded by HD 3086 at Durgapura (65.04 q/ha) as well as Ajmar (62.40 q/ha).

In CZ, HI 1544 gave highest average yield of 69.00 q/ha at Indore centre though non-significant followed by DBW 110 (67.14 q/ha) at Neemuch and GJW 463 (64.00q/ha) at Junagarh centre which was significant. In PZ, MACS 6478 gave the highest significant yield (49.82 q/ha) at Pune centre followed by UAS 304 (40.92 q/ha) and DBW 168 (40.29 q/ha) at Dharwad centre.

Table 7: Performance of improved late sown wheat varieties during rabi 2018-19

Zone & Centre	Improved varieties	Mean yield (q/ha)	Check varieties	Mean yield (q/ha)	Gain (in %)
NWPZ					
Amity Noida	DBW 173	51.04	PBW 226	45.88	11.26***
IWBR Karnal	DBW 173	51.00	DBW 90	48.50	05.15 ^{NS}
Modipuram Meerut	DBW 173	46.50	DBW 16	43.13	07.83***
Muzaffarnagar	DBW 173	41.40	PBW 590	38.08	08.71 ^{NS}
Muzaffarnagar	DBW 173	41.55	DBW 16	38.10	09.06 ^{NS}
CZ					
Udaipur	Raj 4238	45.15	Raj 3765	41.77	08.10***
Ratlam	Raj 4238	40.70	Lok 1	35.54	14.53***
Bilaspur	Raj 4238	40.02	HD 2932	36.13	10.78***
Jagdapur Bastar	Raj 4238	19.67	Lok 1	14.75	33.36***
Kota	Raj 4238	51.56	Raj 4037	46.72	10.37*
Vijapur	GW 11	52.87	GW 496	45.44	16.36***

*** Significant at 1 percent level, ** Significant at 5 percent level, * Significant at 10 percent level, NS– Non-significant

The late sown varieties mean yield data revealed that variety DBW 173 gave significantly higher yield (51.04 q/ha) at Amity Noida center in NWPZ (Table 7). In CZ, the significant average yield was recorded by GW 11 (52.87 q/ha) at Vijapur center followed by Raj 4238 (51.56 q/ha) at Kota center.

Table 8a: Zone wise productivity under FLDs over regional mean during rabi 2018-19

Zone	Mean yield (q/ha)		Gain (in %)
	WFLDs	Regional	
NHZ	33.26	24.91	33.54***
NEPZ	37.89	28.97	30.83***
NWPZ	52.27	44.60	17.19***
CZ	48.04	36.02	33.39***
PZ	33.76	26.81	25.90***

*** Significant at 1 percent level

The yield gain due to improved varieties over regional mean yield was highest in NHZ (33.54%) followed by CZ (33.39 %), NEPZ (30.83 %) PZ (25.90%) and NWPZ (17.19 %) (Table 8a). It is clear from table 8a that there was a significant yield gain in all the zones under wheat FLDs, which ranged from 17.19% in north western plains zone to 33.54 in northern hills zone.

Table 8b: Zone wise productivity under FLDs over check during rabi 2018-19

Zone	Mean yield(q/ha)		Gain (in %)
	WFLDs	Check	
NHZ	33.26	27.95	19.00***
NEPZ	37.89	31.52	20.21***
NWPZ	52.27	48.40	07.99***
CZ	48.04	42.89	12.01***
PZ	33.76	29.28	15.28***

*** Significant at 1 percent level

Across all zones demonstrated varieties have shown yield superiority over check varieties and it ranged from 07.99% in NWPZ to 20.21% in NEPZ. The yield gain due to improved varieties over check was highest in NEPZ (20.21%) followed by NHZ (19.00%), PZ (15.28%), CZ (12.01%) and NWPZ (07.99%) (Table 8b). Concerted efforts are needed to be made by the developmental agencies in all zones to bridge yield gap.

Table 9: Highest average yield attained by wheat variety in various zones during rabi 2018-19

Zone	Centre	Variety	Yield (q/ha)
NHZ	Bajaura	HS 562	53.80
NEPZ	Kanpur	K 1006	58.00
NWPZ	Durgapura	HD 3086	69.50
CZ	Indore	HI 8759 (d)	75.00
PZ	Pune	MACS 6478	63.75

The location specific highest average varietal yield (Table 9) attained in a zone were; HI 8759 (d) (75.00 q/ha) at Indore centre in CZ, HD 3086 (69.50 q/ha) at Durgapura in NWPZ, K 1006 (58.00 q/ha) at Kanpur in NEPZ, MACS 6478 (63.75 q/ha) at Pune in PZ and HS 562 (53.80 q/ha) at Bajaura in NHZ (Table 9).

Table 10: Yield gain through bio-fertilizer during rabi 2018-19

Zone & Centre	100 % Inorganic + Bio-fertilizer (Azotobactor+PSB)		100 % Inorganic fertilizer		% Gain
	Variety	Mean yield (q/ha)	Variety	Mean yield (q/ha)	
NEPZ					
Faizabad	HD 2967	51.60	HD 2967	42.40	21.70***
Shillongani	HD 2967	20.20	HD 2967	18.08	11.73*
NWPZ					
Hisar	HD 3086	56.33	HD 3086	54.00	04.32 ^{NS}
Pantnagar	HD 3086	63.85	HD 3086	62.89	01.52**
IARI, New Delhi	HD 3086	50.23	HD 3086	47.97	04.72*
Agra	HD 3086	44.40	HD 3086	41.00	08.29**
Nagina Bijnor	DBW 173	49.90	DBW 173	46.59	07.10**
CZ					
Jagdapur, Bastar	Raj 4238	20.86	Raj 4238	20.18	03.36 ^{NS}

*** Significant at 1 percent level, ** Significant at 5 percent level, * Significant at 10 percent level, NS– Non-significant

FLDs on bio-fertilizer (Azotobactor & PSB) along with 100% inorganic fertilizer as compared to check (100% recommended dose of inorganic fertilizer) showed that the significant yield gain was 21.70% at Faizabad and 11.73% at Shillongani in NEPZ. In NWPZ, significant yield gain of 8.29% was recorded at Agra centre. In CZ only 3.36% non-significant yield gain was recorded at Jagdalpur, Bastar center.

Table 11: Performance of improved durum/ dicoccum varieties during rabi 2018-19

Zone & Center	Improved variety	Yield (q/ha)	Check variety	Yield (q/ha)	Gain (in %)
CZ					
Banswara	HI 8759 (d)	46.75	HI 8498 (d)	42.88	09.04***
Udaipur	HI 8759 (d)	47.40	HI 8498 (d)	42.80	10.75***
Vijapur	GDW 1255 (d)	49.07	GW 496	44.55	10.15 ^{NS}
Indore	HD 4728 (d)	65.00	HI 8498 (d)	51.17	27.04***
Indore	HD 8759 (d)	65.00	HI 8663 (d)	57.29	13.47**
Indore	HI 8737 (d)	64.00	HI 8663 (d)	56.83	12.61***
Harda	HI 8759 (d)	59.96	GW 322	49.13	22.04***
Bilaspur	HI 8759 (d)	39.75	HI 8381 (d)	37.30	6.59*

PZ					
Niphad, Nashik	MACS 3949 (d)	36.42	HD 2189	34.14	6.68 ^{NS}
Pune	MACS 3949 (d)	46.50	MACS 3125 (d)	42.83	8.58 ^{NS}
Pune	MACS 4028 (d)	21.25	HD 2781 (d)	21.75	-2.30 ^{NS}
Pune	HW 1098 (dic.)	42.50	MACS 2971 (dic.)	38.50	10.39 ^{NS}
Dharwad	HI 8777 (d)	17.33	DWR 2006	14.71	17.81 ^{***}
Dharwad	MACS 3949 (d)	42.55	UAS 415 (d)	37.16	14.50 ^{***}
Dharwad	UAS 428 (d)	40.68	DWR 1006	35.58	14.33 ^{***}
Dharwad	UAS 446 (d)	16.03	B. Yellow (d)	14.00	14.46 [*]
Wellington	HW 1098 (dic.)	29.44	-	-	-

*** Significant at 1 percent level, ** Significant at 5 percent level, * Significant at 10 percent level, NS– Non-significant

In case of improved durum varieties, the variety HD 4728 (d) and HD 8759 (d) gave a significant average yield of 65.00 q/ha at Indore centre in Central zone. In PZ, the variety MACS 3949 (d) gave an average yield of 46.50 q/ha at Pune center, though it was non-significant (Table 11).

Table 12: Performance of improved varieties under rainfed/restricted irrigation conditions

Zone & Center	Improved variety	Mean yield (q/ha)	Check variety	Mean yield (q/ha)	% Gain
NHZ					
Bajaura	HS 562	53.80	HPW 349	48.50	10.93 ^{NS}
Bajaura	HS 562	33.63	HS 507	29.20	15.17 ^{***}
Bilaspur	HS 562	29.26	HPW 155	18.02	62.38 ^{***}
Chamba	HS 562	28.08	HPW 236	22.05	27.38 ^{***}
Dhaulakuan	HS 562	37.50	HD 2967	33.00	13.64 ^{**}
Dhaulakuan	HS 562	36.67	Sonalika	30.33	20.88 [*]
Flowerdale, Shimla	HS 562	35.50	Local	24.25	46.39 ^{***}
Hamirpur	HS562	18.34	Local	15.54	18.06 ^{***}
Imphal	HS 562	22.33	K 7410	16.33	36.73 ^{***}
Khudwani, Anantnag	HS562	36.00	SW 2	34.02	05.81 ^{***}
Malan	HS 562	41.11	HPW 155	35.56	15.63 ^{***}
Malan	HS 562	40.14	HPW 349	34.50	16.36 ^{***}
Tandwal, Rajouri	HS 562	30.26	VL 907	24.03	25.95 ^{***}
Tutikandi Shimla	HS 562	31.14	HS 507	29.08	07.08 ^{NS}
Imphal	HS 562	22.33	K 7410	16.33	36.74 ^{***}
CZ					
Vijapur	GW 11	52.87	GW 496	45.44	16.36 ^{***}
PZ					
Dharwad	UAS 446 (d)	16.03	B. Yellow (d)	14.00	14.46 [*]
Dharwad	UAS 347	18.12	Local	15.35	18.02 ^{***}

*** Significant at 1 percent level, ** Significant at 5 percent level, * Significant at 10 percent level, NS– Non-significant

In NHZ, at Bajaura, improved rainfed variety HS 562 yielded 53.80 q/ha which was higher than the check varieties but non-significant. The same variety gave significantly higher yield of 41.11 q/ha and 40.14 q/ha at Malan Kangra centre against check varieties HPW 155 and HPW 349, respectively. In CZ, GW 11 gave 52.87 q/ha yield at Vijapur center which was significantly higher than the check variety. In PZ, UAS 347 yielded 18.12q/ha under rainfed condition at Dharwad centre which was non-significant.

Table 13: Performance of zero tillage/happy seeder during rabi 2018-19

Zone & Centre	Technology	Improved varieties	Zero Tillage/ Happy Seeder mean yield (q/ha)	Check varieties	Conventional tillage mean yield (q/ha)	Gain (in %)
NEPZ						
Coochbehar	Zero Tillage	HD 2967	35.63	HD 2967	32.54	09.51***
Faizabad	Zero Tillage	HD 2967	44.00	HD 2967	42.00	04.76 ^{NS}
Faizabad	Happy Seeder	HD 2967	49.00	HD 2967	39.00	25.64 ^{NS}
NWPZ						
IIWBR Karnal	Happy Seeder	HD 3086	58.83	HD 3086	55.83	05.37**
CSSRI Karnal	Happy Seeder	KRL 210	40.17	KRL 210	38.59	04.10 ^{NS}
Hisar	Zero Tillage	HD 3086	56.25	HD 3086	56.00	00.45 ^{NS}
Hisar	Happy Seeder	HD 3086	53.33	HD 3086	53.00	00.63 ^{NS}
Ambala	Happy Seeder	HD 3086	57.09	HD 3086	56.73	00.64 ^{NS}
Kaithal	Zero Tillage	HD 3086	53.42	HD 3086	51.83	03.05***
Kaithal	Happy Seeder	HD 3086	54.00	HD 3086	52.00	03.85 ^{NS}
Ropar	Happy Seeder	HD 3086	51.00	HD 3086	50.00	02.00 ^{NS}
Ludhiana	Zero Tillage	PBW723	56.45	PBW 723	55.53	01.65 ^{NS}
Ludhiana	Happy Seeder	PBW723	55.82	PBW723	55.58	00.42 ^{NS}
Agra	Zero Tillage	HD 3086	44.40	HD 3086	40.80	08.82**
Pantnagar	Zero Tillage	HD 3086	56.30	HD 3086	56.05	00.44 ^{NS}
IARI New Delhi	Zero Tillage	HD 3086	48.65	HD 3086	47.24	02.99 ^{NS}

*** Significant at 1 percent level, ** Significant at 5 percent level, * Significant at 10 percent level, NS– Non-significant

There was a significant yield gain of 09.51% at coochbehar centre in NEPZ under zero tillage of wheat sowing. In NWPZ, zero tillage gave the yield advantage of 8.82%, 5.37% and 3.05% at Agra, IIWBR Karnal and Kaithal centers. The yield gain due to zero tillage technology was non significant at most of the centres.

Table 14: Performance of rotavator during rabi 2018-19

Zone & Centre	Improved varieties	Rotavator mean yield (q/ha)	Conventional tillage mean yield (q/ha)	Gain (in %)
NEPZ				
Siddharthnagar	HD 2967	48.48	40.93	18.45***
NWPZ				
Pantnagar	HD 3086	59.38	59.00	00.64 ^{NS}
Kaithal	HD 3086	52.50	51.63	01.68 ^{NS}
Ludhiana	PBW 723 (Unnat PBW 343)	56.01	54.62	02.54*
Nagina Bijnor	HD 3086	48.98	46.27	05.86*

** - Significant at 5 percent level, * Significant at 10 percent level, NS– Non-significant

Yield gain under rotavator technology was 18.45% at Siddharthnagar which was significantly higher than conventional tillage followed by 5.86% at Nagina Bijnor and 2.54% at Ludhiana.

Table 15: Yield gain through boron application in wheat during rabi 2018-19

Zone & Center	Improved variety	Mean yield (q/ha)	Check variety	Mean yield (q/ha)	% Gain
Shillongani	HD 2967	37.50	HD 2967	33.00	13.64 ^{NS}

The demonstration on micro nutrient application such as boron in wheat has shown encouraging result and it has given 13.64 per cent higher yield at Shillongani centre, though non-significant (Table 15).

Suggestions by the cooperating centers of different zones for the smooth conduct of wheat FLDs

Suggestions	Zone				
	NHZ	NEPZ	NWPZ	CZ	PZ
• Release of funds should be well in advance	√	√	√	√	√
• Supply of quality seeds of newly released varieties on time	√	√			
• Supplies treated seeds		√	√		
• Increase budget POL/hiring of vehicle for monitoring of FLDs, organization of field day and display boards	√	√	√	√	√
• Varieties suitable for late sown as well as limited irrigated conditions should also get priority.	√	√		√	√
• Incorporate short duration, less water requiring and heat tolerant varieties in FLD programme	√	√		√	√
• In place of cluster approach individual farmer approach will be more appropriate to conduct FLDs		√	√		
• Increase number of demonstration per centre	√	√	√	√	√
• Training on latest production technologies for different centres should be organised under FLDs programme	√	√	√	√	√
• There must be flexibility in expenditure of funds as per the requirements of the FLD centres	√	√	√	√	√
• Promote more than one variety in a crop season		√		√	
• There must be freedom of centres to use their own varieties under FLDs		√	√	√	

Suggestions by the cooperating centers of different zones for the smooth conduct of barley FLDs

Suggestions	Zone		
	NEPZ	NWPZ	CZ
• Release of FLD funds well in advance.	√	√	√
• Provision of additional fund for organizing field day and POL under FLDs	√	√	√
• Increase budget for POL/hiring of vehicle for monitoring of FLD sites and organizing field day	√	√	√
• Number of demonstrations should be increased	√	√	√
• The FLDs programme must continue	√	√	√
• Release the high yielding variety of wheat for limited irrigations	√	√	√
• The funds for training and extension literature should also be provided	√	√	√

Farmers' perception about FLDs

- The farmers appreciated the new wheat production technologies demonstrated under FLDs. Improved varieties performed better, yielded over check varieties.
- Farmers were impressed with the performance of zero tillage technology in wheat as it saves time, labour, money and energy.
- First hand experience of seed treatment with bio-fertilizers (Azotobactor and Phosphorus Solubilizing Bacteria) Motivated farmers for real time adoption at their field.
- Neighboring farmers responded positively about FLDs and would like to grow the improved varieties and they have asked for improved varieties seed from the FLD farmer.
- Adoption of zero tillage, seed treatment with bio-fertilizers, integrated nutrient management, and technical guidance from cooperating centres ensured better yield as well as more income to the farmers.

Monitoring of Frontline Demonstrations (FLDs)

The ICAR-IIWBR team accompanied by the experts from the Ministry of Agriculture & Farmers Welfare and the concerned centres monitored the following FLDs centres during the crop season 2018-19.

Team Leader	Centres Monitored	Dates of Monitoring
Dr. Satyavir Singh	Khudwani-Anantnag, Rajouri and Kathua	6-11 March, 2019
Dr. Anuj Kumar	Noida, Rewari, IARI and Ujwa, New Delhi,	9-10 April, 2019
Dr. Anil Khippal	Indore, Ujjain and Ratlam	19-24 February, 2019
Dr. Raj Pal Meena	Faizabad, Kanpur and Varanasi	6-7 March, 2019
Dr. Sendhil R.	Dharwad, Belagavi and Wellington	3-10 March, 2019
Dr. Mangal Singh	Junagarh and Vijapur	25 February-4 March, 2019
Dr. Ramesh Chand	Jaipur, Ajmer, Tonk and Karauli	6-10 March, 2019

FLD Monitoring Report of Indore, Ujjain and Ratlam centers

Monitoring Centre : ICAR-IARI, Regional Station, Indore (MP)

Monitoring Date : 20.02.2019

Monitoring Team

Dr. Anil Khippal, Principal Scientist (Agronomy), ICAR-IIWBR, Karnal (Haryana)

Dr. S.V. Sai Prasad, Head, ICAR-IARI, Regional Station, Indore (MP)

Dr. A. K. Singh, Pr. Scientist, Agri. Extension, ICAR-IARI, Regional Station, Indore (MP)

Dr. Sandip Silawat, STA, Directorate of Pulses Development (DPD), Bhopal (MP)

- Improved or newly released wheat varieties (4 varieties) viz., HI 1605, HI 8759, HI 8737, HD 4728, were demonstrated in 10.80 ha area against three popular check varieties (HI 8663, HI 1513 and HI 8498) across four villages namely Jalod Kew, Jani, Rajoda and Mahudia at 20 farmers' fields. The following observations were made during the overall monitoring and discussion with farmers.
- As per the discussion and site visit at the above farmers' fields, all the farmers opted for line sowing using seed drill. Around 40kg of seed per acre was used for sowing. Around 2-3 irrigations were given under limited irrigation condition. Around 5 irrigations were given under assured irrigation facility. Under assured irrigation facility, farmers expected yield even close to 70 quintals per hectare. A few of the monitored fields were infested with weeds like *Phalaris minor* and wild oats. Fertilizers were applied based on the recommended dose by the Indore Centre for both limited irrigation and assured irrigation conditions. The monitored plots were not infested with any insect-pests and diseases. Harvesting is expected to commence in a couple of weeks in the monitored plots and around 65-70 quintals/ha was their yield expectation. Farmers valued the demonstrations of new wheat production technologies via FLDs as the improved wheat varieties perform better and expected to give more yield than the local check varieties. They appreciated the technical assistance and advisory offered by the ICAR-IARI, RS, Indore centre. They are interested to continue wheat cultivation even if the assistance under FLD programme is stopped.

