



प्रगति प्रतिवेदन
Progress Report
2017-18

अखिल भारतीय समन्वित गेहूँ एवं जौ अनुसंधान परियोजना
AICRP on Wheat and Barley

उन्नत तकनीकियों द्वारा किसानों की अधिक आय
Improved Technologies for Higher Income of Farmers

जौ सुधार
BARLEY IMPROVEMENT

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

For official use only

All India Coordinated Research Project on Wheat and Barley

PROGRESS REPORT 2017-2018

BARLEY IMPROVEMENT

**AS Kharub
Vishnu Kumar
Dinesh Kumar
Chuni Lal
Jogendra Singh
Amit Kumar Sharma
Anil Khippal
Sudheer Kumar
SC Bhardwaj
Poonam Jasrotia
Rekha Malik
Ajay Verma
Satyavir Singh
GP Singh**



**ICAR-Indian Institute of Wheat and
Barley Research**
P.O. BOX - 158, Agrasain Marg, Karnal -132001



Correct Citation:

ICAR-IIWBR 2018. Progress Report of AICRP on Wheat & Barley 2017-18, Barley Improvement. Eds: AS Kharub, Vishnu Kumar, Dinesh Kumar, Chuni Lal, Jogendra Singh, Amit Kumar Sharma, Anil Khippal, Sudheer Kumar, SC Bhardwaj, Poonam Jasrotia, Rekha Malik, Ajay Verma, Satyavir Singh and GP Singh. ICAR-Indian Institute of Wheat and Barley Research, Karnal, India. P. 209.

**NO PART OF THIS REPORT SHOULD BE REPRODUCED
WITHOUT PRIOR PERMISSION OF THE DIRECTOR**

Issued on the occasion of 57th All India Wheat & Barley Research Workers' Meet hosted by BAU, Ranchi during August, 24-26, 2018.

ACKNOWLEDGEMENTS

It gives me great pleasure to record my sincere gratitude to Dr. A. K. Singh, D.D.G. (CS), for providing his constant guidance and encouragement to the barley Improvement programme. I am highly grateful to Ex- ADG (FFC), Dr. I. S. Solanki and incumbent ADG (FFC) Dr R.K. Singh, for their full support in consolidation of various barley improvement activities under the AICRP on wheat and barley.

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

The cooperation received from centres of the AICRP on wheat and barley as well as other testing centres for the successful conduct of barley Improvement trials is praiseworthy and all of them deserve special complements.

Dr. Ajay Verma, who helped in analyzing the voluminous data well in time deserve my special thanks.

I record my sincere acknowledgements for the useful help provided by my colleagues Drs. Chuni Lal, Dinesh Kumar, Jogendra Singh, Anil Khippal, Vishnu Kumar, Sudheer Kumar, SC Bhardwaj, Poonam Jasrotia and Rekha Malik in compilation and editing of this report as well as in coordinating research activities in their respective disciplines.

The useful help rendered by Sh. Sant Kumar, Sh. Ravindra Kumar and Sh. Deepak in the laboratory for analytic work, field experimentation and data compilation is gratefully acknowledged.

The help extended for reproduction of adequate number of copies and binding of this report by Dr. Ajay Verma and his team consisting of Drs. R. Sendhil, Poonam Jasrotia, Vikas Gupta and Sh. Bhim Sain, Sh Ronak Ram is duly acknowledged.

(A.S. Kharub)

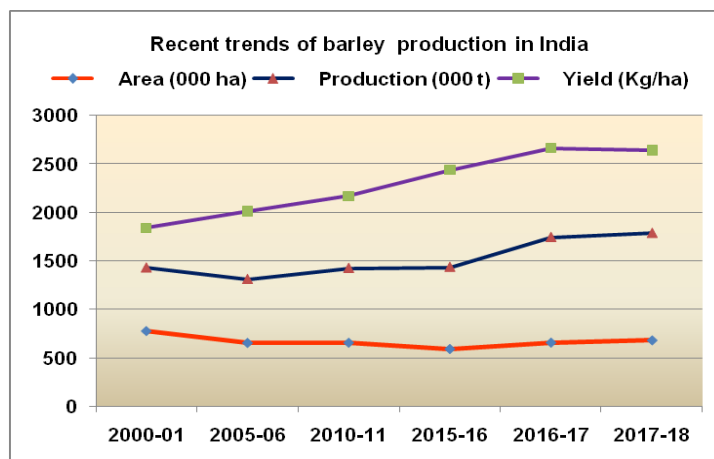
CONTENTS

1.	Research highlights of Barley Network	1.1 – 1.7
2.	Crop Improvement	2.1 - 2.70
	Breakup of the 2016-17 barley network yield trials as proposed, conducted, data received, and data not reported	2.1
	Performance of the centres during 2016-17	2.2 – 2.5
	Parentage of barley varieties under Network testing	2.6 - 2.8
	Data on yield, disease, agronomic and grain characters of varieties under test in different network Yield trials / nurseries.	
	Rainfed Trials	2.9 - 2.13
	Irrigated Trials (Feed barley) AVTs	2.14 - 2.16
	Irrigated Trials (Feed barley) IVTs	2.17 – 2.26
	Dual Purpose Barley Trials	2.27 - 2.39
	Irrigated Trials (Malt barley)	2.40 - 2.43
	Soil Salinity Tolerance Trials	2.44 - 2.45
	Trials rejected	2.46 - 2.52
	International/National Nurseries Evaluation	2.53 - 2.65
	Breeder Seed Production	2.66 - 2.70
3.	Crop Protection	3.1 - 3.45
4.	Resource Management	4.1 - 4.33
5.	Quality Evaluation	5.1 - 5.43
6.	Zonal Monitoring Reports	6.1 - 6.9
7.	Barley FLDs	7.1 - 7.2

57th All India Wheat and Barley workers Meet (24-26 August 2018)

RESEARCH HIGHLIGHTS OF BARLEY IMPROVEMENT

The crop season 2017-18 was quite good in terms of production. According to 3rd advance estimates for Rabi 2017-18, nearly 1790 thousand tons of barley was produced in 680.0 thousand ha area with a productivity of 26.3 q/ha. In India Rajasthan is the largest state having >50% in production and 50% area followed by Uttar Pradesh. A concern is usually raised at various platforms for barley area decline, however, in last 16 years, the area has stabilized and there has been gain in production and productivity resulting in higher production. Though the MSP of barley (Rs.1410/-) is much lower than wheat (Rs.1735/-), but during current season the market price of barley remained higher (>Rs 1500/q). The monitoring teams surveyed the major barley growing areas during the season in addition to visiting the experiments at coordinated centres. The observations indicate that the crop season was by and large a disease free year in major barley growing areas, with some incidence of aphids in the plains and yellow rust in foothills and mid hills. The incidence of leaf blights was observed in the eastern zone.



Estimates of barley area, production and productivity in major barley growing states

State	Area (000 ha)			Production (000 T)			Yield (q/ ha)		
	2015-16	2016-17	2017-18	2015-16	2016-17	2017-18	2015-16	2016-17	2017-18
Rajasthan	256.0	275.9	337.5	766.4	840.5	1028.0	29.93	30.46	30.46
U. P.	124.0	170.0	155.0	269.0	460.0	426.0	21.69	27.06	27.48
M.P.	97.0	116.0	130.0	176.2	252.9	283.4	18.17	21.80	21.80
Haryana	29.0	20.0	35.0	99.0	73.0	120.0	34.14	36.50	34.29
Punjab	9.0	8.3	10.9	33.3	31.5	40.3	37.00	37.95	36.97
Bihar	10.7	10.8	10.6	13.9	16.3	13.9	13.04	15.05	13.06
H.P.	19.2	20.4	20.4	34.3	35.8	35.8	17.86	17.53	17.55
Uttarakhand	18.9	22.0	21.0	18.5	26.0	26.0	9.83	1.182	12.38
J&K	6.7	6.8	6.7	4.1	4.3	4.3	6.22	6.32	6.46
West Bengal	2.5	2.5	2.7	3.5	3.6	3.9	14.0	14.20	14.26
Others	1.0	1.0	1.2	1.0	1.2	1.5	9.85	11.58	13.00
All India	589.4	656.3	737.0	1437.5	1747.5	1986.0	24.39	26.63	26.95

*2nd advance estimates

Release and Identification of new barley variety

One barley variety namely DWRB137 was released and notified by CVRC for commercial cultivation during 2018. The two more varieties RD2899 and RD 2907 were identified by VIC at a meeting held at Varanasi during August 2017. The details of the varieties are as hereunder:

Sr.No	Variety	Parentage	Zone	Developed at	Production condition
1.	DWRB137	DWR28/DWRUB64	NEPZ & CZ	ICAR-IIWBR, Karnal	Irrigated timely sown
2.	RD2899	RD2592/RD2035//RD2715	CZ	RARI Durgapura	Irrigated timely sown
3.	RD2907	RD103/RD2518//RD2592	NWPZ&NEPZ	RARI Durgapura	Salinity conditions

Registration of genetic stocks-

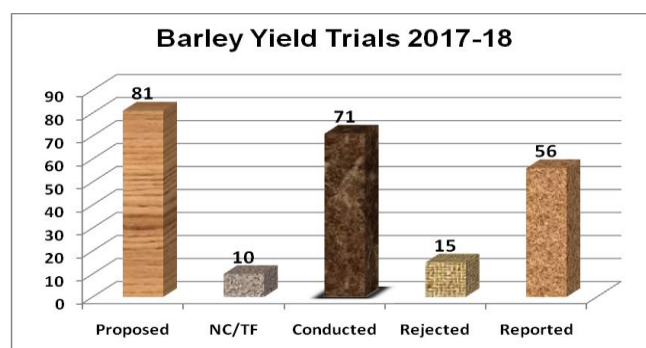
Four genetic stocks namely DWRB173, DWRB175, DWRB 176 and DWRB180 were registered with ICAR-NBPGR for different traits and details are as per below:

Genetic stock	INGR No.	Year	Trait
DWRB173	17043	2017	Hooded and extra early heading
DWRB175	17044	2017	Extra dwarf plant stature
DWRB176	17045	2017	Long spikes for more number of grains and resistant to stripe rust
DWRB180	17046	2017	Resistant to spot blotch

CROP IMPROVEMENT

Coordinated Yield Evaluation Trials

- Out of 81 yield evaluation trials proposed 71 (78%) trials were conducted. Ten trials were either not conducted/failed and data were not received in time. After the analysis, only 56 trials (69% of proposed, 79% of conducted) were found good for reporting.
- These trials were conducted at 12 main centres and 34 testing centres (including ICAR, SAUs and State Department of Agriculture) during *Rabi* 2017-18.
- In all 98 test entries contributed by 12 centres, were evaluated against 31 checks in the coordinated yield trials under rainfed (plains and hills), Irrigated (plains) and saline soils conditions. The new barley entries include malt, feed or dual purposes types and mostly were hulled type with a few hull-less types in northern hills and plains.



Promising entries in AVT/IVTs during 2017-18

Based upon the revised promotion criteria i.e. significantly superior at 10%, monitoring reports and disease and pest reactions, the entries namely DWRB160, DWRB 184, PL 891, VLB155, RD2969, UPB 1074 and DWRB 188 were found suitable for the promotion into advanced varietal evaluation in different trial series. The details of these promising varieties are as below:

Sr. No.	Trial name	Zone	Entry
1	IVT-MB-TS	NWPZ	DWRB160, DWRB184
2	AVT-FB	NWPZ	PL891 (HL)
3	AVT-RF-DP	NHZ	VLB155
4	IVT-FB	NEPZ	RD2969
5	IVT-FB-DP	NEPZ	UPB1074
6	IVT-FB	CZ	DWRB188 (HL)

Malt Barley Evaluation Irrigated

- The IVT-MB (IR-TS) was proposed at 9 centres in NWPZ and 19 test entries (04 exotic varieties, Andreia, Danielle, Explorer and ABI Voyager) and 04 checks were evaluated. The mean grain yield of the trial was 48.92 q/ha. Six rowed entry DWRB137 ranked first (58.82 q/ha) and two row entry DWRB184 (55.92 q/ha) was significantly superior to the best check

DWRB101 (51.57 q/ha). The entries DWRB182 and DWRB160 were numerically higher to the best check.

- The exotic varieties viz., ABI Voyager (43.24 q/ha), Andreia (42.05 q/ha), Explorer (41.18 q/ha) and Danielle (40.79 q/ha) showed late heading and ranked at 19th, 21st, 22nd and 23rd positions, respectively.

Feed Barley Evaluation

Rainfed

- In AVT-RF-NHZ, HBL113 was found to be the best check with 29.3 q/ha grain yield. No test entry was significantly superior to the best check.
- In IVT-RF-NEPZ trial, 15 test entries were evaluated 8 locations. The best check Lakhan ranked first (33.14 q/ha) followed by another check K603 (32.48 q/ha).

Irrigated

- Under irrigated feed barley trials, five trials (AVT-IR-CZ, AVT-IR-NEPZ, IVT-FB-IR-NWPZ, IVT-FB-IR-NEPZ and IVT-FB-IR-CZ) were conducted.
- In AVT-IR-CZ, the check variety DWRB137 ranked first (39.20 q/ha) followed by identified check RD2899 (37.82 q/ha) and test entries namely PL892 (37.33 q/ha), KB1531 (32.58 q/ha) and PL898 (31.97 q/ha) ranked 3rd, 6th and 8th positions, respectively.
- In AVT-IR-NEPZ trial, the check variety RD2552 ranked first (42.42 q/ha) and test entries namely PL892 (40.47 q/ha), KB1531 (37.71 q/ha) and RD2948 (37.21 q/ha) ranked 2nd, 3rd and 6th, respectively.
- 23 test entries along with 07 checks were evaluated in IVT-FB-IR trial. In NWPZ, the zonal mean across the entries for grain yield was 46.85 q/ha. BH946 was the best check with 56.4 q/ha. In NEPZ, the test entry RD2969, (42.80 q/ha) was significantly superior to the best check RD2899. In CZ, DWRB137 was the best check, ranked first giving 54.4 q/ha.

Dual purpose

- In dual purpose barley trials, four trials (AVT-DP-RF-TS-NHZ, IVT-DP-IR-TS-NWPZ, IVT-DP-IR-TS-NEPZ and IVT-DP-IR-TS-CZ) were conducted. In AVT-RF-DP-NHZ, none of the 17 test entries evaluated in AVT-DP-RF-TS-NHZ trial was superior to the best check in grain as well as forage yield. Six test entries (VLB156, HBL804, VLB157, UPB1072, BHS462 and VLB155) were significantly superior to the best check in grain yields and one test entry VLB155 gave numerically higher forage yield to the best check.
- In IVT-DP-IR-TS- NWPZ, IVT-DP-IR-TS- NEPZ and IVT-DP-IR-TS- CZ trials, some test entries had better grain yield while the others gave better forage yields, but no test entry was found to have even numerical superiority in both for grain as well as forage yield over the best check.

Salinity

- An AVT (SAL/ALK) trial was conducted with thirteen new genotypes at seven locations. One genotype RD 2979 (39.95 q/ha) gave numerically higher yield than the best check RD 2794 (37.95 q/ha).

Breeder seed production

An indent of 1048.25q breeder seed of 35 varieties was received from DAC&FW, Ministry of Agriculture & Farmers Welfare, Govt. of India. The indent included requirement of seven states (Haryana, Himachal Pradesh, Jharkhand, Madhya Pradesh, Rajasthan, Uttar Pradesh and Uttarakhand), two public sector agencies (Hindustan Insecticides Limited, National Seeds Corporation) and one private agency (National Seed Association of India) for the Rabi 2017-18. The highest indent was placed by NSAI (395.7q) followed by Rajasthan (310.00q), Uttar Pradesh (120.00q) and National Seed Corporation (120.00q). From variety point of view, the highest indenting varieties were RD 2786 (170.00q) followed by RD2794 (133.00), PL426 (102.75q),

RD2035 (98.50q) and BH393 (73.80q). A net production of 1452.20q breeder seed was reported, which was surplus of (+403.95q) in comparison to the total allocated quantity of 1048.25q. The nucleus seed 84.81q was produced against the targeted quantity of 61.49q of 40 varieties.

Germplasm evaluation and exchange

An Elite International Germplasm Nursery (EIBGN) was constituted with 45 germplasm lines and six released varieties (BH946, BH959, BHS400, RD2715, DWRB101 and HUB113) as standard checks and was supplied for evaluation to ten cooperating centres. A National Barley Genetic Stock Nursery (NBGSN) was constituted with 15 promising entries, received from coordinated centres, were also evaluated at these ten locations. In addition, four sets each of the three International trials and nurseries which comprised a total of 378 entries were received from ICARDA during *rabi* 2017-18. These international trials and nurseries were evaluated along with suitable Indian checks at different selected locations. One set each of these nurseries and trials was also sown at ICAR-IIWBR, Karnal, and barley breeders from SAUs and ICAR institutes were given an opportunity to select desirable germplasm from this germplasm during a Field Day organized on 28th March, 2018 at Indian Institute of Wheat and Barley Research, Karnal, and a total of 94 germplasm lines were selected.

International trials and nurseries evaluated during crop season 2017-18

Sr. No	Trial/ Nurseries	Genotypes received from ICARDA	Indian checks	Number of Sets	Locations
1.	IBYT-HI-2018	24	BH946	4	Karnal, Durgapura, Hisar, Ludhiana
2.	INBYT-HI-2018	24	BHS352 & Geetanjali	4	Karnal, Ludhiana, Bajaura, Kanpur
3.	5 th GSYT-2018	24	K603	4	Karnal, Faizabad, Durgapura, Kanpur
4.	IBON-HI-2018	125	BH946	4	Durgapura, Hisar, Ludhiana, Karnal
5.	INBON-HI-2018	66	BHS352 & Geetanjali	4	Karnal, Bajaura, Ludhiana, Kanpur
6.	5 th GSBON-2018	115	Lakhan	4	Karnal, Kanpur, Faizabad, Durgapura

Zonal Monitoring

The teams constituted for monitoring of Barley Network Yield Trials & Nurseries in central zone, NWPZ, NEPZ and NH Zone, visited different locations of the three zones at the most appropriate stage of the crop and recorded observations about the varietal performance, conduct of trials, disease/ pest incidence and genetic purity of the test entries. The team in NHZ was common for wheat and barley crops, while in other zones barley monitoring was done little earlier keeping the crop stage in mind. On the spot decisions were taken about the rejection of trials and purity of test entries through consensus. The proceedings of these team meetings have been circulated for necessary action by concerned breeders and other scientists and copies of the same is appended in the report for record.

Zonal monitoring visits of the barley teams

Zone	Date	Centres visited
CZ	24-26 Feb., 2018	Udaipur, Vallabhnagar, Vijapur
NEPZ	21-24 Feb., 2018	Kanpur, Dalipnagar, Faizabad, Varanasi, Saini
NEPZ	26-28 Feb., 2018	Ranchi, Sabour, CAU Pusa
NWPZ & CZ	05-08 March, 2018	Mathura, Kumher, Morena, Gwalior, Durgapura, Bawal
NHZ I	23-26 April, 2018	Ranichauri Majhera, Hawalbagh (Almora)
NHZ II	09-13 April, 2018	Shimla, Berthein, Kangra, Malan, Palampur, Bajaura, Katrain

CROP PROTECTION

- Survey was conducted in the barley growing areas by different scientist and there was no rust in barley only loose smut was recorded *in traces* in some fields. Overall barley crop was healthy in all the barley growing areas in India.
- Survey was also conducted to determine the incidence of insect-pests and their natural enemies on barley crop. The main insect pest observed was aphid and its population was found to be moderate to high in barley fields. Among natural enemies, coccinellid beetles, chrysoperla and syrphid fly were frequently noticed preying on barley aphids.
- Total 634 entries were screened under various nurseries (IBDSN, NBDSN and EBDSN) for resistance against various diseases, aphid and CCN at different cooperating centers during the crop season 2017-18.
- Under the IBDSN nursery a total 417 entries were evaluated during 2017-18, among these, 39 entries were found free from yellow rust, 132 entries showed resistant reaction and 132 entries were found moderately resistant against leaf blight.
- Out of 136 entries evaluated during 2017-18 under NBDSN, 19 entries were found free from yellow rust, 65 entries showed resistant reaction to yellow rust and 21 entries showed moderate level of resistance against leaf blight.
- Eighty one entries screened in EBDSN, among these 16 entries found free from yellow rust, 46 shown resistant reaction to yellow rust. One entry DWRB101 found resistant to foliar blight whereas, 22 entries also showed moderate level of resistance against leaf blight.
- None of the NBDSN entry was found resistance to all the tested pathotypes of black, brown or yellow rust pathogens. Resistance to all the pathotypes of black and yellow rust pathogens was observed only in DWRB182. Similarly seven entries (HBL804, HBL812, JB357, RD2786 (C), RD2973, RD2974 and RD2976) conferred resistance to yellow and brown rust pathogens. Thirty one, nineteen and two entries were resistant to all the pathotypes of yellow, brown and black rust pathogens, respectively.
- None of the EBDSN entries was resistant to all the tested pathotypes of black, brown and yellow rusts pathogens. There were seven entries (RD2786, RD2941, RD2949, RD2955, RD2956, RD2957 and VLB153) showing resistance to all the pathotypes of yellow and brown rust pathogens. Eleven EBDSN entries conferred resistance to all the five isolates of the *P. hordei*.
- Among different fungicidal treatments, seed treatment (ST) with Vitavax power + Propiconazole @ 0.1% spray and ST with Vitavax power + Tebuconazole (Folicur) @ 0.1% spray found superior and equally effective against foliar blight and found significantly superior over control.
- A total of 136 barley entries were screened against foliar aphid at five locations (Ludhiana, Kanpur, Karnal and Durgapura) during 2017-18 and these fall in all the category grades i.e. 1 to 5. At Karnal centre, three entries viz., DWRB182, DWRB183 and KB1638 and at Ludhiana, four entries; RD2715, KB1633, PL891 and AZAD, were found moderately resistant (grade 3).
- Five entries viz., DWRB183, DWRB182, RD2988, JYOTI and DWRB160 were found immune (grade 1) at Kanpur location. In addition, one entry; DWRB184 was found resistant and two entries; RD2794 and HUB263 were found to be moderately resistant (grade 3) at Kanpur location.
- A total of eight treatments were tested for their efficacy against foliar aphid in barley at various locations. chlorantranilipride (1.19 aphids/tiller) was found to be the best treatment fifteen days after treatment at Ludhiana and it was at par with other insecticidal treatments. However, at Vijapur, observation taken after 15th day after spray revealed lowest aphid population in the plots treated with of imidacloprid 200 SL (Confidor 17.8) @ 20 g a.i/ha and it was at par with all the treatments except control.
- At Kanpur location, treatments of Fame (Flubendamide 480 SC) was found highly effective in reducing aphid population followed by imidacloprid 200 SL (Confidor 17.8) @ 20 g a.i/ha. Treatments with four insecticides; chlorantranilipride, acetamiprid, quinalphos 25, and imdacloprid gave similar results in curbing aphid population at Karnal.
- The efficacy of bio-pesticides viz., Azadirachtin, *Beauveria bassiana* and *Metarhizium anisopliae* was comparatively lower than chemical pesticides at all the locations. Out of three bio-pesticides, Azadirachtin 1000 ppm was comparatively better than *Beauveria bassiana* and

Metarhizium anisopliae. There were no significant differences between the yields obtained from treated and control plots at most of the tested locations.

- A total 217 entries that includes 136 of NBDSN and 81 of EBDSN, were screened against the Cereal Cyst Nematode (CCN) at three locations viz. Durgapura, Ludhiana and Hisar. Most of the entries fall in the category of susceptible or highly susceptible.

RESOURCE MANAGEMENT

The barley resource management group is involved in the evaluation of advanced barley genotypes and updating the package of practices under the AICRP. During 2017-18, the experiments were carried out at 12 locations covering the states of Himachal Pradesh, Uttarakhand, Punjab, Haryana, Rajasthan and Uttar Pradesh. A total of 39 trials were proposed, conducted and 38 were reported. The significant findings are:

- ❖ In tillage experiment conducted in NWPZ, the yield was at par under different tillage options but there is saving in the cost of cultivation, time and energy and so increase in net profit. In the same trial conducted in NHZ, the yield was significantly more under conventional tillage.
- ❖ The trial on seed rate and varieties conducted in NHZ revealed that The yield of all the varieties increased as the seed rate increased but use of 100 and 125 kg seed/ha were at par in yield.
- ❖ The trial conducted on integrated use of nutrients in NWPZ, reported that FYM and mulching has an additive effect on yield and soil fertility. In NEPZ, application of fertilizers coupled with FYM application @ 5 ton ha⁻¹, mulching @ 6 ton ha⁻¹ and foliar spray of ZnSo₄@ 0.5% or two foliar sprays of KCl @ 0.5 % resulted in significantly higher grain yield as compared to other treatments. Use of Azotobacter + PSB resulted in significantly higher grain yield (35.05 q ha⁻¹) compared to the control treatment.
- ❖ Plant growth regulators, chlormequat-chlorid (CCC) @1.25 L ha⁻¹ at GS₃₀₋₃₁ followed by ethephon(Cerone) @1.0 L ha⁻¹ at GS₃₉₋₄₀ recorded significantly higher grain yield in NWPZ and NEPZ.
- ❖ Among the herbicides used, the best treatment was Halauxifen methyl+Florasulam+Carfentrazone+Surfactant in NWPZ, which produced grain yield at par with weed free treatment. The grain yield reduction due to weeds in weedy check was 29.2 % as compared to weed free conditions. Similar results were observed in NEPZ and CZ. In NHZ grain yield was at par in application of Halauxifen methyl +Florasulam+Carfentrazone+Surfactant, Halauxifen-methyl Ester+ Florasulam 40.85% WG + Polyglycol 26-2 N and weed free condition
- ❖ Seed treatment with Pusa Hydrogel @ 2.5 kg ha⁻¹ resulted in significantly higher grain yield as compared to control conditions. Grain yield (41.87 q ha⁻¹) increased with the increase in irrigation level and three irrigation produced the highest yield.
- ❖ Foliar spray of 2.0% at 45,60 and 75 DAS resulted in significantly higher grain yield as compare to foliar spray of 1.5 %, Reduction in recommended fertilizer dose resulted a significant yield loss.

QUALITY EVALUATION

Malting Quality

The Barley Network Unit took up the evaluation of grain samples of Advanced Varietal Trial (AVT) and Initial Varietal Trial (IVT) on malt barley received from various test sites at its central facility for malting quality evaluation. The malt barley varietal trials were conducted in NWPZ during Rabi 2017-18. The trial conducting centers were requested to provide about 500 gm grain sample of each genotype. The grain samples were received from seven locations (Hisar, Karnal, Bawal,

Ludhiana, Bathinda, Durgapura and Pantnagar. This year a total of 133 samples were received. There were 13 test entries in IVT (TS) and one entry in AVT (DWRB 160) along with five checks. There were several entries observed promising for individual traits, after the detailed analysis across locations in the NWP Zone. This was done by the system of scoring giving due weightage to important traits. Thus based on the ten important traits (a maximum possible score of 30), entries DWRB 160 and PL 905 were having better overall malting quality score.

Promising entries* for individual malting quality trait

Traits	Promising entries
Test Weight	DWRB 160, DWRB 181
Bold Grains (%)	DWRB160, PL904, DWRB184, RD2986, DWRB181, RD2987
Thousand grain weight	DWRB160, PL904, RD2985, RD2988, RD2986
Husk Content	PL905, RD2986, PL904
Beta glucan	DWRB182, PL905, KB1638, RD2987, DWRB181
Malt Friability	DWRB184, PL905
Hot water extract	PL905
Filtration Rate	PL904, PL905
Diastatic Power	RD2986, DWRB182, DWRB183
Over all MQ	DWRB 160, PL 905

*Superior or at par to best check

Barley quality screening nursery

Ten huskless genotypes were evaluated for grain physical traits at four locations and BQSN-A-18 was found best, while eleven malt barley genotypes were evaluated at five locations and BQSN-B-7 was found better than others.

Feed Barley Quality

The feed grain samples from various trials and grown at different locations were analysed for few physical parameters and protein content. A total of 444 samples were received encompassing ten trials and grown in their respective zones. The entries with highest value for each of the parameter analyzed are listed below:

Sr. No.	Trial	Zone	Test weight	Thousand grain weight (g)	Bold grain (%)	Thin grain (%)
1	AVT (RF)	NHZ	BHS352 ©, HBL793	UPB1071	UPB1070	UPB1070
2	AVT (DP)	NHZ	HBL797	UPB1072	UPB1070	UPB1070
3	AVT (IR)	NEPZ	RD2948	JYOTI ©	DWRB137©	DWRB137©
4	IVT (IR)	NWPZ & NEPZ	HUB261	PL900	RD2786©	RD2786©
5	IVT (RF)	NEPZ	PL905	RD2981	RD2981	RD2981
6	AVT (SAL/ALK)	NWPZ & NEPZ	DWRB180	KB1632	HUB263	RD2979
7	IVT (DP)	NWPZ & NEPZ	AZAD ©	NDB1682	NDB1682	UPB1075

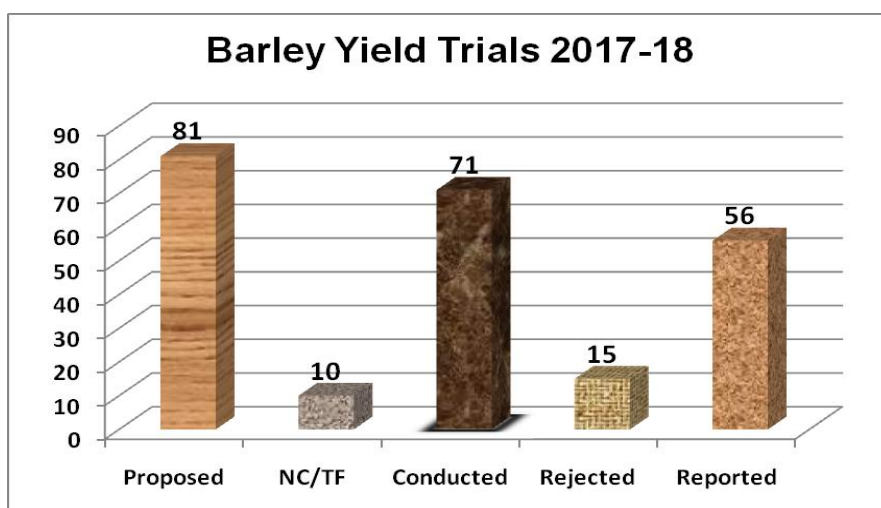
New initiatives were undertaken to improve productivity of barley, malting quality, food purpose barley, lodging tolerance through screening of germplasm, pre-breeding activity, integration of molecular breeding for improving quality and biotic stress, popularisation of barley for the health benefits (high antioxidant, higher beta glucan content). Linkages with national and international organizations, industries and farmers were also strengthened. Scientists visited the malting, brewing and food industries to promote the use of malt and food barley in different products. There is lack of assured market and procurement system and low minimum support price for barley render the crop unpopular among the farmers. There is no good network of barley seed producers where farmers can get certified seed of improved varieties. Low yield of hulless barley varieties is also an issue and focus is being given to develop improved varieties.

BREAK UP OF BARLEY NETWORK YIELD TRIALS

(RABI 2017- 18)

S. No.	Trial Name	No. of Trials				
		Proposed	Not Conducted / Failed/ Not Received/rejected	Data Received	Data Rejected	Data Reported
1.	AVT (RF) Hills	10	2 (Almora, Rajauri)	8	2 (Ranichauri, Majhera)	6
2.	AVT (IR-FB)-NEPZ	7	1 (Rewa)	6	1 (PUSA)	5
3.	AVT (IR-FB)-CZ	6	1 (Banswara)	5	1 (Morena)	4
4.	AVT-SST	7	-	7	1 (Kumher)	6
5.	AVT (Dual Type) Hills	5	-	5	3 (Palampur, Majhera, Almora)	2
6.	IVT (IR-FB) Plains	17	2 (Rewa, Banswara)	15	3(Karnal, PUSA, Morena)	12
7.	IVT (IR-TS) Malt Barley	9	-	9	-	9
8.	IVT (Dual Type) Plains	12	2(Banswara, Rewa)	10	3 (Bikaner (CSWRI), Bikaner, Anand)	7
9.	IVT-RF-NEPZ (Grain)	8	2(Tisshui, Rewa)	6	1 (PUSA)	5
	TOTAL	81	10	71	15	56
				77.7%	21.1%	69.1% (P) 78.9% (R)

P= percent of proposed trials, R= percent of received trials



Performance of test sites during Rabi 2017-18

No.	Centres	No. of Trials		Trials Rejected		
		Allotted	Conducted	No.	Name	Reason
(A) MAIN CENTRES						
1.	Almora	2	2	2	AVT-RF-NHZ, AVT-DP-NHZ	RMT, LSM
2.	Bajaura	2	2	-	-	-
3.	Durgapura	3	3	-	-	-
4.	Faizabad	5	5	-	-	-
5.	Hisar	4	4	-	-	-
6.	Kanpur	4	4	-	-	-
7.	Karnal	3	3	1	IVT-IR-FB	LSM
8.	Ludhiana	3	3	-	-	-
9.	Rewa	4	-	-	-	-
10.	Shimla	2	2	-	-	-
11.	Varanasi	4	4	-	-	-
12.	Pantnagar	2	2	-	-	-
	Total (A)	38	34	3		

Contd....

Performance of test sites during Rabi 2017-18 (contd....)

No.	Centres	No. of Trials		Trials Rejected		
		Allotted	Conducted	No.	Name	Reason
(B)	TESTING CENTRES /SAU / DEPTT. OF AGRIC.					
1.	Anand	1	1	1	IVT-DP	LSM
2.	Bawal	1	1	-	-	-
3.	Banasthali	1	1	-	-	-
4.	Banswara	3	-	-	-	-
5.	Bathinda	1	1	-	-	-
6.	Berthein	1	1	-	-	-
7.	Bikaner	1	1	1	IVT-DP	LSM
8.	Bikaner, CSWRI	1	1	1	IVT-DP	LSM
9.	Dalipnagar	1	1	-	-	-
10.	Gwalior	2	2	-	-	-
11.	Jabalpur	1	1	-	-	-
12.	Kangra	1	1	-	-	-
13.	Katrain	1	1	-	-	-
15.	Kumher	1	1	1	AVT-SST	HCV
16.	Majhera	2	2	2	AVT-DP-NHZ, AVT-FB-NHZ	LSM
17.	Malan	1	1	-	-	-
18.	Mathura	1	1	-	-	-
20.	Morena	2	2	2	AVT-CZ, IVT-IR-FB	HCV
22.	Palampur	1	1	1	AVT-DP-NHZ	LSM
23.	Pusa, CAU	3	3	3	IVT-IR-FB, IVT-RF-NEPZ, AVT-NEPZ	LS
24.	Rajauri	1	-	-	-	-
25.	Ranchi	2	2	-	-	-
26.	Ranichauri	1	1	1	AVT-FB-NHZ	LSM
27.	Sabour	3	3	-	-	-
28.	Sagar	1	1	-	-	-
29.	Saini	1	1	-	-	-
30.	Sriganganagar	1	1	-	-	-
31.	Tabiji	1	1	-	-	-
32.	Tissuhi	1	-	-	-	-
33.	Udaipur	3	3	-	-	-
34.	Vallabhnagar	1	1	-	-	-
	Total (B)	43	38	13		

RMT= rejected by monitoring team, LSM= low yield levels LS= late sowing, HCV= High CV

Trial wise locations during Rabi 2017-18

S no.	Trial Name	Locations	Total
1	AVT (RF)-NHZ	Bajaura, Berthein, Kangra, Katrain, Malan, Shimla, Almora, Ranichauri, Majhera, Rajauri	10
2	AVT-DP-NHZ	Shimla, Bajaura, Palampur, Almora, Majhera	5
3	AVT-IR- NEPZ	Kanpur, Faizabad, Varanasi, Rewa, Pusa (CAU), Sabour, Ranchi	7
4	AVT-IR-CEN	Udaipur, Banaswara, Gwalior, Morena, Sagar, Vijapur	6
5	AVT-SST	Dalipnagar, Faizabad, Hisar, IIWBR Hisar, Kumher, Bansthali, Vallabhnagar	7
6	IVT (IR-TS) Malt Barley	Bawal, Hisar, Karnal, Ludhiana, Bathinda, Durgapura, Mathura, Pantnagar, SG Nagar	9
7	IVT (IR-TS) Feed Barley	Hisar, Karnal, Ludhiana, Durgapura, Tabiji, Banswara, Udaipur, Pantnagar, Kanpur, Varanasi, Faizabad, Rewa, Morena, Gwalior, Pusa (CAU), Sabour, Ranchi	17
8	IVT (Dual Type) Plains	Bikaner, Bikaner (CSWRI), Durgapura, Udaipur, Banswara, Jabalpur, Rewa, Hisar, Ludhiana, Kanpur, Faizabad, Varanasi, Anand	12
9	IVT (RF)-NEPZ	Kanpur, Varanasi, Faizabad, Tissuhi, Rewa, Pusa, Sabour, Saini	8
	Total		81

Center wise Summary Rabi 2017-18

S No.	Centre	Trials proposed	Total
(A) MAIN CENTRES			
1.	Almora	AVT(RF)-NHZ, AVT(DUAL)	2
2.	Bajaura	AVT(RF)-NHZ, AVT(DUAL)	2
3.	Durgapura	IVT(M)TS, IVT (IR)-DP , IVT-IR-FB	3
4.	Faizabad	AVT-SST, IVT(RF)-NEPZ, AVT-IR-NEPZ, IVT-IR-FB, IVT (DUAL)Plains	5
5.	Hisar	IVT(M)TS, IVT (IR)-DP , IVT-IR-FB, AVT-SST	4
6.	Kanpur	IVT(RF)-NEPZ, AVT-(IR)-NEPZ, IVT(IR)-FB, IVT- DP	4
7.	Karnal	IVT(M)TS, AVT-SST, IVT-IR-FB	3
8.	Ludhiana	IVT(M)TS, IVT-IR-FB, IVT-DP	3
9.	Rewa	IVT(RF)-NEPZ, AVT(IR)-NEPZ, IVT-IR-FB, IVT(DP)Plains	4
10.	Shimla	AVT(RF)-NHZ, AVT-RF(DUAL)-NHZ	2
11.	Varanasi	IVT(RF)-NEPZ, AVT-(IR)-NEPZ, IVT(IR)-FB, IVT- DP	4
12.	Pantnagar	IVT(M)TS, IVT(IR)-FB	2
		Sub Total	38
(B) TESTING CENTRES /SAU / DEPTT. OF AGRIC.			
S No.	Centre	Trials proposed	Total
1.	Anand	IVT(DUAL)-TS	1
2.	Bawal	IVT(M)TS	1
3.	Banasthali	AVT-SST	1
4.	Banswara	IVT(IR)-FB, AVT(IR)CEN, IVT(IR)DP	3
5.	Bathinda	IVT(M)TS	1
6.	Berthein	AVT(RF)NHZ	1
7.	Bikaner	IVT(IR)Dual	1
8.	Bikaner, CSWRI	IVT(IR)Dual	1
9.	Dalipnagar	AVT-SST	1
10.	Gwalior	IVT(IR)FB, AVT(IR)CEN	2
11.	Jabalpur	IVT(IR)Dual	1
12.	Kangra	AVT(RF)NHZ	1
13.	Katrain	AVT(RF)NHZ	1
15.	Kumher	AVT-SST	1
16.	Majhera	AVT(RF)Dual, AVT(RF)NHZ	2
17.	Malan	AVT(RF)NHZ	1
18.	Mathura	IVT(M)TS	1
20.	Morena	IVT(IR)FB, AVT(IR)CEN	2
22.	Palampur	AVT(RF)-Dual	1
23.	Pusa, CAU	IVT(RF)NEPZ , AVT(IR)NEPZ, IVT(IR)FB	3
24.	Rajauri	AVT(RF)NHZ	1
25.	Ranchi	AVT-IR-NEPZ, IVT-IR-FB	2
26.	Ranichauri	AVT(RF)NHZ	1
27.	Sabour	IVT-RF-NEPZ , AVT(IR)NEPZ, IVT(IR)FB	3
28.	Sagar	AVT(IR)CEN	1
29.	Saini	IVT-RF-NEPZ	1
30.	Sriganganagar	IVT(M)TS	1
31.	Tabiji	IVT(IR)FB	1
32.	Tissuhi	IVT(RF)-NEPZ	1
33.	Udaipur	AVT (IR)CEN, IVT(IR)TS-Dual, IVT(IR)FB	3
34.	Vallabh Nagar	AVT-SST	1
		SUB TOTAL	43
		G TOTAL (A+B)	81

**PARENTAGE OF BARLEY STRAINS UNDER COORDINATED
EVALUATION DURING RABI 2017-18**

No.	CONTRIBUTING CENTRE	SYMBOLS
1	ALMORA, V.P.K.A.S.	VLB
2	BAJAURA, R.R.S. (CSKHPKV)	HBL
3	DURGAPURA, R.A.R.I. (SKRAU)	RD
4	FAIZABAD, N.D.U.A&T.	NDB
5	HISAR, C.C.S.H.A.U.	BH
6	KANPUR, C.S.A.U.&T.	KB
7	KARNAL, I.I.W.B.R.	DWRB, DWRUB
8	LUDHIANA, P.A.U.	PL
9	PANTNAGAR, G.B.P.U.A.&T.	UPB
10	REWA, J.N.K.V.	JB
11	SHIMLA, RS, I.A.R.I	BHS
12	VARANASI, B. H. U.	HUB

S. No.	Entries	Parentage
ICAR-IARI, RS, Shimla		
1	BHS461	IBYT-LRA-C-1(2009-10)
2	BHS462	1st GBYT-9 (2012-13)
3	BHS463	Manal/3/Lignee527/NK1272/JLB70-63/4/Maknusa
4	BHS464	IBYT-LRA-C-1(2010-11)
5	BHS465	IBYT-HI-7 (2012-13)
6	BHS466	IBYT-HI-15 (2012-13)
7	BHS467	IBYT-HI-6 (2013-14)
8	BHS468	IBON-HI-33 (2009-10)
GBPUA&T, Pantnagar		
9	UBP1070	DOLMA/BH947
10	UBP1071	EIBGN Plot 56 (2015-16)
11	UBP1072	UPB 1005/JB225
12	UBP1073	EIBGN Plot 58 (2015-16)
13	UBP1074	UPB 1006/Jyoti
14	UBP1075	RD2552/RD2670
ICAR-VPKAS, Almora		
15	VLB155	CEV 96060/3/ARUPO/K8755//MORA/4/CANELA
16	VLB156	ATAHUALPA/DD-21//MALT 2
17	VLB157	MN BRITE/LEGACY/4/LEGACY*2/3/PETUNIA 1/CHEVRON-BAR//TOCTE
18	VLB158	GOB/5/MERIT,B/4/GOB/HUMAI10//CANELA/3/ALELI/6/MSEL
19	VLB159*	DD-21/4/ALISO/CI3909.2//HB602/3/MOLA/SHYRI//ARUPO*2/JET
20	VLB160	TOCTE/ND16301
CSKHPKV, RRS, Bajaura		
21	HBL789	HBL113/Barot Local
22	HBL793*	HBL316/Dolma
23	HBL797*	HBL276/HBL113
24	HBL802*	INBON- 25 (2014-15)
25	HBL804	DWRUB74/HBL316
26	HBL812	DWRUB74/HBL316
27	HBL814	RD2752/Dolma
28	HBL818	IBON-59 (2014-15)
29	HBL821	IBON-72 (2014-15)
30	HBL822*	INBON-26 (2014-15)

CCSHAU, Hisar		
31	BH1020	NBGSN-4 (2011-12)/BH393
32	BH1021	NBGSN-30(2010-11)/BQCN-25(2010-11)
BHU, Varanasi		
33	HUB253	JB 18/31st IBON-4-02
34	HUB260	BH 550/IBON-39-1
35	HUB261	33 RD IBON-43-1/BH 902
36	HUB262	25 TH IBYT-45-1/K-727
37	HUB263	RD 2660/BH 902
38	HUB264	MOROC-9-75/RD 2508
JNKVV, Rewa		
39	JB357	30th IBYT – 911
40	JB360	JB 14/JB 211
41	JB362	JB 1/PL 751
42	JB363	K 226/PL 799
43	JB364	K 1185/DL 88
SKNAU, RARI, Durgapura		
44	RD2948	RD 2660/RD 2811
45	RD 2969	RD-2552/RD-2503//RD 2715
46	RD 2970	RD-2552/RD-2503//RD 2715
47	RD 2971	RD-2552/RD-2747
48	RD 2972	RD-2715/RD-2552
49	RD 2973	PL 472/BL 2//RD-2508
50	RD 2974	RD-2660/13 TH EMBGSN-4
51	RD 2975	RD-2715/RD-2552
52	RD 2976	RD-2636/RD-2521//RD-2503
53	RD 2977	RD-2552/PL-419//RD-2508
54	RD 2978	RD-2624/NDB-1173
55	RD 2979	RD-2552/BH-393
56	RD 2980	RD-2660/13 TH EMBGSN-4
57	RD 2981	RD-2660/13 TH EMBGSN-4
58	RD 2982	DWR 64/RD-2503
59	RD 2983	RD-2624/NDB 1173
60	RD 2984	DWR 39/RD-2651
61	RD 2985	Clipper/RD-2668//DWR73
62	RD 2986	DWR39/RD-2651
63	RD 2987	Clipper/EB921//RD-2668
64	RD 2988	DWRUB52/RD-2651
PAU, Ludhiana		
65	PL891*	IBON 343/12th HSBN-176
66	PL892	RD 2683/ RD 2552
67	PL898	PL 751/BH 902
68	PL900	PL751/BH902
69	PL902	VJM560/K898
70	PL903	DWRUB64/RD2668
71	PL904	DWRUB64/RD2668
72	PL905	VJM 604/PL764
CSAUA&T, Kanpur		
73	KB1531	EIGBN-67 (2014-15)
74	KB1605	IBON46/Jyoti
75	KB1606	Manjula/DWRUB52
76	KB1616	Jagriti/RD2785
77	KB1628	3rdGSBYT-18 (2015-16)
78	KB1632	EIBGN -73 (2015-16)
79	KB1633	EIBGN -58 (2015-16)
80	KB1634	Lakhan/JB137
81	KB1636	K141/K603
82	KB1638	K551/NDB1295

83	KB1640	Jagriti/RD2552
NDUA&T, Faizabad		
84	NDB 1680	I st GSBSN (2013-14)
85	NDB 1682	I st GSBSN-97 (2013-14)
86	NDB 1683	30 th IBYT-911 (2008-09)
87	NDB 1698	NDB226/Azad
88	NDB 1699	NB2/K580/NB-2
ICAR-IIWBR, Karnal		
89	DWRB160	DWRB62/DWRB73
90	DWRB180	P.STO/3/LBIRAN/UNA80//LIGNEE640/4/BLLU/5/PETUNIA1/6/M111
91	DWRB181	DWRUB52/DWRB77
92	DWRB182	DWRUB52/DWRB78
93	DWRB183	DWR28/DWRUB52
94	DWRB184	DWRUB52/DWR81
95	DWRB185	DWR28/DWRUB64
96	DWRB186	DWRUB52/RD2715
97	DWRB187	RD2035/ RD2552
98	DWRB188*	PENCO/CHEVRON-BAR/3/LEGACY//PENCO/CHEVRON-BAR (Hulless)
Checks		
1	Azad	K12/K19
2	BH902	BH495/RD2552
3	BH946	BHMS22A/BH549//RD2552
4	BH959	BH393/BH331
5	BHS352	HBL240/BHS504//VLB129
6	BHS380	VOILET/MJA/7/ABN-B6/BA/GAL//FZA-B/5/DG/DC-B/PT-BAR/3/RA-B/BA/3/4/TRYIGAL
7	BHS400	34 th IBON-9009
8	DWRB101	DWR28/BH581
9	DWRB123	DWRUB54/DWR51
10	DWRB137	DWR28/DWRUB64
11	HBL113	SELECTION FROM ZYPHYZE
12	HBL276	HBL233/HBL238
13	HUB113	KARAN280/C138
14	Jyoti	K 12/C 251
15	K508	K394/K141
16	K603	K257/C138
17	Karan16*	AZAM (DWARF)1/EB7576
18	Lakhan	K12/IB226
19	NDB943*	K 1178/Karan 748
20	NDB1173	BYTLRA 3-(1994-95)/NDB217
21	NDB1445	NDB940/Ratna
22	PL751	K226/PL226
23	RD2035	RD103/PL101
24	RD2552	RD2035/DL472
25	RD2715	RD387/BH602//RD2035
26	RD2786	RD2634/NDB1020//K425
27	RD2794	RD2035/RD2683
28	RD2849	DWRUB52/PL705
29	RD2899	RD2592/RD2035//RD2715
30	RD2907	RD103/RD2518//RD2592
31	VLB118	14 th EMSBN-9313

*Hulless barley

INITIAL VARIETAL TRIAL (RAINFED) – NEP ZONE

- The trial was proposed at 8 centres in NEPZ and data were reported from six centres except, Rewa and Tissuhi. All the locations, except PUSA (late sowing) were considered for zonal mean compilation.
- The trial comprised of 15 test entries and 2 checks viz. K603 and Lakhan.
- The trial mean grain yield was observed as 27.71 q/ha, which ranged from 16.37 q/ha (Varanasi) to 35.16 q/ha (Faizabad) indicating good genotypic performances across the centres. The check variety Lakhan ranked first (33.14 q/ha) followed by the check K603 (32.48 q/ha), whereas AVT first year entry showed average grain yield of 30.40 q/ha and ranked at 5th position.

ADVANCED VARIETAL TRIAL (RAINFED) – NH ZONE

- This trial with 18 test entries and 3 checks varieties was conducted at ten locations.
- This trial was rejected by the monitoring team at Almora and Rajauri centre did not report the data. Data of Majhera and Ranichauri locations were not considered for pooled analysis due to low yields and high CV.
- Highest general mean for grain yield (35.31 q/ha) was obtained at Bajaura followed by Katrain (35.31 q/ha) locations. Zonal mean for grain yield across the entries was 24.5 q/ha.
- HBL113 was found to be the best check with 29.3 q/ha grain yield. No test entry was significantly superior to the best check.

IVT-RF-NEPZ
Location wise & Zonal means (Grain Yield in q/ha)

Varieties	Codes	Saini			Kanpur			Faizabad			Sabour			Varanasi			Zonal Mean*			
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	
DWRB185	IVTRFNEPZ-5	22.55	17	0	28.99	13	0	44.38	3	1	25.36	9	0	16.57	7	0	27.57	9	0	
DWRB186	IVTRFNEPZ-15	25.27	13	0	30.80	10	0	37.14	6	0	21.41	13	0	9.84	17	0	24.89	14	0	
HUB253**	IVTRFNEPZ-12	36.68	3	1	40.31	1	1	26.87	15	0	26.51	8	0	21.62	3	0	30.40	5	0	
HUB260	IVTRFNEPZ-9	24.46	14	0	31.61	8	0	30.50	12	0	24.97	11	0	13.06	16	0	24.92	13	0	
JB362	IVTRFNEPZ-1	32.61	5	0	32.70	7	0	36.84	7	0	34.72	1	1	14.99	10	0	30.37	6	0	
JB363	IVTRFNEPZ-16	29.89	10	0	29.89	11	0	24.76	16	0	28.99	4	0	15.64	9	0	25.83	10	0	
KB1606	IVTRFNEPZ-7	37.09	1	1	36.23	4	1	42.57	4	0	26.87	5	0	13.42	15	0	31.24	3	0	
KB1616	IVTRFNEPZ-11	29.89	9	0	25.36	17	0	33.21	11	0	26.57	7	0	13.87	12	0	25.78	12	0	
KB1633	IVTRFNEPZ-6	37.09	2	1	29.44	12	0	35.21	9	0	21.92	12	0	16.88	6	0	28.11	8	0	
NDB1680	IVTRFNEPZ-8	26.22	11	0	27.99	15	0	29.89	13	0	18.87	15	0	14.40	11	0	23.47	16	0	
PL905	IVTRFNEPZ-14	23.51	16	0	27.17	16	0	35.48	8	0	20.29	14	0	13.63	14	0	24.02	15	0	
RD2981	IVTRFNEPZ-10	31.66	7	0	34.42	5	0	40.46	5	0	26.81	6	0	18.29	5	0	30.33	7	0	
RD2982	IVTRFNEPZ-4	24.46	14	0	28.99	13	0	24.70	17	0	18.54	16	0	13.74	13	0	22.08	17	0	
RD2983	IVTRFNEPZ-13	32.61	5	0	31.61	8	0	29.29	14	0	16.49	17	0	18.97	4	0	25.79	11	0	
RD2984	IVTRFNEPZ-2	26.22	11	0	38.13	3	1	46.80	1	1	25.12	10	0	16.56	8	0	30.57	4	0	
K603 ©	IVTRFNEPZ-3	30.71	8	0	39.86	2	1	34.42	10	0	33.57	2	1	23.85	1	1	32.48	2	1	
Lakhan ©	IVTRFNEPZ-17	33.42	4	1	34.42	6	0	45.29	2	1	29.58	3	0	22.99	2	1	33.14	1	1	
G.M.		29.67			32.23			35.16			25.09			16.37			27.71			
S.E.(M)		1.86			1.74			1.63			1.47			0.73			0.69			
C.D.		4.40			4.12			3.87			3.48			1.74			1.61			
C.V.		12.52			10.77			9.29			11.69			7.69						
DOS		01-11-2017			10-11-2017			07-11-2017			08-11-2017			10-11-2017						

*Data from CAU, PUSA (LS) were not included in zonal means, **AVT first year entry

INITIAL VARIETAL TRIAL-(RF)

ZONE: NEPZ

Summary of ancillary and disease data

RABI – 2017-18

Sr. No.	ENTRY	AGRONOMIC CHARACTERS						GRAIN CHARACTERISTICS			DISEASE REACTION		
		H. days Mean & Range	M. days Mean & Range	Height Mean & Range (cm)	Tillering per meter Mean & Range	Spike length (cm) Mean & Range	Two/Six Row	Colour	1000 g.w Mean & Range	H/N	SMUT		Leaf Blight
											L (%)	C (%)	
1	JB362	71 (65-79)	116 (101-126)	72 (50-100)	80 (37-115)	7 (6-9)	6	Y	43 (32-48)	H	0	0	46
2	DWRB185	76 (70-87)	117 (102-130)	72 (56-88)	89 (45-120)	8 (6-10)	6	Y	47 (40-52)	H	0	0	35
3	DWRB186	81 (63-90)	122 (96-140)	79 (55-104)	85 (45-129)	8 (6-9)	6	Y	37 (34-39)	H	0	0	79
4	HUB253	73 (67-81)	117 (102-130)	76 (56-100)	83 (58-100)	7 (6-8)	6	Y	41 (35-44)	H	0	0	35
5	HUB260	81 (74-86)	123 (107-136)	85 (56-106)	85 (42-135)	7 (6-8)	6	Y	41 (38-45)	H	0	0	35
6	JB363	68 (61-75)	115 (98-129)	81 (57-112)	85 (51-117)	8 (7-11)	6	Y	40 (31-46)	H	0	2.5	35
7	KB1606	80 (58-92)	127 (114-141)	71 (50-112)	89 (54-122)	8 (7-10)	6	Y	39 (35-42)	H	0	0	68
8	KB1616	78 (71-88)	120 (106-127)	80 (60-99)	89 (47-119)	9 (7-11)	6	Y	37 (35-40)	H	0	0	68
9	KB1633	79 (75-85)	121 (104-135)	84 (67-104)	85 (62-105)	8 (5-10)	6	Y	40 (37-44)	H	0	0	46
10	NDB1680	77 (73-85)	120 (105-135)	67 (47-88)	70 (35-103)	7 (6-9)	6	Y	35 (29-40)	H	0	0	34
11	PL905	81 (75-89)	122 (112-129)	72 (53-92)	101 (69-141)	8 (7-9)	2	Y	43 (40-45)	H	0	0	24
12	RD2981	75 (68-84)	117 (98-128)	72 (48-93)	82 (45-122)	8 (6-10)	6	Y	47 (32-58)	H	8	7	35
13	RD2982	77 (70-85)	118 (103-134)	85 (54-111)	85 (54-113)	8 (7-10)	6	Y	43 (33-50)	H	0	0	46
14	RD2983	72 (66-77)	115 (103-128)	82 (69-92)	79 (37-127)	7 (7-8)	6	Y	42 (30-49)	H	0	0.5	68
15	RD2984	74 (68-86)	117 (102-129)	72 (56-95)	91 (53-130)	8 (7-9)	6	Y	44 (39-49)	H	6	7	79
16	K603 ©	75 (66-81)	117 (104-127)	87 (60-113)	89 (51-118)	8 (7-10)	6	Y	43 (35-48)	H	0	0	35
17	LAKHAN ©	78 (72-85)	121 (109-133)	90 (66-124)	98 (75-129)	8 (7-11)	6	Y	42 (32-48)	H	0	0	68

ADVANCED VARIETAL TRIAL (RAINFED)-NHZ, Rabi 2017-18
Location wise & Zonal means (Grain Yield in q/ha)