Monitoring Centre : KVK, Ujjain (MP)

Monitoring Date : 21.02.2019

Monitoring Team

Dr. Anil Khippal, Principal Scientist (Agronomy), ICAR-IIWBR, Karnal (Haryana)

Dr. Surendra Kaushik, Scientist (Plant breeding), KVK, Ujjain (MP)

Dr. D.S.Tomar, Scientist (Agronomy), KVK, Ujjain (MP)

Dr. Sandip Silawat, STA, Directorate of Pulses Development (DPD), Bhopal (MP)

- Newly released wheat variety i.e. DBW 110 has been demonstrated in 5.2 hectares area at farmers' fields by the KVK, Ujjain centre against three popular checks namely HI 1544, Pusa Mangal and Lok 1. The following observations were made during the overall monitoring and discussion with the FLD beneficiaries. All farmers have used seed drill for sowing. Around 40kg of seed per acre was used for sowing. Around 2-3 irrigations were given under limited irrigation condition. The beneficiaries reported that they expect yield around 65-70 quintals per ha. In a few of the plots, *Phalaris minor* was found. Most of the farmers have used 2,4 D to manage broad leaved weeds. Technical assistance and advisory offered by the KVK, Ujjain centre was much appreciated by the beneficiaries and they are interested to continue wheat cultivation in the coming years even if the assistance from FLD programme is discontinued.

Monitoring Centre : KVK, Jaora, Ratlam (MP)**Monitoring Date : 22.02.2019****Monitoring Team**

Dr. Anil Khippal, Principal Scientist (Agronomy), ICAR-IIWBR, Karnal (Haryana)

Dr. Ramdhan Ghaswa, SMS (Agri. Extension), KVK, Jaora, Ratlam (MP).

Dr. Sandip Silawat, STA, Directorate of Pulses Development (DPD), Bhopal (MP).

- Newly released two wheat varieties viz., DBW 110 and Raj 4238 have been demonstrated in 10 hectares of farmers' fields by the KVK, Ratlam centre against three popular checks namely HI 1544, Pusa Mangal and Lok 1. The following observations were made during the overall monitoring and discussion with the FLD beneficiaries.
- All farmers except one have used seed drill for sowing. One farmer follows the method of broadcasting for sowing hence, it was recommended to follow the standard practice. Around 40kg of seed per acre was used for sowing. Around 2-3 irrigation were given under limited irrigation condition. In most of the plots, *Phalaris minor* was found. Most of the farmers have used 2,4 D to manage broad leaved weeds. They are interested to continue wheat cultivation in the coming years even if the assistance from FLD programme is discontinued.

FLD Monitoring Report of Junagarh and Vijapur centers**Monitoring Center : JAU, Junagarh (Gujarat)****Monitoring Date : 27.02.2019****Monitoring Team**

Dr. Mangal Singh, ACTO, ICAR-IIWBR, Karnal

Dr. Hitesh Kapadia, Plant Pathologist, JAU, Junagarh

Sh. Ramnarayan, Sr. Technical Assistant, DMD, Jaipur, Rajasthan

- The team visited villages Maktupur and Kankasa in Mangrol tehsil of Junagarh District of Gujarat on 27.02.2019 for monitoring of wheat FLDs conducted by Wheat Research Station, Junagarh Agriculture University, Junagarh during Rabi 2018-19. The center conducted 25 wheat FLDs over 25 acres area at 25 farmers fields. The seed of new released wheat variety GJW 463 was distributed among the beneficiary farmers and demonstrated it with complete package of practices at farmers' fields.

Monitoring Center : SDAU, Vijapur (Gujarat)Monitoring Date: 2nd and 3rd March, 2019**Monitoring Team:**

Dr. Mangal Singh, ACTO, ICAR-IIWBR, Karnal

Dr. B.M. Patel, Agronomist, SDAU, Vijapur

Dr. Manthan Dabhi, Pathologist, SDAU, Vijapur

Sh. Ramnarayan, Sr. Technical Assistant, DMD, Jaipur, Rajasthan

- The team visited Six villages namely Karbatia, Shipor, Kuvasana, Umata, Deodarda and Hasanpur in Vijapur district of Gujarat on 2nd and 3rd March, 2019 for monitoring of wheat FLDs conducted by SDAU, Vijapur during Rabi 2018-19. The center conducted 25 wheat FLDs over 25 acres area at 25 farmers fields. The seed of new released wheat variety GW 451, GDW 1255 (d) and GW 11 were distributed among the beneficiary farmers and demonstrated it with complete package of practices at farmer's fields.
- Wheat FLDs fields were found free from any type of weeds. The monitored fields were found free from insects, pests and diseases. In the monitored fields, better crop stand was observed due to more tillering, lodging free, compact and long earhead and very good canopy cover and good harvesting was expected. The FLDs farmers expected that the new variety will give higher yield in comparison to the existing check varieties. The farmers appreciated the work done by cooperating center.

FLD Monitoring Report of CSAUA&T, Kanpur center**Monitoring Centre: CSAUA&T, Kanpur (UP)****Monitoring Date: 06.03.2019-07.03.2019****Monitoring Team**

Dr. Raj Pal Meena, Sr. Scientist (Agronomy), ICAR-IIWBR, Karnal (Haryana).

Dr. Mahesh Kumar, Joint Director, Directorate of Sugarcane Development (DSD), Lucknow (UP).

Dr. Javed Bahar Khan, Wheat Pathologist, CSAUA&T, Kanpur (UP).

Dr. Jitendra Kumar, Wheat Entomologist, CSAUA&T, Kanpur (UP).

- The team visited different villages of Kanpur and Kannauj districts on 6th and 7th March, 2019 for monitoring of Wheat and Barley FLDs conducted by CSAUA&T, Kanpur during 2018-19. The centre has conducted 20 FLDs of wheat over 20 acres area at 20 farmers' field and 13 FLDs of Barley over 13 acres area at 13 farmers' fields. The seeds of improved wheat varieties i.e. K 1006 and K 1317; and improved barley varieties i.e. K 1055 (Prakhar) and DWRB 137 were distributed among the beneficiary farmers and demonstrated with complete package of practices at farmers' fields. The check varieties of wheat were old varieties, used by farmers in the area. In visited fields, wheat crop was found in flowering stage, whereas, in few fields, it was in milking stage. The barley crop was found in physiological maturity stage.
- The sowing was done with seed drill machine and maintained the proper crop geometry. Display board was not found in demonstrated fields. The performance of FLDs crop was good. Wheat crop was at flowering stage whereas barley was in physiological maturity stage. The performance of barley crop was very good in all monitored fields. No incidence of disease and insects-pests was observed in the demonstration plots. Weed infestation especially *Phalaris minor* was found in wheat FLD's. In the demonstration fields no incidence of crop lodging was observed. Except few fields, all demonstrations have good plant population. The farmers were especially young farmers able to interact about the performance of demonstrate varieties, package of practices and aim of FLDs.

FLD Monitoring Report of Chomu-Jaipur, Durgapura-Jaipur, Ajmer and Karauli centers

Monitoring Centre: KVK, Chomu, Jaipur (Rajasthan)

Monitoring Date: 07.03.2019

Monitoring Team

Dr. Ramesh Chand , ACTO, Social Sciences, ICAR-IIWBR, Karnal, Haryana.

Dr. Hoshiar Singh, Pr. Scientist and Wheat Breeder, Durgapura, Jaipur, Rajasthan.

Dr. N.K. Gupta, SMS (Horticulture), KVK, Chomu, Jaipur, Rajasthan.

Sh. Madan Lal , Sr. Tech. Asstt. RARI (SKNAU), Durgapura, Jaipur, Rajasthan.

- Improved and newly released barley varieties namely RD 2907, a six row barley was demonstrated by the KVK, Chomu centre at 13 farmers' fields in four hectares area in village *Bai ka Bas* against the check variety RD 2035.

Monitoring Centre: RARI, Durgapura, Jaipur (Rajasthan)

Monitoring Date: 07.03.2019

Monitoring Team

Dr. Ramesh Chand , ACTO, Social Sciences, ICAR-IIWBR, Karnal, Haryana.

Dr. Hoshiar Singh, Pr. Scientist and Wheat Breeder, Durgapura, Jaipur, Rajasthan.

Sh. Madan Lal , Sr. Tech. Asstt. RARI (SKNAU), Durgapura, Jaipur, Rajasthan.

- Improved and newly released wheat variety namely HD 3086 was demonstrated by the RARI, Durgapura (Rajasthan) centre at 14 farmers' fields in 5.6 hectare area in villages *Dhani Badhawali Dodsar, Gobind garh, Sita Rampura and Khekroli*, Tehsil Chomu and District Jaipur (Rajasthan) against the check variety Raj 4079. The FLD farmers were interested to continue with the improved varieties in the forthcoming years. FLDs farmers were interested in sharing of wheat seed among fellow farmers in the villages.

Monitoring Centre : KVK, Ajmer (Rajasthan)

Monitoring Date : 08.03.2019

Monitoring Team

Dr. Ramesh Chand , ACTO, Social Sciences, ICAR-IIWBR, Karnal, Haryana.

Dr. Hoshiar Singh, Pr. Scientist and Wheat Breeder, Durgapura, Jaipur, Rajasthan.

Dr. Dinesh Kumar, Project Coordinator, KVK, Ajmer.

Dr. Ramakant Sharma, Asstt. Prof. Extension, KVK, Ajmer.

- Improved and newly released wheat varieties namely HD 3086 was demonstrated by the KVK, Ajmer (Rajasthan) centre at 12 farmers' fields 12 acres area in villages *Nadi-II, Govindgarh, Ajmer* (Rajasthan) against the check variety Raj 3077.

Monitoring Centre: KVK, Hindaun, Karauli (Rajasthan)

Monitoring Date: 09.03.2019

Monitoring Team

Dr. Ramesh Chand , ACTO, Social Science, ICAR-IIWBR, Karnal (Haryana)

Dr. Shankar Lal, SMS. Agronomist, KVK Hindaun, Karauli (Rajasthan)

- Improved and newly released wheat varieties namely RD 2907 six rowed barley was demonstrated by the Hindaun, Karauli (Rajasthan) centre in 12 farmers' in 12 acres field in villages *Humikhera, and Akorasiin Karauli* (Rajasthan) against the check variety RD 2035.
- During the monitoring it was observed that barley crop was excellent having good tillers and expected good, may be 50-55 qt/ha at FLD sites. Almost all the farmers had sown variety timely in first fortnight of November and seed rate used was @ 40 kg/acre using seed drill. Number of irrigations varied from farmer to farmer and farmers had applied sprinkler irrigation from 2 - 5 times.
- Recommended fertilizer doses were used and condition of the crop was very good. Grain market is far away and MSP is not as per their expectation. Blue bulls (Neelgaye) in this area were reported as major problem after shortage of water. Farmers appreciated the technical assistance provided by the KVKs. The FLD farmers were interested to continue the wheat and barley improved varieties in the coming years for good yield.

FLD Monitoring Report of Dharwad, Belagavi and Wellington centers

Monitoring Center : UAS Dharwad, Karnataka

Monitoring Date : 04.03.2019 and 05.03.2019

Monitoring Team

Dr. R. Sendhil, Scientist, Social Sciences, ICAR-IIWBR, Karnal, Haryana

Dr. T. Sudha, Professor and Head, AICRP on Wheat and Barley, UAS Dharwad

Sh. S.S. Kagi, Technical Officer, Directorate of Oilseeds Development, Hyderabad.

Sh. B.M. Ghatanatti, Technical Officer, AICRP on Wheat and Barley, UAS Dharwad

Sh.V.M. Hosur, Agricultural Officer, Dharwad

- Improved varieties and bio-fertilizer technology has been demonstrated (50 FLDs) at various sites. Seeds were sown more than the recommended rate being a rainfed area.
- A majority of the demonstrated plots were nearby the main road and were line sown with a good crop stand. Harvesting is expected to commence in a couple of weeks in the monitored plots and around 30 quintals/ha was their yield expectation.
- Irrigation was reported as a major issue in that region. Despite a good crop stand, a few fields were infested with weeds and yellow rust incidence.
- Farmers valued the demonstrations of new wheat production technologies via FLDs as the improved wheat varieties perform better and expected to give more yield than the check varieties. They appreciated the technical assistance and advisories offered by the UAS, Dharwad team. They are interested to continue wheat cultivation even if the assistance from FLD programme is stopped.

Monitoring Center : KVK Belagavi, Karnataka

Monitoring Date : 05.03.2019

Monitoring Team

Dr. R. Sendhil, Scientist, Social Sciences, ICAR-IIWBR, Karnal, Haryana

Dr. Chougala DC, Senior Scientist and Head, FLD Coordinator, KVK Belagavi.

Sh. SS Kagi, Technical Officer, Directorate of Oilseeds Development, Hyderabad.

Subject Matter Specialist, KVK, Belagavi.

- A total of 27 demonstrations on improved wheat varieties have been conducted at various sites by the center. The monitored fields were infested with weeds and harvesting is expected to commence in a couple of days. Few farmers have sown wheat for the first time and expecting a good yield in comparison to the check.
- Irrigation and weeds were reported as a major issue in that region. A lot of offtypes were noticed in the monitored fields indicating the lack of seed quality.
- Site was properly selected to disseminate the technology and it was told to fix a banner indicating the details of demonstrated technology. There was no incidence of pests and diseases in the monitored plots. FLDs expected to yield around 28-30 Quintals/ha which supposed to be relatively higher than the check varieties by 10-20 per cent.
- Technical assistance and advisory offered by the KVK, Belagavi was much appreciated by the beneficiaries and they are interested to continue with the improved varieties in the coming years even if the assistance from FLD programme is discontinued.

Monitoring Center : IARI-RS, Wellington, Tamil Nadu**Monitoring Date : 07.03.2019 to 09.03.2019****Monitoring Team**

Dr. R. Sendhil, Scientist, Social Sciences, ICAR-IIWBR, Karnal, Haryana

Dr. M. Sivasamy, PS and Head, FLD Coordinator, IARI-RS, Wellington Centre

Dr. K. Manoharan, Director, Directorate of Oilseeds Development, Hyderabad.

Dr. P. Jayaprakash, Principal Scientist, IARI-RS, Wellington Centre

Dr. Vikas, Scientist, IARI-RS, Wellington Centre

Dr. Manjunatha, Scientist, IARI-RS, Wellington Centre

Subject Matter Specialist, MYRDA KVK, Erode, Tamil Nadu.

- A total of 18 demonstrations of improved wheat variety (mostly in new areas to promote wheat cultivation) in 48 acres have been carried out by the IARI-RS Wellington center.
- Seeds were sown at recommended levels. In some fields, broadcasting was practiced by a few farmers against the recommended line sowing which led to poor tillering. The monitored fields were infested with a few weeds and manual weeding is under practice. The crop stand was very good with more tillers and a portion of few monitored fields were harvested already.
- Farmers expect around 30-35 quintals/ha. Wild animals and birds were reported as a major issue in that region. A field day was organised at the Thalavadi village FLD site and the benefit of cultivating improved wheat varieties have been elaborated to farmers.
- Beneficiaries highly appreciated the technical assistance and advisories offered by the IARI-RS Wellington Centre and the FLD farmers are interested to continue their wheat production with the improved varieties in the forthcoming years without any monetary assistance.

FLD Monitoring Report of Khudwani-Anantnag, Rajouri and Kathua centers**Monitoring Centre: Khudwani-Anantnag (J&K)****Monitoring Date: 12.03.2019****Monitoring Team**

Dr. Satyavir Singh, Principal Scientist & PI (SS), ICAR-IIWBR, Karnal (Haryana).

Dr. Manzoor Ahmed Ganai, Sr. Scientist (Agronomy), MRCFC (SKUAST-K), Khudwani (J&K).

Dr. Asiq Hussain, Sr. Scientist (Agronomy), MRCFC (SKUAST-K), Khudwani, Anantnag (J&K).

Dr. Shabir Hussain Wani, Assistant Professor (GPB), MRCFC (SKUAST-K), Khudwani (J&K).

Mr. Mubarak Ahmed Ganai, Field-cum-Lab Assistant, MRCFC (SKUAST-K), Khudwani (J&K).

- The team visited the wheat FLDs on 12th March, 2019 conducted by MRCFC (SKUAST-K), Khudwani, Anantnag center at village Checkkoot in district Pulwama using variety HS 562. The technology i.e. improved or newly released wheat variety (NRWV) with complete package of practices was demonstrated at farmers' fields.

Monitoring Centre: Rajouri (J&K)**Monitoring Date: 14.03.2019****Monitoring Team**

Dr. Satyavir Singh, Principal Scientist & PI (SS), ICAR-IIWBR, Karnal (Haryana).

Dr. Deepak Kumar, Incharge, RARS, SKUAST-J, Tandwal, Rajouri (J&K).

Dr. Vikas Sharma, Sr. Scientist (Agronomy), RARS, SKUAST-J, Tandwal, Rajouri (J&K).

Dr. Sunil Mishra, Jr. Scientist (Agronomy), RARS, SKUAST-J, Tandwal, Rajouri (J&K).

- The team visited the wheat FLDs on 14th March, 2019 conducted by RARS, SKUAST-J, Tandwal, Rajouri at villages Dalogra, Chatyar and Kallar in district Rajouri using variety HS 562. The technology i.e. improved or newly released wheat variety (NRWV) with complete package of practices was demonstrated at farmers' fields.

Monitoring Centre: Rajouri (J&K)**Monitoring Date: 15.03.2019****Monitoring Team**

Dr. Satyavir Singh, Principal Scientist & PI (SS), ICAR-IIWBR, Karnal (Haryana).

Dr. Vishal Mahajan, SMS (Agroforestry) & PC Acting, KVK, Kathua (J&K).

Dr. Berjesh Ajrawat, SMS (Agri. Extension), KVK, Kathua (J&K).

Dr. Saurabh Gupta, SMS (Entomology), KVK, Kathua (J&K).

- The team visited the wheat FLDs on 15th March, 2019 conducted by KVK, Kathua at villages Taraftajwal, Sunjwan, Rajbagh, Dabwal and Rajhani in district Kathua using variety HS 562. The technology i.e. improved or newly released wheat variety (NRWV) with complete package of practices was demonstrated at farmers' fields.