Entry	Code	Kangra			Malan			Bajaura			Shimla			Berthin			Katrain			Pooled		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
BHS465	NHGBZ-8	19.13	13	0	27.04	4	1	40.68	4	0	14.98	13	0	13.95	12	0	30.43	16	0	24.4	13	0
BHS466	NHGBZ-15	28.57	5	0	28.62	2	1	44.33	2	0	17.41	6	1	7.39	19	0	48.86	1	1	29.2	3	1
BHS467	NHGBZ-13	24.47	8	0	26.32	6	0	38.90	7	0	19.24	2	1	11.52	16	0	48.14	2	1	28.1	5	0
BHS468	NHGBZ-10	18.88	14	0	22.62	12	0	34.94	12	0	12.48	21	0	6.52	20	0	36.65	7	0	22.0	15	0
HBL789	NHGBZ-9	12.42	20	0	16.36	18	0	23.91	20	0	14.30	16	0	9.78	17	0	35.82	9	0	18.8	19	0
HBL793	NHGBZ-5	14.16	18	0	13.66	20	0	24.84	19	0	14.09	17	0	12.68	15	0	27.95	18	0	17.9	20	0
HBL802	NHGBZ-12	11.18	21	0	13.20	21	0	33.46	15	0	13.11	19	0	5.07	21	0	24.22	20	0	16.7	21	0
HBL812	NHGBZ-19	21.37	11	0	18.12	17	0	39.75	5	0	15.33	11	0	22.46	5	0	36.65	7	0	25.6	12	0
HBL814	NHGBZ-7	13.66	19	0	22.45	14	0	37.42	9	0	17.86	4	1	22.28	8	0	32.30	14	0	24.3	14	0
UPB1070	NHGBZ-16	29.44	3	0	27.32	3	1	33.31	16	0	16.63	7	0	22.46	5	0	45.96	3	0	29.2	4	1
UPB1071	NHGBZ-18	16.40	17	0	15.72	19	0	22.36	21	0	14.76	15	0	20.29	9	0	29.19	17	0	19.8	17	0
UPB1072	NHGBZ-14	29.94	2	1	23.61	11	0	38.35	8	0	13.07	20	0	25.36	3	1	36.75	6	0	27.8	6	0
VLB155	NHGBZ-4	22.73	10	0	23.93	10	0	33.62	14	0	15.70	10	0	22.46	5	0	35.40	11	0	25.6	11	0
VLB156	NHGBZ-1	27.83	7	0	22.61	13	0	35.95	11	0	17.68	5	1	26.81	2	1	33.64	13	0	27.4	7	0
VLB157	NHGBZ-21	30.56	1	1	23.99	9	0	42.31	3	0	19.24	1	1	26.99	1	1	35.82	9	0	29.8	1	1
VLB158	NHGBZ-2	18.63	15	0	26.33	5	0	37.11	10	0	19.22	3	1	13.77	13	0	42.13	4	0	26.2	10	0
VLB159	NHGBZ-20	20.62	12	0	19.32	16	0	29.97	17	0	13.98	18	0	7.54	18	0	27.95	18	0	19.9	16	0
BHS352 ©	NHGBZ-17	17.64	16	0	19.49	15	0	26.55	18	0	15.19	12	0	13.04	14	0	22.98	21	0	19.1	18	0
BHS400 ©	NHGBZ-3	23.85	9	0	29.06	1	1	34.24	13	0	16.56	8	0	23.73	4	0	32.30	14	0	26.6	8	0
HBL113 (c)	NHGBZ-6	29.19	4	0	24.03	8	0	49.84	1	1	16.01	9	0	18.66	10	0	37.89	5	0	29.3	2	1
VLB118 ©	NHGBZ-11	28.45	6	0	25.34	7	0	39.60	6	0	14.83	14	0	15.58	11	0	34.78	12	0	26.4	9	0
	G.M.	21.86			22.34			35.31			15.79			16.59			35.04			24.5		
	S.E.(M)	0.45			1.10			1.33			0.93			1.38			1.07			0.44		
	C.D.	1.06			2.61			3.15			2.19			3.26			2.55			1.03		
	C.V.	4.10			9.89			7.55			11.73			16.63			5.30					
	DOS	9.11.17			10.11.17			8.11.17			6.11.17			8.11.17			10.11.17					

ADVANCED VARIETAL TRIAL (RAINFED)-NHZ, Rabi 2017-18
Summary of ancillary and disease data

Sr. No.	ENTRY	AGRONOMIC CHARACTERS						GRAIN CHARACTERISTICS			DISEASE REACTION	
		H. days Mean & Range	M. days Mean & Range	Height Mean & Range (cm)	Tillering per meter Mean & Range	Str. Stn. Mean & Range	Two / Six Row	Grain Colour	1000 g.w Mean & Range	H/N	RUST YL	Leaf Stri p e
1	BHS465	125 (104-162)	169 (143-198)	72 (53-98)	116 (70-231)	2 (1-4)	6	Y	36 (30-46)	H	Tr	1
2	BHS466	123 (97-163)	171 (144-197)	75 (57-92)	93 (42-194)	3 (1-5)	6	Y	41 (36-49)	H	5S	-
3	BHS467	124 (107-159)	171 (141-202)	70 (53-95)	91 (46-184)	3 (1-5)	6	Y	42 (40-45)	H	0	-
4	BHS468	127 (108-156)	171 (141-202)	72 (58-56)	100 (46-180)	3 (1-5)	6	Y	42 (35-49)	H	Tr	-
5	HBL113	127 (109-162)	171 (142-200)	71 (61-94)	151 (73-274)	2 (1-4)	2	Y	39 (35-52)	H	0	-
6	HBL789	124 (106-155)	169 (140-193)	90 (71-126)	95 (54-187)	2 (1-3)	2	Y	46 (44-50)	H	0	-
7	HBL793	126 (107-161)	169 (139-199)	81 (60-106)	101 (41-191)	2 (1-3)	6	A	36 (29-45)	HL	0	-
8	HBL802	127 (108-164)	171 (143-197)	70 (53-91)	70 (30-127)	3 (1-5)	6	A	41 (34-50)	HL	0	3
9	HBL812	123 (105-156)	169 (139-198)	79 (63-101)	99 (43-210)	2 (1-4)	6	Y	35 (29-51)	H	0	-
10	HBL814	121 (103-158)	167 (135-199)	75 (51-101)	104 (48-191)	3 (1-4)	6	Y	35 (30-45)	H	0	1
11	UPB1070	121 (103-154)	171 (140-197)	72 (47-100)	100 (44-238)	2 (1-4)	6	Y	42 (33-46)	H	0	1
12	UPB1071	113 (93-148)	164 (132-196)	84 (57-119)	117 (57-236)	2 (1-4)	2	Y	48 (45-53)	H	0	-
13	UPB1072	117 (97-150)	170 (142-198)	73 (52-110)	117 (60-246)	3 (1-5)	6	Y	37 (33-43)	H	30S	-
14	VLB155	112 (91-149)	167 (134-196)	84 (57-111)	134 (72-268)	2 (1-4)	2	Y	46 (42-51)	H	10S	-
15	VLB156	126 (106-162)	171 (141-200)	78 (60-102)	108 (48-229)	3 (1-5)	6	Y	35 (27-50)	H	0	-
16	VLB157	121 (103-162)	167 (136-198)	70 (49-100)	148 (82-303)	2 (1-4)	2	Y	48 (44-51)	H	0	-
17	VLB158	123 (104-156)	170 (139-193)	71 (57-96)	94 (51-187)	3 (1-5)	6	Y	44 (39-51)	H	0	-
18	VLB159	120 (103-153)	167 (163-193)	69 (49-88)	118 (50-253)	2 (1-4)	2	A	40 (25-50)	HL	Tr	-
19	BHS352 ©	119 (101-156)	168 (136-196)	85 (58-109)	99 (63-202)	2 (1-3)	6	A	33 (27-42)	HL	0	-
20	BHS400 ©	125 (104-167)	171 (141-202)	76 (63-94)	120 (51-233)	3 (1-5)	6	Y	38 (30-44)	H	5S	-
21	VLB118 ©	121 (101-154)	169 (139-193)	76 (53-105)	97 (50-209)	3 (1-5)	6	Y	41 (37-43)	H	0	3

ADVANCED VARIETAL TRIAL (IRRIGATED) – NEP ZONE

- The trial was allotted to 7 centres in NEPZ and data from Rewa were not reported. The means of five locations, except PUSA (late sowing) were considered for zonal mean compilation.
- The trial comprised of 03 test entries viz., KB1531, PL892 and RD2948 and 05 check varieties.
- The zonal mean grain yield was exhibited as 38.0 q/ha and varied from 29.29 q/ha (Varanasi) to 47.36 q/ha (Ranchi). The check variety RD2552 ranked first (42.42 q/ha) and test entries namely PL892 (40.47 q/ha), KB1531 (37.71 q/ha) and RD2948 (37.21 q/ha) ranked 2nd, 3rd and 6th, respectively.

ADVANCED VARIETAL TRIAL (IRRIGATED) – CEN ZONE

- The trial was planned at 7 centres in CZ and was conducted at 05 locations except, Kota and Sagar centres. The data of 04 locations, except Morena (high CV) were pooled for statistical analysis.
- The trial comprised of 03 test entries viz., PL892, PL898 and KB1531 and 05 check varieties.
- The zonal mean grain yield was exhibited as 35.23 q/ha and ranged from 29.54 q/ha (Vijapur) to 42.23 q/ha (Gwalior). The check variety DWRB137 ranked first (39.20 q/ha) followed by identified check RD2899 (37.82 q/ha) and test entries namely PL892 (37.33 q/ha), KB1531 (32.58 q/ha) and PL898 (31.97 q/ha) ranked 3rd, 6th and 8th positions, respectively.

AVT- IR-FB-NEPZ
Location wise& Zonal means (Grain Yield in q/ha)

Varieties	Codes	Kanpur			Varanasi			Faizabad			Ranchi			Sabour			NEPZ*		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
KB1531	AVT-IR-NEPZ-1	38.86	4	0	27.31	6	0	44.11	2	1	43.86	7	0	34.43	4	1	37.71	3	0
PL892	AVT-IR-NEPZ-2	48.59	2	1	26.06	8	0	43.31	4	0	51.77	2	1	32.61	6	0	40.47	2	0
RD2948	AVT-IR-NEPZ-7	46.68	3	1	29.75	5	0	34.69	7	0	38.05	8	0	36.88	2	1	37.21	6	0
DWRB137 ©	AVT-IR-NEPZ-5	35.87	5	0	32.38	1	1	33.96	8	0	47.77	5	0	29.35	7	0	35.87	7	0
HUB113 ©	AVT-IR-NEPZ-8	32.39	7	0	26.24	7	0	43.31	4	0	50.40	3	1	36.01	3	1	37.67	4	0
Jyoti ©	AVT-IR-NEPZ-4	33.26	6	0	31.01	3	0	36.06	6	0	49.13	4	1	37.85	1	1	37.46	5	0
K508 ©	AVT-IR-NEPZ-3	29.62	8	0	30.40	4	0	46.21	1	1	44.21	6	0	25.63	8	0	35.21	8	0
RD2552 ©	AVT-IR-NEPZ-6	49.13	1	1	31.13	2	0	43.91	3	1	53.66	1	1	34.25	5	1	42.42	1	1
G.M.		39.30			29.29			40.69			47.36			33.38			38.00		
S.E.(M)		1.46			0.48			1.08			2.08			1.81			0.67		
C.D.		3.55			1.17			2.63			5.07			4.41			1.57		
C.V.		7.43			3.28			5.31			8.79			10.85					
DOS		25-11-2017			21-11-2017			10-11-2017			13-11-2017			25-11-2017					

*Data from CAU,PUSA (LS) were not included in zonal mean

Ancillary data

Sr. No.	ENTRY	AGRONOMIC CHARACTERS						GRAIN CHARACTERISTICS			DISEASE REACTION		
		H. days Mean & Range	M. days Mean & Range	Pl. Height Mean & Range (cm)	Tillers/ mt Mean & Range	Spike Length (cm) Mean & Range	Two/ Six Row	Colour	1000 g.w Mean & Range	H/N	Smut		Leaf Blight
											L(%)	C(%)	
1	KB1531	75 (68-80)	113 (109-120)	92 (78-112)	86 (71-132)	8 (7-9)	6	Y	42 (35-54)	H	0	0	57
2	PL892	76 (66-83)	115 (110-124)	93 (80-111)	99 (69-124)	7 (7-8)	6	Y	44 (38-54)	H	1	0	42
3	RD2948	73 (70-77)	112 (103-116)	104 (83-129)	94 (68-135)	9 (8-10)	6	Y	45 (35-58)	H	1	0.01	67
4	DWRB137 ©	73 (66-80)	115 (107-120)	79 (65-94)	92 (72-126)	8 (7-10)	6	Y	44 (36-59)	H	2	0	46
5	HUB113 ©	76 (69-83)	114 (110-117)	91 (79-109)	94 (70-129)	8 (7-8)	6	Y	41 (36-51)	H	0	0	36
6	JYOTI ©	76 (70-80)	115 (111-120)	99 (88-118)	97 (68-136)	9 (7-10)	6	Y	44 (42-50)	H	1	0	45
7	K508 ©	75 (67-83)	113 (104-118)	91 (77-109)	106 (76-142)	8 (8-8)	6	Y	39 (30-50)	H	2	0	24
8	RD2552 ©	78 (70-83)	117 (114-122)	93 (70-111)	104 (64-137)	6 (4-7)	6	Y	44 (35-53)	H	2	4	46

AVT-IR-FB-CEN Zone
Location wise and zonal means in q/ha

Varieties	Codes	Vijapur			Udaipur			Sagar			Gwalior			CZ*		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
KB1531	AVTIRCZ-08	32.39	2	1	30.14	6	0	32.73	4	0	35.07	8	0	32.58	6	0
PL892	AVTIRCZ-06	27.70	7	0	41.23	5	0	42.63	1	1	37.75	7	0	37.33	3	1
PL898	AVTIRCZ-07	26.25	8	0	29.52	7	0	32.61	5	0	39.50	6	0	31.97	8	0
BH959 ©	AVTIRCZ-05	27.89	6	0	50.41	1	1	17.75	8	0	39.66	5	0	33.93	5	0
DWRB137 ©	AVTIRCZ-04	32.92	1	1	43.96	2	0	27.13	6	0	52.78	1	1	39.20	1	1
PL751 ©	AVTIRCZ-03	28.92	4	0	26.53	8	0	26.09	7	0	46.47	3	0	32.00	7	0
RD2786 ©	AVTIRCZ-01	31.95	3	1	43.45	3	0	32.73	3	0	40.06	4	0	37.05	4	0
RD2899 ©	AVTIRCZ-02	28.28	5	0	41.57	4	0	34.90	2	0	46.54	2	0	37.82	2	1
G.M.		29.54			38.35			30.82			42.23			35.23		
S.E.(M)		1.50			1.61			1.02			2.15			0.81		
C.D.		3.66			3.92			2.48			5.23			1.90		
C.V.		10.17			8.39			6.60			10.18					
DOS		10-11-2017			21-11-2017			10-11-2017			13-11-2017					

*Data from Morena (HCV) were not included in zonal means.

Ancillary data

Sr. No.	ENTRY	AGRONOMIC CHARACTERS						GRAIN CHARACTERISTICS			DISEASE REACTION		
		H. days Mean & Range	M. days Mean & Range	Height Mean & Range (cm)	Tillers/m Mean & Range	Spike Length (cm) Mean & Range	Two/ Six Row	Color	1000 g.w Mean & Range	H/N	RUST		APHID (1-5)
											BR	BL	
1	KB1531	67 (53-80)	109 (92-118)	87 (77-110)	83 (61-101)	8 (8-8)	6	Y	45 (33-55)	H	TMR	10MS	5
2	PL892	72 (61-84)	113 (99-120)	85 (69-103)	93 (71-115)	6 (6-7)	6	Y	46 (42-51)	H	10MS	20MS	5
3	PL898	65 (50-77)	109 (97-118)	87 (70-103)	88 (56-114)	7 (6-8)	6	Y	47 (39-56)	H	TMS	5S	5
4	DWRB137 ©	67 (53-78)	109 (91-117)	74 (62-95)	81 (66-101)	7 (7-7)	6	Y	46 (31-54)	H	10MS	5S	5
5	PL751 ©	68 (56-81)	107 (92-118)	77 (55-99)	91 (77-106)	8 (6-10)	6	Y	46 (33-54)	H	TMS	5MS	5
6	RD2786 ©	71 (61-84)	112 (99-118)	97 (78-115)	74 (48-93)	8 (7-10)	6	Y	46 (39-50)	H	TR	5MS	5
7	RD2899 ©	73 (60-84)	111 (99-120)	82 (52-103)	86 (69-95)	6 (5-8)	6	Y	46 (40-51)	H	5MS	20MS	5
8	BH959 ©	68 (58-79)	107 (92-118)	78 (53-95)	86 (69-107)	6 (6-7)	6	Y	39 (30-49)	H	TMR	TMS	5

INITIAL VARIETAL TRIAL-FEED BARLEY (IRRIGATED)-NWPZ

- This trial was conducted at six locations. The data of Karnal centre was not considered for pooling due to high CV for grain yield.
- Highest general mean for grain yield (55.72/ha) was obtained at Durgapura centre
- The zonal mean across the entries for grain yield was 46.85 q/ha for this trial.
- BH946 was the best check with 56.4 q/ha and ranked first for the grain yield.
- No test entry was significantly superior to the best check variety.

INITIAL VARIETAL TRIAL-FEED BARLEY (IRRIGATED)-NEPZ

- This trial was conducted at six locations. Data of Pusa centre was not considered for pooling due to high CV.
- Highest general mean for grain yield (42.01 q/ha) was obtained at Ranchi centre
- The zonal mean across the entries for grain yield was 33.71 q/ha for this trial.
- Among the seven checks of this trial, RD2899 (38.57 q/ha) was the best check which ranked third.
- Only one test entry RD2969, ranking first, gave grain yield (42.80 q/ha) significantly superior over the best check variety RD2899

INITIAL VARIETAL TRIAL-FEED BARLEY (IRRIGATED)-CZ

- This trial was conducted at three locations in this zone. The data of Morena centre was not considered for pooling due to high CV.
- Highest general mean for grain yield (42.47 q/ha) was obtained at Gwalior centre.
- The zonal mean across the entries for grain yield was 39.22 q/ha for this trial.
- Among the seven checks of this trial, DWRB137 was found to be the best check which ranked first giving 54.4 q/ha.
- No test entry was significantly superior to the best check variety.

INITIAL VARIETAL TRIAL-FEED BARLEY (IRRIGATED)-NWPZ
Location wise & Zonal means (Grain Yield in q/ha)

Rabi 2017-18

Entry	Code	Durgapura			Hisar			Ludhiana			Pantnagar			Tabiji			Pooled		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
BH1020	IVTIRFB-10	72.83	1	1	47.71	7	0	50.72	6	0	46.09	20	0	38.35	25	0	51.1	7	0
BH1021	IVTIRFB-8	54.71	18	0	43.36	14	0	42.03	14	0	42.61	23	0	48.91	12	0	46.3	17	0
DWRB187	IVTIRFB-5	42.21	29	0	51.33	3	1	34.33	26	0	51.26	12	0	50.72	9	0	46.0	18	0
DWRB188	IVTIRFB-4	32.25	30	0	21.80	30	0	26.81	29	0	41.87	24	0	40.46	22	0	32.6	30	0
HUB260	IVTIRFB-23	67.39	3	1	51.12	4	0	52.90	4	0	51.28	11	0	49.21	10	0	54.4	2	0
HUB261	IVTIRFB-17	52.17	20	0	28.68	28	0	41.49	17	0	44.82	21	0	56.16	6	0	44.7	22	0
HUB262	IVTIRFB-24	56.52	16	0	39.25	21	0	36.96	24	0	39.52	26	0	42.27	20	0	42.9	24	0
JB357	IVTIRFB-21	51.09	22	0	37.86	23	0	32.25	27	0	26.32	30	0	57.67	3	0	41.0	26	0
JB360	IVTIRFB-1	64.13	6	0	43.84	12	0	56.70	3	0	56.07	5	0	35.93	27	0	51.3	6	0
KB1605	IVTIRFB-13	61.59	8	0	50.82	5	0	38.77	20	0	63.46	1	1	57.07	4	0	54.3	3	0
KB1606	IVTIRFB-25	42.39	28	0	44.93	10	0	47.10	10	0	57.19	3	0	61.90	1	1	50.7	8	0
NDB1698	IVTIRFB-20	57.61	14	0	49.09	6	0	45.11	12	0	51.84	10	0	38.95	24	0	48.5	12	0
PL891	IVTIRFB-2	50.00	23	0	38.59	22	0	32.07	28	0	39.37	27	0	46.50	14	0	41.3	25	0
PL900	IVTIRFB-29	60.14	11	0	40.28	18	0	38.04	22	0	48.98	15	0	60.99	2	1	49.7	10	0
PL902	IVTIRFB-18	43.84	26	0	52.05	2	1	41.67	16	0	46.42	19	0	44.08	17	0	45.6	20	0
PL903	IVTIRFB-7	63.41	7	0	44.02	11	0	43.12	13	0	53.13	8	0	56.46	5	0	52.0	5	0
RD2969	IVTIRFB-28	60.87	10	0	39.61	20	0	37.86	23	0	61.00	2	1	53.44	7	0	50.6	9	0
RD2970	IVTIRFB-19	55.98	17	0	35.45	26	0	48.55	9	0	49.10	14	0	32.91	30	0	44.4	23	0
RD2971	IVTIRFB-27	65.22	4	0	36.96	24	0	41.67	15	0	47.98	17	0	42.57	18	0	46.9	16	0
RD2972	IVTIRFB-26	49.09	25	0	40.22	19	0	50.72	7	0	27.61	29	0	35.02	28	0	40.5	27	0
UPB1073	IVTIRFB-3	57.97	13	0	35.93	25	0	40.04	19	0	49.64	13	0	45.89	15	0	45.9	19	0
UPB1074	IVTIRFB-14	51.45	21	0	40.58	17	0	62.32	2	1	48.52	16	0	44.69	16	0	49.5	11	0
UPB1075	IVTIRFB-30	59.78	12	0	42.09	16	0	45.83	11	0	41.35	25	0	34.42	29	0	44.7	21	0
BH946 (C)	IVTIRFB-11	65.22	4	0	56.04	1	1	64.86	1	1	55.28	7	0	40.76	21	0	56.4	1	1
DWRB137 (C)	IVTIRFB-12	69.57	2	1	43.60	13	0	51.63	5	0	56.33	4	0	48.31	13	0	53.9	4	0
KARAN 16 (C)	IVTIRFB-6	42.75	27	0	31.88	27	0	26.63	30	0	44.09	22	0	42.57	18	0	37.6	29	0
NDB943 (C)	IVTIRFB-15	57.61	14	0	25.54	29	0	36.05	25	0	33.21	28	0	37.44	26	0	38.0	28	0
RD2552 (C)	IVTIRFB-9	60.87	9	0	46.80	8	0	38.59	21	0	55.68	6	0	40.16	23	0	48.4	13	0
RD2786 (C)	IVTIRFB-22	53.80	19	0	42.75	15	0	48.73	8	0	46.92	18	0	49.21	10	0	48.3	14	0
RD2899 (C)	IVTIRFB-16	49.28	24	0	45.11	9	0	41.30	18	0	51.88	9	0	52.23	8	0	48.0	15	0
	G.M.	55.72			41.58			43.16			47.63			46.18			46.85		
	S.E.(M)	2.46			2.01			1.83			1.52			1.22			0.83		
	C.D.	5.78			4.73			4.31			3.58			2.86			1.93		
	C.V.	8.82			9.69			8.49			6.40			5.27					
	DOS	11.11.17			12.11.17						13.11.17			15.11.17					

INITIAL VARIETAL TRIAL-FEED BARLEY (IRRIGATED)-NWPZ
Summary of ancillary and disease data

Rabi 2017-18

Entry	Code	AGRONOMIC CHARACTERS						GRAIN CHARACTERISTICS			DISEASE REACTION						
		H. days Mean & Range	M. days Mean & Range	Height Mean & Range (cm)	Tillering per meter Mean & Range	Str. Stn. ange	Two/ Six Row	Colo ur	1000 g.w Mean & Range	H/N	RUST		SMUT		Spot Leaf	Leaf Bligh t	Net Leaf
											YL (Max &ACI)	BL	L (%)	C (%)			
BH1020	IVTIRFB-10	85 (66-95)	129 (117-147)	104 (93-115)	122 (105-142)	3 (1-4)	6	Y	40 (35-53)	H			0	2	12		
BH1021	IVTIRFB-8	81 (65-87)	130 (115-147)	97 (84-121)	111 (92-130)	2 (1-3)	6	Y	46 (41-50)	H			0	2	13		
DWRB187	IVTIRFB-5	85 (67-96)	129 (116-146)	97 (81-114)	96 (76-118)	3 (1-5)	6	Y	33 (29-38)	H			5	2	13		
DWRB188	IVTIRFB-4	86 (67-96)	128 (114-144)	103 (89-118)	102 (77-121)	2 (1-4)	6	Y	36 (33-43)	HL			0	3	12		
HUB260	IVTIRFB-23	81 (69-91)	129 (118-146)	97 (87-109)	115 (84-142)	3 (1-4)	6	Y	36 (24-45)	H			0	2	13		
HUB261	IVTIRFB-17	81 (64-90)	127 (113-145)	108 (92-122)	107 (80-126)	2 (1-3)	6	Y	41 (24-48)	H			0	2	23		
HUB262	IVTIRFB-24	75 (50-91)	127 (114-146)	102 (84-112)	99 (77-120)	2 (1-4)	6	Y	39 (24-45)	H			0	3	12		
JB357	IVTIRFB-21	79 (66-88)	129 (113-146)	104 (84-121)	102 (60-135)	4 (3-5)	6	Y	35 (24-44)	H			0	2	23		
JB360	IVTIRFB-1	78 (55-93)	128 (114-145)	100 (95-113)	106 (66-140)	3 (1-5)	6	Y	48 (44-53)	H			0	2	13		
KB1605	IVTIRFB-13	80 (60-92)	127 (113-145)	85 (73-101)	117 (82-142)	3 (1-5)	6	Y	32 (30-34)	H			0	3	12		
KB1606	IVTIRFB-25	87 (74-96)	132 (120-146)	99 (86-106)	116 (100-133)	3 (1-5)	6	Y	38 (31-46)	H			0	2	13		
NDB1698	IVTIRFB-20	89 (71-96)	133 (120-147)	98 (87-109)	116 (96-138)	3 (1-5)	6	Y	35 (23-45)	H			0	3	23		
PL891	IVTIRFB-2	89 (71-98)	131 (118-147)	103 (92-117)	136 (84-198)	3 (1-4)	2	Y	47 (40-51)	HL			0	3	12		
PL900	IVTIRFB-29	82 (64-89)	129 (118-147)	100 (93-114)	105 (64-139)	2 (1-4)	6	Y	46 (39-51)	H			0	2	23		
PL902	IVTIRFB-18	89 (72-96)	133 (120-147)	103 (85-117)	107 (96-127)	2 (1-3)	6	Y	43 (24-52)	H			0	3	23		

PL903	IVTIRFB-7	82 (63-91)	129 (113-144)	92 (81-115)	114 (84-132)	2 (1-4)	6	Y	37 (31-43)	H				5	3	13	
RD2969	IVTIRFB-28	86 (69-93)	130 (116-146)	101 (84-122)	119 (94-141)	3 (3-4)	6	Y	47 (42-54)	H				0	3	12	
RD2970	IVTIRFB-19	82 (64-90)	128 (114-146)	102 (90-119)	106 (85-140)	2 (1-3)	6	Y	41 (24-52)	H				0	2	24	
RD2971	IVTIRFB-27	82 (64-91)	130 (116-146)	100 (92-114)	109 (90-138)	3 (1-4)	6	Y	52 (46-61)	H				0	2	13	
RD2972	IVTIRFB-26	79 (62-89)	129 (116-145)	96 (89-112)	98 (62-134)	3 (1-5)	6	Y	42 (41-45)	H				0	2	12	
UPB1073	IVTIRFB-3	84 (67-90)	128 (113-146)	105 (92-127)	107 (79-125)	3 (1-4)	6	Y	38 (34-44)	H				0	2	13	
UPB1074	IVTIRFB-14	84 (69-90)	130 (114-147)	98 (79-115)	116 (99-127)	2 (1-4)	6	Y	39 (36-45)	H				0	2	12	
UPB1075	IVTIRFB-28	91 (78-97)	133 (120-148)	108 (88-120)	115 (80-141)	3 (1-5)	6	Y	41 (36-48)	H				0	1	12	
BH946 (C)	IVTIRFB-11	85 (64-94)	129 (117-148)	101 (86-114)	105 (66-140)	3 (1-5)	6	Y	42 (39-45)	H				0	2	12	
DWRB137 (C)	IVTIRFB-12	80 (60-88)	129 (113-146)	94 (83-119)	107 (76-145)	3 (1-5)	6	Y	46 (42-51)	H				0	2	12	
KARAN 16 (C)	IVTIRFB-6	85 (57-96)	131 (114-146)	100 (84-115)	89 (63-117)	2 (1-3)	6	Y	32 (30-37)	HL				0	2	13	
NDB943 (C)	IVTIRFB-15	80 (66-91)	128 (113-147)	106 (90-119)	95 (64-130)	3 (1-5)	6	Y	39 (34-42)	HL				0	2	24	
RD2552 (C)	IVTIRFB-9	87 (71-95)	132 (120-146)	97 (81-112)	124 (115-135)	3 (2-4)	6	Y	38 (32-46)	H				20	2	13	
RD2786 (C)	IVTIRFB-22	83 (65-33)	131 (122-146)	109 (88-120)	115 (98-132)	3 (1-4)	6	Y	40 (23-49)	H				0	2	12	
RD2899 (C)	IVTIRFB-16	87 (71-96)	132 (120-146)	99 (81-111)	131 (68-224)	3 (1-5)	6	Y	39 (24-50)	H				0	3	23	

INITIAL VARIETAL TRIAL-FEED BARLEY (IRRIGATED)-NEPZ
Location wise& Zonal means (Grain Yield in q/ha)