- The weeds infestation in FLDs was negligible. The wheat FLDs crop was free from diseases. New wheat varieties have good tillering good crop stand, long earhead, more number of grains per earhead and bold grains. Wheat straw is good for domestic animals. The improved wheat varieties being popularized were HS 562 and HD 3086. The check varieties being used were SW 2, VL 907 and HD 2967. The neighbour farmers of the wheat FLDs were impressed by the performance of new varieties. No lodging was seen in new varieties fields. Farmers expected more yield from the new varieties than the old varieties. FLD is good source of technology transfer. The farmers appreciated the work done by FLDs co-operators.

FLD Monitoring Report of Noida, IARI-New Delhi, Ujwa-New Delhi and Rewari centers

Monitoring Centre: ACES, Amity University, Noida (UP)

Monitoring Date: 09.04.2019

Monitoring Team

Dr. Anuj Kumar, Principal Scientist, ICAR-IIWBR, Karnal (Haryana)

Dr. NP Singh, Director, ACES, Amity University, Noida (UP)

Mr. Roshan Lal, Research Associate, ACES, Amity University, Noida (UP)

Mr. Satish Kumar, Field Assistant, ACES, Amity University, Noida (UP)

- The team visited demonstration plots of Sh. Sanjay, Sh. Dunger, Sh. Naveen, Sh. Devender of Village Fajaalpur and Mohd. Gulfaam, Smt. Jagriti, Sh. Bimlesh and Sh. Parvinder of village Shahpur, Block, Dankaur, District, Gautam Budh Nagar on 09.04.2019. The wheat varieties HD 3086 for irrigated and timely sown condition and DBW 173 for irrigated and late sown condition were demonstrated under FLD. The check plots were on HD 2967 and PBW 226. The performance of both the varieties was excellent and farmers were expecting good yield. The crop was at maturity stage. The farmers displayed the name of variety, date of sowing and name of sponsoring agencies on a display board at FLD site.
- The FLD plots were weed free. Insects, pests and diseases were not recorded in any plot. Crop stand was good and good harvest was expected. Farmers were impressed with both the varieties and were planning to store seed for next season. Farmers were satisfied with the services provided by ACES, Amity University, Noida (UP)

Monitoring Centre: CATAT, IARI, New Delhi

Monitoring Date: 09.04.2019

Monitoring Team

Dr. Anuj Kumar, Principal Scientist, ICAR-IIWBR, Karnal

Dr. Nafees Ahmed, Principal Scientist, CATAT, IARI, New Delhi

Mr. Nand Kishor, Technical Officer, CATAT, IARI, New Delhi

- The team visited demonstration plots of Sh. Ram Singh, Sh. Manjit, Smt. Ramrati, Sh. Satvir and Sh. Rammehar. Sowing of wheat variety HD 3086 was done with Turbo happy seeder machine to show the benefits of this technology among the farmers. The variety used under conventional tillage was HD 3086. The performance of zero tillage technology was excellent and farmers were expecting good yield. The crop was about to mature. The farmers displayed the name of variety, date of sowing and name of sponsoring agencies on a display board at FLD site. The FLD plots were free from any weed. Disease Free Crop stand was good. Farmers were impressed with zero tillage method of sowing. Farmers were highly satisfied with the services provided by CATAT, IARI, New Delhi.

Monitoring Centre: KVK, Ujwa, New Delhi

Monitoring Date: 10.04.2019

Monitoring Team

Dr. Anuj Kumar, Principal Scientist, ICAR-IIWBR, Karnal

Dr. D.K. Rana, Sr. Scientist, KVK, Ujwa, New Delhi

Dr. Samar Pal, Scientist, KVK, Ujwa, New Delhi

Dr. Vishal Chauhan, Scientist, KVK, Ujwa, New Delhi

- The team visited demonstration plots of Sh. Supan Prakash, Sh. Shivpal Singh of village Malikpur, Sh. Jitendra, Smt. Chand Kaur Sh. Jai Prakash of Village Sarangpur and Sh. Narendra Kumar and Sh. Mukesh Dagar of Village Ujwa, Najafgarh, South Delhi. The wheat variety HD 3086 was demonstrated and the check variety used was WH 711 in all demonstration plots. The performance of HD 3086 was extremely good and farmers were expecting good harvest. The crop was about to mature in few days. The farmers displayed the name of variety, date of sowing and name of sponsors on a display board.

- The FLD plots were free from any weed. Crop was free from insect, pest and disease. Crop stand was good and good harvest was expected. Farmers were impressed with the performance of HD 3086 at their field. Farmers were highly satisfied with the services provided KVK, Ujwa, New Delhi.

Monitoring Centre: KVK Rampura, Rewari, Haryana

Monitoring Date: 10.04.2019

Monitoring Team

Dr. Anuj Kumar, Principal Scientist, ICAR-IIWBR, Karnal

Dr. Kapoor Singh, Programme Coordinator, KVK Rampura, Rewari, Haryana.

- The team visited barley demonstration plots of Sh. Kartar Singh, Sh. Ishwar Singh, and Sh. Sumer Singh of village Khurshid Nagar, Block Nahar, Tehsil Kosali, District Rewari. The newly released barley variety RD 2907 was demonstrated against BH 393. The performance of RD 2907 was extremely good and farmers were expecting good harvest. The crop was about to harvest in a few days. The farmers displayed the name of variety, date of sowing and name of sponsoring agencies on a display board in FLD field.
- The FLD plots were free from any weed. Barley crop was quite healthy. Crop stand was good and good harvest was expected. Farmers were impressed with the performance of RD 2907 at their field. Farmers were highly satisfied with the technical services provided KVK, Rampur, Rewari.

Table 17: Improved and check wheat varieties at farmers' field in various zones during *rabi* 2018-19

Zone	Improved Varieties	Check Varieties
NHZ	VL 953, HS 562	HPW 155, HPW 236, HS 507, Local, SW 2, HPW 349, Sonalika, VL 907, K 7410, HD 2967
NEPZ	HD 2967, K 1317, K 1006	HD 2967, PBW 343, HD 2733, HUW 468, UP 262, Sonalika, Local, K 9107, HD 3086
NWPZ	HD 3086, PBW 725, KRL 210, DBW 173, PBW 723 (Unnant PBW 343)	HD 2967, WH 1105, HD 3086, PBW 502, PBW 590, Raj 4079, Raj 3077, Raj 1482, PBW 725, Raj 4120, KRL 210, WH 711, PBW 550, DBW 16, DBW 90, WH 147
CZ	DBW 110, GJW 463, Raj 4238, GW 451, MP 3382, HI 8737 (d), GDW 1255 (d), HI 8759 (d), HD 4728 (d), HI 1544	Lok 1, Raj 4037, GW 322, GW 496, HI 8498 (d), Raj 3765, HI 8663 (d), HD 2932
PZ	HI 1605, MACS 6478, MACS 3949 (d), HW 1098 (dic.), UAS 446 (d), UAS 347, UAS 428(d), UAS 304, DBW 168, MACS 4028 (d), HI 8777(d)	HD 2189, MACS 3125 (d), MACS 2971 (dic.), DWR 162, B.Yellow, Local, Lok 1, NIAW 301, UAS 415 (d), HD 2781 (d), DWR 1006, DWR 2006

Table 18: Zone wise distribution of popular wheat varieties during *rabi* 2018-19

Zone	Popular Wheat Varieties
NHZ	Local, HPW 155, DPW 621-50, HD 2967, HS 507, HPW 368, HPW 236, VL 907, Raj 3765, Sonalika, PBW 343, WH 1080, HD 2380, SW 1 (SKW 196), PBW 175, WH 1105
NEPZ	PBW 343, K 0307, K 9107 (Dewa), Halna, K 0402, HUW 234, HD 2733, PBW 550, UP 262, HD 2967, Sonalika, PBW 154, PBW 502, DBW 39, PBW 443, HD 2967, HW 2045, NW 2036, HD 3086, Mollah
NWPZ	HD 2967, DBW 17, DPW 621-50, DBW 88, Raj 3077, Raj 3765, PBW 725, PBW 677, PBW 550, PBW 502, HD 3086, WH 1105, PBW 343, DBW 16, PBW 590, PBW 226, UP 2628, WH 711, Raj 4037, Raj 4079, HD 2851, KRL 210, Raj 4238, WH 283
CZ	Raj 4037, Raj 3765, HI 1544, GW 366, HI 8498 (d), GW 322, GW 273, WH 147, Sujata, JW 3211, Ratan, Lok 1, HI 8663 (d)
PZ	Lok 1, Ajit 102, GW 496, HD 2189, DWR 162, DWR 2006, Kedar, Mohan Wonder, Gold 38, Amruth, B.Yellow, HW 1098 (dic.), Kirti

Wheat FLDs conducted at ICAR-IIWBR, Karnal centre

During *rabi* 2018-19, 20 acres wheat FLDs were conducted at twenty farmers' fields in the villages namely Amin, Bid Amin, Amin Dera Rampura, Deeg and Yara in Kurukshetra district of Haryana state using varieties HD 3086 and DBW 173. The demonstrations were conducted using happy seeder and conventional tillage technology with a complete package of practices and farmers were provided with the improved varieties seeds.

Constraints analysis in different wheat producing zones of India (2018-19)

India witnessed a continuous increase in wheat production in the recent years. The current year production has reached an all time record of 101.20 million tonnes with an average productivity of 3424 kg/ha. Variation in yield levels exists among different states, farmers and farms leading to yield gap in different states and different zones. Several reasons are attributed to this yield gap which needs to be addressed for sustainable wheat production. Through constraint analysis, an effort has been made to identify constraints impeding wheat production in different parts of the country.

Methodology

An inventory of constraints impeding wheat production in the country has been developed after thorough review of literature and taking experts' opinion. Data were collected on a well designed pre-structured questionnaire mailed to all the cooperating centres conducting wheat FLDs. The responses were collected on a three point continuum *viz*; most serious, serious and not serious. The scores were assigned as 3, 2, 1 for the most serious, serious and not serious constraints, respectively. Based on the total score for each constraint, the rank was assigned to ascertain the level of seriousness.

Northern Hills Zone (NHZ): In NHZ (Table 19), small land holding, high cost of inputs, untimely rain, *Phalaris minor*, non availability of labour were the major constraints faced by the farmers of northern hills zone.

Table19: Constraints in NHZ

(n=229)

NHZ	Score	Rank
Small land holding	253	I
High cost of inputs	243	II
Untimely rain	231	III
<i>Phalaris minor</i>	228	IV
Non availability of labour	202	V
Non availability of seeds of newly released varieties	193	VI
Birds	178	VII
Lack of knowledge among farmers about recent technologies	162	VIII
Non availability of farm machinery	161	IX
Water logging	151	X

North Eastern Plains Zone (NEPZ): Under FLDs it has shown tremendous yield realization. But still there are some constraints which need to be addressed for more production from this zone. Among major constraints of this zone, high cost of inputs, higher custom hiring charges, non-availability of farm labours, erratic power supply, poor information delivery by the state extension machinery and *Phalaris minor* were identified. Farmers of this zone need to be educated and trained on recent wheat production technologies to harvest potential yield in their fields. There is a need to address the problem of *Phalaris minor* through weed management strategies. Migration of farm labour from eastern zone to other parts of the country is creating scarcity of agricultural labourers in this zone. Marketing of wheat is still a concern for this region for better price realization and profitability.

Table 20: Constraints in NEPZ

(n=498)

NEPZ	Score	Rank
High cost of inputs	589	I
Higher customer hiring rate of land levelling, field preparation, sowing, harvesting and threshing	530	II
Non availability of labour	502	III
Erratic power supply	460	IV
Poor information delivery by state extension machinery	459	V
<i>Phalaris minor</i>	458	VI
Non availability of crop loan	449	VII
Lack of facility of canal irrigation	445	VIII
Non availability of electricity	430	IX
Non availability of seeds of newly released varieties	420	X
Lack of knowledge among farmers about recent technologies	419	XI
Problem in marketing of wheat	408	XII

North Western Plains Zone (NWPZ): Non availability of seed of newly released varieties was identified as the most serious constraint in this zone. In addition to this, small land holdings, declining water table, low organic matter in the soil were also given high priority (Table 21). Now Government of Punjab and Haryana has introduced kharif maize cultivation on a larger scale to save water. Green manuring has also been promoted by the State Department of Agriculture to improve soil organic carbon in the soil. Farmers need to be made aware about Government schemes launched for their benefit.

Table 21: Constraints in NWPZ

(n= 382)

NWPZ	Score	Rank
Non availability of seeds of newly released varieties	305	I
Small land holding	291	II
Decline in water table	264	III
Low organic matter	252	IV
High cost of inputs	221	V
High custom hiring rate of land levelling, field preparation, sowing, harvesting & threshing	219	VI
Lack of facility of canal irrigation	215	VII
Poor quality seeds	205	VIII
<i>Chenopodium album</i> (Bathua)	204	IX
Poor information delivery by state extension machinery	200	X
Low price of wheat	198	XI
Non-availability of farm machinery	195	XII

Central Zone (CZ): In central zone, high cost of inputs, decline in water table, low price of wheat, small land holdings and problem in marketing were the major constraints faced by the farmers (Table 22). This zone has been identified as export zone for quality wheat. The processing quality of wheat in this zone is better than that of NEPZ and NWPZ. The above said constraints need to be addressed seriously for more income.

Peninsular Zone (PZ): In peninsular zone, higher rate of custom hiring, low price of wheat, water stress, high cost of inputs and high temperature at maturity were the major constraints of this zone (Table 23). For making wheat cultivation remunerative there is a need to develop proper market. For better price realization farmers need to be educated about selling of their agricultural produce through e-NAM portal.

Table 22: Constraints in CZ**(n=258)**

CZ	Score	Rank
High cost of inputs	219	I
Decline in water table	216	II
Low price of wheat	196	III
Small land holding	195	IV
Problem in marketing of wheat	174	V
Low organic matter in the soil	172	VI
Non availability of labour	171	VII
Faulty irrigation methods	169	VIII
Non availability of seeds of newly released varieties	164	IX
Imbalanced use of fertilizers	156	X

Table 23: Constraints in PZ**(n=195)**

PZ	Score	Rank
High custom hiring rate of land levelling, field preparation sowing, harvesting & threshing	239	I
Low price of wheat	218	II
Water stress	199	III
High cost of inputs	193	IV
High temperature at maturity	185	V
Small land holding	183	VI
Non availability of labour	170	VII
Non availability of seed of newly released variety	166	VIII
Untimely rain	166	IX
Non availability of crop loan	165	X

Overall Constraints: The overall analysis of constraints across zones revealed that high cost of inputs, small land holding, non-availability of seed of newly released varieties, non-availability of labour, higher customer hiring rate of land levelling, field preparation sowing, harvesting and threshing and *Phalaris minor* were the major constraints of wheat production as identified under FLDs (Table 24).

Table 24: Overall constraints impeding wheat production**(n=1562)**

Constraints	Score	Rank
High cost of inputs	1662	I
Small land holding	1497	II
Non availability of seeds of newly released varieties	1413	III
Non availability of labour	1363	IV
High custom hiring rate of land levelling, field preparation sowing, harvesting & threshing	1276	V
<i>Phalaris minor</i>	1192	VI
Lack of facility of canal irrigation	1186	VII
Decline in water table	1162	VIII
Lack of knowledge among farmers about recent technologies	1128	IX
Problem in marketing of wheat	1121	X

Farmers need to be educated and trained on recent wheat production technologies, complete package of practices and soil health management. There is a need of government intervention to ensure quality seeds as well as quality inputs. Farmers need to be updated on impact of climate change on wheat cultivation and what are the coping strategies they can adopt to mitigate it. The concept of conservation agriculture and adoption of resource conservation technologies at farmers' field can be propagated at a larger scale. To ensure better price, farmers have to go for quality wheat production. There is a need to register wheat growers on e NAM platform for selling of wheat. All the constraints need appropriate attention in order to increase wheat production in all major wheat producing zones.

Barley Frontline Demonstrations

During the *rabi* crop season 2018-19, 250 Barley Frontline Demonstrations (BFLDs) of one acre each were allotted to 21 cooperating centers all over India in six states namely, HP, UP, Punjab, Haryana, Rajasthan and MP. Out of these, 225 were conducted by these centers, covering 238.5 acres area of 264 farmers (Table 25a). Improved barley varieties with complete package of practices (irrigation management, nutrient management, weed control, seed treatment etc.) were demonstrated.

Table 25a : Centre wise distribution of barley FLDs during *rabi* 2018-19 (in acres)

S.No.	Zone and Centre	BFLDs Allotted	BFLDs Conducted	Area sown	No. of farmers/ locations
Northern Hills Zone (NHZ)					
1.	CSKHPKV, HAREC, Bajaura, Kullu (HP)	12	03	2.5	6
2.	ICAR-IARI, RS, Amartara Cottage, Shimla (HP)	12	10	10	36
North Eastern Plains Zone (NEPZ)					
3.	NDUA&T, Kumarganj, Faizabad (UP)	12	05	05	07
4.	KVK (IAS-BHU), Barkachha, Mirzapur (UP)	12	05	05	05
5.	CSAUA&T, Kanpur (UP)	12	12	13*	13
6.	BHU, Varanasi (UP)	12	12	12	11
North Western Plains Zone (NWPZ)					
7.	PAU, Ludhiana (Punjab)	08	08	08	08
8.	KVK (PAU), Khokhar Khurd, Mansa (Punjab)	12	12	12	12
9.	CCSHAU, Hisar (Haryana)	12	12	12	12
10.	KVK (BB Ashram), Rampura, Rewari (Haryana)	12	12	12	11
11.	KVK (CCSHAU), Bhiwani (Haryana)	12	12	17*	9
12.	RARI (SKNAU), Durgapura, Jaipur (Rajasthan)	16	16	16	16
13.	KVK (Pragati Trust), Chomu, Jaipur (Rajasthan)	10	10	10	13
14.	KVK (AU-Kota), Hindauncity, Karauli (Rajasthan)	12	12	12	12
Central Zone (CZ)					
15.	RCOA (MPUA&T), Udaipur (Rajasthan)	12	12	12	12
16.	KVK (MPUA&T), Rajasmand (Rajasthan)	12	12	12	11
17.	KVK (JNKVV), Kuthulia Farm, Rewa (MP)	12	12	12	12
18.	KVK (JNKVV), Purushottampur, Panna (MP)	12	12	12	14
19.	KVK (JNKVV), Nowgaon, Chhatarpur (MP)	12	12	12	12
20.	KVK (RVSKVV), Biaora, Kothi Bagh, Rajgarh (MP)	12	12	20*	20
21.	COA (JNKVV), Ganj Basoda, Vidisha (MP)	12	12	12	12
Total		250	225	238.5	264

* Area covered more than allotted which is restricted equal to allotted FLDs.

Table 25b : Centre wise distribution of barley FLDs during *rabi* 2018-19 (in hectares)

S.No.	Zone and Centre	BFLDs Allotted	BFLDs Conducted	Area Sown	No. of Farmers/ Locations
NHZ					
1.	CSKHPKV, HAREC, Bajaura, Kullu (HP)	4.8	1.2	1	6
2.	ICAR-IARI, RS, Amartara Cottage, Shimla (HP)	4.8	4	4	36
NEPZ					
3.	NDUA&T, Kumarganj, Faizabad (UP)	4.8	2	2	07
4.	KVK (IAS-BHU), Barkachha, Mirzapur (UP)	4.8	2	2	05
5.	CSAUA&T, Kanpur (UP)	4.8	4.8	5.2	13
6.	BHU, Varanasi (UP)	4.8	4.8	4.8	11

S.No.	Zone and Centre	BFLDs Allotted	BFLDs Conducted	Area Sown	No. of Farmers/ Locations
NWPZ					
7.	PAU, Ludhiana (Punjab)	3.2	3.2	3.2	08
8.	KVK (PAU), Khokhar Khurd, Mansa (Punjab)	4.8	4.8	4.8	12
9.	CCSHAU, Hisar (Haryana)	4.8	4.8	4.8	12
10.	KVK (BB Ashram), Rampura, Rewari (Haryana)	4.8	4.8	4.8	11
11.	KVK (CCSHAU), Bhiwani (Haryana)	4.8	4.8	6.8*	9
12.	RARI (SKNAU), Durgapura, Jaipur (Rajasthan)	6.4	6.4	6.4	16
13.	KVK (Pragati Trust), Chomu, Jaipur (Rajasthan)	4	4	4	13
14.	KVK (AU-Kota), Hindauncity, Karauli (Rajasthan)	4.8	4.8	4.8	12
CZ					
15.	RCOA (MPUA&T), Udaipur (Rajasthan)	4.8	4.8	4.8	12
16.	KVK (MPUA&T), Rajasmand (Rajasthan)	4.8	4.8	4.8	11
17.	KVK (JNKVV), Kuthulia Farm, Rewa (MP)	4.8	4.8	4.8	12
18.	KVK (JNKVV), Purushottampur, Panna (MP)	4.8	4.8	4.8	14
19.	KVK (JNKVV), Nowgaon, Chhatarpur (MP)	4.8	4.8	4.8	12
20.	KVK (RVSKVV), Biaora, Rajgarh (MP)	4.8	4.8	8*	20
21.	COA (JNKVV), Ganj Basoda, Vidisha (MP)	4.8	4.8	4.8	12
Total		100	90	95.4	264

* Area covered more than allotted which is restricted to area equal to allotted FLDs.

Table 26a : State wise distribution of barley FLDs during rabi 2018-19 (in acres)

S.N.	State	BFLDs Allotted	BFLDs Conducted	Area Sown	No. of farmers/ Locations
1.	HP	24	13	12.5	42
2.	UP	48	34	35*	36
3.	Punjab	20	20	20	20
4.	Haryana	36	36	41*	32
5.	Rajasthan	62	62	62	64
6.	MP	60	60	68*	70
Total		250	225	238.5	264

* Area covered more than allotted which is restricted to area equal to allotted FLDs.

Table 26b : State wise distribution of barley FLDs during rabi 2018-19 (in hectares)

S.N.	State	BFLDs Allotted	BFLDs Conducted	Area Sown	No. of Farmers/ Locations
1.	HP	9.6	5.2	5	42
2.	UP	19.2	13.6	14*	36
3.	Punjab	8	8	8	20
4.	Haryana	14.4	14.4	16.4*	32
5.	Rajasthan	24.8	24.8	24.8	64
6.	MP	24	24	27.2*	70
Total		100	90	95.4	264

* Area covered more than allotted which is restricted to area equal to allotted FLDs.

Table 27a : Zone wise distribution of barley FLDs during rabi 2018-19 (in acres)

S.N.	Zone	BFLDs Allotted	BFLDs Conducted	Area Sown	No. of Farmers/ Locations
1.	NHZ	24	13	12.5	42
2.	NEPZ	48	34	35*	36
3.	NWPZ	94	94	99*	93
4.	CZ	84	84	92*	93
Total		250	225	238.5	264

* Area covered more than allotted which is restricted to area equal to allotted FLDs.

Table 27b : Zone wise distribution of barley FLDs during rabi 2018-19 (in hectares)

Zone	Allotted	Conducted	Area sown	No. of farmers/ locations
NHZ	9.6	5.2	5	42
NEPZ	19.2	13.6	14*	36
NWPZ	37.6	37.6	39.6*	93
CZ	33.6	33.6	36.8*	93
Total	100	90	95.4	264

* Area covered more than allotted which is restricted to area equal to allotted FLDs.

Table 28 : State wise yield gain during rabi 2018-19

State	BFLDs yield (q/ha)	Check yield (q/ha)	Gain (%)
HP	26.12	21.72	20.22**
UP	43.71	34.34	27.28***
Punjab	43.43	35.40	22.67***
Haryana	45.78	43.58	05.05 ^{NS}
Rajasthan	52.51	46.77	12.27***
MP	34.43	27.64	24.58***

*** Significant at 1 percent level, ** Significant at 5 percent level, NS– Non-significant

The highest gain in barley yield was recorded in UP (27.28 %) followed by MP (24.58 %). The lowest gain in yield was reported in Haryana (5.05 %) (Table 28).

Table 29 : Zone wise productivity over regional during rabi 2018-19

Zone	BFLDs yield (q/ha)	Regional mean yield (q/ha)	Gain (%)
NHZ	26.12	19.31	35.26***
NEPZ	43.71	30.29	44.29***
NWPZ	49.27	41.85	17.73***
CZ	40.34	32.65	23.53***

*** -Significant at 1 per cent level

The yield gain due to improved varieties over regional mean yield was highest in NEPZ (44.29 %) followed by NHZ (35.26 %), CZ (23.53 %) and NWPZ (17.73 %) (Table 29).

Table 30 : Zone wise productivity over check during rabi 2018-19

Zone	BFLDs yield (q/ha)	Check mean yield (q/ha)	Gain (%)
NHZ	26.12	21.72	20.22***
NEPZ	43.71	34.34	27.28***
NWPZ	49.27	44.83	09.90***
CZ	40.34	33.51	20.39***

***- Significant at 1 per cent level

The yield gain due to improved varieties over check mean yield was highest in NEPZ (27.28 %) followed by CZ (20.39 %), NHZ (20.22 %) and NWPZ (9.90 %) (Table 30). Therefore, efforts should be made to increase barley yield in the NEPZ and CZ by promoting recent barley production technologies in collaboration with the state department of agriculture.

Table 31 : Centre wise performance of improved barley varieties during rabi 2018-19

Zone and Centre	BFLDs yield (q/ha)	Check yield (q/ha)	Gain (%)
NHZ			
Bajaura	32.17	28.80	11.69 ^{NS}
Shimla	24.30	19.60	23.98***
NEPZ			
Faizabad	34.71	26.43	31.35***
Mirzapur	43.08	32.13	34.10***
Kanpur	49.69	38.92	27.67***
Varanasi	42.66	34.98	21.98***

NWPZ			
Ludhiana	40.50	38.25	05.88*
Mansa	45.38	33.50	35.45***
Hisar	42.08	40.50	03.91 NS
Rewari	55.23	51.75	06.72***
Bhiwani	38.35	36.98	03.72 NS
Durgapura, Jaipur	63.72	61.19	04.14***
Chomu, Jaipur	48.79	42.19	15.66***
Karauli	62.50	54.50	14.69***
CZ			
Udaipur	42.58	38.42	10.85***
Rajasmamand	40.55	31.92	27.03***
Rewa	31.23	22.91	36.32***
Panna	32.35	27.18	19.01***
Chhattarpur	23.85	20.15	18.36**
Rajgarh	27.75	19.00	46.05*
Vidisha	50.00	40.58	23.20***

*** - Significant at 1 percent level, ** - Significant at 5 percent level, * - Significant at 10 percent level, NS- Non-Significant

The yield gain under barley FLD was highest at Rajgarh (46.05%) centre followed by Rewa (36.32%), Mansa (35.45%), Mirzapur (34.10%), Faizabad (31.35%), Kanpur (27.67%), Rajasmamand (27.03%), Shimla (23.98%) and Vidisha (23.20%) centers across the zones. The increase in yield due to improved varieties over check varieties at Bhiwani center was the lowest (03.72%) but non-significant (Table 31).

Table 32 : Variety wise performance of improved barley varieties during rabi 2018-19

Zone and Centre	Improved variety	Average yield (q/ha)	Check variety	Average yield (q/ha)	Yield gain over check (%)
NHZ					
Bajaura	HBL 713	32.17	HBL 113	28.80	11.69 NS
Shimla	BHS 380	23.33	Local	19.00	22.79***
Shimla	BHS 400	24.71	Local	19.86	24.42***
NEPZ					
Faizabad	DWRB 137	34.71	Local	26.43	31.35***
Mirzapur	DWRB 137	43.08	Amber	32.13	34.10***
Kanpur	K1055	49.14	Jyoti	38.73	26.88**
Kanpur	DWRB 137	52.75	Azad	40.00	31.88 NS
Varanasi	DWRB 137	42.98	RD 2552	34.09	26.09***
Varanasi	RD 2907	42.21	HUB 113	41.25	02.34 NS
Varanasi	RD 2907	42.59	Jyoti	33.18	28.36***
NWPZ					
Ludhiana	RD 2907	40.50	PL 807	38.25	05.88*
Mansa	RD 2907	45.38	PL 807	33.50	35.45***
Hisar	RD 2907	42.08	BH 393	40.50	03.91 NS
Rewari	RD 2907	55.23	BH 393	51.75	06.72***
Bhiwani	RD 2907	38.35	BH 393	36.98	03.72 NS
Durgapura Jaipur	RD 2907	63.72	RD 2035	61.19	04.14***
Chomu Jaipur	RD 2907	48.79	RD 2035	42.19	15.66***
Karauli	RD 2907	62.50	RD 2035	54.50	14.69***
CZ					
Udaipur	RD 2899	42.70	RD 2035	38.30	11.49***
Udaipur	DWRB 137	42.00	RD 2035	39.00	07.69 NS
Rajasmamand	DWRB 137	41.50	Local	31.60	31.33***
Rajasmamand	RD 2899	39.40	Local	32.30	21.98***
Rewa	DWRB 137	29.49	JB 58	22.77	29.54***

Zone and Centre	Improved variety	Average yield (q/ha)	Check variety	Average yield (q/ha)	Yield gain over check (%)
Rewa	RD 2899	32.97	JB 58	23.05	43.02***
Panna	DWRB 137	32.45	JB 58	27.07	19.89***
Panna	RD 2899	32.16	JB 58	27.38	17.46***
Chhattarpur	DWRB 137	24.07	JB 58	20.07	19.93 ^{NS}
Chhattarpur	RD 2899	23.33	JB 58	20.33	14.75**
Rajgarh	RD 2899	28.00	Local	20.00	40.00 ^{NS}
Rajgarh	DWRB 137	27.50	Local	18.00	52.78 ^{NS}
Vidisha	DWRB 137	50.00	Local	41.00	21.95***
Vidisha	RD 2899	50.00	Local	40.00	25.00 ^{NS}

***-Significant at 1 percent level, ** - Significant at 5 percent level, * Significant at 10 percent level, NS- Non-significant

In NHZ, HBL 713 was the highest average yielding (32.17 q/ha) variety at Bajaura centre. In NEPZ, DWRB 137 at Kanpur (52.75 q/ha), RD 2907 at Durgapura (63.72 q/ha) in NWPZ and RD 2899 at Udaipur (42.70 q/ha) in CZ were the highest average yielding varieties (Table 32).

Table 33 : Yield potential of barley varieties in different zones during *rabi* 2018-19

Zone	Centre	Variety	Yield (q/ha)
NHZ	Bajaura	HBL 713	34.50
NEPZ	Kanpur	K 1055 (Prakhar)	62.00
NWPZ	Durgapura Jaipur	RD 2907	66.50
CZ	Hindon Karauli	RD 2907	64.50

It is evident from table 12 that varieties HBL 713 (34.50 q/ha), K 1055 (62.00 q/ha), RD 2907 (66.50 q/ha) and RD 2907 (64.50 q/ha) performed better than other varieties at Bajaura, Kanpur, Durgapura Jaipur and Hindon Karauli centres in the NHZ, NEPZ, NWPZ and CZ, respectively (Table 33).

Table 34 : Barley varieties grown in different zones during *rabi* 2018-19

Zone	Improved varieties	Check varieties	Popular varieties in the region
NHZ	HBL 713, BHS 400, BHS 380	HBL 113, Local	Sonu, Dolma, HBL 276, Local, HBL 113, HBL 316
NEPZ	DWRB, 137, K 1055 (Prakhar), RD 2907	Faizabad Local, Azad, Jyoti, Amber, RD 2552, HUB 113	Faizabad Local, Azad, Jyoti, Amber, Geetanjali, RD 2552
NWPZ	RD 2907	PL 807, BH 393, RD 2035	PL 807, BH 393, RD 2035, RD 2052, RD 2715, RD 2794
CZ	RD 2899, DWRB 137	RD 2035, JB 58, Local	RD 2035, RD 2552, RD 2715, RD 2660, RD 2786, JB 1, JB 58, Munda Jawa, Local

Constraints analysis in different barley producing zones of India (2018-19)

Variation in yield levels among different states, farmers and farms leads to yield gap in different states and different zones. There are many reasons of this yield gap which need to be addressed for sustainable barley production. Through constraint analysis an effort has been made to identify the factors impeding barley production in different parts of the country.

NHZ: In northern hills zone, yellow rust, small land holding, lack of knowledge among farmers about recent technologies, water stress, lack of irrigation facilities, termite, poor quality seeds, jungali jai and lack of training facility were identified as major constraints faced by the farmers (Table 35).

Table 35: Constraints in NHZ (n=42)

Constraints	Score	Rank
Yellow rust	22	I
Small land holding	22	I
Lack of knowledge among farmers about recent technologies	22	I
Water stress	19	II
Lack of irrigation facilities	19	II
Termite	16	III
Poor quality seeds	11	IV
<i>Avena ludoviciana</i> (Jungali Jai)	11	IV
Lack of training facility	11	IV

NEPZ: In this zone, erratic power supply, untimely rain, high cost of inputs, non availability of electricity, lack of irrigation facilities, low price of barley, *Phalaris minor*, *Chenopodium album*, temperature fluctuation during crop growth, non availability of farm machinery and imbalanced use of fertilizers were major constraints. Most of the constraints were administrative in nature which need immediate intervention by the state governments of this zone. Regarding technical constraints, farmers need to be made aware through awareness programmes and trainings about the use of fertilizers (Table 36). Marketing of barley is still a concern in NEPZ.

Table 36: Constraints in NEPZ (n=36)

Constraints	Score	Rank
Erratic power supply	55	I
Untimely rain	53	II
High cost of inputs	50	III
Non availability of electricity	48	IV
Lack of irrigation facilities	45	V
Low price of barley	43	VI
<i>Phalaris minor</i>	41	VII
<i>Chenopodium album</i> (Bathua)	38	VIII
Temperature fluctuation during crop growth	38	VIII
Non-availability of farm machinery	38	VIII
Imbalanced use of fertilizers	38	VIII

NWPZ: Being the highest barley producing zone of the country, there a need to address major constraints in NWPZ. Under FLD programme, small land holding was identified as the most serious constraint followed by low organic matter, *Chenopodium album*, higher custom hiring charges, decline in water table, poor soil fertility, erratic power supply, low level of micro nutrients in the soil and high temperature at maturity (Table 37).

CZ: In central zone, decline in water table, temperature fluctuation during crop growth, high cost of inputs, high temperature at maturity, lack of knowledge among farmers about recent technologies, untimely rain, imbalanced use of fertilizers, higher customer hiring rate of land levelling, field preparation, sowing, harvesting and threshing, low price of barley and water stress were identified as major constraints (Table 38).

Table 37: Constraints in NWPZ**(n=93)**

Constraints	Score	Rank
Small land holding	73	I
Low organic matter in soil	72	II
<i>Chenopodium album</i> (Bathua)	71	III
High custom hiring rate of land levelling, field preparation, sowing, harvesting & threshing	66	IV
Decline in water table	64	V
Poor soil fertility	59	VI
Erratic power supply	59	VI
Low micro nutrient in soil	47	VII
High temperature at maturity	46	VIII
Lack of knowledge about appropriate dose and method of herbicide application	40	IX

Table 38: Constraints in CZ**(n=93)**

Constraints	Score	Rank
Decline in water table	105	I
Temperature fluctuation during crop growth	93	II
High cost of inputs	89	III
High temperature at maturity	89	III
Lack of knowledge among farmers about recent technologies	87	IV
Untimely rain	83	V
Imbalanced use of fertilizers	68	VI
High custom hiring rate of land levelling, field preparation, sowing, harvesting and threshing	66	VII
Low price of barley	66	VIII
Water stress	64	IX

Most serious constraints impeding barley production in the country

Overall analysis of constraints in different zones clearly indicated that decline in water table, small land holding, low price of barley, high cost of inputs, lack of knowledge among farmers about recent technologies, high temperature at maturity, temperature fluctuation during crop growth higher customer hiring rate of land levelling, field preparation, sowing, harvesting and threshing, *Chenopodium album* and erratic power supply were identified as major constraints affecting barley production and productivity in the country (Table 39).

Table 39: Major constraints impeding barley production in the country**(n=264)**

Constraints	Score	Rank
Decline in water table	203	I
Small land holding	179	II
Low price of barley	178	III
High cost of inputs	173	IV
Lack of knowledge among farmers about recent technologies	173	IV
High temperature at maturity	169	V
Temperature fluctuation during crop growth	165	VI
Higher customer hiring rate of land levelling, field preparation, sowing and harvesting	162	VII
<i>Chenopodium album</i> (Bathua)	160	VIII
Erratic power supply	146	IX

Costs and Returns for Wheat and Barley FLDs vis-à-vis Check Plots

Profitability on investment is one of major deciding factors for adoption of any crop production technology. In this section, costs and returns analysis for wheat and barley FLDs have been attempted across regions for the improved production technologies that were tested at farmers' field during 2018-19. Generally, in any economic study, total costs are discussed under two categories *viz.*, variable costs and fixed costs, the widely adopted norm. Nevertheless, variable costs alone are reckoned to be the cost incurred by the farmers ignoring the fixed costs. The profit and loss are estimated accordingly. But in any economic analysis of farm business, the fixed costs should also be taken into consideration to arrive at total costs for computing the net income. However, in the present analysis only operational or variable costs were considered to know the profitability of technology adoption with the assumption of fixed costs remains same for the particular farm wherein technology has been demonstrated. Operational costs include expenses on labour employed to perform different cultural operations and expenses incurred on material inputs *viz.*, seeds, FYM, fertilizers, plant protection chemicals *etc.* The returns over variable costs give an idea of profitability accrued to the farmer after meeting all the working expenses and accordingly profits were worked out for a better comparison. Cost of production was also estimated to know the cost incurred in producing a unit quantity of crop output. Returns per rupee of investment were also worked out to know the comparative profitability between wheat and barley.