Rabi 2017-18

Entry	Code	Varanasi			Faizabad			Kanpur			Sabour			Ranchi			Pooled		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
BH1020	IVTIRFB-10	30.88	10	0	32.49	22	0	40.58	8	0	25.43	17	0	60.88	2	1	38.05	7	0
BH1021	IVTIRFB-8	35.22	3	0	39.19	10	0	35.51	17	0	25.91	15	0	55.24	5	1	38.21	5	0
DWRB187	IVTIRFB-5	23.58	25	0	39.73	8	0	29.35	26	0	30.66	6	0	30.26	24	0	30.72	23	0
DWRB188	IVTIRFB-4	23.28	26	0	35.93	18	0	21.56	30	0	22.30	21	0	19.04	29	0	24.42	29	0
HUB260	IVTIRFB-23	25.69	23	0	40.10	7	0	41.67	5	0	30.31	7	0	44.06	15	0	36.36	10	0
HUB261	IVTIRFB-17	30.82	11	0	40.40	5	0	34.78	19	0	31.49	4	0	36.28	22	0	34.76	14	0
HUB262	IVTIRFB-24	20.63	29	0	33.45	19	0	34.06	22	0	21.65	23	0	17.14	30	0	25.39	28	0
JB357	IVTIRFB-21	28.97	13	0	48.61	2	1	36.59	11	0	16.50	30	0	46.19	13	0	35.37	12	0
JB360	IVTIRFB-1	34.64	5	0	31.88	23	0	42.75	4	0	36.32	1	1	40.50	18	0	37.22	8	0
KB1605	IVTIRFB-13	34.78	4	0	36.35	17	0	41.12	7	0	29.80	9	0	27.33	27	0	33.88	15	0
KB1606	IVTIRFB-25	26.49	20	0	29.23	29	0	34.42	21	0	31.59	3	0	47.19	12	0	33.78	16	0
NDB1698	IVTIRFB-20	31.21	9	0	40.22	6	0	41.67	5	0	23.97	20	0	61.18	1	1	39.65	2	0
PL891	IVTIRFB-2	20.42	30	0	30.37	27	0	21.74	29	0	19.32	27	0	28.53	26	0	24.08	30	0
PL900	IVTIRFB-29	27.31	16	0	38.89	13	0	44.02	3	0	29.08	12	0	38.81	20	0	35.62	11	0
PL902	IVTIRFB-18	21.15	28	0	40.46	4	0	36.23	13	0	20.52	25	0	50.07	9	0	33.68	19	0
PL903	IVTIRFB-7	32.78	7	0	38.95	12	0	33.51	24	0	24.38	19	0	39.01	19	0	33.73	17	0
RD2969	IVTIRFB-28	38.11	2	0	39.61	9	0	48.91	1	1	31.92	2	0	55.44	4	1	42.80	1	1
RD2970	IVTIRFB-19	26.91	18	0	25.66	30	0	36.41	12	0	25.85	16	0	29.91	25	0	28.95	25	0
RD2971	IVTIRFB-27	26.22	22	0	36.71	16	0	36.23	14	0	24.76	18	0	44.52	14	0	33.69	18	0
RD2972	IVTIRFB-26	26.60	19	0	30.68	25	0	35.87	15	0	19.07	28	0	40.81	16	0	30.61	24	0
UPB1073	IVTIRFB-3	26.39	21	0	32.97	21	0	35.87	16	0	29.72	10	0	32.88	23	0	31.57	22	0
UPB1074	IVTIRFB-14	27.51	15	0	39.07	11	0	37.32	9	0	22.02	22	0	38.09	21	0	32.80	21	0
UPB1075	IVTIRFB-30	24.38	24	0	50.12	1	1	30.62	25	0	29.80	8	0	55.44	3	1	38.07	6	0
BH946 (C)	IVTIRFB-11	32.33	8	0	38.77	14	0	34.78	19	0	29.29	11	0	49.27	11	0	36.89	9	0
DWRB137(C)	IVTIRFB-12	40.27	1	1	30.50	26	0	37.14	10	0	30.94	5	0	52.96	7	0	38.36	4	0
KARAN16(C)	IVTIRFB-6	23.25	27	0	33.21	20	0	22.64	28	0	20.08	26	0	40.68	17	0	27.97	26	0
NDB943 (C)	IVTIRFB-15	27.01	17	0	42.27	3	0	24.46	27	0	20.71	24	0	23.65	28	0	27.62	27	0
RD2552 (C)	IVTIRFB-9	28.65	14	0	31.10	24	0	33.51	23	0	28.69	14	0	53.20	6	0	35.03	13	0
RD2786 (C)	IVTIRFB-22	34.14	6	0	30.19	28	0	35.51	17	0	16.68	29	0	51.83	8	0	33.67	20	0
RD2899 (C)	IVTIRFB-16	30.43	12	0	38.29	15	0	45.29	2	1	28.83	13	0	50.01	10	0	38.57	3	0
	G.M.	28.67			36.51			35.47			25.92			42.01			33.71		
	S.E.(M)	0.87			1.42			1.81			1.20			2.97			1.19		
	C.D.	2.05			3.33			4.25			2.81			7.03			1.95		
	C.V.	6.08			7.76			10.19			9.24			12.25					
	DOS	22.11.17			23.11.17			25.11.17			24.11.17			14.11.17					

INITIAL VARIETAL TRIAL-FEED BARLEY (IRRIGATED)-NEPZ
Summary of ancillary and disease data

Rabi 2017-18

Entry	Code	AGRONOMIC CHARACTERS						GRAIN CHARACTERISTICS			DISEASE REACTION						
		H. days Mean & Range	M. days Mean & Range	Height Mean & Range (cm)	Tillering per meter Mean & Range	Str. Stn. Mean & Range	Two / Six Row	Color	1000 g.w Mean & Range	H/N	RUST		SMUT		Hel. Disease		APHI D (1-5)
											YL (Max &ACI)	BR	L (%)	C (%)	Spot Leaf	Leaf Blight	
BH1020	IVTIRFB-10	75 (66-80)	115 (109-119)	98 (86-106)	105 (61-138)	2 (1-4)	6	Y	42 (34-50)	H			0	5	68	12	
BH1021	IVTIRFB-8	79 (69-86)	121 (112-126)	94 (77-109)	90 (43-129)	3 (3-5)	6	LY	41 (34-55)	H			0	0	68	24	5
DWRB187	IVTIRFB-5	77 (69-83)	117 (109-125)	87 (70-103)	115 (72-145)	3 (1-5)	6	LY	46 (33-59)	H			2	2	46	12	25
DWRB188	IVTIRFB-4	81 (69-87)	121 (118-126)	94 (71-114)	101 (60-143)	2 (1-3)	6	Y	42 (33-55)	HL			0	25	36	12	
HUB260	IVTIRFB-23	76 (68-79)	117 (107-125)	98 (78-109)	98 (54-130)	3 (1-4)	6	LY	41 (32-58)	H			0	0	24	12	5
HUB261	IVTIRFB-17	75 (68-81)	116 (109-124)	116 (95-128)	93 (60-115)	3 (2-5)	6	LY	45 (36-58)	H			0	0	36	24	10
HUB262	IVTIRFB-24	70 (66-73)	113 (103-122)	102 (80-124)	97 (43-128)	3 (1-4)	6	LY	43 (34-51)	H			0	0	68	24	5
JB357	IVTIRFB-21	74 (66-78)	113 (105-122)	99 (75-117)	84 (48-129)	2 (1-3)	6	Ly	40 (30-55)	H			0	0	89	45	
JB360	IVTIRFB-1	72 (66-74)	115 (106-125)	99 (83-116)	100 (67-133)	2 (1-3)	6	LY	47 (40-56)	H			0	0	24	12	20
KB1605	IVTIRFB-13	74 (65-76)	115 (106-124)	84 (64-100)	123 (75-153)	2 (1-4)	6	Y	37 (28-45)	H			0	0	35	24	25
KB1606	IVTIRFB-25	76 (52-89)	121 (117-125)	100 (84-113)	115 (74-148)	2 (1-3)	6	LY	42 (34-54)	H			0	0	89	12	
NDB1698	IVTIRFB-20	78 (69-85)	118 (109-126)	95 (73-111)	117 (70-150)	2 (1-3)	6	LY	41 (32-54)	H			0	0	68	36	5
PL891*	IVTIRFB-2	81 (66-90)	121 (117-124)	103 (89-109)	114 (53-165)	3 (2-3)	2	Y	48 (40-65)	HL			0	0	35	12	
PL900	IVTIRFB-29	75 (65-81)	115 (106-121)	97 (83-108)	93 (45-135)	3 (1-5)	6	LY	47 (41-55)	H			0	0	34	36	5
PL902	IVTIRFB-18	78 (65-84)	120 (110-125)	100 (84-122)	91 (37-123)	4 (2-6)	6	Y	47 (32-66)	H			0	0	68	36	5
PL903	IVTIRFB-7	75 (65-80)	116 (110-124)	92 (71-108)	114 (71-167)	3 (1-5)	6	LY	41 (33-53)	H			0	0	89	36	5
RD2969	IVTIRFB-28	76 (66-81)	116 (110-122)	101 (74-116)	106 (76-130)	3 (1-4)	6	Y	46 (38-54)	H			4	0	36	12	

RD2970	IVTIRFB-19	75 (64-81)	115 (104-122)	99 (80-112)	80 (44-117)	4 (3-6)	6	Y	47 (38-63)	H			25	0	68	12	25
RD2971	IVTIRFB-27	77 (70-80)	117 (109-124)	97 (77-117)	98 (51-136)	3 (1-5)	6	LY	47 (36-63)	H			1	10	34	36	5
RD2972	IVTIRFB-26	73 (68-76)	112 (105-117)	88 (70-105)	81 (44-113)	2 (2-3)	6	Y	42 (28-63)	H			4	0	68	78	
UPB1073	IVTIRFB-3	79 (70-85)	118 (112-123)	101 (86-112)	107 (57-146)	3 (2-4)	6	LY	42 (32-65)	H			0	1	89	24	10
UPB1074	IVTIRFB-14	77 (71-84)	117 (110-124)	99 (74-119)	103 (79-131)	3 (1-4)	6	LY	42 (36-51)	H			0	0	68	12	10
UPB1075	IVTIRFB-28	81 (66-89)	120 (118-123)	99 (89-109)	94 (48-149)	3 (1-5)	6	LY	44 (36-52)	H			0	0	12	24	
BH946 (C)	IVTIRFB-11	75 (67-81)	116 (109-124)	93 (78-108)	114 (86-135)	3 (1-4)	6	LY	40 (35-52)	H			0.0 1	0	24	12	5
DWRB137 (C)	IVTIRFB-12	74 (65-81)	114 (103-119)	78 (51-89)	100 (61-117)	2 (1-5)	6	Y	46 (39-60)	H			3	7	46	78	
KARAN 16 (C)	IVTIRFB-6	75 (66-85)	115 (107-124)	98 (77-107)	102 (63-135)	2 (1-3)	6	Y	38 (30-50)	HL			0	5	35	12	10
NDB943 (C)	IVTIRFB-15	76 (68-83)	116 (109-124)	99 (82-112)	96 (54-123)	3 (2-4)	6	Y	39 (30-55)	HL			0	2	46	24	5
RD2552 (C)	IVTIRFB-9	79 (68-85)	119 (110-126)	93 (76-105)	107 (77-132)	2 (1-4)	6	Y	42 (32-59)	H			3	1	35	24	
RD2786 (C)	IVTIRFB-22	76 (67-80)	117 (112-121)	100 (80-110)	94 (64-137)	2 (1-3)	6	LY	42 (28-67)	H			0	0	57	78	5
RD2899 (C)	IVTIRFB-16	79 (68-85)	120 (114-126)	92 (77-104)	112 (55-145)	3 (1-5)	6	LY	42 (35-53)	H			1	0	36	24	5

*AVT first year

INITIAL VARIETAL TRIAL-FEED BARLEY (IRRIGATED)-CZ
Location wise& Zonal means (Grain Yield in q/ha)

Rabi 2017-18

Entry	Code	Udaipur			Gwalior			Pooled		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
BH1020	IVTIRFB-10	48.67	1	1	47.29	9	0	48.0	2	0
BH1021	IVTIRFB-8	47.49	3	1	31.79	28	0	39.6	14	0
DWRB187	IVTIRFB-5	36.26	17	0	39.60	21	0	37.9	21	0
DWRB188	IVTIRFB-4	42.21	9	0	32.88	27	0	37.5	23	0
HUB260	IVTIRFB-23	37.41	14	0	49.47	5	0	43.4	7	0
HUB261	IVTIRFB-17	21.71	29	0	34.19	24	0	27.9	29	0
HUB262	IVTIRFB-24	28.59	24	0	49.25	6	0	38.9	15	0
JB357	IVTIRFB-21	46.80	4	1	48.61	8	0	47.7	4	0
JB360	IVTIRFB-1	30.16	22	0	50.47	4	0	40.3	12	0
KB1605	IVTIRFB-13	33.61	20	0	42.83	15	0	38.2	18	0
KB1606	IVTIRFB-25	48.16	2	1	40.16	19	0	44.2	6	0
NDB1698	IVTIRFB-20	37.50	13	0	26.87	30	0	32.2	26	0
PL891	IVTIRFB-2	23.97	27	0	33.74	25	0	28.9	28	0
PL900	IVTIRFB-29	22.43	28	0	42.57	16	0	32.5	25	0
PL902	IVTIRFB-18	36.38	16	0	39.66	20	0	38.0	20	0
PL903	IVTIRFB-7	35.90	18	0	41.12	17	0	38.5	17	0
RD2969	IVTIRFB-28	40.67	11	0	42.91	14	0	41.8	9	0
RD2970	IVTIRFB-19	30.37	21	0	42.97	13	0	36.7	24	0
RD2971	IVTIRFB-27	27.10	25	0	49.00	7	0	38.0	19	0
RD2972	IVTIRFB-26	45.02	5	1	50.93	3	0	48.0	3	0
UPB1073	IVTIRFB-3	36.56	15	0	44.57	12	0	40.6	11	0
UPB1074	IVTIRFB-14	30.04	23	0	45.37	10	0	37.7	22	0
UPB1075	IVTIRFB-30	42.27	8	0	40.46	18	0	41.4	10	0
BH946 (C)	IVTIRFB-11	39.98	12	0	44.99	11	0	42.5	8	0
DWRB137 (C)	IVTIRFB-12	43.66	6	1	65.22	1	1	54.4	1	1
KARAN 16 (C)	IVTIRFB-6	25.91	26	0	37.36	23	0	31.6	27	0
NDB943 (C)	IVTIRFB-15	19.60	30	0	28.88	29	0	24.2	30	0
RD2552 (C)	IVTIRFB-9	41.36	10	0	38.54	22	0	40.0	13	0
RD2786 (C)	IVTIRFB-22	43.63	7	1	33.68	26	0	38.7	16	0
RD2899 (C)	IVTIRFB-16	35.72	19	0	58.76	2	0	47.2	5	0
	G.M.	35.97			42.47			39.22		
	S.E.(M)	2.29			2.23			0.87		
	C.D.	5.39			5.23			2.04		
	C.V.	12.75			10.48					
	DOS	23.11.17			13.11.17					

INITIAL VARIETAL TRIAL-FEED BARLEY (IRRIGATED)-CZ
Summary of ancillary and disease data

Rabi 2017-18

Entry	Code	AGRONOMIC CHARACTERS						GRAIN CHARACTERISTICS			DISEASE REACTION							
		H. days Mean & Range	M. days Mean & Range	Height Mean & Range (cm)	Tillering per meter Mean & Range	Str. Stn. Mean & Range	Two / Six Row	Color	1000 g.w Mean & Range	H/N	RUST			SMUT		Hel. Disease		APHI D (1-5)
											YL	BR	BL	L (%)	C (%)	ST R (%)	Leaf Blight	
BH1020	IVTIRFB-10	80 (70-89)	117 (109-124)	89 (77-108)	116 (74-167)		6	A	38 (23-50)	H								5
BH1021	IVTIRFB-8	76 (70-82)	118 (112-124)	103 (85-113)	126 (82-186)		6	W	42 (35-51)	H								5
DWRB187	IVTIRFB-5	76 (70-79)	116 (106-124)	96 (75-107)	113 (65-171)		6	W	38 (30-47)	H								5
DWRB188	IVTIRFB-4	83 (72-94)	118 (110-125)	99 (84-110)	117 (72-169)		6	A	45 (37-55)	HL								5
HUB260	IVTIRFB-23	79 (69-90)	114 (111-117)	99 (87-111)	114 (61-170)		6	W	40 (37-44)	H								5
HUB261	IVTIRFB-17	75 (70-78)	113 (103-119)	113 (89-127)	120 (72-184)		6	W	47 (42-53)	H								5
HUB262	IVTIRFB-24	74 (65-85)	114 (104-120)	105 (87-118)	111 (64-164)		6	W	44 (40-48)	H								5
JB357	IVTIRFB-21	77 (69-83)	114 (106-119)	103 (86-114)	113 (90-148)		6	W	43 (38-53)	H								5
JB360	IVTIRFB-1	73 (69-77)	115 (107-122)	96 (86-110)	108 (64-156)		6	W	49 (45-56)	H								5
KB1605	IVTIRFB-13	78 (69-86)	113 (101-122)	89 (76-99)	114 (71-175)		6	W	36 (27-45)	H								5
KB1606	IVTIRFB-25	80 (76-86)	116 (111-119)	94 (82-104)	119 (80-168)		6	A	45 (37-55)	H								5
NDB1698	IVTIRFB-20	76 (69-84)	118 (114-120)	96 (81-110)	110 (77-157)		6	W	40 (35-45)	H								5
PL891	IVTIRFB-2	85 (81-88)	117 (114-118)	103 (80-118)	122 (78-174)		2	A	51 (46-52)	HL								5
PL900	IVTIRFB-29	79 (70-88)	114 (105-121)	100 (87-108)	123 (76-192)		6	A	51 (48-52)	H								5
PL902	IVTIRFB-18	81 (73-85)	117 (113-121)	108 (94-118)	121 (74-186)		6	W	50 (42-57)	H								5
PL903	IVTIRFB-7	74 (66-79)	117 (108-125)	91 (79-106)	122 (94-167)		6	W	45 (42-50)	H								5
RD2969	IVTIRFB-28	77 (69-82)	116 (110-120)	95 (85-112)	109 (71-156)		6	W	51 (45-59)	H								5
RD2970	IVTIRFB-19	79 (71-86)	116 (107-124)	98 (88-109)	113 (74-165)		6	W	45 (39-54)	H								5
RD2971	IVTIRFB-27	79 (71-88)	115 (110-118)	106 (87-115)	111 (73-151)		6	A	52 (49-56)	H								5
RD2972	IVTIRFB-26	73 (69-78)	115 (109-120)	90 (77-107)	111 (83-159)		6	W	49 (46-53)	H								5

UPB1073	IVTIRFB-3	76 (70-82)	114 (104-121)	93 (74-109)	120 (74-190)		6	W	43 (39-45)	H								5
UPB1074	IVTIRFB-14	80 (71-87)	115 (110-118)	104 (88-116)	117 (75-171)		6	A	39 (31-48)	H								5
UPB1075	IVTIRFB-28	84 (74-91)	116 (113-119)	103 (90-113)	122 (87-173)		6	W	45 (32-55)	H								5
BH946 (C)	IVTIRFB-11	74 (69-81)	115 (109-119)	88 (68-110)	115 (77-153)		6	W	40 (32-49)	H								5
DWRB137 (C)	IVTIRFB-12	72 (68-75)	112 (102-117)	88 (74-105)	111 (71-151)		6	A	53 (47-59)	H								5
KARAN 16 (C)	IVTIRFB-6	76 (72-78)	115 (109-118)	97 (80-109)	110 (74-155)		6	A	40 (35-46)	HL								5
NDB943 (C)	IVTIRFB-15	75 (70-78)	115 (104-123)	107 (84-122)	105 (66-155)		6	A	42 (40-46)	HL								5
RD2552 (C)	IVTIRFB-9	80 (71-87)	115 (110-118)	86 (76-100)	126 (85-170)		6	W	47 (38-55)	H								5
RD2786 (C)	IVTIRFB-22	81 (71-90)	117 (112-121)	103 (90-110)	107 (67-153)		6	W	43 (40-49)	H								5
RD2899 (C)	IVTIRFB-16	77 (71-84)	117 (115-119)	91 (81-107)	126 (91-172)		6	W	52 (47-60)	H								5

ADVANCED VARIETAL TRIAL-DUAL PURPOSE (RAINFED)-NHZ

- This trial was conducted at five locations. Almora, Majhera and Palampur data were not considered for pooled analysis due to low grain yield levels.
- General means both for grain (14.41 q/ha) and forage (27.93 q/ha) yields were highest at Bajaura location.
- The check variety BHS380 which ranked 10th for grain yield and 2nd for forage yield across the two test locations Shimla and Bajaura, was the best check for grain as well as forage yield in this zone.
- Six test entries namely, VLB156, HBL804, VLB157, UPB1072, BHS462 and VLB155 were significantly superior to the best check in grain yields.
- The test entry VLB155 which gave numerically higher for forage yield over the best check.

INITIAL VARIETAL TRIAL- DUAL PURPOSE

NWPZ:

- This trial was conducted at five locations. Data of RAU, Bikaner and CSWRI, Bikaner centres were not considered for pooled analysis due to low yield levels and high CV.
- Highest general means for grain (38.95 q/ha) and forage (167.84 q/ha) yields were obtained at Ludhiana and Durgapura centres, respectively.
- The zonal means across the entries for grain and forage yields were 30.17 q/ha and 158.9 q/ha, respectively for this trial.
- Pooled analysis over locations revealed RD2552 (rank 4) and RD2715 (rank 4) as the best checks for grain and forage yields, respectively.
- The test entry UPB1075 (rank 1) had significantly superior grain yield (39.6 q/ha) over the best check, where as two test entries RD2976 (196.2 q/ha) and RD2975 (191.2 q/ha), registered significantly higher forage yields.
- No test entry was found to have significant superiority over the best check in both grain and forage yield.

NEPZ:

- This trial was conducted at three locations in this zone.
- Highest general means for grain (37.67 q/ha) and forage (151.94 q/ha) yields were obtained at Faizabad and Kanpur , respectively. The zonal means across the entries for grain and forage yields were 27.16 q/ha and 117.2 q/ha, respectively.
- Pooled data revealed that RD2552 (rank 2) and RD2715 (rank 3) as the best checks for grain and forage yields, respectively.
- The test entry UPB1074 (34.2 q/ha) with ranked first for grain yield and significantly superiority over the best check, however, test entry RD2975 (rank 1) with 145.5 q/ha forage yield was significantly superior to the best check.
- No test entry was found to have significant superiority over the best check in both grain and forage yield

CZ:

- This trial was conducted at three locations in this zone. Data from Anand was not considered for pooled analysis due to low grain yield and high CV.
- Highest location means for grain (44.30 q/ha) and forage (203.6 q/ha) yields were obtained at Jabalpur. The zonal means across the entries for grain and forage yields were 34.86 q/ha and 191.3 q/ha, respectively.
- Analysis of data pooled over locations revealed RD2715 (rank 2) and RD2552 (rank 1) as the best checks for grain and forage yields, respectively.
- One test entry RD2975 (42.5 q/ha) ranked first, registered significantly superior grain yield over the best check.
- No test entry was found to have even numerical superiority over the best check for forage yield.

ADVANCED VARIETAL TRIAL-DUAL PURPOSE BARLEY (RF-TS)-NHZ
Location wise & Zonal means (Grain Yield in q/ha)
Rabi 2017-18

Entry	Code	Shimla			Bajaura			Pooled		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
BHS461	NHDBZ-1	13.83	15	0	11.02	18	0	12.4	18	0
BHS462	NHDBZ-13	16.81	7	0	17.62	3	1	17.2	5	0
BHS463	NHDBZ-6	16.62	8	0	11.34	16	0	14.0	15	0
BHS464	NHDBZ-11	14.43	14	0	14.60	11	0	14.5	13	0
HBL797	NHDBZ-10	13.72	16	0	7.14	19	0	10.4	19	0
HBL804	NHDBZ-9	21.55	2	1	15.14	9	0	18.3	2	1
HBL818	NHDBZ-18	16.59	9	0	15.22	8	0	15.9	8	0
HBL821	NHDBZ-8	13.50	18	0	16.54	5	0	15.0	11	0
HBL822	NHDBZ-7	16.21	10	0	11.10	17	0	13.7	17	0
UPB1070	NHDBZ-2	13.52	17	0	13.98	13	0	13.7	16	0
UPB1071	NHDBZ-12	18.08	5	0	11.88	15	0	15.0	12	0
UPB1072	NHDBZ-19	17.55	6	0	18.25	2	1	17.9	4	1
VLB155	NHDBZ-5	19.10	4	0	14.98	10	0	17.0	6	0
VLB156	NHDBZ-16	19.99	3	0	17.62	3	1	18.8	1	1
VLB157	NHDBZ-14	22.39	1	1	13.90	14	0	18.1	3	1
VLB158	NHDBZ-4	13.47	19	0	18.40	1	1	15.9	7	0
VLB160	NHDBZ-3	15.80	11	0	15.53	6	0	15.7	9	0
BHS380 ©	NHDBZ-15	14.62	13	0	15.53	6	0	15.1	10	0
HBL276 ©	NHDBZ-17	14.96	12	0	14.05	12	0	14.5	14	0
	G.M.	16.46			14.41			15.4		
	S.E.(M)	0.46			0.74			0.44		
	C.D.	1.09			1.76			1.03		
	C.V.	5.59			10.32					
	DOS	30.10.17			4.11.17					

**ADVANCED VARIETAL TRIAL-DUAL PURPOSE (RF-TS)-NHZ
Location wise & Zonal means (Forage Yield in q/ha)**

Rabi 2017-18

Entry	Code	Shimla			Bajaura			Pooled		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
BHS461	NHDBZ-1	22.20	4	1	22.36	16	0	22.28	13	0
BHS462	NHDBZ-13	21.82	6	1	25.70	12	0	23.76	9	0
BHS463	NHDBZ-6	22.44	3	1	29.97	5	0	26.20	4	0
BHS464	NHDBZ-11	19.80	10	0	27.17	10	0	23.49	11	0
HBL797	NHDBZ-10	19.72	11	0	23.91	14	0	21.82	14	0
HBL804	NHDBZ-9	21.97	5	1	38.12	3	0	30.05	3	0
HBL818	NHDBZ-18	19.49	14	0	27.80	7	0	23.64	10	0
HBL821	NHDBZ-8	16.54	17	0	25.93	11	0	21.23	16	0
HBL822	NHDBZ-7	14.75	19	0	16.93	19	0	15.84	19	0
UPB1070	NHDBZ-2	19.18	15	0	31.75	4	0	25.47	5	0
UPB1071	NHDBZ-12	19.64	13	0	27.95	6	0	23.80	8	0
UPB1072	NHDBZ-19	20.96	8	1	24.69	13	0	22.83	12	0
VLB155	NHDBZ-5	22.67	2	1	45.34	1	1	34.01	1	1
VLB156	NHDBZ-16	18.87	16	0	23.84	15	0	21.35	15	0
VLB157	NHDBZ-14	21.66	7	1	27.72	8	0	24.69	6	0
VLB158	NHDBZ-4	20.42	9	0	27.48	9	0	23.95	7	0
VLB160	NHDBZ-3	19.72	11	0	20.50	18	0	20.11	17	0
BHS380 ©	NHDBZ-15	23.06	1	1	42.86	2	1	32.96	2	1
HBL276 ©	NHDBZ-17	15.22	18	0	20.73	17	0	17.97	18	0
	G.M.	20.01			27.93			23.97		
	S.E.(M)	0.95			1.70			0.98		
	C.D.	2.26			4.03			2.29		
	C.V.	9.53			12.19					
	DOS	30.10.17			4.11.17					

ADVANCED VARIETAL TRIAL-DUAL PURPOSE BARLEY (RF-TS)-NHZ
 Summary of ancillary and disease data
Rabi 2017-18

Sr · N o.	ENTRY	AGRONOMIC CHARACTERS						GRAIN CHARACTERISTICS			DISEASE REACTIO N
		H. days Mean & Range	M. days Mean & Range	Height Mean & Range (cm)	Tillering per meter Mean & Range	Str. Stn. Mean & Rang e	Two/ Six Row	Grain Colour	1000 g.w Mean & Rang e	H/ N	Leaf Blight
1	BHS461	128	184	51	60	2	6	Y	34	H	0
2	BHS462	127	183	54	63	2	6	Y	37	H	0
3	BHS463	129	185	54	63	2	6	Y	32	H	1
4	BHS464	133	187	57	70	2	6	Y	40	H	1
5	HBL797	135	185	57	61	2	6	A	29	HL	1
6	HBL804	132	184	57	60	2	6	Y	32	H	0
7	HBL818	131	184	60	63	2	6	Y	38	H	1
8	HBL821	133	187	59	67	2	6	Y	42	H	3
9	HBL822	128	184	60	76	2	6	A	36	HL	0
10	UPB1070	131	187	55	84	2	6	Y	41	H	1
11	UPB1071	125	183	65	80	2	2	Y	43	H	3
12	UPB1072	127	185	56	57	2	6	A	35	H	1
13	VLB155	133	184	60	78	2	2	Y	40	H	12
14	VLB156	134	186	55	66	2	6	Y	33	H	1
15	VLB157	130	185	53	68	2	2	Y	44	H	1
16	VLB158	130	187	55	56	2	6	Y	42	H	1
17	VLB160	133	188	54	70	2	6	Y	37	H	0
18	BHS380 ©	134	187	51	67	2	6	Y	34	H	0
19	HBL276 ©	134	184	57	65	2	6	A	28	HL	0

INITIAL VARIETAL TRIAL- DUAL PURPOSE- NWPZ
Location wise & Zonal means (Grain Yield in q/ha)