Data Collection

Primary data were collected by the cooperating centres from the selected farmers who were allotted with the FLDs. Personal interview and discussion method was adopted with the aid of pre-tested schedules designed exclusively for the purpose evaluating the technologies disseminated through FLDs. The data collected pertained to the *Rabi* season 2018-2019. The communicated data were compiled and processed at the ICAR-Indian Institute of Wheat and Barley Research for further analysis and reporting. Every genuine effort was made by the FLD coordinators to collect realistic data from the FLD beneficiaries and inappropriate data reported from the cooperating centres/ delayed reporting were not included for the costs and returns analysis.

Costs and Returns for Wheat (FLDs vis-à-vis Check plot)

Perusal of Table 40 indicates that on an average, wheat varieties or technologies demonstrated at farmers' field under the FLD program gave ₹3.07 per rupee of investment in comparison to the check varieties (₹2.70). A significant difference in returns per rupee of investment was noticed between the FLD and check plots across states, zones and technologies. The returns per rupee of investment from FLDs ranged from ₹6.90 (Haryana) to ₹1.54 (West Bengal) across states, ₹4.06 (NWPZ) to ₹2.48 (NEPZ) across zones, and ₹7.37 (Happy Seeder) to ₹2.21 (Variety: Late Sown & Restricted Irrigation) across technologies. Haryana registered the highest returns per rupee of investment owing to the low operational costs *i.e.*, ₹16978 per hectare. On the contrary, West Bengal registered lowest returns per rupee of investment due to higher operational costs per unit area (₹49232/ha).

The profit per hectare in FLDs was highest in Haryana (₹100224), followed by Punjab (₹100161) and Madhya Pradesh (₹83387). The difference in profit levels between demonstration and check plots ranged from ₹20318 in West Bengal to ₹4077 in Chattisgarh. Interestingly, operational costs in Bihar, Gujarat, Haryana, Jharkhand, Madhya Pradesh, Punjab and West Bengal were lower in demonstrations in comparison to the check plots. The probable reason for Haryana might be demonstration of resource efficient CA techniques which reduced the operational costs, significantly. Estimates of cost of production indicated that the operational cost incurred in producing a unit quantity of output was least in Haryana (₹323 per quintal) owing to less operational costs and the likelihood of getting more yield being a progressive state located in the NWPZ. Among wheat growing zones, the cost of production in the NWPZ was ₹566 per quintal due to relatively less operational costs in raising the crop and realized yield levels was more than the other zones. NWPZ also realized a good return per rupee of investment at the demonstrated plots (₹4.06) which is mainly due to the higher productivity, followed by less operational costs.

Among the wheat production technologies demonstrated at farmers' field, dicocum gave the highest profit per hectare (₹118400) and the least profit was observed for the boron application (₹32890), despite a single demonstrated plot. However, the results were not consistent across sites owing to testing of particular technology in different locations of diverse soil properties. Overall, on an average, an Indian farmer by adopting a new wheat variety or production technology will earn ₹64592/ha. Further, ₹789 have to be spent to produce a quintal of wheat through adoption of a new wheat variety or production technology against ₹913 (check varieties).

Costs and Returns for Barley (FLDs vis-à-vis Check plot)

Table 41 indicates that on an average, improved barley varieties demonstrated at farmers' field under the FLD program gave around 25 per cent profit per hectare in comparison to the check. A significant difference in returns per rupee of investment was noticed between the demonstration and check plots across states and zones. Punjab registered the highest returns per rupee of investment (₹6.49) through demonstrations, followed by Uttar Pradesh (₹4.16) and Haryana (₹3.23). The difference in returns per rupee of investment between demonstration and check plots was highest in Punjab, followed by Uttar Pradesh and Madhya Pradesh. The profit per hectare in FLDs was highest in Uttar Pradesh (₹73870), followed by Rajasthan (₹70789) and Punjab (₹61431). The difference in profit between FLD and check plots ranged from ₹22112 in Uttar Pradesh to ₹3189 in Haryana. Interestingly, operational costs in Uttar Pradesh were lower in FLDs than check plots. The valid reason might be reduction in the use of inputs based on the recommendation. The returns per rupee of investment across barley growing zones were highest in the NEPZ (₹4.16), followed by NWPZ (₹3.56) and CZ (₹2.86). Estimates of cost of production indicated that the cost incurred in producing a unit quantity of output was least (₹271 per quintal) in Madhya Pradesh (CZ) owing to higher yield and remunerative price factor.

Table 40: Costs and returns from wheat during 2018-19

Particulars	Cost of Cultivation (₹/ha)						Returns per ₹ invested		Cost of Production (₹/Qtl)	
	Operational Costs		Gross Returns		Profit		FLD	Check	FLD	Check
	FLD	Check	FLD	Check	FLD	Check				
State										
Assam	24932	23370	51073	38783	26141	15413	2.05	1.66	1015	1228
Bihar	28888	31997	88943	78767	60055	46770	3.08	2.46	727	925
Chhattisgarh	23064	20648	67435	60942	44371	40294	2.92	2.95	834	884
Gujarat	39592	39692	113729	102082	74137	62390	2.87	2.57	775	869
Haryana	16978	18067	117202	112342	100224	94275	6.90	6.22	323	357
Himachal Pradesh	35045	33486	98625	81771	63580	48284	2.81	2.44	1012	1183
Jammu & Kashmir	27190	27090	98185	82729	70996	55640	3.61	3.05	663	777
Jharkhand	34560	35723	63758	51281	29197	15558	1.84	1.44	1060	1398
Karnataka	25912	23549	78658	65549	52746	42000	3.04	2.78	936	1006
Madhya Pradesh	31747	32027	115134	98614	83387	66587	3.63	3.08	635	726
Maharashtra	27182	27013	82137	66281	54955	39268	3.02	2.45	732	843
New Delhi	47747	47655	108764	101920	61017	54265	2.28	2.14	963	1031
Punjab	19794	21550	119955	116957	100161	95408	6.06	5.43	375	423
Rajasthan	39779	38809	117732	107594	77954	68786	2.96	2.77	789	841
Uttar Pradesh	34624	33707	110562	97905	75938	64198	3.19	2.90	731	809
Uttarakhand	31611	31358	99943	87670	68332	56312	3.16	2.80	794	917
West Bengal	49232	49332	75888	55670	26656	6338	1.54	1.13	1290	1583
Zone										
CZ	33703	33228	103884	91691	70181	58463	3.08	2.76	744	821
NEPZ	32919	33511	81579	68327	48660	34816	2.48	2.04	911	1122
NHZ	31839	30732	86611	72484	54772	41752	2.72	2.36	975	1134
NWPZ	29198	29245	118474	110025	89276	80779	4.06	3.76	566	614
PZ	26623	25489	80606	65959	53983	40470	3.03	2.59	822	915
Technology										
Bio-fertilizer	35821	35162	99071	91570	63251	56408	2.77	2.60	917	979
Boron Application	22400	21050	55290	48930	32890	27880	2.47	2.32	597	638
Dicoccum	34600	25100	153000	125125	118400	100025	4.42	4.99	345	652
Durum	26116	26646	101602	84129	75486	57483	3.89	3.16	623	703
Happy Seeder	15321	17356	112947	109022	97626	91666	7.37	6.28	298	348
Rotavator	28934	28947	110446	102498	81512	73550	3.82	3.54	568	621
Variety	31988	31613	93761	80746	61773	49133	2.93	2.55	829	967
Variety (late sown)	32094	30489	89976	81031	57882	50542	2.80	2.66	793	861
Variety (late sown - RI)	48484	48484	107015	92006	58531	43522	2.21	1.90	918	1068
Zero Tillage	38360	41785	98402	95251	60042	53466	2.57	2.28	912	1050
All Categories										
India	31173	30994	95765	83674	64592	52680	3.07	2.70	789	913

Table 41: Costs and returns from barley during 2018-19

Particulars	Cost of Cultivation (₹/ha)						Returns per ₹ invested		Cost of Production (₹/Qtl)	
	Operational Costs		Gross Returns		Profit					
	FLD	Check	FLD	Check	FLD	Check	FLD	Check	FLD	Check
State										
Haryana	26535	25559	85812	81647	59277	56088	3.23	3.19	550	559
Himachal Pradesh	27192	26708	64217	53794	37025	27087	2.36	2.01	787	913
Madhya Pradesh	25440	23933	72723	57065	47283	33132	2.86	2.38	271	323
Punjab	11182	11140	72613	59180	61431	48041	6.49	5.31	678	732
Rajasthan	35172	33944	105962	95014	70789	61070	3.01	2.80	563	745
Uttar Pradesh	23388	24631	97258	76389	73870	51758	4.16	3.10	547	725
Zone										
CZ	29136	27469	83396	68773	54260	41304	2.86	2.50	759	857
NEPZ	23388	24631	97258	76389	73870	51758	4.16	3.10	547	725
NHZ	27192	26708	64217	53794	37025	27087	2.36	2.01	1036	1233
NWPZ	26159	25616	93019	85039	66860	59423	3.56	3.32	509	544
Technology										
Improved Variety	26938	26253	88160	75225	61222	48972	3.27	2.87	647	741
All Categories										
India	26938	26253	88160	75225	61222	48972	3.27	2.87	647	741

Overall, the profit analysis on wheat and barley indicated that additional returns per hectare from FLDs was more than the check varieties by ₹11912 and ₹12250 respectively establishing the fact that FLDs carry the successful technologies from lab to land. For some beneficiaries it was found that the operational costs under check varieties were more than the FLDs. However, the present estimates are only the indicators for comparison within the current year and may not have a complete inter-year relevance as the demonstrations were conducted in different sites as well as by different farm households. Further, the difference in profit earned from wheat/barley cultivation is subject to farm-farmer-region specific conditions as it varies from case to case.

Technology Outreach Programme (2018-19)

Mera Gaon Mera Gaurav Scheme at ICAR-IIWBR, Karnal: The activities of the governments flagship programme towards doubling of farmers' income, 'Mera Gaon Mera Gaurav' scheme were carried out on a large scale during the current crop season and all the teams visited their adopted villages and created awareness among the farmers on advanced practices of crop cultivation and supplied mini kits on DBW 173 variety of wheat and DWRB 123 barley variety were distributed among the farmers. Timely reports of monthly and quarterly activities were compiled at IIWBR and submitted to the Zonal Nodal Officer & Director, ICAR- Agricultural Technology Application Research Institute (ATARI), Zone-2, Jodhpur (Rajasthan) regularly. All the Fourteen teams of scientists of different disciplines have been constituted including four to five scientists. Out of these each of the twelve teams have selected five different villages, one team has selected four different villages, one team has selected one village.

Training programmes organised at ICAR – IIWBR, Karnal

S.No.	Date	Duration (Days)	No. of Trainees/ Farmers	Subject	Organised by
1	05 April, 2018	1	20	Bharatpur me Gehoon Evam Jau ki Unnat Kheti	ICAR-IIWBR, Karnal
2	05 July, 2018	1	33	“Gujarat me Gehoon ki Unnat Kheti”	ICAR-IIWBR, Karnal
3	18-25 Sept., 2018	08	22	Strengthening value chain in wheat and barley for doubling farmers income	Ministry of Agriculture and Farmers Welfare
4	24 Dec., 2018	01	40	Leadership development and sensitization, for FPO members	NABARD and ICAR-IIWBR, Karnal
5	09 Jan., 2019	1	46	Sri Ganganagar me Gehoon aur jau ki adhunik kheti	ICAR-IIWBR, Karnal
6	14 Jan., 2019	1	60	“Samsamayik sasya kriyayon dwara gehoon utpadan se labharjan	ICAR-IIWBR, Karnal In association with Omkar Sewa Sansthan, Amithi
7	11-12 March, 2019	2	24	Uttarakhand me Gehoon ki Adhunik Kheti	ICAR-IIWBR, Karnal with State Department of Agriculture, Tihri

Awareness programmes organised by ICAR-IIWBR, Karnal

S.No.	Date	Number of participants	Subject	Organised by
1	02 April, 2018	100	Field Day at FLD Site in Hajwana Village	ICAR-IIWBR, Karnal
2	21 June, 2018	100	4 th International Yoga Day-2018 organised at IIWBR, Karnal	ICAR-IIWBR, Karnal
3	15 October, 2018	1500	Farmer-Scientist Workshop and Seed Day	ICAR-IIWBR, Karnal
4	03 December, 2018	220	Agricultural Education Day	ICAR-IIWBR, Karnal
5	05 December, 2018	125	World Soil Day at village Vaid Kheri, UP	ICAR-IIWBR, Karnal
6	23 December, 2018	150	Kisan Diwas at Shekhpura Khalsa, Gharaunda, Karnal	ICAR-IIWBR, Karnal
7	24 December, 2018	70	Sanitation Awareness Campaign at Village Fatuhpur, Kurukshetra	ICAR-IIWBR, Karnal
8	09 February, 2019	200	Foundation Day of ICAR-IIWBR	ICAR-IIWBR, Karnal
9	8 March, 2019	200	Live telecast programme on International Women Day by Honourable Prime Minister Sh. Narendra Modi ji	ICAR-IIWBR, Karnal

Organization/Participation in Exhibition

S.N.	Program	Date	Duration (days)	Organized by
1	State Level Agricultural Fair at Motihari	12-16 April, 2018	5	Ministry of Agriculture and Farmers Welfare
2	Kisan Mela-2018	15 September, 2018	1	sremaF gnuoY noitaicossA, Rakhra, Patiala, Punjab
3	Kharif Kisan Mela 2018	09 October, 2018	1	ICAR-CSSRI, Karnal
4	Jaivik Krishi Sammelan	23 October, 2018	1	Surya Foundation
5	Farmers Fair & Agro-Industrial Exhibition organised on the theme "Crop Residue Management"	7-8 December, 2018	2	NDUAT, Ayodhya (UP)
6	Krishi Kumbh -2018	26-28 October, 2018	3	IISR, Lucknow (UP)
7	Kisan Mela on Crop Residue Management	28 December, 2018	1	KVK, NDRI, Karnal
8	106 th Indian Science Congress	3-7 January, 2019	5	Lovely Professional University, Phagwara, Punjab
9	'Golden Jubilee International Salinity Conference (GJISC-2019)	7-9 February, 2019	3	ICAR-CSSRI, Karnal
10	VIX gnirud noitibihxE Agriculture Sciences Congress	20-23 February, 2019	4	NAAS, New Delhi
11	Pusa Krishi Vigyan Mela-2019	05-07 March, 2019	3	ICAR-Indian Agricultural Research Institute, New Delhi
12	Exhibition on the occasion of Live telecast of programme on International Women Day by Honourable Prime Minister Sh. Narendra Modi ji	8 March, 2019	1	ICAR-IIWBR, Karnal
13	Kisan Mela-2019	14 March, 2019	1	Young Farmers Association, Rakhra, Patiala
14	Live telecast of Pradhan Mantri Kisan Samman Nidhi Yojana by Honourable Prime Minister Sh. Narendra Modiji	24 March, 2019	1	ICAR-IIWBR, Karnal

Coordination of visits at ICAR-IIWBR, Karnal during 2018-19

S.No	Date	Number of Visitors	From
1	July 30, 2018	50 Farmers	Chotta Udaipur, Gujarat
2	August 04, 2018	50 Female Farmers	Botad, Gujarat
3	August 18, 2018	25 Farmers	Farrukhabad, Uttar Pradesh
4	September 01, 2018	100 Farmers	Assandh, Karnal
5	September 4, 2018	86 Students	RVS, Tamil Nadu
6	September 6 2018	126 Students	Mandi, Himachal Pradesh
7	September 7, 2018	46 Farmers	Jhunjhunu, Rajasthan
8	September 7, 2018	126 Students	Tamil Nadu
9	September 6, 2018	65 Students	Fatehgarh Sahib, Punjab
10	September 18, 2018	48 Students	SRS Agri. Collage, Tamil Nadu
11	September 24, 2018	50 Farmers	Raipur, Bhalodh, Ghaziabad (UP)
12	September 24, 2018	73 Students	APA Collage G.B. Nagar, Tamil Nadu
13	September 25, 2018	50 Farmers	AGRI, Chhattisgarh
14	September 28, 2018	68 Students	AGRI KALAVAI, Tamil Nadu
15	October 03, 2018	50 Farmers	Jabalpur, Madhya Pradesh
16	October 08, 2018	50 Farmers	ATMA, Gujarat
17	October 23, 2018	126 Students	AGRI, Tamil Nadu
18	October 23, 2018	46 Farmers	Karnal, Haryana
19	October 25, 2018	50 Students	AGRI, Gujarat
20	October 31, 2018	57 Students	Mumbai, Maharashtra
21	November 12, 2018	-	Perambalur, Tamil Nadu
22	November 17, 2018	40 Farmers	Denapur, West Bengal

S.No	Date	Number of Visitors	From
23	December 13, 2018	42 Farmers	Banaskatha, Gujarat
24	December 19, 2018	40 Farmers	Bhartpur, Rajasthan
25	December 26, 2018	76 Students	Palampur, Himachal Pradesh
26	January 03, 2019	36 Female Farmers	Raypipla, Narmada, Gujarat
27	January 09, 2019	46 Farmers	Sriganganagar, Rajasthan
28	January 10, 2019	-	Azamgarh, Uttar Pradesh
29	January 14, 2019	60 Farmers	Amethi, Sultanpur, Uttar Pradesh
30	January 15, 2019	26 Female Farmers	Gurugram, Haryana
31	January 17, 2019	24 Farmers	Sriganganagar, Rajasthan
32	January 23, 2019	-	Kutail, Karnal
33	January 31, 2019	-	Sriganganagar, Rajasthan
34	February 05, 2019	45 Farmers	Chhattisgarh
35	February 06, 2019	30 Farmers	Vidisha, Madhya Pradesh
36	February 11, 2019	32 Farmers	Ayodhya and Bareilly, Uttar Pradesh
37	February 14, 2019	35 Farmers	Churu, Rajasthan
38	February 20, 2019	16 Students	Nashik, Maharashtra
39	February 23, 2019	28 Farmers	Jhunjhunu, Rajasthan
40	March 02, 2019	25 Farmers	Kullu, Himachal Pradesh
41	March 05, 2019	32 Farmers	Churu, Rajasthan
42	March 06, 2019	100 Farmers	Nilokheri, Karnal
43	March 11, 2019	50 Farmers	Hapur, Uttar Pradesh
44	March 16, 2019	20 Farmers	Jhunjhunu, Rajasthan
45	March 26, 2019	50 Students	Meerut, Uttar Pradesh

Lectures delivered

Date	Topic
June 26, 2018	"DBT (Direct Benefit Transfer and cash less transactions at EEI, Nilokheri during training on extension strategies to promote DBT and cashless transactions for farmers during 25-27 June, 2018.
July 07, 2018	"Tracking Price Discovery and Volatility in Commodity Futures for Resource Allocation" at the CAFT program organized at Division of Agricultural Economics, IARI on 21.07.2018.
July 26, 2018	Role and importance of soft skills in professional life during training programme on development of soft skills for better extension management from 24-28 July, 2018
October 16, 2018	"Impact Study: Scientific Method, Result analysis and Report Writing" for field functionaries at EEI, Nilokheri on October 16, 2018.
September 18-25, 2018	"Value Chain in Wheat and Barley: Scope and Opportunities" in the Model Training Course (MTC) during 18.09.2018 organised at the ICAR-IIWBR, Karnal during September 18-25, 2018.
September 18-25, 2018	"Economic Impact of Improved Technologies at Farmers Field" in the Model Training Course (MTC) during 21.09.2018 organised at the ICAR-IIWBR, Karnal during September 18-25, 2018.
December 3, 2018	"Agricultural Education: Scope and Career Opportunities" to 80 students from different schools of Karnal on the occasion of Agricultural Education Day.
March 08, 2019.	"Role of ICAR-IIWBR in Wheat Production Technologies" during the Field Day organised by the IARI-RS Wellington at the FLD site.

TV programmes on DD National and DD Kisan Channels

Date	Topic
23.05.2018	Shooting of DD Kisan "Chaupal Charcha" on "Mera Gaon Mera Gaurav".
26.05.2018	Webcast of "Seedhi Baat" programme by Honourable Prime Minister Sh. Narendra Modi ji was shown to farmers and staff members.
28.10.2018	Vichar Vimarsh programme on "Sowing of Wheat and Barley and Related Aspects".
18.02.2019	Vichar Vimarsh Programme on "Gehoon Ki Dekhbhal".
24.02.2019	Live telecast of Pradhan Mantri Kisan Samman Nidhi Yojana by Honourable Prime Minister Sh. Narendra Modi ji.
08. 03.2019	Live telecast of programme on International Women Day by Honourable Prime Minister Sh. Narendra Modi ji.

Special Assignments

- **Evaluation of Ph.D.** Thesis (Dairy Extension) of Ms. Misha Madhavan on 06.08.2018 at ICAR-NDRI, Deemed University, Karnal
- Member of evaluation committee of **“Best Masters and Ph.D Thesis”** of Agricultural Extension Education, Agricultural Economics and Agronomy division during 18-19 March, 2019
- Capacity building programmes for different stakeholders during 2018-19
- **Wheat App:** Wheat Informatics and Wheat Doctor Apps were popularized for the benefit of the farming community.
- **Video Film:** A video film on profile of ‘ICAR-Indian Institute of Wheat and Barley Research, Karnal’ was prepared. All the jobs related to shooting and editing has been completed.
- **Weather Updates:** Regular weather updates were uploaded on ICAR-IIWBR webpage for timely weather updates and other related advisories to the farmers.
- **Installation of the IVRS:** Interactive Voice Response System (IVRS) was successfully installed at ICAR-IIWBR, Karnal during the year 2018-19.

Annexure – I : Category wise number of wheat FLDs farmers during 2018-19

S.N.	Name of Centre	Allocation		Achievement		Achievement Men, Area in Acres, (No. of Farmers)				Achievement Women, Area in Acres, (No. of Farmers)				Men	Women	Total
		No. of FLDs	Area under FLDs (Acres)	No. of FLDs	Area under FLDs (Acres)	SC	ST	OBC	Gen	SC	ST	OBC	Gen	Area(Acres) (No. of Farmers)	Area(ha) (No. of Farmers)	Area (Acres) (No. of Farmers)
NHZ																
1.	VPKAS, Almora (Uttarakhand)	63	18	63	18	-	3.5	-	8.3	-	-	-	6.2	11.8(33)	6.2(30)	18.0(63)
2.	CSKHPKV, HAREC, Bajaura, Kullu (HP)	27	12	27	12	1.2	-	-	9.2	-	-	-	1.6	10.4(23)	1.6(4)	12.0 (27)
3.	CSKHPKV, RWRC, Malan, Kangra (HP)	23	12	23	12	3.0	1.0	2.95	1.94	-	1.5	1.25	0.36	8.88(17)	3.12(6)	12 (23)
4.	KVK (CSKHPKV) and RSS, Berthin, Bilaspur (HP)	11	11	11	11	3.0	-	1.0	4.0	-	-	-	3.0	8.0(8)	3.0(3)	11 (11)
5.	CSKHPKV, HAREC, Dhaulakuan, Sirmour (HP)	11	10	11	10	-	-	8.0	2.0	-	-	-	-	10.0(11)	-	10.0 (11)
6.	IARI, RS, Amartara Cottage, Shimla (HP)	12	12	12	12	2.0	1.0	1.0	8.0	-	-	-	-	12.0(12)	-	12.0 (12)
7.	ICAR-IIWBR, RS, Flowerdale, Shimla (HP)	12	12	12	12	1.0	-	-	11.0	-	-	-	-	12.0(12)	-	12.0 (12)
8.	KVK (Dr.YSPUH&F), Chamba at Saru, Chamba (HP)	11	10	11	10	4.0	2.0	2.5	1.5	-	-	-	-	10.0(11)	-	10.0 (11)
9.	MRCFC, SKUAST-K, Khudwani, Anantnag (J&K)	17	12	17	12	-	9.4	-	2.6	-	-	-	-	12.0(18)	-	12.0(18)
10.	RARS, SKUAST-Jammu, Tandwal, Rajouri (J&K)	12	12	12	12	-	-	5.0	7.0	-	-	-	-	12.0(12)	-	12.0 (12)
11.	KVK (CSKHPKV),	12	12	12	12	0.3	-	0.5	8.2	-	-	2.0	1.0	9.0(20)	3.0(6)	12.0(26)

S.N.	Name of Centre	Allocation		Achievement		Achievement Men, Area in Acres, (No. of Farmers)				Achievement Women, Area in Acres, (No. of Farmers)				Men	Women	Total
		No. of FLDs	Area under FLDs (Acres)	No. of FLDs	Area under FLDs (Acres)	SC	ST	OBC	Gen	SC	ST	OBC	Gen	Area(Acres) (No. of Farmers)	Area(ha) (No. of Farmers)	Area (Acres) (No. of Farmers)
	Bara, Hamirpur (HP)															
12.	AICW&BIP Sub-Centre, CAU, Imphal (Manipur)	03	05	03	05	-	2.5	2.5	-	-	-	-	-	5.0(03)		5.0(03)
NEPZ																
13.	NDUA&T, Kumarganj, Faizabad (UP)	18	18	18	18	-	-	2.0	12.0	1.0		1.0	2.0	14.0(14)	4.0(4)	18.0(18)
14.	CSAUA&T, Kanpur (UP)	20	20	20	20	9.0	-	8.0	3.0	-	-	-	-	20.0(20)	-	20.0(20)
15.	BHU, Varanasi (UP)	38	20	38	20	2.5	-	10.0	7.5	-	-	-	-	20.0(38)	-	20.0(38)
16.	KVK, Sohna, Sidharthnagar (UP)	25	25	25	25	-	-	15.0	7.0	1.0	-	2.0	-	22.0(22)	3.0(03)	25.0(25)
17.	Kamla Nehru KVK, Sultanpur (UP)	12	12	12	12	-	-	3.0	9.0	-	-	-	-	12.0(12)		12.0(12)
18.	KVK (NDUA&T), Katiya, Banjariaya Farm, Basti (UP)	10	10	10	10	1.0	-	-	8.0	-	-	-	1.0	9.0(9)	1.0(01)	10.0(10)
19.	BCKV, Kalyani, Nadia (West Bengal)	39	25	39	25	10.1	4.5	-	4.6	5.1	-	-	0.7	19.2(30)	5.8(09)	25.0(39)
20.	UBKV, Pundibari, Coochbehar (West Bengal)	18	25.58	18	25.58	10.58	-	7.75	3.25	1.0	-	-	3.0	21.58(16)	4.0(02)	25.58(18)
21.	RARS, AAU, Shillongani, Nagaon (Assam)	25	25	25	25	-	2.0	4.0	19.0	-	-	-	-	25.0(25)	-	25.0(25)
22.	KVK (AAU), Chirakuta, (Jamduar Pt.II) Dhubri (Assam)	48	24.78	48	24.78	10.00	-	5.33	9.43	-	-	-	-	24.7(48)	-	24.76(48)
23.	KVK (AAU), Napam, Tejpur,	18	18	18	18	-	-	-	17.0	-	-	-	1.0	17.0(17)	1.0(01)	18.0(18)

S.N.	Name of Centre	Allocation		Achievement		Achievement Men, Area in Acres, (No. of Farmers)				Achievement Women, Area in Acres, (No. of Farmers)				Men	Women	Total
		No. of FLDs	Area under FLDs (Acres)	No. of FLDs	Area under FLDs (Acres)	SC	ST	OBC	Gen	SC	ST	OBC	Gen	Area(Acres) (No. of Farmers)	Area(ha) (No. of Farmers)	Area (Acres) (No. of Farmers)
	Sonitpur (Assam)															
24.	KVK (AAU), Kajalgaon, Chirang (Assam)	25	24	25	24	1.5	1.0	10.0	11.5	-	-	-	-	24.0(25)	-	24.0(25)
25.	IARI, RS, Pusa, Samastipur (Bihar)	16	25	16	25	1.25	1.25	17.5	5.0	-	-	-	-	25.0(16)	-	25.0(16)
26.	KVK (Gram Nirman Mandal), Sokhodeora, Nawadah (Bihar)	15	15	15	15	6.0	-	6.0	-	-	-	3.0		12.0(12)	3.0(03)	15.0(15)
27.	KVK (RAU), Hariharpur, Vaishali (Bihar)	24	25	25	24	6.0		8.0	10.0	1.0	-	-	-	24.0(23)	1.0(01)	25.0(24)
28.	KVK (Vanvasi Seva Kendra), Adhaura, Kaimur, Bhabua (Bihar)	20	18	20	18	-	-	1.0	16.0	-	-	1.0		17.0(18)	1.0(02)	18.0(20)
29.	KVK (SKCET), Chanpura-Basaith, Madhubani (Bihar)	12	12	12	12	1.0	2.0	1.0	8.0	-	-	-	-	12.0(12)	-	12.0(12)
30.	KVK (RAU), Pipra Kothi, East Champaran (Bihar)	18	18	18	18	4.0		7.0	7.0	-	-	-	-	18.0(18)	-	18.0(18)
31.	KVK (RAU), Madhopur, West Champaran (Bihar)	20	18	20	18	-	-	13.0	3.0	-	-	1.0	1.0	16.0(18)	2.0(02)	18.0(20)
32.	KVK (Samta Seva Kendra-Sitamarhi), Balha Madhusudan, Pupri, Sitamarhi (Bihar)	12	12	12	12	-	-	4.0	5.0	-	-	3.0	-	9.0(09)	3.0(03)	12.0(12)
33.	BAU, Kanke, Ranchi (Jharkhand)	20	20	20	20	-	-	6.5	9.0	-	-	2.5	2.0	15.5(14)	4.5(06)	20.0(20)

S.N.	Name of Centre	Allocation		Achievement		Achievement Men, Area in Acres, (No. of Farmers)				Achievement Women, Area in Acres, (No. of Farmers)				Men	Women	Total
		No. of FLDs	Area under FLDs (Acres)	No. of FLDs	Area under FLDs (Acres)	SC	ST	OBC	Gen	SC	ST	OBC	Gen	Area(Acres) (No. of Farmers)	Area(ha) (No. of Farmers)	Area (Acres) (No. of Farmers)
34.	KVK (Ramakrishna Mission), Morabadi, Ranchi (Jharkhand)	25	25	25	25	2.0	15.0	4.0	3.0	-	-	1.0		24.0(24)	1.0(01)	25.0(25)
35.	KVK (BAU), Jagannathpur, West Singhbhum (Jharkhand)	20	20	20	20		19.0	1.0	-	-	-	-	-	20.0(20)	-	20.0(20)
36.	KVK (CSKHPKV), Una (HP)	9	13	9	13	-	-	0.7	9.0	-	-	-	3.3	9.7(07)	3.3(02)	13.0(09)
37.	KVK (SKUAST-Jammu), Rajhani, Kathua, Jammu (J&K)	25	25	25	25	1.0	3.0		21.0	-	-	-	-	25.0(25)		25.0(25)
38.	PAU, Ludhiana (Punjab)	25	25	25	25	3.0	-	-	10.0	3.0	-	-	9.0	13.0(13)	12.0(12)	25.0(25)
39.	PAU, RRS, Gurdaspur (Punjab)	18	18	18	18	-	-	-	15.0	-	-	-	3.0	15.0(15)	3.0(03)	18.0(18)
40.	KVK (PAU), Haveli Kalan, Rupnagar (Punjab)	12	15	12	15	-	-	3.0	12.0	-	-	-	-	15.0(12)	-	15.0(12)
41.	KVK (PAU), NagKalan-Jahangir, Majitha Road, Amritsar (Punjab)	8	15	8	15	-	-	-	15.0	-	-	-	-	15.0(08)	-	15.0(08)
NWPZ																
42.	RBS College, Bichpuri, Agra (UP)	15	15	15	15	1.0		13.0	1.0	-	-	-	-	15.0(15)	-	15.0(15)
43.	KVK, Baghara, Muzaffarnagar (UP)	15	15	15	15	-	-	9.0	5.0	-	-	1.0		14.0(14)	1.0(01)	15.0(15)
44.	ZARS, Nagina, Bijnor (UP)	12	12	12	12	2.0		6.0	4.0	-	-	-	-	12.0(12)	-	12.0(12)

S.N.	Name of Centre	Allocation		Achievement		Achievement Men, Area in Acres, (No. of Farmers)				Achievement Women, Area in Acres, (No. of Farmers)				Men	Women	Total
		No. of FLDs	Area under FLDs (Acres)	No. of FLDs	Area under FLDs (Acres)	SC	ST	OBC	Gen	SC	ST	OBC	Gen	Area(Acres) (No. of Farmers)	Area(ha) (No. of Farmers)	Area (Acres) (No. of Farmers)
45.	KVK, Khajuri Bagh, New Gopal Nagar, Saharanpur (UP)	12	12	12	12	-	-	-	12.0	-	-	-	-	12.0(12)	-	12.0(12)
46.	ICAR-IIFSR, Modipuram, Meerut (UP)	18	18	18	18	7.0	-	5.0	6.0	-	-	-	-	18.0(18)	-	18.0(18)
47.	Amity Centre for Extension Services, AUUP Campus, Sector-125, Noida (UP)	15	15	15	15	3.0	-	12.0	-	-	-	-	-	15.0(15)	-	15.0(15)
48.	GBPUA&T, Pantnagar, US Nagar (Uttarakhand)	19	19	19	19	-	-	5.0	9.0	-	-	2.0	2.0	14.0(15.0)	4.0(04)	18.0(19)
49.	CATAT, ICAR-IARI, New Delhi	18	18	18	18	1.0	-	14.0	2.0			1.0		16.0(16)	2.0(02)	18.0(18)
50.	KVK (NHRDF), Ujwa, New Delhi	18	18	18	18	2.0	-	11.0	4.0			1.0		17.0(17)	1.0(01)	18.0(18)
51.	ICAR-IIWBR, Karnal (Haryana)	20	20	20	20	4.0	-	4.0	12.0	-	-	-	-	20.0(20)	-	20.0(20)
52.	ICAR-CSSRI, Karnal (Haryana)	18	18	18	18	-	-	-	18.0	-	-	-	-	18.0(18)	-	18.0(18)
53.	CCSHAU, Hisar (Haryana)	8	15	8	15	-	-	2.0	13.0	-	-	-	-	15.0(08)	-	15.0(8)
54.	KVK (CCSHAU), Bhiwani (Haryana)	12	12	12	12	-	-	5.0	7.0	-	-	-	-	12.0(12)	-	12.0(12)
55.	KVK (SCHE), Tepla, Ambala (Haryana)	12	12	12	12	-	-	11.0	-	-	-	1.0		11.0(11)	1.0(01)	12.0(12)
56.	KVK (CCSHAU), Peoda Road, Kaithal (Haryana)	12	12	12	12	1.0	-	2.0	9.0	-	-	-	-	12.0 (12)	-	12.0(12)
57.	RARI (SKNAU-	14	14	14	14	1.0	2.0	9.0	1.0			1.0		13.0(13)	1.0(01)	14.0(14)

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		No. of FLDs	Area under FLDs (Acres)	No. of FLDs	Area under FLDs (Acres)	SC	ST	OBC	Gen	SC	ST	OBC	Gen	Area(Acres) (No. of Farmers)	Area(ha) (No. of Farmers)	Area (Acres) (No. of Farmers)
	Jobner), Durgapura, Jaipur (Rajasthan)															
58.	KVK (SKNAU-Jobner), Ajmer (Rajasthan)	12	12	12	12	-	-	11.0	1.0	-	-	-	-	12.0(12)		12.0(12)
59.	KVK (Banasthali Vidyapeeth), Tonk (Rajasthan)	12	12	12	12	1.0	1.0	5.0	5.0	-	-	-	-	12.0(12)		12.0(12)
60.	ARS (SKRAU-Bikaner), Karni Road, Sriganganagar (Rajasthan)	12	12	12	12	1.0	-	11.0	-	-	-	-	-	12.0(12)		12.0(12)
61.	KVK (AU-Kota), Sawai Madhopur (Rajasthan)	11	12	11	12	1.0	-	11.0	-	-	-	-	-	12.0(12)		12.0(12)
	CZ															
62.	RCOA (MPUA&T), Udaipur (Rajasthan)	18	18	18	18	12.0	1.0	-	-	5.0	-	-	-	13.0(13)	5.0(05)	18.0(18)
63.	ARS (MPUAT-Udaipur), Borwat Farm, Banswara (Rajasthan)	16	16	16	16	-	15.0	1.0	-	-	-	-	-	16.0(16)		16.0(16)
64.	ARS (AU-Kota), Ummedganj Farm, Kota (Rajasthan)	18	18	18	18	2.0	3.0	10.0	-	-	1.0	2.0		15.0(15)	3.0(03)	18.0(18)
65.	WRS (JAU), Junagarh (Gujarat)	25	25	25	25	-	-	23.0	-	-	-	-	2.0	23.0(23)	2.0(02)	25.0(25)
66.	CERW (SDAU), Vijapur, Mehsana (Gujarat)	25	25	25	25	-	-	6.0	19.0	-	-	-	-	25.0(25)		25.0(25)
67.	JNKVV, Jabalpur (MP)	10	25	10	25	-	-	15.	5.0			2.5	2.5	20.0(08)	5.0(02)	25.0(10)
68.	ICAR-IARI,	25	25	25	27*	-	-	26.625	0.375	-	-	-	-	27.0(20)		27.0(20)