Rabi 2017-18

Entry	Code	Hisar			Durgapura			Ludhiana			Pooled		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
JB364	IVTIRTSDP-5	25.42	11	0	18.84	14	0	55.54	1	1	33.3	8	0
KB1636	IVTIRTSDP-15	18.78	13	0	31.34	4	0	40.29	9	0	30.1	10	0
KB1638	IVTIRTSDP-14	34.00	4	0	21.01	11	0	41.20	8	0	32.1	9	0
KB1640	IVTIRTSDP-16	28.74	8	0	31.70	2	0	47.32	5	0	35.9	2	0
NDB1682	IVTIRTSDP-6	39.25	1	1	18.84	13	0	45.00	7	0	34.4	5	0
RD2973	IVTIRTSDP-7	13.95	15	0	21.38	10	0	34.57	11	0	23.3	14	0
RD2974	IVTIRTSDP-11	24.70	12	0	11.23	16	0	18.77	15	0	18.2	15	0
RD2975	IVTIRTSDP-9	13.19	16	0	17.03	15	0	18.30	16	0	16.2	16	0
RD2976	IVTIRTSDP-8	17.93	14	0	23.19	8	0	32.61	12	0	24.6	13	0
UPB1073	IVTIRTSDP-3	32.19	6	0	19.75	12	0	49.28	2	0	33.7	7	0
UPB1074	IVTIRTSDP-10	34.42	3	0	27.72	5	0	45.22	6	0	35.8	3	0
UPB1075	IVTIRTSDP-2	31.58	7	0	39.13	1	1	48.15	4	0	39.6	1	1
AZAD ©	IVTIRTSDP-4	28.44	9	0	31.70	2	0	29.49	13	0	29.9	11	0
RD2035 (c)	IVTIRTSDP-12	33.88	5	0	27.72	5	0	39.67	10	0	33.8	6	0
RD2552 ©	IVTIRTSDP-13	35.27	2	0	23.19	8	0	48.66	3	0	35.7	4	0
RD2715 ©	IVTIRTSDP-1	25.79	10	0	23.91	7	0	29.13	14	0	26.3	12	0
	G.M.	27.35			24.23			38.95			30.17		
	S.E.(M)	1.17			1.10			0.42			0.55		
	C.D.	2.79			2.60			0.99			1.30		
	C.V.	8.59			9.04			2.15					
	DOS	11.11.17			13.11.17								

INITIAL VARIETAL TRIAL- DUAL PURPOSE-NWPZ
Location wise & Zonal means (Forage Yield in q/ha)

Rabi 2017-18

Entry	Code	Hisar			Durgapura			Ludhiana			Pooled		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
JB364	IVTIRTS DP-5	186.59	3	0	222.10	1	1	153.26	6	0	187.3	3	0
KB1636	IVTIRTS DP-15	134.06	13	0	130.43	14	0	125.00	10	0	129.8	16	0
KB1638	IVTIRTS DP-14	219.81	1	1	129.35	15	0	113.04	16	0	154.1	8	0
KB1640	IVTIRTS DP-16	161.23	7	0	113.04	16	0	143.48	7	0	139.3	15	0
NDB1682	IVTIRTS DP-6	128.02	16	0	179.35	7	0	113.41	15	0	140.3	14	0
RD2973	IVTIRTS DP-7	159.72	8	0	174.64	8	0	124.64	11	0	153.0	9	0
RD2974	IVTIRTS DP-11	179.65	5	0	182.97	4	0	124.64	12	0	162.4	6	0
RD2975	IVTIRTS DP-9	195.65	2	0	180.07	6	0	197.83	1	1	191.2	2	1
RD2976	IVTIRTS DP-8	185.39	4	0	218.12	2	1	185.14	4	0	196.2	1	1
UPB1073	IVTIRTS DP-3	153.99	9	0	172.46	9	0	178.62	5	0	168.4	5	0
UPB1074	IVTIRTS DP-10	143.72	10	0	146.74	12	0	135.14	9	0	141.9	13	0
UPB1075	IVTIRTS DP-2	143.72	10	0	140.94	13	0	143.12	8	0	142.6	12	0
AZAD ©	IVTIRTS DP-4	134.06	13	0	181.52	5	0	123.55	13	0	146.4	11	0
RD2035 (c)	IVTIRTS DP-12	128.93	15	0	157.25	11	0	191.30	3	1	159.2	7	0
RD2552 ©	IVTIRTS DP-13	140.10	12	0	185.51	3	0	115.94	14	0	147.2	10	0
RD2715 ©	IVTIRTS DP-1	178.74	6	0	171.01	10	0	197.83	1	1	182.5	4	0
	G.M.	160.84			167.84			147.87			158.9		
	S.E.(M)	7.16			7.91			2.86			3.7		
	C.D.	17.01			18.78			6.79			8.6		
	C.V.	8.90			9.42			3.87					
	DOS	11.11.17			13.11.17								

INITIAL VARIETAL TRIAL- DUAL PURPOSE-NWPZ
Summary of ancillary and disease data

Rabi – 2017-18

ENTRY	Code	AGRONOMIC CHARACTERS						GRAIN CHARACTERISTICS			DISEASE / PEST REACTION							
		H. days Mean & Range	M. days Mean & Range	Height Mean & Range (cm)	Tillering per meter Mean & Range	Str. Stn. Mean & Range	Two / Six Row	Grain Colou r	1000 g.w Mean & Range	H/ N	RUSTS			SMUTS		Spot Leaf	Net leaf	Aph id (1-5)
											YL	B R	B L	L (%)	C (%)			
JB364	IVTIRTSDP-5	99 (77-121)	138 (123-159)	79 (59-97)	112 (96-125)	3 (1-4)	6	Y	38 (25-45)	H						2	2	
KB1636	IVTIRTSDP-15	93 (79-100)	129 (120-135)	85 (70-97)	104 (84-130)	3 (1-5)	6	Y	39 (30-47)	H						2	2	
KB1638	IVTIRTSDP-14	96 (76-114)	136 (123-152)	73 (60-85)	124 (107-140)	3 (1-4)	6	Y	36 (30-41)	H						2	2	
KB1640	IVTIRTSDP-16	94 (76-111)	132 (122-140)	68 (50-85)	112 (94-132)	2 (1-2)	6	Y	39 (31-53)	H						2	2	
NDB1682	IVTIRTSDP-6	98 (81-114)	135 (123-149)	79 (59-97)	108 (84-120)	3 (1-4)	6	Y	40 (27-50)	H						2	2	
RD2973	IVTIRTSDP-7	94 (72-111)	134 (120-151)	76 (58-94)	112 (74-140)	3 (2-4)	6	Y	35 (26-48)	H						2	2	
RD2974	IVTIRTSDP-11	94 (75-111)	136 (121-152)	74 (64-87)	113 (100-124)	3 (1-4)	6	Y	40 (31-50)	H						2	2	
RD2975	IVTIRTSDP-9	95 (75-112)	134 (117-152)	76 (67-86)	107 (100-117)	3 (2-4)	6	Y	35 (26-45)	H						5	6	
RD2976	IVTIRTSDP-8	92 (73-109)	132 (123-141)	72 (61-83)	109 (90-125)	3 (1-5)	6	Y	38 (31-45)	H						4	5	
UPB1073	IVTIRTSDP-3	101 (82-121)	139 (123-161)	84 (65-102)	100 (84-117)	2 (1-3)	6	Y	38 (28-50)	H						2	3	
UPB1074	IVTIRTSDP-10	96 (78-111)	132 (121-140)	81 (72-97)	125 (120-132)	3 (1-5)	6	Y	36 (28-47)	H						3	3	
UPB1075	IVTIRTSDP-2	100 (81-118)	138 (122-152)	85 (70-103)	115 (98-125)	3 (1-4)	6	Y	35 (30-40)	H						2	2	
AZAD ©	IVTIRTSDP-4	97 (79-111)	136 (126-145)	95 (83-108)	121 (112-135)	2 (2-2)	6	Y	40 (35-47)	H						3	4	
RD2035 (c)	IVTIRTSDP-12	97 (77-114)	135 (121-150)	80 (73-99)	117 (106-126)	2 (2-2)	6	Y	32 (25-41)	H						2	2	
RD2552 ©	IVTIRTSDP-13	101 (82-121)	138 (120-160)	70 (64-81)	109 (92-120)	3 (1-4)	6	Y	38 (29-49)	H						2	3	
RD2715 ©	IVTIRTSDP-1	94 (75-114)	135 (123-150)	76 (58-91)	116 (110-124)	3 (1-4)	6	Y	35 (28-40)	H						3	3	

INITIAL VARIETAL TRIAL- DUAL PURPOSE-NEPZ
Location wise & Zonal means (Grain Yield in q/ha)

Rabi 2017-18

Entry	Code	Varanasi			Kanpur			Faizabad			Pooled		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
JB364	IVTIRTSDP-5	24.92	4	0	23.91	8	0	39.13	7	0	29.3	6	0
KB1636	IVTIRTSDP-15	20.97	8	0	25.00	7	0	40.16	6	0	28.7	7	0
KB1638	IVTIRTSDP-14	19.96	10	0	20.65	9	0	43.06	3	1	27.9	9	0
KB1640	IVTIRTSDP-16	17.54	11	0	19.02	11	0	43.84	1	1	26.8	10	0
NDB1682	IVTIRTSDP-6	23.75	5	0	29.35	4	0	40.46	5	0	31.2	4	0
RD2973	IVTIRTSDP-7	12.96	16	0	16.85	14	0	29.29	16	0	19.7	16	0
RD2974	IVTIRTSDP-11	13.45	14	0	17.39	13	0	38.95	8	0	23.3	12	0
RD2975	IVTIRTSDP-9	14.91	12	0	15.49	16	0	31.82	15	0	20.7	15	0
RD2976	IVTIRTSDP-8	14.81	13	0	16.30	15	0	32.49	14	0	21.2	14	0
UPB1073	IVTIRTSDP-3	23.54	7	0	17.93	12	0	38.53	9	0	26.7	11	0
UPB1074	IVTIRTSDP-10	25.27	3	0	35.33	1	1	42.15	4	1	34.2	1	1
UPB1075	IVTIRTSDP-2	25.30	2	0	34.24	2	1	34.72	12	0	31.4	3	0
AZAD ©	IVTIRTSDP-4	29.52	1	1	27.85	5	0	34.72	11	0	30.7	5	0
RD2035 (c)	IVTIRTSDP-12	20.18	9	0	27.72	6	0	37.02	10	0	28.3	8	0
RD2552 ©	IVTIRTSDP-13	23.62	6	0	30.43	3	0	43.12	2	1	32.4	2	1
RD2715 ©	IVTIRTSDP-1	13.33	15	0	19.57	10	0	33.21	13	0	22.0	13	0
	G.M.	20.25			23.56			37.67			27.16		
	S.E.(M)	0.85			2.03			1.15			0.83		
	C.D.	2.02			4.82			2.72			1.94		
	C.V.	8.40			17.22			6.09					
	DOS	20.11.17			25.11.17			18.11.17					

INITIAL VARIETAL TRIAL- DUAL PURPOSE-NEPZ
Location wise & Zonal means (Forage Yield in q/ha)

Rabi 2017-18

Entry	Code	Varanasi			Kanpur			Faizabad			Pooled		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
JB364	IVTIRTSDP-5	99.03	8	0	144.47	12	0	85.14	14	0	109.6	13	0
KB1636	IVTIRTSDP-15	95.41	13	0	155.80	7	0	90.58	10	0	113.9	9	0
KB1638	IVTIRTSDP-14	105.07	5	0	184.69	1	1	93.60	7	0	127.8	2	0
KB1640	IVTIRTSDP-16	102.66	7	0	103.17	16	0	103.86	5	0	103.2	14	0
NDB1682	IVTIRTSDP-6	97.83	10	0	148.37	8	0	92.39	8	0	112.9	11	0
RD2973	IVTIRTSDP-7	114.73	3	0	175.63	3	1	80.92	15	0	123.8	5	0
RD2974	IVTIRTSDP-11	125.00	2	0	145.65	11	0	95.41	6	0	122.0	7	0
RD2975	IVTIRTSDP-9	138.89	1	1	184.15	2	1	113.53	3	1	145.5	1	1
RD2976	IVTIRTSDP-8	90.58	14	0	145.83	10	0	92.39	9	0	109.6	12	0
UPB1073	IVTIRTSDP-3	97.83	9	0	160.14	5	0	113.53	3	1	123.8	4	0
UPB1074	IVTIRTSDP-10	105.68	4	0	146.74	9	0	88.16	12	0	113.5	10	0
UPB1075	IVTIRTSDP-2	104.47	6	0	141.30	13	0	123.79	1	1	123.2	6	0
AZAD ©	IVTIRTSDP-4	88.77	16	0	129.53	15	0	90.58	10	0	103.0	15	0
RD2035 (c)	IVTIRTSDP-12	97.83	10	0	164.40	4	0	86.35	13	0	116.2	8	0
RD2552 ©	IVTIRTSDP-13	89.37	15	0	141.30	13	0	73.07	16	0	101.2	16	0
RD2715 ©	IVTIRTSDP-1	96.01	12	0	159.87	6	0	123.19	2	1	126.4	3	0
	G.M.	103.07			151.94			96.66			117.22		
	S.E.(M)	4.78			6.19			5.87			3.26		
	C.D.	11.36			14.71			13.94			7.64		
	C.V.	9.28			8.15			12.14					
	DOS	20.11.17			25.11.17			18.11.17					

INITIAL VARIETAL TRIAL- DUAL PURPOSE-NEPZ
Summary of ancillary and disease data

Rabi 2017-18

Entry	Code	AGRONOMIC CHARACTERS						GRAIN CHARACTERISTICS			DISEASE / PEST REACTION							
		H. days Mean & Range	M. days Mean & Range	Height Mean & Range (cm)	Tillering per meter Mean & Range	Str. Stn. Mean & Range	Two/ Six Row	Grain Colour	1000 g.w Mean & Range	H/N	RUSTS			SMUTS		Spot leaf	leaf Blight	Aphid (1-5)
											YL	BR	BL	L (%)	C (%)			
JB364	IVTIRTS DP-5	83 (74-93)	119 (113-129)	81 (70-101)	98 (72-118)	2 (2-3)	6	LY	36 (30-41)	H						1	68	1
KB1636	IVTIRTS DP-15	84 (79-92)	121 (115-129)	89 (79-104)	95 (73-139)	2 (1-4)	6	LY	37 (30-47)	H						0	36	1
KB1638	IVTIRTS DP-14	82 (71-95)	117 (108-120)	81 (73-94)	98 (66-139)	2 (1-3)	6	LY	32 (27-36)	H						13	36	5
KB1640	IVTIRTS DP-16	81 (78-85)	118 (111-123)	87 (73-107)	90 (75-117)	2 (1-3)	6	LY	33 (24-44)	H						0	12	1
NDB1682	IVTIRTS DP-6	80 (68-87)	115 (105-123)	88 (74-110)	95 (72-118)	2 (1-2)	6	LY	37 (34-42)	H						0	57	1
RD2973	IVTIRTS DP-7	83 (76-93)	117 (108-128)	86 (76-102)	78 (55-123)	3 (3-3)	6	LY	29 (25-33)	H				0.0 1		79	99	3
RD2974	IVTIRTS DP-11	81 (69-96)	117 (109-131)	79 (73-85)	90 (58-119)	2 (1-3)	6	Y	34 (25-40)	H				0.0 1		79	89	1
RD2975	IVTIRTS DP-9	82 (80-84)	119 (111-124)	85 (71-92)	84 (68-113)	2 (1-2)	6	LY	33 (28-36)	H				0.0 1		79	79	1
RD2976	IVTIRTS DP-8	81 (68-92)	117 (110)129	86 (70-101)	88 (65-123)	2 (1-2)	6	LY	33 (27-39)	H						69	78	5
UPB1073	IVTIRTS DP-3	84 (73-98)	124 (113-132)	89 (63-113)	88 (66-123)	1 (1-2)	6	Y	34 (27-42)	H						0	12	4
UPB1074	IVTIRTS DP-10	78 (67-86)	114 (104-125)	81 (61-105)	88 (65-129)	3 (3-3)	6	Y	35 (28-43)	H						1	36	4
UPB1075	IVTIRTS DP-2	81 (67-88)	115 (101-126)	95 (73-113)	89 (54-135)	2 (1-2)	6	Y	35 (32-37)	H						2	36	1
AZAD ©	IVTIRTS DP-4	80 (68-92)	116 (109-128)	93 (79-115)	87 (64-129)	3 (2-4)	6	Y	37 (34-40)	H						12	57	4
RD2035 (c)	IVTIRTS DP-12	81 (68-94)	117 (110-130)	83 (62-111)	91 (70-132)	2 (1-3)	6	Y	33 (26-42)	H						12	68	1
RD2552 ©	IVTIRTS DP-13	80 (70-97)	117 (112-124)	77 (66-98)	122 (65-155)	2 (1-3)	6	LY	35 (27-46)	H				0.0 1	0.0 1	0	24	1
RD2715 ©	IVTIRTS DP-1	84 (78-94)	118 (109-131)	89 (74-99)	91 (70-132)	2 (1-2)	6	Y	31 (25-38)	H						69	79	1

INITIAL VARIETAL TRIAL- DUAL PURPOSE-CZ
Location wise & Zonal means (Grain Yield in q/ha)

Rabi 2017-18

Entry	Code	Udaipur			Jabalpur			Pooled		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
JB364	IVTIRTSDP-5	24.46	9	0	52.84	2	1	38.6	4	1
KB1636	IVTIRTSDP-15	16.18	16	0	36.53	14	0	26.4	16	0
KB1638	IVTIRTSDP-14	20.53	14	0	41.97	10	0	31.3	12	0
KB1640	IVTIRTSDP-16	24.25	10	0	31.88	16	0	28.1	14	0
NDB1682	IVTIRTSDP-6	23.61	11	0	51.63	3	0	37.6	7	0
RD2973	IVTIRTSDP-7	30.28	3	1	42.57	9	0	36.4	8	0
RD2974	IVTIRTSDP-11	17.09	15	0	38.35	13	0	27.7	15	0
RD2975	IVTIRTSDP-9	24.91	8	0	60.08	1	1	42.5	1	1
RD2976	IVTIRTSDP-8	28.32	6	0	47.71	5	0	38.0	6	0
UPB1073	IVTIRTSDP-3	22.77	12	0	47.10	7	0	34.9	9	0
UPB1074	IVTIRTSDP-10	22.10	13	0	39.07	12	0	30.6	13	0
UPB1075	IVTIRTSDP-2	32.88	2	1	48.13	4	0	40.5	3	1
AZAD ©	IVTIRTSDP-4	30.10	4	0	46.80	8	0	38.5	5	0
RD2035 (c)	IVTIRTSDP-12	29.17	5	0	35.63	15	0	32.4	11	0
RD2552 ©	IVTIRTSDP-13	26.12	7	0	40.88	11	0	33.5	10	0
RD2715 ©	IVTIRTSDP-1	33.83	1	1	47.71	6	0	40.8	2	1
	G.M.	25.41			44.30			34.86		
	S.E.(M)	1.51			3.08			1.72		
	C.D.	3.60			7.32			4.03		
	C.V.	11.92			13.91					
	DOS	21.11.17			25.11.17					

INITIAL VARIETAL TRIAL- DUAL PURPOSE-CZ
Location wise & Zonal means (Forage Yield in q/ha)

Rabi 2017-18

Entry	Code	Udaipur			Jabalpur			Pooled		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
JB364	IVTIRTSDP-5	178.74	9	1	115.34	15	0	147.04	15	0
KB1636	IVTIRTSDP-15	177.54	10	0	155.19	12	0	166.36	12	0
KB1638	IVTIRTSDP-14	167.27	11	0	180.56	11	0	173.91	10	0
KB1640	IVTIRTSDP-16	156.40	14	0	229.47	6	0	192.93	7	0
NDB1682	IVTIRTSDP-6	152.17	15	0	181.76	10	0	166.97	11	0
RD2973	IVTIRTSDP-7	157.00	13	0	147.95	13	0	152.48	14	0
RD2974	IVTIRTSDP-11	187.20	7	1	181.76	9	0	184.48	9	0
RD2975	IVTIRTSDP-9	188.41	5	1	236.17	5	0	212.29	4	0
RD2976	IVTIRTSDP-8	206.52	2	1	185.39	8	0	195.95	6	0
UPB1073	IVTIRTSDP-3	207.13	1	1	86.96	16	0	147.04	15	0
UPB1074	IVTIRTSDP-10	161.23	12	0	318.24	2	1	239.7	3	0
UPB1075	IVTIRTSDP-2	150.36	16	0	270.53	4	0	210.4	5	0
AZAD ©	IVTIRTSDP-4	188.41	5	1	137.68	14	0	163.0	13	0
RD2035 (c)	IVTIRTSDP-12	199.88	3	1	314.61	3	1	257.2	2	1
RD2552 ©	IVTIRTSDP-13	199.28	4	1	326.09	1	1	262.7	1	1
RD2715 ©	IVTIRTSDP-1	184.78	8	1	190.22	7	0	187.5	8	0
	G.M.	178.89			203.62			191.26		
	S.E.(M)	12.36			10.49			8.10		
	C.D.	29.35			24.91			19.04		
	C.V.	13.82			10.30					
	DOS	21.11.17			25.11.17					

INITIAL VARIETAL TRIAL- DUAL PURPOSE-CZ, Rabi 2017-18
Summary of ancillary and disease data

Entry	Code	AGRONOMIC CHARACTERS						GRAIN CHARACTERISTICS		
		H. days Mean & Range	M. days Mean & Range	Height Mean & Range (cm)	Tillering per meter Mean & Range	Str. Stn. Mean & Range	Two/ Six Row	Grain Colour	1000 g.w Mean & Range	H/N
NDB1682	IVTIRTSDP-5	84 (81-86)	113 (110-120)	63 (50-70)	104 (62-159)	0	6	W	47 (38-60)	H
RD2552 ©	IVTIRTSDP-15	84 (82-85)	117 (111-123)	63 (52-76)	103 (61-142)	1	6	W	45 (36-61)	H
RD2035 (c)	IVTIRTSDP-14	85 (80-89)	118 (113-121)	62 (51-70)	93 (63-147)	1	6	W	43 (35-57)	H
RD2715 ©	IVTIRTSDP-16	78 (78-78)	116 (108-123)	67 (61-74)	95 (57-141)	0	6	W	42 (35-54)	H
RD2973	IVTIRTSDP-6	85 (82-88)	120 (112-128)	59 (49-65)	86 (62-110)	1	6	W	41 (29-53)	H
RD2974	IVTIRTSDP-7	80 (76-83)	115 (108-122)	66 (56-77)	99 (55-165)	0	6	W	41 (29-53)	H
UPB1074	IVTIRTSDP-11	84 (80-88)	113 (110-115)	52 (43-66)	88 (59-125)	3	6	W	47 (39-61)	H
RD2976	IVTIRTSDP-9	82 (78-86)	118 (113-123)	61 (52-72)	105 (53-191)	0	6	W	44 (30-62)	H
RD2975	IVTIRTSDP-8	79 (75-83)	115 (106-123)	63 (58-67)	93 (60-148)	0	6	W	44 (33-56)	H
KB1638	IVTIRTSDP-3	83 (81-85)	117 (113-120)	72 (67-80)	96 (60-154)	0	6	W	42 (36-52)	H
UPB1073	IVTIRTSDP-10	78 (75-80)	116 (110-121)	65 (60-69)	101 (63-157)	0	6	W	40 (26-61)	H
KB1636	IVTIRTSDP-2	83 (80-85)	113 (106-118)	70 (63-77)	121 (78-176)	0	6	W	42 (33-55)	H
KB1640	IVTIRTSDP-4	84 (78-90)	116 (107-122)	68 (48-85)	86 (70-107)	0	6	W	48 (38-60)	H
UPB1075	IVTIRTSDP-12	83 (79-87)	113 (107-118)	69 (62-76)	106 (69-148)	1	6	W	43 (38-54)	H
AZAD ©	IVTIRTSDP-13	80 (78-81)	115 (110-118)	65 (46-84)	104 (57-162)	1	6	W	39 (27-58)	H
JB364	IVTIRTSDP-1	80 (77-83)	114 (109-117)	70 (61-77)	94 (67-134)	1	6	W	41 (26-56)	H

MALT BARLEY

INITIAL VARIETAL TRIAL-IR-TS

- The IVT-MB (IR-TS) was proposed at 10 centres in NWPZ and data of all the locations, except Modipuram (not conducted) were considered for zonal mean compilation.
- The trial comprised of 19 test entries (04 exotic varieties namely Andreia, Danielle, Explorer and ABI Voyager) and 04 checks viz. BH 902 (six-row) and DWRB101, DWRB123 and RD2849 (all two-row).
- The trial mean grain yield was observed as 48.92 q/ha, which ranged from 34.82 q/ha (Mathura) to 66.28 q/ha (Bawal), suggested varied genotypic performances across the locations. The six rowed entry DWRB137 ranked first (58.82 q/ha) and stood alone in first non-significant group. The tow row entry DWRB184 (55.92 q/ha) was significantly superior whereas, the entries DWRB182 and DWRB160 were numerically higher to the best check DWRB101 (51.57 q/ha).
- The exotic varieties viz., ABI Voyager (43.24 q/ha), Andreia (42.05 q/ha), Explorer (41.18 q/ha) and Danielle (40.79 q/ha) showed late heading and ranked at 19th, 21st, 22nd and 23rd positions, respectively.

IVT-IR-TS-MB-NWPZ
Location wise & Zonal means (Grain Yield in q/ha)

Varieties	Codes	Bawal			Durgapura			Hisar			SG Nagar			Ludhiana			Bathinda			Mathura			Pantnagar			Karnal			NWPZ				
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G		
ABI Voyager	IVT-MB-TS-20	55.09	19	0	44.91	16	0	18.75	23	0	66.91	7	0	43.98	21	0	51.40	4	1	32.41	16	0	42.28	16	0	33.44	20	0	43.24	19	0		
Andreia	IVT-MB-TS-10	51.85	22	0	35.65	23	0	25.54	20	0	51.17	22	0	56.71	10	0	46.99	10	0	33.95	10	0	44.88	10	0	31.70	23	0	42.05	21	0		
Danielle	IVT-MB-TS-21	54.63	20	0	50.69	14	0	24.92	21	0	41.20	23	0	44.68	20	0	41.45	19	0	32.41	16	0	40.64	18	0	36.51	11	0	40.79	23	0		
DWRB137	IVT-MB-TS-7	83.80	1	1	62.50	4	0	46.30	5	0	60.90	13	0	67.59	3	0	47.90	7	0	41.67	2	1	60.38	1	1	58.68	2	1	58.86	1	1		
DWRB160*	IVT-MB-TS-8	74.07	4	0	57.41	8	0	44.06	7	0	57.65	17	0	59.03	8	0	42.14	18	0	34.72	9	0	41.18	17	0	59.10	1	1	52.15	7	0		
DWRB181	IVT-MB-TS-1	66.20	13	0	39.58	22	0	42.13	10	0	66.45	9	0	54.40	13	0	36.52	23	0	36.27	6	0	46.93	8	0	42.67	8	0	47.91	14	0		
DWRB182	IVT-MB-TS-5	70.37	7	0	42.36	20	0	48.15	4	0	74.54	4	0	49.54	17	0	53.13	2	1	33.95	10	0	43.42	15	0	55.49	4	1	52.33	6	0		
DWRB183	IVT-MB-TS-4	67.13	11	0	44.91	16	0	49.54	2	1	60.43	14	0	62.04	6	0	43.74	16	0	32.41	16	0	43.86	14	0	45.07	6	0	49.90	10	0		
DWRB184	IVT-MB-TS-9	73.15	6	0	42.59	18	0	42.21	9	0	80.09	2	1	75.00	1	1	55.03	1	1	33.18	13	0	44.24	13	0	57.78	3	1	55.92	2	0		
DWRB187	IVT-MB-TS-19	78.24	2	0	54.63	10	0	40.97	12	0	81.48	1	1	48.38	18	0	52.00	3	1	35.49	7	0	52.23	4	0	52.08	5	0	55.06	3	0		
Explorer	IVT-MB-TS-14	51.39	23	0	53.70	12	0	25.89	19	0	51.85	21	0	38.66	22	0	40.31	22	0	30.86	21	0	44.27	12	0	33.72	18	0	41.18	22	0		
KB1634	IVT-MB-TS-18	77.55	3	0	59.72	5	0	46.30	6	0	62.75	12	0	66.67	4	0	46.29	12	0	42.44	1	1	47.78	7	0	35.24	12	0	53.86	5	0		
KB1638	IVT-MB-TS-3	69.44	9	0	54.17	11	0	38.66	13	0	55.09	20	0	50.93	16	0	44.51	14	0	40.12	4	1	49.06	5	0	34.17	15	0	48.46	13	0		
PL904	IVT-MB-TS-11	67.13	12	0	42.59	18	0	41.90	11	0	56.27	19	0	65.74	5	0	41.42	20	0	30.86	21	0	32.74	22	0	32.60	21	0	45.70	18	0		
PL905	IVT-MB-TS-22	70.37	8	0	46.06	15	0	33.02	15	0	66.91	7	0	53.01	15	0	50.96	5	1	33.18	13	0	46.17	9	0	41.94	9	0	49.07	12	0		
RD2985	IVT-MB-TS-16	63.66	16	0	64.58	2	1	29.63	18	0	65.28	10	0	55.56	12	0	40.57	21	0	33.95	10	0	38.31	19	0	35.21	13	0	47.42	15	0		
RD2986	IVT-MB-TS-2	54.17	21	0	42.13	21	0	30.17	17	0	78.95	3	1	71.30	2	1	44.73	13	0	34.72	8	0	35.99	21	0	33.61	19	0	47.31	16	0		
RD2987	IVT-MB-TS-23	64.81	15	0	52.78	13	0	31.33	16	0	58.33	16	0	46.76	19	0	49.13	6	0	39.35	5	1	36.38	20	0	34.97	14	0	45.98	17	0		
RD2988	IVT-MB-TS-6	62.27	17	0	59.26	6	0	24.54	22	0	59.94	15	0	37.27	23	0	43.84	15	0	31.64	20	0	27.99	23	0	33.99	16	0	42.30	20	0		
BH902 (c)	IVT-MB-TS-17	74.07	4	0	68.06	1	1	53.24	1	1	56.48	18	0	59.26	7	0	43.14	17	0	40.90	3	1	48.38	6	0	44.58	7	0	54.23	4	0		
DWRB101 (c)	IVT-MB-TS-13	68.29	10	0	63.43	3	1	43.29	8	0	68.98	5	0	53.47	14	0	47.17	9	0	33.18	13	0	52.47	3	0	33.82	17	0	51.57	8	0		
DWRB123 (c)	IVT-MB-TS-15	65.74	14	0	58.56	7	0	35.73	14	0	67.13	6	0	57.64	9	0	47.48	8	0	32.41	16	0	54.91	2	0	32.08	22	0	50.19	9	0		
RD2849 (c)	IVT-MB-TS-12	61.11	18	0	55.09	9	0	48.30	3	0	64.60	11	0	56.48	11	0	46.47	11	0	30.86	21	0	44.31	11	0	39.10	10	0	49.59	11	0		
G.M.		66.28			51.97			37.59			63.19			55.39			45.93			34.82			44.29			40.76			48.92				
S.E.(M)		1.82			2.18			1.88			2.30			2.34			2.36			1.58			1.35			2.29			0.68				
C.D.		4.28			5.14			4.44			5.42			5.51			5.56			3.72			3.19			5.41			1.58				
C.V.		5.48			8.37			10.02			7.27			8.44			10.26			9.06			6.11			11.25							
DOS		08-11-2017			13-11-2017			11-11-2017			25-11-2017			10-11-2017			24-11-2017			24-11-2017			13-11-2017			20-11-2017							

*AVT First year entry

INITIAL VARIETAL TRIAL (TS) MALT BARLEY

ZONE : NWPZ

Summary of ancillary and disease data

RABI – 2017-18

Sr. No.	ENTRY	AGRONOMIC CHARACTERS						GRAIN CHARACTERISTICS			DISEASE REACTION	
		H. days Mean & Range	M. days Mean & Range	Height Mean & Range (cm)	Tillering per meter Mean & Range	Spike length (cm) Mean & Range	Two/ Six row	Grain Colour	1000 g.w Mean & Range	H/N	SMUT	Leaf Blight
											C (%)	
1	ABI Voyager	92 (72-101)	132 (121-148)	94 (82-110)	128 (93-211)	10 (9-10)	2	Y	41 (38-45)	H	0	12
2	Andreaia	98 (84-104)	133 (123-148)	86 (75-95)	124 (104-175)	10 (10-10)	2	Y	47 (44-52)	H	0	23
3	Danielle	98 (82-104)	134 (123-150)	80 (56-92)	117 (77-165)	9 (9-10)	2	Y	45 (37-54)	H	5	13
4	DWRB137	80 (63-91)	129 (113-149)	86 (80-95)	110 (81-195)	9 (9-9)	6	Y	49 (46-51)	H	0	23
5	DWRB160	87 (65-98)	131 (120-149)	102 (92-112)	116 (69-190)	11 (10-12)	2	Y	64 (53-74)	H	0	25
6	DWRB181	87 (66-97)	130 (121-149)	92 (85-98)	122 (83-170)	9 (9-9)	2	Y	53 (47-60)	H	5	23
7	DWRB182	84 (62-95)	129 (115-148)	87 (74-99)	122 (100-165)	8 (7-8)	2	Y	46 (40-52)	H	0	24
8	DWRB183	87 (73-96)	129 (120-147)	88 (85-98)	127 (94-172)	8 (8-9)	2	Y	50 (45-55)	H	0	24
9	DWRB184	88 (71-97)	130 (116-150)	88 (78-104)	118 (77-172)	8 (7-8)	2	Y	50 (32-55)	H	0	46
10	DWRB187	88 (67-100)	130 (114-116)	97 (84-126)	103 (76-120)	8 (8-9)	6	Y	39 (31-55)	H	0	12
11	Explorer	98 (82-107)	132 (121-147)	79 (72-86)	118 (85-165)	9 (8-10)	2	Y	42 (39-52)	H	10	25
12	KB1634	88 (73-98)	131 (123-149)	95 (76-107)	101 (74-128)	7 (7-8)	6	Y	48 (42-53)	H	0	12
13	KB1638	79 (64-93)	128 (118-148)	89 (71-101)	103 (76-127)	8 (8-9)	6	Y	45 (36-59)	H	0	24
14	PL904	76 (49-91)	129 (120-148)	92 (80-106)	109 (67-165)	9 (9-10)	2	Y	58 (52-64)	H	0	24

15	PL905	90 (73-98)	131 (120-150)	104 (95-116)	123 (83-170)	10 (10-10)	2	Y	46 (41-49)	H	10	12
16	RD2985	78 (60-93)	127 (113-148)	98 (90-109)	126 (104-192)	9 (9-9)	2	Y	56 (50-62)	H	10	12
17	RD2986	83 (55-96)	131 (122-146)	95 (81-105)	117 (79-165)	9 (9-9)	2	Y	56 (50-61)	H	0	24
18	RD2987	78 (58-91)	129 (121-148)	100 (94-111)	128 (102-175)	8 (8-8)	2	Y	52 (43-62)	H	5	12
19	RD2988	84 (67-92)	130 (120-148)	94 (82-105)	110 (81-192)	9 (9-10)	2	Y	55 (46-65)	H	0	24
20	BH902 ©	90 (80-97)	132 (123-151)	99 (80-112)	102 (68-135)	8 (8-9)	6	Y	49 (48-51)	H	5	12
21	DWRB101 ©	82 (60-94)	130 (121-147)	91 (78-113)	120 (89-190)	8 (8-8)	2	Y	50 (46-57)	H	0	24
22	DWRB123 ©	83 (64-91)	129 (116-147)	88 (75-98)	132 (102-172)	8 (8-9)	2	Y	52 (47-58)	H	5	24
23	RD2849 ©	85 (64-98)	130 (116-149)	93 (80-107)	122 (92-170)	9 (9-9)	2	Y	50 (46-54)	H	0	12

AVT-SST
Location wise& Zonal means (Grain Yield in q/ha)

Varieties	Codes	Hisar			Faizabad			Dalipnagar			Banasthali			IIWBR, Hisar			Vallabh Nagar			Zonal Mean*		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
DWRB180	AVT-SST-4	22.22	17	0	35.81	9	0	30.16	8	0	46.01	7	1	26.56	11	0	35.57	3	1	32.72	10	0
DWRB187	AVT-SST-12	28.26	12	0	33.21	14	0	31.79	7	0	37.32	16	0	31.90	6	0	31.99	6	0	32.41	11	0
HUB263	AVT-SST-8	36.17	3	1	38.10	3	1	36.68	5	0	32.25	18	0	35.74	3	1	26.05	13	0	34.17	7	0
HUB264	AVT-SST-17	32.91	8	0	35.02	12	0	36.68	5	0	43.12	11	0	23.48	14	0	30.32	8	0	33.59	9	0
KB1628	AVT-SST-6	34.54	6	0	38.53	2	1	39.95	2	1	43.48	10	0	25.87	12	0	29.85	9	0	35.37	3	0
KB1632	AVT-SST-13	18.90	18	0	33.76	13	0	29.35	9	0	44.93	9	0	24.24	13	0	29.02	11	0	30.03	14	0
KB1634	AVT-SST-10	35.69	4	1	35.69	10	0	26.09	11	0	39.13	14	0	34.21	4	0	33.80	4	0	34.10	8	0
NDB1683	AVT-SST-11	39.55	1	1	38.68	1	1	16.76	17	0	42.75	12	0	26.82	10	0	24.34	16	0	31.48	13	0
NDB1699	AVT-SST-7	24.82	16	0	28.68	17	0	24.46	12	0	35.51	17	0	23.19	16	0	25.83	14	0	27.08	17	0
RD2977	AVT-SST-2	26.33	15	0	31.70	16	0	17.12	16	0	49.28	5	1	23.09	17	0	22.39	18	0	28.32	16	0
RD2978	AVT-SST-18	38.50	2	1	37.74	4	1	37.50	4	0	51.81	3	1	36.62	2	1	37.53	1	1	39.95	1	1
RD2979	AVT-SST-5	26.99	14	0	32.07	15	0	16.67	18	0	37.68	15	0	22.06	18	0	24.42	15	0	26.65	18	0
RD2980	AVT-SST-14	32.85	9	0	36.53	8	1	19.20	14	0	45.65	8	1	38.17	1	1	36.26	2	1	34.78	5	0
NDB1173 ©	AVT-SST-15	27.54	13	0	27.17	18	0	18.75	15	0	47.10	6	1	27.74	9	0	31.19	7	0	29.92	15	0
NDB1445 ©	AVT-SST-3	34.30	7	0	36.53	7	1	19.57	13	0	53.62	1	1	23.41	15	0	23.47	17	0	31.82	12	0
RD2552 ©	AVT-SST-1	35.63	5	1	37.14	5	1	28.53	10	0	50.36	4	1	30.23	8	0	29.34	10	0	35.21	4	0
RD2794 ©	AVT-SST-9	32.07	10	0	37.02	6	1	43.21	1	1	52.17	2	1	30.41	7	0	32.86	5	0	37.95	2	1
RD2907 © (I)	AVT-SST-16	28.96	11	0	35.21	11	0	38.68	3	0	41.30	13	0	33.38	5	0	28.33	12	0	34.31	6	0
G.M.		30.90			34.92			28.40			44.08			28.73			29.59			32.80		
S.E.(M)		2.10			1.06			1.50			3.42			1.14			1.49			0.98		
C.D.		4.97			2.51			3.56			8.11			2.70			3.52			2.28		
C.V.		13.57			6.07			10.58			15.52			7.95			10.06					
DOS		12-11-2017			24-11-2017			25-11-2017			25-11-2017			21-11-2017			16-11-2017					

*Data from Kumher (HCV) were not included in zonal mean

AVT-SST:

- The trial was proposed at 7 centres and data of 06 locations, except Kumher (high CV) were considered for pooled analysis.
- The trial comprised of 13 test entries and 05 check varieties.
- The zonal mean grain yield was exhibited as 32.80 q/ha, which ranged from 28.40 q/ha (Dalipnagar) to 44.08 q/ha (Banasthali). The test genotype RD2978 ranked first (39.95 q/ha) and was numerically higher to the best check RD2794 (37.95 q/ha).

ADVANCED VARIETAL TRIAL – Salinity ZONE: NWPZ / NEPZ
Summary of ancillary and disease data Rabi 2017-18

Sr No	ENTRY	AGRONOMIC CHARACTERS						GRAIN CHARACTERISTICS			DISEASE REACTION		
		H. days Mean & Range	M. days Mean & Range	Height Mean & Range (cm)	Tillering per meter Mean & Range	Spike length (cm) Mean & Range	T w o/ S i x R o w	Col our	1000 g.w Mean & Range	H / N	SMUT		Leaf Blight
											L (%)	C (%)	
1	DWRB180	84 (73-92)	123 (111-130)	96 (70-111)	109 (49-167)	7 (6-8)	6	Y	40 (35-44)	H	-	5	35
2	DWRB187	85 (77-93)	122 (114-128)	87 (70-101)	119 (66-144)	7 (6-8)	6	Y	34 (27-46)	H	-	5	24
3	HUB263	85 (80-91)	122 (116-129)	88 (64-105)	98 (75-122)	7 (6-8)	6	Y	39 (36-44)	H	-	5	36
4	HUB264	83 (74-90)	121 (110-128)	95 (71-105)	101 (42-138)	8 (7-9)	6	Y	41 (36-45)	H	-	0	36
5	KB1628	79 (75-88)	119 (112-127)	82 (71-104)	102 (74-129)	7 (6-8)	6	Y	40 (37-42)	H	-	0	24
6	KB1632	88 (76-96)	123 (114-130)	95 (70-111)	102 (45-177)	8 (7-9)	6	Y	36 (32-41)	H	-	5	24
7	KB1634	89 (84-95)	126 (120-132)	88 (59-100)	101 (54-154)	6 (5-7)	6	Y	43 (40-46)	H	-	5	24
8	NDB1683	88 (85-95)	126 (120-131)	86 (69-97)	116 (61-143)	8 (7-9)	6	Y	41 (34-46)	H	-	5	12
9	NDB1699	90 (76-99)	125 (112-134)	93 (66-100)	95 (39-123)	7 (5-9)	6	Y	43 (38-46)	H	-	5	36
10	RD2977	78 (70-90)	120 (106-128)	83 (63-103)	94 (44-122)	8 (6-9)	6	Y	43 (38-47)	H	5	5	68
11	RD2978	80 (75-88)	123 (116-128)	87 (64-108)	105 (58-155)	8 (8-9)	6	Y	41 (38-44)	H	1	0	13
12	RD2979	78 (73-87)	118 (112-123)	87 (65-106)	117 (54-156)	8 (6-9)	2	Y	47 (41-52)	H	-	0	24
13	RD2980	82 (74-90)	121 (116-127)	84 (52-106)	91 (51-121)	7 (6-8)	6	Y	43 (39-49)	H	5	0	68
14	NDB1173 ©	87 (83-92)	123 (118-128)	85 (72-103)	103 (48-124)	7 (6-9)	6	Y	38 (36-40)	H	0.01	0	36
15	NDB1445 ©	82 (71-89)	120 (108-127)	91 (68-106)	111 (68-148)	7 (5-8)	6	Y	38 (36-42)	H	-	5	24
16	RD2552 ©	83 (72-90)	124 (116-131)	90 (67-105)	118 (67-164)	7 (5-7)	6	Y	42 (40-48)	H	2	0	36
17	RD2794 ©	87 (81-96)	124 (118-132)	82 (48-108)	107 (59-142)	7 (6-8)	6	Y	41 (39-42)	H	0.5	5	36
18	RD2907 ©	87 (85-89)	123 (120-128)	87 (67-107)	97 (51-146)	8 (6-9)	6	Y	43 (36-49)	H	-	0	24

REJECTED TRIALS

INITIAL VARIETAL TRIAL-FEED BARLEY (IRRIGATED)

Location wise & Zonal means (Grain Yield in q/ha)

Entry	Code	NWPZ			NEPZ			CZ		
		Karnal			Pusa			Morena		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
BH1020	IVTIRFB-10	40.34	1	1	21.01	17	0	40.51	12	1
BH1021	IVTIRFB-8	32.13	7	1	8.33	27	0	14.69	30	0
DWRB187	IVTIRFB-5	28.08	18	0	17.03	22	0	34.17	25	0
DWRB188	IVTIRFB-4	37.62	2	1	9.78	26	0	35.02	23	0
HUB260	IVTIRFB-23	27.48	20	0	51.09	1	1	42.57	7	1
HUB261	IVTIRFB-17	31.70	9	0	19.57	20	0	45.11	4	1
HUB262	IVTIRFB-24	31.76	8	0	26.81	15	0	43.97	5	1
JB357	IVTIRFB-21	28.38	16	0	31.88	9	0	48.37	2	1
JB360	IVTIRFB-1	30.56	12	0	31.52	11	0	43.91	6	1
KB1605	IVTIRFB-13	30.98	10	0	36.23	7	0	36.52	20	0
KB1606	IVTIRFB-25	29.41	14	0	27.90	14	0	28.41	28	0
NDB1698	IVTIRFB-20	32.73	5	1	44.20	3	0	42.32	8	1
PL891	IVTIRFB-2	26.93	22	0	19.93	19	0	38.04	17	0
PL900	IVTIRFB-29	25.72	27	0	34.42	8	0	39.80	15	0
PL902	IVTIRFB-18	26.99	21	0	11.59	23	0	40.18	13	0
PL903	IVTIRFB-7	30.74	11	0	31.88	9	0	41.68	10	1
RD2969	IVTIRFB-28	25.24	28	0	45.29	2	0	34.20	24	0
RD2970	IVTIRFB-19	29.41	14	0	11.59	24	0	33.53	26	0
RD2971	IVTIRFB-27	28.20	17	0	5.80	29	0	37.77	18	0
RD2972	IVTIRFB-26	27.78	19	0	43.48	5	0	41.63	11	1
UPB1073	IVTIRFB-3	32.55	6	1	23.55	16	0	38.66	16	0
UPB1074	IVTIRFB-14	25.79	26	0	43.84	4	0	42.05	9	1
UPB1075	IVTIRFB-30	19.02	30	0	19.57	20	0	25.69	29	0
BH946 (C)	IVTIRFB-11	26.09	25	0	38.41	6	0	37.14	19	0
DWRB137 (C)	IVTIRFB-12	26.27	24	0	20.65	18	0	36.14	21	0
KARAN 16 (C)	IVTIRFB-6	23.49	29	0	10.51	25	0	31.59	27	0
NDB943 (C)	IVTIRFB-15	30.01	13	0	31.52	11	0	45.82	3	1
RD2552 (C)	IVTIRFB-9	26.51	23	0	4.71	30	0	40.00	14	0
RD2786 (C)	IVTIRFB-22	33.21	4	1	6.88	28	0	50.00	1	1
RD2899 (C)	IVTIRFB-16	36.96	3	1	30.07	13	0	35.04	22	0
	G.M.	29.40			25.30			38.15		
	S.E.(M)	3.52			1.68			4.16		
	C.D.	8.27			3.95			9.77		
	C.V.	23.92			13.27			21.78		
	DOS	24.11.17			14.12.17			25.11.17		

INITIAL VARIETAL TRIAL- DUAL PURPOSE
Location wise & Zonal means (Grain Yield in q/ha)

Rabi 2017-18

Entry	Code	NWPZ						CZ		
		RAU, Bikaner			CSWRI, Bikaner			Anand		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
JB364	IVTIRTSDP-5	14.23	9	0	19.44	5	1	15.72	1	1
KB1636	IVTIRTSDP-15	12.34	12	0	17.39	8	1	8.22	15	0
KB1638	IVTIRTSDP-14	8.11	16	0	11.96	13	0	9.09	13	0
KB1640	IVTIRTSDP-16	9.75	15	0	6.28	16	0	13.55	5	0
NDB1682	IVTIRTSDP-6	17.77	3	0	17.87	7	1	9.02	14	0
RD2973	IVTIRTSDP-7	14.49	8	0	9.78	15	0	9.71	10	0
RD2974	IVTIRTSDP-11	14.58	7	0	12.56	12	0	9.75	9	0
RD2975	IVTIRTSDP-9	10.61	14	0	21.14	3	1	6.68	16	0
RD2976	IVTIRTSDP-8	16.65	5	0	15.82	10	1	14.96	2	1
UPB1073	IVTIRTSDP-3	13.29	11	0	17.27	9	1	14.82	3	1
UPB1074	IVTIRTSDP-10	17.77	4	0	22.34	1	1	14.82	3	1
UPB1075	IVTIRTSDP-2	17.95	2	0	10.63	14	0	9.82	8	0
AZAD ©	IVTIRTSDP-4	14.15	10	0	22.22	2	1	13.04	6	0
RD2035 (c)	IVTIRTSDP-12	16.14	6	0	13.41	11	0	9.17	12	0
RD2552 ©	IVTIRTSDP-13	12.08	13	0	19.93	4	1	9.49	11	0
RD2715 ©	IVTIRTSDP-1	22.69	1	1	18.60	6	1	9.89	7	0
	G.M.	14.54			16.04			11.11		
	S.E.(M)	1.38			3.46			0.86		
	C.D.	3.28			8.22			2.04		
	C.V.	18.9			43.13			15.47		
	DOS	19.11.17			19.11.17			13.11.17		

**ADVANCED VARIETAL TRIAL (RAINFED)-NHZ
Location wise & Zonal means (Grain Yield in q/ha)**

Rabi 2017-18

Entry	Code	Majhera			Ranichouri		
		Yield	Rk	G	Yield	Rk	G
BHS465	NHGBZ-8	7.25	19	0	5.80	14	0
BHS466	NHGBZ-15	11.41	3	0	5.74	17	0
BHS467	NHGBZ-13	9.51	12	0	7.37	5	0
BHS468	NHGBZ-10	6.34	20	0	5.80	14	0
HBL113	NHGBZ-6	10.60	5	0	11.78	1	1
HBL789	NHGBZ-9	10.60	6	0	6.88	6	0
HBL793	NHGBZ-5	7.25	18	0	8.76	3	0
HBL802	NHGBZ-12	6.16	21	0	5.86	12	0
HBL812	NHGBZ-19	10.05	8	0	8.57	4	0
HBL814	NHGBZ-7	8.51	16	0	5.74	17	0
UPB1070	NHGBZ-16	14.67	1	1	5.68	20	0
UPB1071	NHGBZ-18	9.33	13	0	5.92	11	0
UPB1072	NHGBZ-14	11.14	4	0	5.86	12	0
VLB155	NHGBZ-4	8.42	17	0	6.64	7	0
VLB156	NHGBZ-1	9.87	9	0	5.98	9	0
VLB157	NHGBZ-21	9.33	13	0	5.98	9	0
VLB158	NHGBZ-2	10.42	7	0	5.74	17	0
VLB159	NHGBZ-20	8.88	15	0	5.62	21	0
BHS352 ©	NHGBZ-17	9.69	11	0	9.06	2	0
BHS400 ©	NHGBZ-3	9.87	9	0	6.16	8	0
HBL113 (c)	NHGBZ-6	10.60	5	0	11.78	1	1
VLB118 ©	NHGBZ-11	11.78	2	0	5.80	14	0
	G.M.	9.58			6.70		
	S.E.(M)	0.92			0.68		
	C.D.	2.19			1.60		
	C.V.	19.31			20.21		
	DOS	1.11.17			10.11.17		

**ADVANCED VARIETAL TRIAL-DUAL PURPOSE (RF-TS)-NHZ
(Grain Yield in q/ha)**

Entry	Code	Almora			Majhera			Palampur		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
BHS461	NHDBZ-1	9.35	13	0	9.78	5	0	6.16	14	0
BHS462	NHDBZ-13	9.08	14	0	8.97	9	0	12.86	2	0
BHS463	NHDBZ-6	10.95	9	0	9.87	4	0	7.07	11	0
BHS464	NHDBZ-11	10.96	8	0	9.60	7	0	7.27	10	0
HBL797	NHDBZ-10	8.95	15	0	5.62	17	0	5.87	15	0
HBL804	NHDBZ-9	11.70	5	0	7.07	15	0	8.75	6	0
HBL818	NHDBZ-18	13.04	2	0	9.24	8	0	3.16	18	0
HBL821	NHDBZ-8	8.70	16	0	11.68	2	1	6.52	13	0
HBL822	NHDBZ-7	6.98	18	0	5.34	18	0	2.22	19	0
UPB1070	NHDBZ-2	11.25	6	0	10.78	3	1	4.45	17	0
UPB1071	NHDBZ-12	9.49	12	0	7.25	14	0	5.43	16	0
UPB1072	NHDBZ-19	6.26	19	0	11.87	1	1	10.95	3	0
VLB155	NHDBZ-5	11.79	4	0	8.51	12	0	15.76	1	1
VLB156	NHDBZ-16	14.87	1	1	5.71	16	0	10.20	4	0
VLB157	NHDBZ-14	10.24	11	0	8.88	10	0	8.11	8	0
VLB158	NHDBZ-4	8.02	17	0	9.69	6	0	7.82	9	0
VLB160	NHDBZ-3	12.36	3	0	8.79	11	0	6.65	12	0
BHS380 ©	NHDBZ-15	10.93	10	0	8.15	13	0	9.96	5	0
HBL276 ©	NHDBZ-17	11.17	7	0	4.71	19	0	8.75	6	0
	G.M.	10.32			8.50			7.79		
	S.E.(M)	0.71			0.81			0.38		
	C.D.	1.67			1.91			0.89		
	C.V.	13.71			19.00			9.63		
	DOS	25.10.17			1.11.17			26.10.17		

**ADVANCED VARIETAL TRIAL-DUAL PURPOSE (RF-TS)-NHZ
(Forage Yield in q/ha)**

Entry	Code	Almora			Majhera			Palampur		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
BHS461	NHDBZ-1	25.01	11	0	31.25	5	1	34.16	1	1
BHS462	NHDBZ-13	28.42	8	0	37.41	1	1	15.53	9	0
BHS463	NHDBZ-6	15.59	18	0	32.52	3	1	28.47	2	0
BHS464	NHDBZ-11	18.24	17	0	26.81	11	0	15.01	11	0
HBL797	NHDBZ-10	22.37	14	0	28.26	10	0	5.69	19	0
HBL804	NHDBZ-9	26.00	10	0	21.29	18	0	18.17	6	0
HBL818	NHDBZ-18	28.67	7	0	23.37	14	0	12.94	16	0
HBL821	NHDBZ-8	21.40	15	0	36.41	2	1	14.75	12	0
HBL822	NHDBZ-7	13.08	19	0	15.40	19	0	7.51	18	0
UPB1070	NHDBZ-2	26.14	9	0	22.83	15	0	19.25	5	0
UPB1071	NHDBZ-12	32.35	5	0	28.80	9	0	14.49	13	0
UPB1072	NHDBZ-19	34.18	4	1	26.27	12	0	13.35	15	0
VLB155	NHDBZ-5	36.86	1	1	32.16	4	1	15.53	9	0
VLB156	NHDBZ-16	24.39	12	0	21.65	16	0	12.16	17	0
VLB157	NHDBZ-14	36.01	2	1	29.35	7	0	17.86	7	0
VLB158	NHDBZ-4	28.89	6	0	24.91	13	0	21.48	4	0
VLB160	NHDBZ-3	23.83	13	0	29.26	8	0	26.14	3	0
BHS380 ©	NHDBZ-15	35.59	3	1	30.62	6	0	13.46	14	0
HBL276 ©	NHDBZ-17	20.43	16	0	21.65	16	0	16.05	8	0
	G.M.	26.18			27.38			16.95		
	S.E.(M)	1.27			2.75			0.74		
	C.D.	3.01			6.51			1.75		
	C.V.	9.72			20.07			8.73		
	DOS	25.10.17			1.11.17			26.10.17		

AVT-IR-CZ

Entry	Morena		
	Yield (q/ha)	Rk	G
KB1531	51.60	5	1
PL892	52.15	4	1
PL898	48.87	6	1
BH959 ©	48.18	7	1
DWRB137 ©	58.28	1	1
PL751 ©	43.61	8	0
RD2786 ©	56.06	2	1
RD2899 ©	54.00	3	1
G.M.	51.59		
S.E.(M)	5.36		
C.D.	13.03		
C.V. (%)	20.76		
DOS	25.11.2017		
Reason	High CV		

AVT-SST

Entry	Kumher		
	Yield (q/ha)	Rk	G
DWRB180	19.69	14	0
DWRB187	31.52	2	1
HUB263	23.67	11	0
HUB264	24.76	10	0
KB1628	19.44	15	0
KB1632	30.62	3	1
KB1634	25.60	8	0
NDB1683	8.21	18	0
NDB1699	27.90	5	0
RD2977	27.66	6	0
RD2978	28.02	4	0
RD2979	26.33	7	0
RD2980	19.87	12	0
NDB1173 ©	13.64	17	0
NDB1445 ©	18.30	16	0
RD2552 ©	38.29	1	1
RD2794 ©	19.87	12	0
RD2907 ©	25.00	9	0
G.M.	23.80		
S.E.(M)	3.37		
C.D.	7.97		
C.V. (%)	28.29		
DOS	16.11.2017		
Reason	High CV		

AVT-IR-NEPZ

Entry	CAU, PUSA		
	Yield (q/ha)	Rk	G
KB1531	47.28	3	0
PL892	39.46	8	0
RD2948	45.92	5	0
DWRB137 ©	55.20	1	1
HUB113 ©	40.58	7	0
JYOTI ©	46.78	4	0
K508 ©	44.02	6	0
RD2552 ©	54.35	2	1
G.M.	46.70		
S.E.(M)	0.91		
C.D.	2.21		
C.V. (%)	3.89		
DOS	05.12.2017		
Reason	Late sowing		

IVT-RF-NEPZ

Entry	CAU, PUSA		
	Yield (q/ha)	Rk	G
DWRB185	31.88	3	0
DWRB186	27.54	8	0
HUB253	29.71	5	0
HUB260	26.81	9	0
JB362	18.48	14	0
JB363	25.72	10	0
KB1606	30.43	4	0
KB1616	13.41	16	0
KB1633	22.10	11	0
NDB1680	12.32	17	0
PL905	19.57	12	0
RD2981	28.26	7	0
RD2982	18.84	13	0
RD2983	13.77	15	0
RD2984	28.99	6	0
K603 ©	43.12	1	1
LAKHAN ©	40.22	2	1
G.M.	25.36		
S.E.(M)	1.73		
C.D.	4.11		
C.V. (%)	13.68		
DOS	04.12.2017		
Reason	Late sowing		

International Trials and Nurseries

During *rabi* 2017-18, six trials and nurseries were received from ICARDA which included a total of 378 genotypes for different production conditions. These international trials and nurseries were evaluated at different selected locations. One set each of these nurseries and trials was also sown at ICAR-IIWBR, Karnal, and barley breeders from SAUs and ICAR institutes were given an opportunity to select desirable germplasm from these international trials and nurseries during a field day organized on 28th March, 2018 and a total of 94-germplasm lines were selected by different breeders. In addition, one set each of EIBGN and NBGSN was supplied to 10 different locations.