S.N.	Name of Centre	Allocation		Achievement		Achievement Men, Area in Acres, (No. of Farmers)				Achievement Women, Area in Acres, (No. of Farmers)				Men	Women	Total
		No. of FLDs	Area under FLDs (Acres)	No. of FLDs	Area under FLDs (Acres)	SC	ST	OBC	Gen	SC	ST	OBC	Gen	Area(Acres) (No. of Farmers)	Area(ha) (No. of Farmers)	Area (Acres) (No. of Farmers)
	RWRS, Indore (MP)															
69.	KVK (JNKVV), Purushottampur, Panna (MP)	14	18	14	18	-	2.0	5.0	9.0	-	-	2.0		16.0(13)	2.0(01)	18.0(14)
70.	KVK (Kalukhera Shiksha Samiti), Kalukhera, Ratlam (MP)	25	25	25	25	2.0	1.0	15.0	7.0	-	-	-	-	25.0(25)		25.0(25)
71.	KVK (RVSKVV), Pipersama, Neemuch (MP)	12	12	12	12	-	-	3.0	9.0	-	-	-	-	12.0(12)		12.0(12)
72.	KVK (RVSKVV), COH, Mandsour (MP)	12	12	12	12	2.0	-	8.0	2.0	-	-	-	-	12.0(12)		12.0(12)
73.	KVK (RVSKVV), M.L.Nagar, Ujjain (MP)	10	10	10	10	1.0	-	1.0	6.0	-	-	-	1.0	9.0(09)	1.0(01)	10.0(10)
74.	KVK (JNKVV), Sudamanagar, Indore road, Harda (MP)	10	10	10	10	-	-	1.0	6.0	-	-	-	3.0	7.0(07)	3.0(03)	10.0(10)
75.	KVK (IGKV-Raipur), RRS, Kumhrawand Farm, Jagdalpur, Bastar (Chhattisgarh)	18	18	18	18	-	3.0	5.0	2.0	-	3.0	3.0	2.0	10.0(10)	8.0(08)	18.0(18)
76.	BTC College of Agri & RS (IGKV-Raipur), Sarkanda, Bilaspur (Chhattisgarh)	25	25	25	25	9.0	13.0	-	-	1.0	2.0	-	-	22.0(22)	3.0(03)	25.0(25)
PZ																
77.	Dr. PDKV, Krishi Nagar, Akola (Maharashtra)	25	25	25	25	1.0	1.0	4.0	14.0	-	-	-	5.0	20.0(20)	5.0(05)	25.0(25)

S.N.	Name of Centre	Allocation		Achievement		Achievement Men, Area in Acres, (No. of Farmers)				Achievement Women, Area in Acres, (No. of Farmers)				Men	Women	Total
		No. of FLDs	Area under FLDs (Acres)	No. of FLDs	Area under FLDs (Acres)	SC	ST	OBC	Gen	SC	ST	OBC	Gen	Area(Acres) (No. of Farmers)	Area(ha) (No. of Farmers)	Area (Acres) (No. of Farmers)
78.	ARS, Niphad, Nasik (Maharashtra)	25	25	25	25	-	23.0	-	-	-	2.0	-	-	23.0(23)	2.0(02)	25.0(25)
79.	MAU, Parbhani (Maharashtra)	24	25	24	25	-	-	-	24.0	-	-	-	1.0	24.0(23)	1.0(01)	25.0(24)
80.	ARI, MACS, Agharkar Road, Pune (Maharashtra)	25	25	25	25	1.0	1.0	7.0	13.0	-	-	-	3.0	22.0(22)	3.0(03)	25.0(25)
81.	UAS, Dharwad (Karnataka)	50	50	50	50	2.0	1.0	4.0	43.0	-	-	-	-	50.0(50)	-	50.0(50)
82.	BIRDS KVK, Tukkanatti, Gokak, Belgaum (Karnataka)	26	26	26	26	-	-	10.0	15.0	-	-	-	-	25.0(25)	-	25.0(25)
83.	ICAR-IARI, RS, Wellington (Tamil Nadu)	49	49	48	48	4.5		43.5	-	-	-	-	-	48.0(18)	-	48.0(18)
Total		1500	1500	1499	1503.34	144.9	134.2	495.4	607.4	18.1	9.5	34.3	59.7	1381.83 (1409)	121.51 (153)	1503.34 (1562)

Annexure - II : Category wise number of barley FLDs farmers during 2018-19

S.N.	Name of Centre	Allocation		Achievement		Achievement Men, Area in ha, (No. of Farmers)				Achievement Women, Area in ha, (No. of Farmers)				Men	Women	Total
		No. of FLDs	Area under FLDs (ha)	No. of FLDs	Area under FLDs (ha)	SC	ST	OBC	Gen	SC	ST	OBC	Gen	Area(ha) (No. of Farmers)	Area(ha) (No. of Farmers)	Area(ha) (No. of Farmers)
NHZ																
1.	CSKHPKV, HAREC, Bajaura, Kullu (HP)	12	03	06	2.5	-	-	-	2.3	-	-	-	0.2	2.3 (05)	0.2 (01)	2.5 (06)
2.	IARI, RS, Amartara Cottage, Shimla (HP)	12	10	36	10	-	-	-	10.0	-	-	-	-	10.0 (36)	-	10.0 (36)
NEPZ																
3.	NDUA&T, Narendranagar, Kumarganj, Ayodhya (UP)	12	05	07	05	0.75	-	-	2.0	-	-	1.5	0.75	2.75 (04)	2.25 (03)	5.0 (07)
4.	KVK (IAS-BHU), Barkachha, Mirzapur (UP)	12	05	05	05	-	-	2.0	3.0	-	-	-	-	5.0 (05)	-	5.0 (05)
5.	CSAUA&T, Kanpur (UP)	12	12	13	13	1.0	-	12.0	-	-	-	-	-	13.0 (13)	-	13.0 (13)
6.	BHU, Varanasi (UP)	12	12	11	12	1.0	-	4.0	7.0	-	-	-	-	12.0 (11)	-	12.0 (11)
NWPZ																
7.	PAU, Ludhiana (Punjab)	08	08	08	08	-	-	-	8.0	-	-	-	-	8.0 (08)	-	8.0 (08)
8.	KVK, Mansa (Punjab)	12	12	12	12	-	-	-	12.0	-	-	-	-	12.0 (12)	-	12.0 (12)
9.	CCSHAU, Hisar (Haryana)	12	12	12	12	3.0	-	1.0	8.0	-	-	-	-	12.0 (12)	-	12.0 (12)
10.	KVK, Rampura, Rewari (Haryana)	12	12	11	12	-	-	12.0	-	-	-	-	-	12.0 (11)	-	12.0 (11)
11.	KVK (CCSHAU), Bhiwani (Haryana)	12	12	09	17	-	-	-	17.0	-	-	-	-	17.0 (09)	-	17.0 (09)
12.	RARI (SKNAU), Durgapura, Jaipur (Rajasthan)	16	16	16	16	-	3.0	12.0	-	-	-	1.0	-	15.0 (15)	1.0(01)	16.0 (16)
13.	KVK, Tankarda,	10	10	13	10	7.5	-	-	2.5	-	-	-	-	10.0	-	10.0

S.N.	Name of Centre	Allocation		Achievement		Achievement Men, Area in ha, (No. of Farmers)				Achievement Women, Area in ha, (No. of Farmers)				Men	Women	Total
		No. of FLDs	Area under FLDs (ha)	No. of FLDs	Area under FLDs (ha)	SC	ST	OBC	Gen	SC	ST	OBC	Gen	Area(ha) (No. of Farmers)	Area(ha) (No. of Farmers)	Area(ha) (No. of Farmers)
	Chomu, Jaipur (Rajasthan)													(13)		(13)
14.	KVK (AU-Kota) Akorashi, Dhindora, Hindauncity, Karauli (Rajasthan)	12	12	12	12	-	-	11.0	1.0	-	-	-	-	12.0 (12)	-	12.0 (12)
CZ																
15.	RCOA, MPUA&T, Udaipur (Rajasthan)	12	12	12	12	3.0	1.0	2.0	-	6.0	-	-	-	6.0 (06)	6.0 (06)	12.0 (12)
16.	KVK (MPUA&T), Dhoinda, Rajasmand (Rajasthan)	12	12	11	12	-	-	10.0	2.0	-	-	-	-	12.0 (11)		12.0 (11)
17.	KVK (JNKVV), Kuthulia Farm, Rewa (MP)	12	12	12	12	-	-	5.0	7.0	-	-	-	-	12.0 (12)	-	12.0 (12)
18.	KVK (JNKVV), Purushottampur, Panna (MP)	12	12	14	12	-	1.0	9.0	2.0	-	-	-	-	12.0 (14)	-	12.0 (14)
19.	KVK (JNKVV), Nowgaon, Chhattarpur (MP)	12	12	12	12	3.0	-	4.0	5.0	-	-	-	-	12.0 (12)	-	12.0 (12)
20.	KVK (RVSKVV), Biaora, Kothi Bagh, Rajgarh (MP)	12	12	20	20	-	-	20.0	-	-	-	-	-	20.0 (20)	-	20.0 (20)
21.	KVK (RVSKVV), Ganj Basoda, Vidisha (MP)	12	12	12	12	4.0	-	2.0	3.0	2.0	-	1.0	-	9.0 (09)	3.0 (03)	12.0 (12)
Total		250	225	264	238.5	23.25	5.0	106	91.8	8.0	0.0	3.5	0.95	226.05 (250)	12.45 (14)	238.5 (264)

Note : The figures in brackets indicate the number of farmers. * Area covered more than allotted which is restricted equal to allotted FLDs.

Annexure-III : Information on wheat varieties demonstrated in Frontline Demonstrations (FLDs) during 2018-19

Name of Variety	HS 562
Zone/State	Northern Hill Zone
Production condition	Timely sown
Year of release	2016
Released by CVRC/SVRC	CVRC
Developed by	ICAR-IARI, New Delhi
Plant height (cm)	Rainfed: 97cm Irrigated: 101cm
Days to maturity (days)	Rainfed: 183 Irrigated: 175
1000-grain weight (g)	43
Average yield (q/ha)	Rainfed: 36 Irrigated: 52.7
Potential yield (q/ha)	Rainfed: 58.8 Irrigated: 62.2
Special Feature: It has tapering ear shape, waxy peduncle and leaf sheath.	
Name of Variety	VL 953
Zone/State	Uttarakhand Hills and Uttarakhand Plains
Production condition	Timely sown irrigated organic conditions of hills Timely sown irrigated conditions of Plains
Year of release	2016
Released by CVRC/SVRC	SVRC
Developed by	ICAR-VPKAS, Almora
Plant height (cm)	85-90 cm (hills) 95-100 cm (Plains)
Days to maturity (days)	160-165 (hills) 135-137 days (Plains)
1000-grain weight (g)	46-48 gm
Average yield (q/ha)	30-35 q/ha (hills), 40-45 q/ha (Plains)
Potential yield (q/ha)	41.16 q/ha(hills) ,65.22 q/ha (Plains)
Special Feature: Recommended for Hills as well as Plains both	
Name of Variety	HD 2967
Zone/State	NWPZ & NEPZ
Production condition	Timely sown, Irrigated
Year of release	2011
Released by CVRC/SVRC	CVRC
Developed by	IARI, New- Delhi
Plant height (cm)	98
Days to maturity (days)	143
1000-grain weight (g)	42.1
Average yield (q/ha)	50.4
Potential yield (q/ha)	66.1
Special Feature: Recommended for two mega zones (NWPZ & NEPZ). This genotype has adult plant resistant to yellow and brown rusts. It has high zinc, copper and iron thereby securing nutritional security.	
Name of Variety	HD 3086
Zone/State	NWPZ
Production condition	Timely sown, Irrigated
Year of release	2014
Released by CVRC/SVRC	CVRC
Developed by	IARI, New Delhi
Plant height (cm)	98
Days to maturity (days)	143
1000-grain weight (g)	39
Average yield (q/ha)	54.6
Potential yield (q/ha)	71.1
Special Feature: The variety has higher yield, resistant to yellow and brown rust.	

Name of Wheat Variety	PBW 677
Zone/State	State
Production condition	Timely sown irrigated conditions
Year of release	2016
Released by CVRC/SVRC	SVRC
Developed by	PAU, Ludhiana
Plant height (cm)	107 cm
Days to maturity (days)	157 days
1000-grain weight (g)	41 g
Average yield (q/ha)	60.8
Potential yield (q/ha)	78.2
Special Feature: Green foliage with semi-erect growth habit, Parallel ear shape with medium ear density.PBW 677 takes about 106 days (range 98-114 days) from seeding to heading and 157 days (150-167 days) for maturity seed to seed.PBW 677 possesses resistance to yellow and brown rusts both under natural and artificial conditions.	
Name of Wheat Variety	PBW 725
Zone/State	State
Production condition	Timely sown irrigated conditions
Year of release	2016
Released by CVRC/SVRC	SVRC
Developed by	PAU, Ludhiana
Plant height (cm)	105 cm
Days to maturity (days)	154 days
1000-grain weight (g)	43g
Average yield (q/ha)	61.7
Potential yield (q/ha)	81.5
Significantly out yielded the check varieties DPW 621-50, HD 2967 and WH 1105 by 7.7, 7.6 & 1.9 percent, respectively in research and adaptive trials conducted in the Punjab state.High degree of resistance to yellow rust & brown rust. Glume shoulder shape sloping with short glume beak length and straight peduncle attitude, Parallel ear shape and medium ear density.	
Name of Wheat Variety	PBW1Zn
Zone/State	NWPZ
Production condition	Timely sown irrigated conditions
Year of release	2017
Released by CVRC/SVRC	CVRC
Developed by	PAU, Ludhiana
Plant height (cm)	103
Days to maturity (days)	151
1000-grain weight (g)	47
Average yield (q/ha)	59.3
Potential yield (q/ha)	70.8
Special Feature: Dark green foliage; semi-erect growth habit, ear bearing tapering shape with intermediate density.Based on three years of testing in coordinated trials in NWPZ, PBW 1 Zn possessed higher (14.7%) grain zinc concentration (40.6 ppm) compared to the check PBW 621 (35.4 ppm) along with higher grain iron (5.0%) concentration, with other quality parameters almost comparable to check varieties.PBW 1 Zn possessed low ACI (average coefficient of infection) for yellow rust under natural and artificial conditions over the years in comparison with the check. PBW 1 Zn possessed very high level of resistance to brown rust under natural and artificial conditions over the years.	
Name of Wheat Variety	WB 2
Zone/State	NWPZ
Production condition	Irrigated timely sown
Year of release	2017
Released by CVRC/SVRC	CVRC
Developed by	ICAR-IIWBR, Karnal
Plant height (cms)	100
Days to maturity (days)	142
1000-grain weight (g)	39
Average yield (q/ha)	51.6
Potential yield (q/ha)	58.9
Special Feature: High Zinc content (42.0 ppm), high iron content (40.0 ppm), resistant to yellow rust and brown rust.	

Name of Variety	DBW 71
Zone/State	NWPZ
Production condition	Late sown, Irrigated
Year of release	2013
Released by CVRC/SVRC	CVRC
Developed by	IIWBR, Karnal
Plant height (cm)	90
Days to maturity (days)	119
1000-grain weight (g)	37.1
Average yield (q/ha)	42.7
Potential yield (q/ha)	68.9
Special Feature: The high yield potential of DBW 71 under irrigated late sown condition of NWPZ possess disease resistance and heat tolerance. The genotype has high protein, chapatti score, yellow pigment and micro nutrients.	
Name of Variety	KRL 210
Zone/State	Northern Plains Zone
Production condition	Timely sown, Irrigated, saline soils
Year of release	2012
Released by CVRC/SVRC	CVRC
Developed by	CSSRI, KARNAL
Plant height (cm)	99
Days to maturity (days)	143
1000-grain weight (g)	40.1
Average yield (q/ha)	33.7
Potential yield (q/ha)	49.3
Special Feature: KRL 210 has shown high yielding ability along with salt tolerance over years and locations. This variety is lodging resistance, possessing resistance to yellow and brown rust along with good quality parameters.	
Name of Variety	HI 8737(d)
Zone/State	CZ
Production condition	Timely sown, Irrigated
Year of release	2014
Released by CVRC/SVRC	CVRC
Developed by	IARI, Indore
Plant height (cm)	85
Days to maturity (days)	124
1000-grain weight (g)	51
Average yield (q/ha)	53.4
Potential yield (q/ha)	81.0
Special Feature: HI 8737 is a widely adopted high yielding durum genotype that has shown yield stability under timely and late sown conditions. The variety has good levels of resistance against leaf and stem rust seedling resistance test indicated presence of diverse genes for resistance. The variety is good for chapatti making and also for pasta preparations and essential micro-nutrients like iron and zinc.	
Name of Variety	DBW 110
Zone/State	CZ
Production condition	Timely sown, Restricted Irrigation
Year of release	2015
Released by CVRC/SVRC	CVRC
Developed by	IIWBR, Karnal
Plant height (cm)	89
Days to maturity (days)	124
1000-grain weight (g)	43
Average yield (q/ha)	39.2
Potential yield (q/ha)	50.1
Special Feature: DBW 110 has high yield potential under timely sown restricted irrigation condition in central zone. This genotype is resistance to brown and black rust. It is also resistance to Karnal bunt. This genotype has shown promise for better yield with two irrigations. It has good protein, test weight and good chapatti/bread making score.	