International trials and nurseries evaluated during crop season 2017-18

Sr. No.	Trial/Nurseries	Genotypes received from ICARDA	Indian National check	Number of Sets	Locations
1.	IBYT-HI-2018	24	BH946	4	Karnal, Durgapura, Hisar, Ludhiana
2.	INBYT-HI-2018	24	BHS352/ Geetanjali	4	Karnal, Ludhiana, Bajaura, Kanpur
3.	5 th GSYT-2018	24	K603	4	Karnal, Faizabad, Durgapura, Kanpur
4.	IBON-HI-2018	125	BH946	4	Durgapura, Hisar, Ludhiana, Karnal
5.	INBON-HI-2018	66	BHS352/ Geetanjali	4	Karnal, Bajaura, Ludhiana, Kanpur
6.	5 th GSBON-2018	115	Lakhan	4	Karnal, Kanpur, Faizabad, Durgapura

International Barley Yield Trial-High Input-2018 (IBYT-HI-2018)

This trial comprising of 25 entries including one local check BH946, was evaluated in an Alpha-Lattice Design with two replications at four locations namely, Durgapura, Hisar, Karnal and Ludhiana under high input conditions. The performance of the entries for grain yield varied across the locations and it was not linear. Location-wise analysis revealed that the check BH946 ranked second at Karnal location and was in the first non-significant group (NSG). However, at other locations this check ranked 7, 16 and 20, respectively at Hisar, Durgapura and Ludhiana and was not significant. The test entry IBYT-HI-20 was found promising yielder as it registered significantly higher yield at Durgapura and Ludhiana. Three more test entries which recorded higher yield and were in the NSG 1 at two of the four locations Karnal and Ludhiana (3 and 16) and Hisar and Ludhiana (6). Based on field performance and plant type, 9-entries (6, 7, 8, 9, 10, 13, 17, 20 and 21) were selected by the barley breeders during the field day.

Grain yield, ranking and grouping of barley genotypes evaluated under IBYT-HI-(2018) at different locations in *rabi* 2017-18

Genotypes (IBYT-HI-18)	Karnal			Hisar			Durgapura			Ludhiana		
	Yield	RK	G (5%)	Yield	RK	G(5%)	Yield	RK	G(5%)	Yield	RK	G(5%)
1.	21.80	14	0	36.83	16	0	44.91	12	0	10.73	23	0
2.	22.57	12	0	47.67	3	1	17.05	25	0	14.67	16	0
3.	37.62	1	1	31.83	23	0	54.74	6	0	18.32	5	1
4.	27.49	7	0	35.50	18	0	55.97	3	0	21.88	2	1
5.	27.56	6	0	39.00	12	0	41.90	18	0	18.50	3	1
6.	19.16	18	0	49.33	1	1	52.88	7	0	17.61	8	1
7.	21.55	15	0	34.17	20	0	39.84	19	0	18.33	4	1
8.	21.21	17	0	39.58	9	0	51.14	8	0	17.18	11	0
9.	21.33	16	0	35.33	19	0	61.69	2	1	7.93	24	0
10.	23.77	9	0	24.17	25	0	43.58	15	0	22.02	1	1

11.	14.08	25	0	36.33	17	0	54.96	4	0	18.32	6	1
12.	30.89	3	1	37.67	14	0	51.03	9	0	11.61	22	0
13.	16.61	21	0	37.17	15	0	45.35	11	0	7.53	25	0
14.	16.83	20	0	42.67	6	0	23.61	24	0	11.88	21	0
15.	14.60	23	0	32.67	21	0	38.61	21	0	15.58	15	0
16.	29.07	5	1	41.00	8	0	41.91	17	0	18.07	7	1
17.	30.42	4	1	39.42	10	0	27.43	23	0	14.48	17	0
18.	21.81	13	0	32.50	22	0	54.75	5	0	17.16	12	0
19.	15.58	22	0	29.50	24	0	44.30	13	0	16.39	13	0
20.	22.61	11	0	46.33	5	1	65.42	1	1	17.38	9	1
21.	25.00	8	0	39.17	11	0	43.68	14	0	17.38	9	1
22.	14.37	24	0	47.67	3	1	46.20	10	0	14.05	19	0
23.	23.19	10	0	37.83	13	0	38.63	20	0	14.37	18	0
24.	18.45	19	0	48.00	2	1	29.94	22	0	15.84	14	0
25.	33.76	2	1	41.67	7	0	42.05	16	0	12.88	20	0
Mean	22.85			38.52			44.46			15.60		
S.E.m	4.05			2.24			2.22			1.89		
C.D. (5%)	10.01			5.43			5.48			4.67		
C.V.(%)	25.08			8.24			7.06			17.13		
D.O.S.	25.11.17			14.11.17			20.11.17			28.11.17		

Mean and range (in parenthesis) across the locations for ancillary characters of barley genotypes evaluated under IBYT-HI-(2018) in *rabi* 2017-18 season

Genotype (IBYT-HI-18)	Days to Heading (Mean & Range)	Days to Maturity (Mean & Range)	Plant Height (cm) (Mean & Range)
1.	83 (69-91)	123 (113-133)	96 (77-109)
2.	78 (67-87)	121 (109-131)	86 (54-107)
3.	85 (76-95)	124 (113-133)	99 (84-113)
4.	79 (67-87)	122 (109-134)	93 (68-111)
5.	86 (73-95)	122 (111-132)	101 (84-121)
6.	84 (71-94)	122 (111-132)	95 (76-109)
7.	90 (77-98)	125 (112-134)	98 (82-120)
8.	88 (72-98)	123 (112-134)	104 (81-124)
9.	81 (71-95)	120 (112-128)	95 (85-106)
10.	89 (76-99)	123 (114-134)	102 (90-121)
11.	84 (71-95)	124 (114-133)	98 (85-127)
12.	82 (69-96)	122 (111-132)	87 (70-107)
13.	81 (71-92)	122 (109-132)	86 (75-102)
14.	84 (74-95)	123 (113-133)	90 (66-107)
15.	82 (67-94)	123 (109-133)	90 (63-116)
16.	79 (69-89)	120 (107-132)	89 (61-111)
17.	85 (64-96)	122 (109-133)	92 (65-115)
18.	88 (74-102)	124 (113-134)	99 (82-118)
19.	81 (74-91)	122 (113-132)	86 (68-112)

20.	83 (72-95)	122	95 (81-113)
21.	86 (72-96)	124 (113-134)	91 (77-106)
22.	85 (75-95)	123 (112-132)	100 (86-115)
23.	89 (76-99)	126 (117-134)	98 (85-111)
24.	81 (69-92)	122 (109-133)	93 (68-106)
25.	81 (71-94)	124 (113-133)	95 (72-119)

International Naked Barley Yield Trial-High Input-2018 (INBYT-HI-2018)

This trial comprising of twenty-four test entries and one check Geetanjali at Karnal, Ludhiana and Kanpur; and BHS352 at Bajaura were evaluated in an Alpha-Lattice Design with two replications. At Karnal centre the test entry 13 ranked 1. Six more entries (3, 6, 7, 8, 12 and 22) were statistically at par with the highest yielder (13) and belonged to NSG 1 at this location, but were inferior to the check Geetanjali which ranked 2. Two entries which were found to be higher yielder at more than one location were 11(Kanpur and Bajaura) and 12 (Karnal and Bajaura). Sixteen test entries (1, 2, 3, 4, 5, 6, 7, 11, 12, 14, 15, 17, 18, 19, 20 and 22) were selected by the breeders during the field day.

Grain yield, ranking and grouping of barley genotypes evaluated under INBYT-HI-(2018) at different locations in *rabi* 2017-18 season

Genotype (INBYT-HI-18)	Karnal			Kanpur			Ludhiana			Bajaura*		
	Yield	RK	G	Yield	RK	G	Yield	RK	G	Yield	RK	G
1.	7.80	25	0	22.44	18	0	8.33	25	0	9.87	20	0
2.	9.43	24	0	19.90	23	0	10.72	23	0	4.00	25	0
3.	21.58	7	1	34.62	6	0	11.74	18	0	17.14	5	0
4.	10.41	22	0	38.25	5	0	11.59	19	0	15.50	9	0
5.	15.21	15	0	26.29	13	0	11.74	17	0	12.06	14	0
6.	21.20	8	1	26.67	11	0	16.09	7	0	10.33	19	0
7.	24.24	4	1	26.67	12	0	13.04	13	0	11.55	17	0
8.	21.82	6	1	21.02	19	0	13.77	12	0	13.96	10	0
9.	17.12	12	0	29.14	9	0	14.06	11	0	22.65	1	1
10.	15.59	14	0	29.19	8	0	12.90	14	0	17.68	4	0
11.	14.21	17	0	41.49	2	1	16.67	6	0	20.59	2	1
12.	22.05	5	1	19.52	25	0	17.68	3	0	19.04	3	1
13.	26.52	1	1	20.90	20	0	20.29	2	0	16.54	6	0
14.	13.47	18	0	19.90	23	0	12.32	15	0	16.54	7	0
15.	16.54	13	0	24.02	16	0	10.87	21	0	8.10	22	0
16.	17.72	11	0	33.48	7	0	16.96	5	0	11.90	16	0
17.	10.76	21	0	22.86	17	0	11.45	20	0	9.48	21	0
18.	12.19	20	0	44.49	1	1	14.35	9	0	16.50	8	0
19.	18.30	10	0	25.19	14	0	14.49	8	0	11.95	15	0
20.	18.42	9	0	28.24	10	0	10.72	23	0	10.56	18	0
21.	10.15	23	0	20.24	21	0	11.88	16	0	12.89	13	0
22.	24.86	3	1	40.03	3	0	17.54	4	0	13.07	12	0
23.	14.95	16	0	24.16	15	0	14.13	10	0	13.65	11	0
24.	13.42	19	0	20.21	22	0	10.87	21	0	7.12	23	0
25.(Geetanjali / BHS352*; LC)	25.08	2	1	39.18	4	0	56.52	1	1	6.03	24	0
Mean	16.92			27.92			15.23			13.15		
S.E.m	2.58			1.68			9.65			1.98		
C.D. (5%)	6.37			4.16			23.35			4.89		
C.V. (%)	21.56			8.53			89.62			21.28		
D.O.S.	25.11.17			25.11.17			28.11.17			20.11.2017		

Mean and range (in parenthesis) across the locations for ancillary characters of barley genotypes evaluated under INBYT-HI-(2018) at different locations in *rabi* 2017-18

Genotype (INBYT-HI-18)	Days to Heading (Mean & Range)	Days to Maturity (Mean & Range)	Plant Height (cm) (Mean & Range)
1.	98 (76-125)	135 (118-168)	95 (68-111)
2.	99 (87-123)	136 (121-167)	98 (73-130)
3.	90 (70-119)	134 (115-165)	97 (75-116)
4.	88 (70-123)	132 (117-166)	96 (72-118)
5.	89 (71-123)	133 (117-166)	95 (64-114)
6.	96 (78-123)	135 (120-167)	93 (58-115)
7.	99 (85-127)	138 (122-170)	93 (61-112)
8.	98 (85-123)	136 (119-167)	94 (69-119)
9.	87 (70-121)	132 (116-164)	98 (70-111)
10.	92 (73-119)	133 (117-164)	96 (62-122)
11.	96 (77-123)	135 (121-165)	94 (68-111)
12.	98 (84-121)	136 (123-164)	93 (69-111)
13.	93 (77-119)	136 (121-163)	101 (83-117)
14.	98 (80-125)	135 (121-167)	93 (55-117)
15.	99 (70-127)	137 (121-168)	104 (85-140)
16.	97 (83-123)	134 (120-165)	91 (60-111)
17.	96 (76-123)	136 (120-166)	101 (76-121)
18.	91 (75-121)	256 (118-113)	99 (79-116)
19.	97 (80-123)	135 (117-166)	94 (61-121)
20.	94 (75-123)	132 (115-164)	92 (59-112)
21.	94 (78-121)	132 (117-162)	91 (55-115)
22.	94 (76-123)	134 (115-165)	88 (62-105)
23.	103 (84-130)	137 (122-169)	95 (65-120)
24.	91 (77-119)	133 (118-163)	96 (60-123)
25.	89 (73-121)	133 (116-163)	94 (63-113)

5th Global Spring Barley Yield Trail-2018 (5th GSBYT-2018)

This trial comprised of twenty-five entries including one check variety K603 and was evaluated at four locations (Kanpur, Karnal, Durgapura and Faizabad) under low input production conditions. The check variety K603 was ranked first at Kanpur and Durgapura locations, and ranked 3 at Faizabad with NSG 1. The test entry 15 gave higher yields at Karnal, Kanpur and Faizabad locations and was in NSG 1 at these locations. Other entries which were at par with the highest yielder of the location at two locations were 1, 11 and 22 at Karnal and Faizabad and 3, 4 and 21 at Kanpur and Faizabad locations. Based on field observations on plant and spike characters, 11-genotypes (3, 4, 6, 7, 8, 10, 11, 15, 17, 19 and 21) were selected by the barley breeders of different centres during the field day organized at ICAR-IIWBR, Karnal.

Grain yield, ranking and grouping of barley genotypes evaluated under 4th GSBYT-(2018) at different locations in *rabi* 2017-18

Genotype (5th GSBYT-18)	Karnal			Kanpur			Durgapura			Faizabad		
	Yield	RK	G(5%)	Yield	RK	G(5%)	Yield	RK	G(5%)	Yield	RK	G(5%)
1	30.22	6	1	23.17	17	0	11.59	25	0	27.99	2	1
2	12.83	23	0	31.43	10	0	26.09	23	0	7.30	23	0
3	21.52	13	0	37.02	4	1	48.55	5	0	20.67	4	1
4	24.78	10	0	34.81	6	1	38.41	14	0	19.67	5	1
5	23.04	11	0	19.05	24	0	49.28	4	0	8.91	19	0
6	20.22	17	0	32.89	8	0	48.55	5	0	13.68	10	1
7	18.04	19	0	34.22	7	0	52.17	2	0	9.41	17	0
8	21.30	14	0	31.62	9	0	36.96	19	0	7.12	24	0
9	6.96	25	0	29.21	13	0	45.65	8	0	7.50	22	0
10	11.74	24	0	26.79	15	0	38.41	14	0	15.33	7	1
11	28.91	7	1	21.92	20	0	38.41	14	0	14.74	8	1
12	30.43	5	1	22.16	19	0	36.96	18	0	10.44	15	0
13	13.91	22	0	29.33	12	0	31.88	21	0	8.28	20	0
14	18.48	18	0	24.00	16	0	43.48	11	0	14.41	9	1
15	30.65	4	1	35.36	5	1	26.81	22	0	12.62	12	1
16	30.87	3	1	20.95	21	0	44.93	10	0	11.53	14	0
17	34.57	1	1	19.87	23	0	42.03	12	0	7.96	21	0
18	28.70	8	1	23.00	18	0	34.06	20	0	8.97	18	0
19	20.65	16	0	40.57	2	1	45.65	8	0	4.17	25	0
20	27.17	9	1	30.41	11	0	20.29	24	0	9.64	16	0
21	15.87	20	0	37.08	3	1	48.55	5	0	29.91	1	1
22	31.96	2	1	29.08	14	0	51.45	3	0	19.13	6	1
23	21.96	12	0	20.00	22	0	37.68	17	0	13.17	11	1
24	15.00	21	0	16.12	25	0	40.58	13	0	12.47	13	1
25 (K603; LC)	21.09	15	0	42.05	1	1	63.77	1	1	22.68	3	1
Mean	22.43			28.48			40.09			13.51		
S.E.m	3.88			3.11			2.82			7.09		
C.D. (5%)	9.38			7.68			6.83			17.50		
C.V. (%)	24.43			15.44			9.96			74.19		
D.O.S.	25.11.17			25.11.17			20.11.17					

Mean and range (in parenthesis) across the locations for ancillary characters of barley genotypes evaluated under 5th GSBYT-(2018) at different locations in *rabi* 2017-18

Genotype 5th GSBYT-18	Days to Heading (Mean & Range)	Days to Maturity (Mean & Range)	Plant Height (cm) (Mean & Range)
1.	90 (84-105)	125 (119-134)	97 (64-119)
2.	88 (74-97)	124 (116-132)	94 (72-111)
3.	85 (75-94)	121 (110-135)	97 (69-108)
4.	87 (69-96)	123 (114-133)	97 (70-109)
5.	88 (76-96)	123 (115-134)	91 (45-116)
6.	81 (73-95)	120 (110-133)	101 (54-127)
7.	80 (69-88)	119 (110-133)	98 (70-120)
8.	84 (72-95)	120 (111-131)	98 (67-116)
9.	86 (67-99)	124 (115-135)	91 (46-109)
10.	86 (76-95)	121 (109-133)	93 (75-112)
11.	83 (73-94)	120 (111-133)	85 (47-106)
12.	90 (79-101)	123 (112-134)	89 (72-102)
13.	90 (81-96)	124 (113-134)	83 (50-105)
14.	84 (68-94)	120 (109-133)	89 (57-103)
15.	85 (76-94)	121 (112-134)	92 (74-107)
16.	93 (83-105)	127 (117-137)	88 (74-105)
17.	91 (81-96)	122 (113-134)	77 (60-99)
18.	91 (79-96)	123 (113-135)	87 (57-105)
19.	85 (68-96)	122 (109-134)	98 (74-108)
20.	86 (76-95)	122 (114-134)	81 (53-109)
21.	84 (75-95)	120 (109-131)	97 (89-105)
22.	77 (64-96)	116 (109-125)	104 (82-119)
23.	87 (75-97)	122 (109-132)	91 (67-117)
24.	89 (69-101)	126 (119-135)	97 (82-115)
25.	77 (70-92)	119 (108-133)	103 (86-113)

International Barley Observation Nursery-High Input-2018 (IBON-HI-2018)

The IBON comprising of 130 entries including one local check (BH946), repeated five times, were raised at four locations namely, Durgapura, Hisar, Ludhiana and Karnal in rabi 20167-18 The means and range for ancillary characters, and mean yields worked out as g/plot (plot size 1.15 m²) across the test locations for 25 top entries based on grain yield in the decreasing order of ranking are tabulated and given below. Plot yield in the check variety BH946 ranged from 503 g to 623 g with a mean of 568 g. Only three test entries 97 (614 g), 108 (590 g) and 47 (573 g) gave higher grain yield across the locations over the average yield of the check variety BH946. A total of 14 entries (9, 11, 13, 16, 30, 31, 36, 61, 79, 82, 83, 84, 91 and 120) were selected by the barley breeders during the field day.

Mean and range (in parenthesis) across the locations for ancillary characters of barley genotypes evaluated under IBON-HI-(2018) at different locations in *rabi* 2017-18

Genotype (IBON-HI-18)	Days to Heading	Days to Maturity	Plant Height (cm)	Yield /plot (1.15m ²)	Genotype (IBON-HI-2018)	Days to Heading	Days to Maturity	Plant Height (cm)	Yield /plot (1.15m ²)
97	86 (70-97)	124 (113-136)	98 (82-118)	614 (425-850)	16	80 (65-93)	120 (101-131)	107 (86-125)	520 (100-830)
108	84 (70-97)	123 (115-135)	100 (85-119)	590 (350-700)	90	80 (69-92)	121 (111-132)	95 (78-109)	518 (400-760)
47	89 (74-102)	124 (109-136)	114 (98-131)	573 (450-760)	70	91 (82-101)	126 (114-134)	105 (86-120)	508 (450-600)
80 (Check)	82 (64-94)	122 (107-133)	98 (71-114)	568 (350-830)	84	81 (71-90)	123 (113-134)	92 (79-109)	508 (400-770)
82	83 (64-97)	123 (107-135)	93 (80-102)	565	103	86 (70-97)	125 (115-133)	97 (80-118)	508 (350-800)
46	84 (74-96)	124 (110-135)	98 (81-113)	564 (325-800)	45	83 (67-97)	122 (105-135)	96 (80-111)	504 (375-810)
59	83 (70-96)	124 (111-134)	102 (80-123)	561 (290-840)	6	81 (67-93)	120 (103-130)	95 (76-110)	500 (350-700)
100	89 (74-10)	127 (113-137)	101 (91-113)	545 (450-600)	107	81 (70-94)	118 (111-126)	99 (93-111)	498 (250-710)
60	82 (70-95)	124 (113-133)	99 (88-110)	539 (290-840)	22	80 (66-92)	123 (105-137)	114 (101-126)	495 (350-650)
79	84 (71-97)	122 (107-133)	95 (71-109)	539 (375-710)	34	82 (67-95)	121 (105-132)	102 (90-113)	495 (300-790)
120	82 (70-95)	123 (115-130)	96 (79-110)	529 (270-840)	93	83 (72-95)	124 (115-134)	112 (99-121)	495 (350-650)
87	85 (73-96)	124 (113-132)	94 (82-104)	525 (400-750)	29	85 (68-100)	124 (105-135)	104 (90-121)	494 (225-810)
81	86 (69-97)	124 (107-136)	100 (88-113)	523 (370-750)					

International Naked Barley Observation Nursery–High Input-2018 (INBON-HI-2018)

This nursery consisting of 100-entries including one local check repeated four times (BHS352 at Bajaura and Geetanjali at Karnal, Ludhiana and Kanpur), was raised at these four locations. The means and range for ancillary characters, and mean yields worked out as g/plot (plot size 1.15 m²) across the test locations for 25 top entries based on grain yield in the decreasing order of ranking are tabulated and given below. The mean plot yield for check variety ranged from 198 to 438 g with an overall mean value of 307 g /plot across the location. 15-test entries gave grain yield higher than the average yields of checks. These entries are 48, 7, 55, 11, 49, 26, 15, 57, 46, 3, 24, 19, 28, 10, and 23 which ranged from 308 g to 403 g /plot for grain yield. Breeders from different centres selected 16-entries (4, 6, 7, 11, 13, 17, 18, 31, 33, 38, 43, 47, 54, 60, 61 and 64) during the field day.

Mean and range (in parenthesis) across the locations for ancillary characters of barley genotypes evaluated under INBON-HI- (2018) at different locations in *rabi* 2017-18

Genotype (INBON-HI-18)	Days to Heading	Days to Maturity	Plant Height (cm)	Yield /plot (1.15m ²)	Genotype (INBON-HI-18)	Days to Heading	Days to Maturity	Plant Height (cm)	Yield /plot (1.15m ²)
48	92 (73-121)	134 (116-163)	102	403 (200-700)	23	96 (73-123)	135 (121-165)	96 (67-118)	308 (220-400)
7	98 (83-121)	135 (121-164)	96 (78-106)	395 (240-700)	30 (C)	87 (71-124)	134 (115-163)	90 (60-107)	436 (160-725)
55	103 (88-122)	134 (120-163)	93 (74-113)	390 (50-790)	9	96 (81-123)	134 (120-163)	95 (65-108)	306 (125-700)
11	98 (83-123)	134 (119-163)	96 (70-110)	388 (230-450)	4	90 (73-119)	133 (116-165)	96 (70-119)	304 (110-500)
49	95 (76-126)	134 (114-164)	100 (78-124)	385 (245-700)	6	95 (73-123)	134 (119-162)	99 (74-114)	304 (225-490)
26	96 (81-129)	134 (118-164)	107 (89-122)	378 (220-700)	8	97 (81-123)	134 (120-163)	91 (63-108)	303 (180-600)
15	102 (92-123)	135 (124-162)	97 (78-111)	358 (200-550)	54	99 (89-123)	134 (120-161)	95 (65-125)	300 (80-500)
57	91 (75-123)	131 (115-161)	97 (75-121)	343 (100-600)	42	91 (73-122)	135 (118-165)	106 (70-125)	299 (100-600)
46	89 (71-123)	132 (112-165)	101 (75-127)	340 (200-450)	17	98 (81-126)	138 (121-169)	94 (80-101)	296 (80-600)
3	88 (71-115)	133 (115-164)	97 (80-106)	325 (170-450)	43	98 (81-126)	136 (118-166)	100 (59-124)	294 (110-500)
24	96 (81-121)	134 (11-164)	100 (68-122)	318 (140-600)	14	100 (91-123)	134 (118-163)	93 (68-118)	285 (190-400)
19	99 (81-123)	135 (121-163)	95 (68-108)	316 (220-500)	29	96 (81-127)	135 (121-164)	100 (77-116)	284 (175-500)
28	99 (81-123)	135 (119-166)	98 (80-116)	314 (275-390)					

5th Global Spring Barley Screening Nursery-2018 (5th GSBSN-2018)

This nursery consisted of 120 entries including a local check Lakhan repeated five times at each location. This nursery was raised at four locations namely, Kanpur, Faizabad, Durgapura and Karnal. The means and range for ancillary characters, and mean yields worked out as g/plot (plot size 1.15 m²) across the test locations for 25 top entries based on grain yield in the decreasing order of ranking are tabulated and given below. Nine entries namely 110, 79, 104, 105, 84, 107, 120, 65 and 94, whose plot yield (plot size 1.15 m²) ranged from 723 to 755 g, gave grain yield higher than the average yield of the check variety Lakhan (621 g/plot). During the field day organized at ICAR-IIWBR, Karnal, barley breeders from different centres selected as many as 28-entries (7, 14, 21, 25, 26, 29, 32, 35, 36, 48, 49, 62, 63, 65, 66, 67, 72, 83, 84, 86, 87, 88, 92, 94, 98, 99, 104 and 108) as per their requirements.

Mean and range (in parenthesis) across the locations for ancillary characters of barley genotypes evaluated under 5th GBSN-(2018) at different locations in *rabi* 2017-18

Genotype 5 th GYSBON- 18	Days to Heading	Days to Maturity	Plant Height (cm)	Yield /plot (1.15m ²)	Genotype 5 th GYSBON- 18	Days to Heading	Days to Maturity	Plant Height (cm)	Yield /plot (1.15m ²)
110	80 (67-95)	120 (113-132)	105 (100-113)	755 (480-990)	48	88 (70-96)	122 (106-131)	98 (69-111)	591 (425-700)
79	83 (68-95)	118 (106-130)	100 (91-114)	710 (480-850)	67	84 (69-95)	119 (105-129)	95 (86-113)	590 (470-800)
104	83 (66-95)	120 (108-130)	102 (101-106)	680 (330-1000)	76	90 (72-98)	123 (107-135)	98 (87-106)	588 (300-770)
105	84 (66-95)	120 (108-133)	101 (92-116)	673 (450-880)	80	86 (69-101)	125 (115-135)	106 (102-110)	588 (200-1100)
84	84 (70-95)	120 (113-130)	105 (104-107)	670 (600-850)	77	81 (67-91)	116 (106-129)	108 (104-116)	583 (420-900)
107	81 (66-93)	117 (105-130)	103 (95-117)	644 (360-900)	69	84 (69-95)	119 (105-129)	95 (78-114)	580 (330-750)
120	79 (68-95)	119 (108-135)	109 (97-119)	633 (370-1050)	73	85 (70-95)	118 (103-130)	102 (90-118)	580 (300-950)
65	87 (72-95)	119 (105-129)	90 (64-104)	625 (350-950)	78	83 (69-94)	118 (107-130)	108 (98-125)	575 (200-880)
94	89 (78-95)	124 (115-131)	94 (78-111)	623 (510-850)	83	77 (62-87)	116 (103-128)	97 (87-108)	570 (370-900)
50 Check	84 (70-95)	122 (115-133)	105 (94-118)	816 (630-1000)	98	83 (66-95)	119 (107-130)	97 (75-108)	570 (440-740)
37	85 (68-93)	122 (107-132)	92 (79-107)	610 (500-710)	109	83 (68-95)	118 (106-130)	101 (95-106)	570 (350-780)
86	83 (67-95)	119 (106-130)	92 (78-107)	600 (480-750)	7	76 (65-83)	115 (103-125)	94 (72-114)	569 (260-770)
97	87 (71-95)	122 (110-130)	102 (95-109)	593 (310-800)					

Elite International Barley Germplasm Nursery (EIBGN-2017-18)

This nursery was constituted with 45-germplasm lines and six released varieties (BH946, BH959, BHS400, RD2715, DWRB101 and HUB113) as checks. These 45 promising germplasm lines were selected from different international trials and nurseries based on their performance in *rabi* 2016-17 under respective trials/nurseries. A set of 75 entries including these six checks repeated five times at each location were evaluated in an augmented design at eleven locations in NEPZ (Kanpur, Faizabad, Varanasi), NHZ (Shimla, Bajaura) and NWPZ (Karnal, Hisar, Durgapura, Ludhiana, Pantnagar) in *rabi* season of 2017-18. Each entry was sown in a plot of two rows each of 2.5 m length and spaced at 30 cm. The data for grain yield recorded in grams (g) per plot (1.5 m²) plot was pooled across the locations of a zone and is given zone wise in the following table. Similarly, data for ancillary characters is tabulated below trait-wise as mean and range for a character across the 10-testing locations.

In general high yields were obtained in NWPZ followed by NEPZ and NHZ. The check variety BH946 was adjudged to be the best check in NWPZ and NHZ, where as in NEPZ, HUB 113 was the best among the checks in NWPZ and NEPZ, however in NHZ BH400 was the best variety. No test entry was statistically superior in any of the three zones compared to the respective best check of these zones. Only in NHZ, two test entries IBON-2017-11 and IBON-2017-90 had numerically higher yields over the best check variety. Two test entries 4th GSBYT-17-22 and IBON-17-75, though registered numerically lower yields over the best check varieties, but had consistency in the higher ranking across two zones (NWPZ and NEPZ) indicating stable performance of these entries.