Name of Variety	HI 8713 (d)
Zone/State	Central Zone
Production condition	Timely sown, Irrigated conditions
Year of release	2013
Released by CVRC/SVRC	CVRC
Developed by	ICAR-IARI Regional Station, Indore (MP)
Plant height (cm)	90-95
Days to maturity (days)	120-125
1000-grain weight (g)	45
Average yield (q/ha)	52.5
Potential yield (q/ha)	68.2
Special Feature: It can contribute to “nutritional security” in central India, because of its high protein content (~12.0 %), high yellow pigment (~7.16 ppm) and good levels of essential micronutrients like iron, zinc, copper and manganese.	
Name of Variety	HI 8759 (d)
Zone/State	Central Zone
Production condition	Timely sown, Irrigated conditions
Year of release	2016
Released by CVRC/SVRC	CVRC
Developed by	ICAR-IARI Regional Station, Indore (MP)
Plant height (cm)	80-85
Days to maturity (days)	115-120
1000-grain weight (g)	50-55
Average yield (q/ha)	56.9
Potential yield (q/ha)	75.5
Special Feature: It can serve as a “dual purpose” variety suitable both for making chapati and for pasta preparations due to its moderate SDS-sedimentation value (~35 ml) and high protein content (~12.0 %), good levels of yellow pigment (~5.7 ppm), and essential micronutrients like iron (42.1 ppm) and zinc (42.8 ppm).	
Name of Variety	Raj 4238
Zone/State	CZ
Production condition	Late sown, Irrigated
Year of release	2016
Released by CVRC/SVRC	CVRC
Developed by	RS, RAU, Durgapura
Plant height (cm)	84
Days to maturity (days)	114
1000-grain weight (g)	40
Average yield (q/ha)	45.5
Potential yield (q/ha)	62.8
Special Feature: Good for chapatti (score 8.0)	
Name of Variety	GJW 463
Zone/State	Gujarat
Production condition	Early sown, irrigated condition of Saurashtra region and Timely sown, irrigated condition of Gujarat
Year of release	2016
Released by CVRC/SVRC	SVRC
Developed by	WRS, JAU, Junagadh (Gujarat)
Plant height (cm)	80-86 cm
Days to maturity (days)	103-118 days
1000-grain weight (g)	42-46 gm
Average yield (q/ha)	55.75 ES, 50.91 TS
Potential yield (q/ha)	75.90 (NIVT-II Powarkheda centre)
Special Feature: Heat tolerance (HSI-0.48)	

Name of Variety	GW 451
Zone/State	Gujarat
Production condition	Timely sown, Irrigated
Year of release	2016
Released by CVRC/SVRC	SVRC
Developed by	Vijapur
Plant height (cm)	76 (68-88)
Days to maturity (days)	105 (95-113)
1000-grain weight (g)	45.8 (37-48)
Average yield (q/ha)	53.9
Potential yield (q/ha)	66.0
Name of Variety	GDW 1255 (d)
Zone/State	Gujarat (excluding South Gujarat)
Production condition	Timely sown, Irrigated
Year of release	2013
Released by CVRC/SVRC	SVRC
Developed by	Vijapur
Average yield (q/ha)	47.6
Potential yield (q/ha)	66.1
Name of Wheat Variety	RVW 4106
Zone/State	Madhya Pradesh
Production condition	Irrigated late sown
Year of release	2010-11
Released by CVRC/SVRC	SVRC
Developed by	RVSKVV, Gwalior, MP
Plant height (cm)	95
Days to maturity (days)	105-110
1000-grain weight (g)	33.8
Average yield (q/ha)	50.35
Potential yield (q/ha)	-
Special Feature: Recommended for Late Sown Irrigated Condition of Madhya Pradesh. It is resistant against Black & Brown Rust diseases.	
Name of Variety	MP 3382
Zone/State	MP
Production condition	Irrigated timely sown (High fertility timely sown)
Year of release	2015-16
Released by CVRC/SVRC	SVRC
Developed by	JNKVV, Jabalpur (MP)
Plant height (cm)	85-90
Days to maturity (days)	115-120
1000-grain weight (g)	44-46
Average yield (q/ha)	52-55
Potential yield (q/ha)	60-65
Special Feature: Semi erect flag leaves, thick stem, waxiness is present on peduncle, leaf sheath and ear, early maturing, dwarf, non-lodging with rich in protein and other quality attributes, resistance to the black and leaf rusts, high protein, good grain appearance and hectoliters weight with high Glu-1 score, better chapatti making quality, bread loaf volume, wet dry gluten content, gluten index and zinc.	
Name of Variety	HD3090
Zone/State	PZ
Production condition	Late sown, Irrigated
Year of release	2014
Released by CVRC/SVRC	CVRC
Developed by	IARI, New Delhi
Plant height (cm)	80
Days to maturity (days)	101
1000-grain weight (g)	37.2
Average yield (q/ha)	41.4
Potential yield (q/ha)	63.1
Special Feature: This genotype is an early maturity semi dwarf with high yield potential under timely irrigation late sown conditions. It has high degree of resistance against leaf and stem rusts. The variety has high protein content, high biscuit spread factor and also good for chapatti making.	

Name of Variety	NIAW 1994 (Phule Samadhan)
Zone/State	Maharashtra state
Production condition	Late sown irrigated and Timely sown irrigated
Year of release	2014
Released by CVRC/SVRC	SVRC
Developed by	ARS, Niphad, MPKV, Rahuri, Ahmednagar, (Maharashtra)
Plant height (cm)	Timely sown irrigated: 73-87 cm Late sown irrigated : 67-84 cm
Days to maturity (days)	Timely sown irrigated: 108(95-118) days Late sown irrigated: 97 (91-102) days
1000-grain weight (g)	Timely sown irrigated: Large 43g (42-44g) Late sown irrigated: Medium 39g (36g-42g)
Average yield (q/ha)	Timely sown irrigated: 46.12 q/ha Late sown irrigated: 44.23 q/ha
Special Feature: NIAW 1994 is a thermo-tolerant variety which suits both the sowing conditions viz., Late sown irrigated and Timely sown irrigated. <i>chapati</i> quality of NIAW 1994 is superior than the checks viz. MACS 6222, NIAW 34 and NIAW 917 . Grain protein content in NIAW 1994 varies between 12.5 to 13.8 % under different conditions. Under late sown condition NIAW 1994 is superior in hectoliter weight (81.1) against HD 2392 (80.0), similarly under timely sown condition NIAW 1994 (81.5) showed higher test weight than MACS 6222 (81.1).	
Name of Variety	MACS 6478
Zone/State	PZ
Production condition	Timely sown, Irrigated
Year of release	2014
Released by CVRC/SVRC	CVRC
Developed by	ARI, Pune
Plant height (cm)	78
Days to maturity (days)	105
1000-grain weight (g)	45.1
Average yield (q/ha)	45
Potential yield (q/ha)	65.7
Special Feature: Variety MACS 6478 is highly resistant to both black and brown rust and carries adult plant resistant genes. This variety has high yield potential and thus can give better yield with matching agronomic practices. The variety has high protein content and better nutritional quality for zinc and iron thereby making it good for chapatti and bread quality.	
Name of Variety	MACS 3949 (d)
Zone/State	Peninsular Zone
Production condition	Irrigated timely sown condition
Year of release	2017
Released by CVRC/SVRC	CVRC
Developed by	Agharkar Research Institute (MACS), Pune
Plant height (cm)	81 cm (78 to 83 cm)
Days to maturity (days)	112 days (108 to 117)
1000-grain weight (g)	47 g
Average yield (q/ha)	43.9 q/ha
Potential yield (q/ha)	53.5 q/ha
Special Feature: MACS 3949 (d) has bold & lustrous grain with 47g 1000-grain weight with high protein content (12.9 %), better nutritional quality (Zinc 40.6 ppm, Iron 38.6 ppm) with good milling quality (Test weight 81.4 kg/hl) and highest overall acceptability 7.25 (best cooking quality for pasta product out of 9). It has also shown resistance against stem and leaf rusts under both natural and artificial screening conditions. MACS 3949 (d) also showed resistance against leaf blight, powdery mildew, flag smut and Karnal bunts. It has also shown good level of resistance to insect pests than checks.	

Name of Variety	UAS 446 (d)
Zone/State	PZ
Production condition	Timely sown, Rainfed
Year of release	2015
Released by CVRC/SVRC	CVRC
Developed by	UAS Dharwad
Plant height (cm)	66
Days to maturity (days)	96
1000-grain weight (g)	44
Average yield (q/ha)	18.3
Potential yield (q/ha)	24.4
Special Feature: UAS 446 is a high yielding durum wheat genotype suitable for rainfed condition and responded well to different doses of fertilizers. It is resistant to black and brown rusts.	
Name of Variety	UAS 347
Zone/State	PZ
Production condition	Timely sown, Rainfed
Year of release	2015
Released by CVRC/SVRC	CVRC
Developed by	UAS, Dharwad
Average yield (q/ha)	18.4
Potential yield (q/ha)	24.6
Special Feature: Good for biscuit quality (score 8.47)	
Name of Variety	HI 1605
Zone/State	Peninsular Zone
Production condition	Timely sown, Restricted Irrigation Conditions
Year of release	2016
Released by CVRC/SVRC	CVRC
Developed by	ICAR-IARI Regional Station, Indore (MP)
Plant height (cm)	80-85
Days to maturity (days)	105-110
1000-grain weight (g)	35 - 40
Average yield (q/ha)	29.1
Potential yield (q/ha)	44.0
Special Feature: HI 1605 is a good quality wheat genotype with high protein content (~13%), good grain appearance (~6.5), high sedimentation value (~55 ml), high extraction rate (~74%), good bread, chapatti and biscuit quality with good levels of micronutrients like iron (43.0 ppm) and zinc (35.0 ppm).	
Name of Variety	HW 5207 as COW3
Zone/State	Tamil Nadu including hilly regions
Production condition	Restricted irrigated, medium fertility, timely sown conditions in Tamil Nadu including hills
Year of release	2017 by CVRC
Released by CVRC/SVRC	2017 by CVRC and 2015 by SVRC
Developed by	IARI, Regional Station, Wellington, Tamil Nadu
Plant height (cm)	90 cms
Days to maturity (days)	95-100 Days
1000-grain weight (g)	40.5gm
Average yield (q/ha)	40.70q/ha
Potential yield (q/ha)	59.60q/ha
Special Feature: HW 5207(COW3) has recorded the highest mean grain yield (4076 kg/ha) which is 12 per cent increase over the check COW (W) 1 (3641 kg/ha) in a total of 131 trials. The variety mature in about 100 days still yielding over 40 q/ha and the per day productivity is much higher. It has the ideal plant height (90 cm) with erect plant type, strong and resilient stem providing resistance to lodging. It produces very nutritious grain, registering a mean test weight of 40.5g with more than 11 per cent protein, and high level of Iron (53.1ppm), Zinc (46.3ppm), Copper (5.33ppm) and Manganese (47.5ppm) indicating excellent grain nutritional quality. In addition, this variety has high scores for bread making quality (7.0 out of 10), <i>chapathi</i> quality (7.4 out of 10) with Glu-1 score of 8 out of 10 and mean sedimentation value of 45.5, high Hectolitre weight of 78.3. The variety HW 5207(COW3) showed high degree of resistance to stem, leaf and stripe rusts under both artificial and natural epiphytotic conditions against all the pathotypes occurring in the Nilgiris which is a hot spot for rust incidence.	

Name of Variety	HW 1098 (Dicoccum)
Zone/State	SHZ
Production condition	Timely sown, Irrigated
Year of release	2015
Released by CVRC/SVRC	CVRC
Developed by	IARI-RS, Wellington
Plant height (cm)	85
Days to maturity (days)	106
1000-grain weight (g)	40.3
Average yield (q/ha)	45.5
Potential yield (q/ha)	59.0
Special Feature: Dicoccum variety HW1098 has high yield potential and showed wider adaptability for planting under normal and late sown conditions. This is a semi dwarf variety that has required level of resistance, medium bold grains, early maturing and good protein content.	

Name of Variety	K 1006 (Shekhar New)
Zone/State	NEPZ
Production condition	Timely sown, Irrigated
Year of release	2014
Released by CVRC/SVRC	CVRC
Developed by	CSAUA&T, Kanpur, UP
Plant height (cm)	86
Days to maturity (days)	123
1000-grain weight (g)	41
Average yield (q/ha)	47.0
Potential yield (q/ha)	65.4
Special Feature: <i>T. aestivum</i> variety	

Name of Variety	K 1317
Zone/State	NEPZ
Production condition	Timely sown, Rainfed
Year of release	2018
Released by CVRC/SVRC	CVRC
Developed by	CSAUA&T, Kanpur, UP
Plant height (cm)	92
Days to maturity (days)	125
1000-grain weight (g)	43
Average yield (q/ha)	30.1
Potential yield (q/ha)	38.6
Special Feature: <i>T. aestivum</i> variety	

Name of Variety	PBW 723 (Unnat PBW 343)
Zone/State	NWPZ
Production condition	Timely sown, Irrigated
Year of release	2017
Released by CVRC/SVRC	CVRC
Developed by	PAU, Ludhiana, Punjab
Plant height (cm)	97
Days to maturity (days)	146
1000-grain weight (g)	42
Average yield (q/ha)	49.2
Potential yield (q/ha)	63.2
Special Feature: <i>T. aestivum</i> variety	

Name of Variety	DBW 173
Zone/State	NWPZ
Production condition	Late sown, Irrigated
Year of release	2017
Released by CVRC/SVRC	CVRC
Developed by	IIWBR, Karnal, Haryana
Plant height (cm)	90
Days to maturity (days)	122
1000-grain weight (g)	37
Average yield (q/ha)	47.2
Potential yield (q/ha)	57
Special Feature: <i>T. aestivum</i> variety	

Name of Variety	HI 1544 (Purna)
Zone/State	CZ
Production condition	Timely sown, Irrigated
Year of release	2007
Released by CVRC/SVRC	CVRC
Developed by	IARI, RS, Indore, MP
Plant height (cm)	85-90
Days to maturity (days)	111
1000-grain weight (g)	40-45
Average yield (q/ha)	51.4
Potential yield (q/ha)	68.2
Special Feature: <i>T. aestivum</i> variety	

Name of Variety	DBW 168
Zone/State	PZ
Production condition	Timely sown, Irrigated
Year of release	2017
Released by CVRC/SVRC	CVRC
Developed by	IIWBR, Karnal, Haryana
Plant height (cm)	84
Days to maturity (days)	115
1000-grain weight (g)	41
Average yield (q/ha)	47.46
Potential yield (q/ha)	70.1
Special Feature : <i>T. aestivum</i> variety	

Name of Variety	HI 8777 (d)
Zone/State	PZ
Production condition	Timely sown, Rainfed
Year of release	2017
Released by CVRC/SVRC	CVRC
Developed by	IARI, RS, Indore, MP
Plant height (cm)	65-70
Days to maturity (days)	105-110
1000-grain weight (g)	45-50
Average yield (q/ha)	18.5
Potential yield (q/ha)	28.8
Special Feature : <i>T. durum</i> variety	

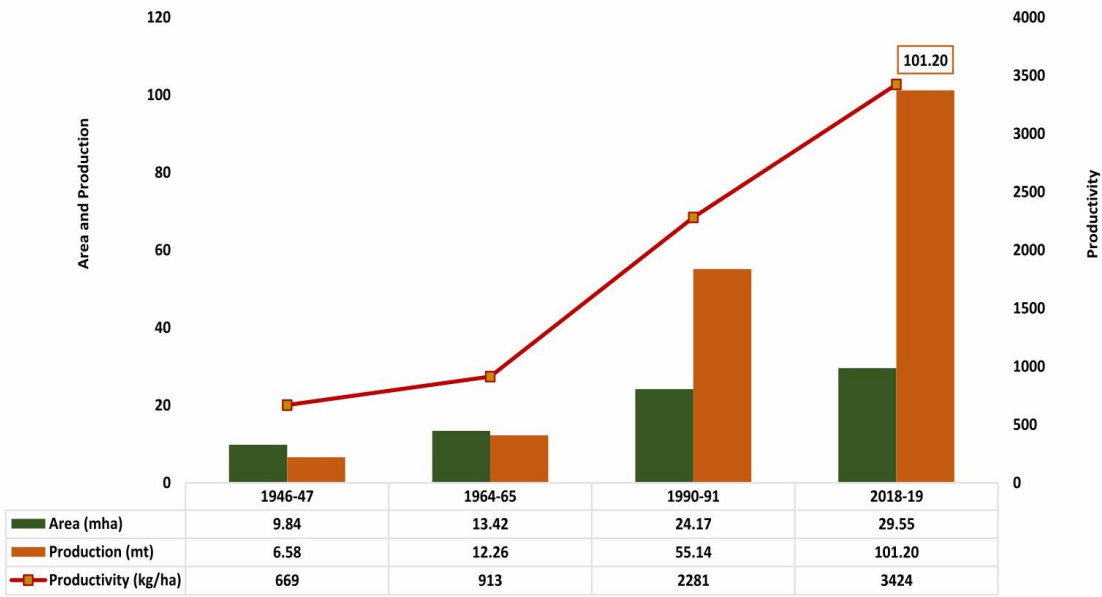
Name of Variety	MACS 4028 (d)
Zone/State	PZ
Production condition	Timely sown, Rainfed
Year of release	2017
Released by CVRC/SVRC	CVRC
Developed by	ARI, MACS, Pune, Maharashtra
Plant height (cm)	75
Days to maturity (days)	102
1000-grain weight (g)	46.7
Average yield (q/ha)	19.3
Potential yield (q/ha)	28.7
Special Feature : <i>T. durum</i> variety	
Name of Variety	UAS 428 (d)
Zone/State	PZ
Production condition	Timely sown, Irrigated
Year of release	2012
Released by CVRC/SVRC	CVRC
Developed by	UAS, Dharwad
Plant height (cm)	83
Days to maturity (days)	108
1000-grain weight (g)	43.7
Average yield (q/ha)	48
Potential yield (q/ha)	58.8
Special Feature : <i>T. durum</i> variety	
Name of Variety	HI 8759 (d)
Zone/State	Central Zone
Production condition	Timely sown, Irrigated conditions
Year of release	2016
Released by CVRC/SVRC	CVRC
Developed by	ICAR-IARI Regional Station, Indore (MP)
Plant height (cm)	80-85
Days to maturity (days)	115-120
1000-grain weight (g)	50-55
Average yield (q/ha)	56.9
Potential yield (q/ha)	75.5
Special Feature: It can serve as a "dual purpose" variety suitable both for making chapati and for pasta preparations due to its moderate SDS-sedimentation value (~35 ml) and high protein content (~12.0 %), good levels of yellow pigment (~5.7 ppm), and essential micronutrients like iron (42.1 ppm) and zinc (42.8 ppm).	
Name of Variety	UAS 304
Zone/State	PZ
Production condition	Timely sown, Irrigated
Year of release	2013
Released by CVRC/SVRC	CVRC
Developed by	UAS, Dharwad
Plant height (cm)	80
Days to maturity (days)	109
1000-grain weight (g)	41.7
Average yield (q/ha)	46.8
Potential yield (q/ha)	59.9
Special Feature: UAS 304 is widely adopted genotype of bread wheat possessing multiple disease resistance to prevailing leaf and stem rust races and spot blotch. This variety good protein, bold grain and acceptable grain quality.	
Name of Variety	HD 4728 (d)
Zone/State	CZ
Production condition	Timely sown, Irrigated
Year of release	2016
Released by CVRC/SVRC	CVRC
Developed by	IARI, New Delhi
Plant height (cm)	89.3
Days to maturity (days)	120
1000-grain weight (g)	52.6
Average yield (q/ha)	54.2
Potential yield (q/ha)	75.1
Special Feature : <i>T. durum</i> variety	

Annexure-IV : Information on barley varieties demonstrated in Frontline Demonstrations (FLDs) during 2018-19

Variety	Zone	Production condition	Year	Developed by	Height (cm)	Days to maturity	TGW (gm)	Average Yield (q/ha)	Pot. Yield (q/ha)
HBL 713 (Him Palam Jau 1)	Low and Mid Hills of HP	Rainfed/Irrigated	2016	CSKHPKV, HAREC, Bajaura, Kullu (HP)	70-90	170-180	40.30	30-35	51.00
BHS 400	NHZ	Rainfed, Timely sown	2014	IARI, Regional Station, Shimla, HP	83	168	39.13	32.71	58.70
BHS 380	NHZ	Rainfed, Timely sown	2010	IARI, Regional Station, Shimla, HP	60	182	35.00	Grain=21.00 Forage=59.4	Grain=29.80 Forage=89.7
RD 2907	NWPZ NEPZ	Saline/Alkaline soils	2018	RARI, Durgapura, Jaipur, Rajasthan	88	124	43.3	35.25	53.60
RD 2899	CZ	Irrigated, Timely sown	2018	RARI, Durgapura, Jaipur, Rajasthan	84	115	46.67	42.19	57.43
DWRB 137	NEPZ	Irrigated, Timely sown	2018	IIWBR, Karnal, Haryana	87.67	155	40.3	37.9	-
	CZ	Irrigated, Timely sown	2018	IIWBR, Karnal, Haryana	80.7	113	46.0	42.9	-
K 1055 (Prakhar)	NEPZ	Irrigated, Timely sown	2018	CSAUA&T, Kanpur, UP	102	130	45.0	38.0	50.0



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



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