Zonal means for grain yield, ranking and grouping of barley genotypes evaluated under EIBGN-2018 at different locations in *Rabi* 2017-18

Sr. No.	Genotype	Grain Yield (q/ha)								
		NWPZ	Rk	G	NEPZ	Rk	G	NHZ	Rk	G
1	IBYT-HI-(2017)-8	44.01	2	1	22.28	9	1	14.27	10	0
2	IBYT-HI-(2017)-9	34.80	14	0	24.39	3	1	11.02	22	0
3	IBYT-HI-(2017)-12	27.52	25	0	21.61	11	1	10.45	24	0
4	IBYT-HI-(2017)-3	38.08	8	0	25.28	2	1	14.53	8	0
5	INBYT-17-3	11.88	41	0	13.17	35	0	7.25	37	0
6	INBYT-17-4	11.59	42	0	13.17	35	0	7.63	36	0
7	INBYT-17-5	23.84	34	0	10.94	44	0	13.19	15	0
8	INBYT-17-6	33.87	15	0	14.94	32	0	9.89	26	0
9	INBYT-17-7	28.85	21	0	15.83	26	0	9.81	27	0
10	INBYT-17-8	21.72	35	0	14.13	34	0	4.29	44	0
11	INBYT-17-12	36.19	12	0	14.35	33	0	11.30	21	0
12	INBYT-17-14	30.58	20	0	17.69	19	0	12.43	16	0
13	INBYT-17-23	25.62	30	0	15.35	28	0	7.25	38	0
14	4 th GSBYT-17-13	45.56	1	1	13.02	37	0	9.57	29	0
15	4 th GSBYT-17-14	32.59	16	0	11.69	39	0	10.06	25	0
16	4 th GSBYT-17-17	27.25	26	0	15.02	31	0	8.62	33	0
17	4 th GSBYT-17-20	38.46	6	1	17.35	22	0	8.89	32	0
18	4 th GSBYT-17-21	41.91	4	1	15.24	29	0	8.92	31	0
19	4 th GSBYT-17-22	43.72	3	1	25.65	1	1	14.47	9	0
20	4 th GSBYT-17-23	36.94	10	0	20.98	12	1	10.99	23	0
21	INBON-17-32	8.63	44	0	17.98	18	0	6.21	40	0
22	INBON-17-79	24.60	33	0	11.20	42	0	6.27	39	0
23	INBON-17-33,	5.88	45	0	10.98	43	0	5.21	43	0
24	INBON-17-15	11.30	43	0	11.65	40	0	9.55	30	0
25	INBON-17-22	21.19	36	0	9.87	45	0	11.80	19	0
26	INBON-17-26	14.25	39	0	11.98	38	0	8.36	35	0
27	INBON-17-63	25.56	31	0	11.54	41	0	4.21	45	0
28	INBON-17-74	27.63	24	0	21.76	10	1	8.43	34	0
29	INBON-17-80	15.08	38	0	16.54	24	0	5.46	42	0
30	IBON-17-77	37.61	9	0	17.43	20	0	14.24	11	0
31	IBON-17-72	38.33	7	1	18.98	15	0	9.62	28	0
32	IBON-17-76	30.74	19	0	15.20	30	0	16.09	5	0
33	IBON-17-16	31.14	18	0	17.43	20	0	19.47	4	1
34	IBON-17-85	28.27	23	0	18.76	16	0	14.22	12	0
35	IBON-17-54	32.09	17	0	19.43	14	0	14.72	7	0
36	IBON-17-75	41.15	5	1	22.54	8	1	12.07	18	0
37	IBON-17-11	35.51	13	0	24.30	4	1	22.82	1	1
38	IBON-17-15	13.87	40	0	24.19	5	1	15.14	6	0
39	IBON-17-91	26.52	29	0	23.52	6	1	11.51	20	0
40	IBON-17-90	26.83	27	0	23.30	7	1	21.93	2	1
41	IBON-17-53	25.04	32	0	20.41	13	1	20.30	3	1
42	4th GSBSN-17-59	28.65	22	0	18.52	17	0	13.44	14	0

43	4th GSBSN-17-29	36.54	11	0	15.96	25	0	12.19	17	0
44	4th GSBSN-17-109	26.65	28	0	16.63	23	0	13.61	13	0
45	4th GSBSN-17-101	17.16	37	0	15.52	27	0	5.82	41	0
	GM	28.1			17.3			11.3		
	CD (5%)	7.28			5.45			5.32		
Checks										
1	BH 946	48.83			29.45			21.03		
2	BH959	36.37			27.97			19.42		
3	BHS 400	34.50			22.99			21.28		
4	RD 2715	46.04			30.58			16.37		
5	DWRB 101	38.96			27.51			21.02		
6	HUB 113	51.70			36.64			21.22		

Mean and range (in parenthesis) across the locations for ancillary characters of barley genotypes evaluated under EIBGN-(2018) at 10-different locations in *Rabi* 2017-18

Genotype	Days to heading (75%)	Days to maturity	Plant height (cm)	Tiller/meter	Spike length (cm)	Grains/spike	1000-Grain weight (g)	2/6 Row
IBYT-HI-(2017)-8	87 (71-111)	131 (109-162)	88 (50-103)	155 (108-230)	9 (6-16)	27 (23-34)	46 (40-50)	2
IBYT-HI-(2017)-9	86 (67-114)	130 (107-164)	95 (53-117)	119 (89-155)	10 (5-19)	30 (23-36)	49 (45-55)	2
IBYT-HI-(2017)-12	94 (79-113)	136 (120-164)	88 (54-110)	141 (96-212)	9 (6-16)	28 (18-36)	45 (37-50)	2
IBYT-HI-(2017)-3	93 (73-123)	135 (120-162)	102 (55-125)	128 (68-194)	10 (6-18)	31 (21-37)	37-52)5	2
INBYT-17-3	96 (76-125)	136 (118-164)	90 (55-120)	84 (43-155)	11 (8-22)	27 (21-37)	53 (37-52)	2
INBYT-17-4	96 (80-114)	138 (121-169)	91 (54-121)	60 (23-96)	10 (7-18)	67 (42-84)	38 (30-47)	6
INBYT-17-5	96 (82-117)	136 (120-162)	85 (53-115)	68 (18-148)	10 (7-18)	70 (48-91)	39 (36-48)	6
INBYT-17-6	91 (67-120)	135 (120-164)	89 (53-111)	80 (40-121)	10 (8-22)	71 (46-98)	39 (34-47)	6
INBYT-17-7	95 (70-120)	135 (116-162)	83 (59-104)	69 (39-105)	9 (7-19)	67 (48-96)	40 (32-49)	6
INBYT-17-8	95 (83-119)	135 (118-161)	88 (54-119)	94 (45-135)	8 (5-18)	63 (34-102)	39 (32-45)	6
INBYT-17-12	93 (70-117)	135 (118-162)	89 (54-115)	103 (70-132)	8 (5-19)	63 (29-101)	39 (33-41)	6
INBYT-17-14	97 (85-119)	136 (119-161)	89 (54-120)	98 (49-130)	8 (5-18)	63 (32-99)	39 (34-44)	6
INBYT-17-23	96 (80-121)	138 (123-163)	92 (58-120)	84 (40-135)	8 (6-18)	56 (32-72)	40 (35-48)	6
4 th GSBYT-17-13	95 (67-121)	136 (121-164)	83 (54-108)	80 (43-122)	9 (6-19)	68 (29-104)	35 (29-44)	6
4 th GSBYT-17-14	96 (69-125)	137 (118-167)	83 (56-110)	79 (45-130)	10 (6-23)	59 (37-84)	40 (35-45)	6
4 th GSBYT-17-17	89 (69-119)	135 (121-162)	97 (60-122)	103 (68-172)	11 (6-22)	35 (18-96)	44 (39-55)	6
4 th GSBYT-17-20	88 (60-117)	134 (113-163)	89 (50-133)	87 (41-140)	10 (6-22)	32 (19-84)	47 (40-63)	6
4 th GSBYT-17-21	94 (74-121)	136 (116-164)	94 (61-115)	102 (57-183)	9 (6-16)	66 (37-104)	37 (30-41)	6
4 th GSBYT-17-22	93 (68-119)	135 (117-163)	88 (62-109)	93 (58-161)	9 (6-18)	61 (38-97)	37 (21-42)	6
4 th GSBYT-17-23	91 (72-117)	136 (117-162)	86 (60-104)	96 (52-194)	10 (6-19)	67 (29-104)	36 (30-40)	2

INBON-17-32	90 (66-119)	134 (114-161)	80 (58-109)	115 (36-216)	10 (7-20)	31 (21-61)	44 (38-57)	MIX
INBON-17-79	92 (71-117)	136 (116-164)	83 (58-110)	99 (40-196)	9 (7-22)	62 (41-80)	37 (31-43)	6
INBON-17-33,	92 (69-119)	134 (114-163)	83 (59-112)	97 (35-200)	9 (6-17)	74 (42-123)	33 (27-38)	2
INBON-17-15	90 (69-116)	134 (113-164)	84 (50-105)	101 (36-142)	10 (6-21)	66 (32-111)	40 (34-46)	2
INBON-17-22	96 (82-120)	138 (120-169)	185 (48-105)	101 (59-157)	8 (4-19)	56 (32-81)	39 (33-44)	6
INBON-17-26	94 (71-120)	138 (123-168)	82 (43-106)	116 (57-207)	10 (5-23)	30 (15-76)	45 (41-50)	6
INBON-17-63	99 (82-121)	125 (124-169)	79 (52-112)	58 (10-107)	9 (6-22)	61 (38-90)	38 (32-48)	6
INBON-17-74	88 (66-118)	132 (108-164)	86 (54-113)	113 (89-166)	9 (4-18)	62 (40-84)	42 (34-50)	2
INBON-17-80	90 (67-120)	134 (116-162)	83 (50-113)	102 (65-135)	9 (6-17)	61 (32-79)	42 (38-49)	2
IBON-17-77	89 (65-118)	135 (118-162)	86 (61-106)	110 (61-181)	9 (6-16)	65 (33-81)	42 (32-55)	6
IBON-17-72	89 (64-118)	133 (117-162)	83 (61-104)	106 (51-175)	9 (6-16)	68 (56-84)	43 (37-51)	6
IBON-17-76	91 (66-120)	135 (117-161)	82 (50-101)	101 (57-145)	8 (5-16)	62 (48-74)	41 (35-47)	6
IBON-17-16	88 (64-120)	132 (108-164)	74 (53-97)	105 (65-148)	8 (5-18)	60 (42-87)	39 (29-48)	2
IBON-17-85	87 (58-120)	135 (114-164)	73 (44-90)	114 (71-210)	8 (5-18)	62 (38-101)	38 (34-44)	6
IBON-17-54	94 (62-178)	133 (117-162)	78 (60-96)	111 (69-221)	9 (6-18)	66 (25-99)	39 (35-42)	6
IBON-17-75	96 (74-115)	138 (120-162)	84 (50-107)	105 (44-142)	8 (5-17)	58 (28-81)	41 (37-47)	6
IBON-17-11	86 (66-115)	131 (107-161)	88 (53-121)	98 (65-138)	10 (5-19)	61 (44-84)	43 (36-49)	6
IBON-17-15	84 (63-117)	133 (113-160)	94 (61-110)	93 (49-135)	10 (6-19)	63 (46-81)	43 (37-51)	2
IBON-17-91	83 (64-115)	132 (114-162)	93 (59-117)	101 (69-174)	9 (5-18)	61 (21-85)	43 (32-50)	2
IBON-17-90	87 (67-115)	133 (116-163)	90 (49-113)	101 (50-198)	9 (6-19)	66 (31-140)	43 (36-49)	6
IBON-17-53	84 (66-115)	131 (110-162)	89 (59-104)	89 (47-115)	9 (6-16)	57 (20-72)	44 (35-53)	6
4th GSBSN-17-59	87 (64-115)	133 (114-162)	78 (57-97)	124 (50-215)	9 (5-18)	27 (22-31)	44 (35-50)	6
4th GSBSN-17-29	89 (71-120)	134 (110-164)	84 (49-100)	117 (68-189)	8 (5-18)	57 (22-81)	43 (39-49)	6
4th GSBSN-17-109	91 (72-118)	135 (120-164)	83 (53-107)	112 (70-211)	8 (5-16)	64 (29-93)	42 (38-48)	2
4th GSBSN-17-101	91 (72-118)	134 (116-164)	83 (56-115)	109 (66-201)	8 (5-18)	59 (22-103)	42 (33-53)	6
BH 946	91 (67-118)	135 (117-163)	82 (57-105)	93 (48-152)	9 (5-18)	56 (36-80)	42 (35-51)	6
BH 959	88 (63-119)	133 (113-166)	80 (54-106)	104 (67-167)	9 (5-19)	49 (34-78)	43 (36-50)	6
BHS 400	92 (66-118)	135 (117-165)	82 (57-101)	100 (46-169)	9 (6-19)	51 (33-88)	44 (38-52)	6
RD 2715	88 (65-118)	133 (115-165)	81 (47-108)	97 (40-171)	9 (6-20)	45 (29-58)	41 (35-47)	6
DWRB 101	91 (70-117)	135 (117-163)	84 (56-104)	113 (66-175)	9 (6-18)	57 (35-86)	40 (32-48)	2
HUB 113	91 (71-118)	134 (117-162)	80 (53-101)	113 (59-194)	8 (5-17)	44 (25-60)	42 (33-49)	6

National Barley Genetic Stock Nursery (NBGSN-2018)

A set of 15 promising entries endowed with trait(s) of breeding value, received from different centres, were evaluated during *Rabi* 2017-18. This nursery was supplied to 10-centres (Karnal, Durgapura, Kanpur, Hisar, Faizabad, Varanasi, Bajaura, Ludhiana, Pantnagar and Shimla). All the centres have reported the data. Genotype wise means and ranges obtained for different ancillary traits, and grain yield (g/plot) in a plot of 1.5m² across the locations are given in the following table.

Mean and range (in parenthesis) across the locations for ancillary characters of barley genotypes evaluated under NBGSN - (2018) at different locations in *Rabi* 2017-18

Genotype	Special features	Pedigree	Days to Heading	Days to Maturity	Plant height (cm)	Tillers/m	Spike Length (cm)	Grain/ Spike	1000-Grain weight (g)	Grain yield per plot (g)	2/6 Row
BH1017	Resistance to Yellow rust	NBGSN-13/DWR73 (2009)	89 (75-119)	133 (109-167)	83 (63-98)	149 (107-241)	9 (5-17)	25 (20-31)	52 (25-70)	387 (203-700)	2
BH1009	Resistance to leaf blight	BHMS22A/WG91	92 (78-121)	134 (108-165)	85 (50-100)	115 (56-193)	8 (4-16)	60 (44-93)	45 (35-53)	369 (126-802)	6
DWRB123	High grain yield	DWRUB54/DWR51	88 (69-121)	132 (111-166)	83 (59-101)	136 (79-187)	8 (6-17)	27 (20-31)	47 (38-52)	379 (160-600)	2
DWRB137	Resistance to yellow rust	DWR28/DWRUB64	86 (64-123)	130 (106-165)	74 (44-98)	90 (54-124)	9 (6-18)	64 (34-111)	47 (41-52)	294 (80-700)	6
DWRB150	Bold grain size	DWRUB54/Xanadu	86 (69-119)	132 (113-164)	82 (56-98)	127 (75-205)	9 (6-18)	26 (21-33)	50 (45-53)	329 (153-622)	2
HBL113	Brown and Yellow rust	Selection from Zephyre	97 (75-123)	286 (116-167)	77 (52-109)	145 (91-218)	10 (7-18)	28 (19-32)	37 (28-56)	250 (100-425)	2
HUB 250	Resistance to leaf blight	RD2618/RD2660	84 (60-119)	131 (106-165)	90 (55-117)	91 (65-130)	9 (6-19)	63 (43-38)	41 (30-55)	305 (40-510)	6
RD2899	High grain yield	RD2592/RD2035 //RD2715	92 (71-121)	133 (115-165)	82 (53-103)	98 (66-138)	7 (5-16)	51 (36-63)	44 (28-54)	375 (100-740)	6
RD2907	Salinity	RD103/RD2518/ RD2592	90 (69-121)	133 (112-164)	90 (56-110)	92 (45-135)	9 (5-16)	66 (36-111)	42 (24-54)	340 (78-700)	6
RD2909	Brown and Yellow rust	PL 830 / BL 472// RD 2696	88 (69-119)	132 (111-163)	94 (60-112)	92 (58-140)	9 (5-19)	69 (43-117)	46 (40-57)	377 (130-850)	6
RD2927	High GY and FY	RD2624/RD2696	85 (60-119)	132 (110-165)	83 (45-107)	92 (42-129)	8 (5-15)	59 (32-78)	45 (38-52)	374 (80-750)	6
PL895	Malting quality	BM7/BM12	92 (69-123)	134 (114-168)	79 (47-97)	125 (90-206)	9 (6-17)	24 (17-29)	47 (38-55)	301 (145-404)	2
UPB1065 (IBYT-HI-(2012-13)-16)	High Beta glucon	LIMON/BICHY2000 //NE167/CLE176	88 (66-119)	131 (112-164)	87 (59-107)	100 (65-143)	8 (4-19)	61 (34-93)	36 (30-48)	313 (60-670)	6
UPB 1076	Resistance to leaf blight	BCU73/RD2668	87 (62-121)	237 (111-118)	77 (51-95)	156 (95-225)	8 (4-17)	24 (15-32)	45 (39-54)	379 (177-680)	2
VLB130	Brown and Yellow rust	MSEL//BUCK.M.8.88 /E.ACACIA	87 (66-122)	131 (109-166)	87 (55-102)	154 (86-232)	9 (6-19)	26 (18-32)	45 (25-53)	389 (80-700)	2

Seed Production Programme of Barley (Rabi, 2017-18)

The indent and production status of breeder and nucleus seed of different varieties of barley (Rabi 2017-18) has been described as below.

Breeder Seed Indent and Production

To meet out the barley seed requirement of the country, a consolidated indent of 1048.25q breeder seed of 35 varieties was received from Deputy Commissioner (Seeds), DAC, Ministry of Agriculture & Farmers Welfare, Govt. of India. The indent included the requirement of seven states (Haryana, Himachal Pradesh, Jharkhand, Madhya Pradesh, Rajasthan, Uttar Pradesh and Uttarakhand) and two public sector agencies (Hindustan Insecticides Limited, National Seeds Corporation) and one private agency (National Seed Association of India) for the season Rabi 2017-18. The highest indent was placed by NSAI (395.7q) followed by Rajasthan (310.00q), Uttar Pradesh (120.00q) and National Seed Corporation (120.00q).

Among 35 varieties, maximum breeder seed indent was received for the variety RD 2786 (170.00q) followed by RD2794 (133.00), PL426 (102.75q), RD2035 (98.50q) and BH393 (73.80q) whereas the minimum indent was for the varieties BHS380 (0.50) and BHS400 (0.50q). Among all 35 varieties, more than half of the total indent was reported for five varieties' namely RD2786, RD2794, PL426, RD2035 and BH 393 . The allocation of breeder seed production was done at 10 seed producing centres. The purity of breeder seed production was verified by conducting 'Grow out Test' of at IIWBR, Karnal and other centres.

A total of 1452.20q breeder seed of 35 barley varieties was produced by ten breeder seed production centres, which was significantly surplus (+403.95q) over the total allocated quantity (1080.25q) of breeder seed. Out of total 35 allocated varieties, the seed of 31 varieties was produced successfully and the rest of four varieties namely NDB 1020 , NDB 943, RD 2624 and PRB502 could not be produced due to non-availability of their nucleus seeds with the concerned cooperating centres. Among all varieties, the maximum production was reported for RD2786 (289.0q) followed by RD2035 (194.0q), RD2794 (117.90q), PL426 (103.0q) and BH 393 (90.6q). Among 10 breeder seed production centres, maximum seed production was reported from RARI-SKNV, Durgapura (752.90q) followed by IIWBR, Karnal (260.40q) and CCS HAU Hisar (172.75q) while the minimum (1.00q) was reported from IARI, RS Karnal. In most of the varieties, sufficient breeder seed was produced to fulfill the DAC requirement. However, a deficit seed production was reported in a couple of varieties viz., NDB1445 (-34.00q), RD2794 (-15.10q) and JB 110 (-12.42) at different production centres. Among BSP centres NDUA&T, Faizabad produced 36.50 q and JNKVV, Jabalpur produced 10.35 q deficit seed of different varieties

Nucleus Seed production and Test stock multiplication

To ensure the breeder seed requirement for next year, the responsibility of 61.49q nucleus seed of 38 varieties was assigned to different cooperating centres. In response to this allocation, a total of 84.81q nucleus seed of 40 barley varieties was reported by different production centres. Maximum nucleus seed production was observed for variety PL807 (7.25q) followed by RD2786 (7.0q), PL 426(5.00q) and DWRB 137 (5.15q). The nucleus seed production of five varieties could not be accomplished by respective cooperating centres. In addition, test stock multiplication of three barley varieties viz., DWRB137, RD 2899 and RD 2907 was taken up by NSC whereas only one variety DWRB 137 was notified and produced 20.0q by CSF, National Seed Corporation, Hisar .

Variety wise breeder and nucleus seed production of barley varieties (2017-18)

S.No.	Variety	Year	Indent	Breeder Seed (q)			Nucleus Seed (q)		
				BSP-I	BSP-IV	Surplus/ Deficit	BNS-I	BNS-IV	Surplus/ Deficit
1	BH 380 ^(Pusa Losar)	2010	0.50	0.50	0.50	0.00	0.03	0.28	+0.25
2	BH 393	2002	73.80	73.80	90.60	+16.80	4.00	5.00	+1.00
3	BH 885	2012	3.80	3.80	4.55	+0.75	0.20	0.50	+0.30
4	BH 902	2010	38.00	38.00	45.30	+7.30	2.00	2.50	+0.50
5	BH 946	2014	13.50	13.50	14.40	+0.90	1.00	1.50	+0.50
6	BH 959	2015	12.00	12.00	17.90	+5.90	0.50	1.00	+0.50
7	BHS 400 ^(Pusa Sheetal)	2014	0.50	0.50	0.50	+0.00	0.03	0.62	+0.59
8	DWRB 101	2015	15.00	15.00	65.00	+50.00	0.75	3.70	+2.95
9	DWRB 73	2011	20.00	20.00	50.00	+30.00	1.00	2.20	+1.20
10	DWRUB 52	2007	55.00	55.00	75.40	+20.40	2.75	4.80	+2.05
11	DWRUB 64	2012	46.50	46.50	70.00	+23.50	2.50	2.70	0.20
12	DWRB 123	2016	-	-	-	-	00	2.75	+2.75
13	DWRB 137	2017	-	-	-	-	1.00	5.15	+4.15
14	DWRB 91	2012	-	-	-	-	00	1.35	+1.35
15	DWRB 92	2013	-	-	-	-	00	3.20	+3.20
16	JB 110 ^(Jawahar Barley 1)	2010	15.00	15.00	2.58	-12.42	0.75	0.50	-0.25
17	JB 58	2005	41.00	41.00	43.07	+2.07	2.00	1.00	-1.00
18	K 409 ^(Priti)	2001	5.00	5.00	7.00	+2.00	0.25	0.25	0.00
19	K 508 ^(Pragati)	1998	6.87	6.87	8.00	+1.13	0.50	0.50	0.00
20	K 560 ^(Haritma)	1998	5.43	5.43	8.00	+2.57	0.25	0.50	+0.25
21	K 551		-	-	-			0.50	+0.50
22	Mahamana 113 ^(HUB 113)	2014	40.00	40.00	42.00	+2.00	2.00	3.00	+1.00
23	NBD 1445 ^(Narendra Barley 1445)	2014	40.00	40.00	6.00	-34.00	2.00	0.11	-1.89
24	NDB 1020 ^(Narendra Barley 3)	2002	1.20	1.20	0.00	-1.20	0.10	0.00	-0.10
25	NDB 940 ^(Narendra Barley 2)	2001	1.20	1.20	1.10	-0.10	0.10	0.00	-0.10
26	NDB 943 ^(Narendra Barley 5)	2009	1.20	1.20	0.00	-1.20	0.10	0.00	-0.10

27	PL 172	1987	8.20	8.20	14.70	6.50	0.50	1.00	+0.50
28	PL 426	1996	102.75	102.75	103.00	+0.25	5.00	6.00	+1.00
29	PL 751	2007	4.95	4.95	5.20	+0.25	0.25	1.00	+0.75
30	PL 807	2011	20.35	20.35	21.00	+0.65	5.75	7.25	+1.50
31	PRB 502	2010	1.20	1.20	0.00	-1.20	0.10	00	-0.10
32	RD 2035	1994	98.50	98.50	194.00	+95.50	5.00	3.50	-1.50
33	RD 2552	2000	41.40	41.40	46.50	+5.10	2.00	1.50	-0.50
34	RD 2624	2005	0.60	0.60	0.00	-0.60	0.03	00	-0.03
35	RD 2660	2006	15.00	15.00	60.00	+45.00	0.75	0.70	-0.05
36	RD 2715	2009	10.00	10.00	39.00	+29.00	0.50	3.50	+3.00
37	RD 2786	2012	170.00	170.00	289.00	+119.00	8.50	7.00	-1.50
38	RD 2794	2016	133.00	133.00	117.90	-15.10	7.00	5.50	-1.50
39	RD 2849	2016	5.80	5.80	6.50	+0.70	0.25	00	-0.25
40	UPB 1008	2011	1.00	1.00	3.50	+2.50	0.05	0.25	+0.20
41	RD 2899		-	-	-	-	1.00	2.50	+1.50
42	RD 2907		-	-	-	-	1.00	1.50	+0.50
	Total		1048.25	1048.25	1452.20	+403.95	61.49	84.81	23.32

Centre wise Breeder and Nucleus Seed Production of Barley (2017-18)

S.No	Center	Variety	Year	Indent	BSP-I	BSP-IV	Surplus/ Deficit	BNS-I	BNS-IV	Surplus/ Deficit
1	BHU, Varanasi	Mahamana 113 ^(HUB 113)	2014	40.00	40.00	42.00	+2.00	2.00	3.00	+1.00
				40.00	40.00	42.00	+2.00	2.00	3.00	+1.00
2	CCS HAU, Hisar	BH 393	2002	73.80	73.80	90.60	+16.80	4.00	5.00	+1.00
		BH 885	2012	3.80	3.80	4.55	+0.75	0.20	0.50	+0.30
		BH 902	2010	38.00	38.00	45.30	+7.30	2.00	2.50	+0.50
		BH 946	2014	13.50	13.50	14.40	+0.90	1.00	1.50	+0.50
		BH 959	2015	12.00	12.00	17.90	+5.90	0.50	1.00	+0.50
				141.10	141.10	172.75	+31.65	7.70	10.50	+2.80
3	CSAUAT,	K 560 ^(Haritma)	1998	5.43	5.43	8.00	+2.57	0.25	0.50	+0.25

	Kanpur	K 508 ^(Pragati)	1998	6.87	6.87	8.00	+1.13	0.50	0.50	0.00
		K 409 ^(Priti)	2001	5.00	5.00	7.00	+2.00	0.25	0.25	0.00
		K 551					0.00		0.50	+0.50
				17.30	17.30	23.00	+5.70	1.00	1.75	+0.75
4	GBPUAT, Pantnagar	PRB 502	2010	1.20	1.20	0.00	-1.20	0.10		-0.10
		UPB 1008	2011	1.00	1.00	3.50	+2.50	0.05	0.25	+0.20
				2.20	2.20	3.50	+1.30	0.15	0.25	+0.10
5	IARI, Karnal	BH 380 ^(Pusa Losar)	2010	0.50	0.50	0.50	0.00	0.03	0.28	+0.25
		BHS 400 ^(Pusa Sheetal)	2014	0.50	0.50	0.50	0.00	0.03	0.62	+0.59
				1.00	1.00	1.00	0.00	0.06	0.90	+0.84
6	IIWBR, Karnal	DWRB 73	2011	20.00	20.00	50.00	+30.00	1.00	2.20	+1.20
		DWRB 101	2015	15.00	15.00	65.00	+50.00	0.75	3.70	+2.95
		DWRUB 52	2007	55.00	55.00	75.40	+20.40	2.75	4.80	+2.05
		DWRUB 64	2012	46.50	46.50	70.00	+23.50	2.50	2.70	+0.20
		DWRB 91	2014				0.00		1.35	+1.35
		DWRB 92	2014				0.00		3.20	+3.20
		DWRB 123	2016				0.00		2.75	+2.75
		DWRB 137	2017				0.00	1.00	5.15	+4.15
				136.50	136.50	260.40	+123.90	8.00	25.85	+17.85
7	JNKVV, Jabalpur	JB 58	2005	41.00	41.00	43.07	2.07	2.00	1.00	-1.00
		JB 110 ^(Jawahar Barley 1)	2010	15.00	15.00	2.58	-12.42	0.75	0.50	-0.25
				56.00	56.00	45.65	-10.35	2.75	1.50	-1.25
8	NDUA&T, Faizabad	NDB 940 ^(Narendra Barley 2)	2001	1.20	1.20	1.10	-0.10	0.10	0.00	-0.10
		NDB 943 ^(Narendra Barley 5)	2009	1.20	1.20	0.00	-1.20	0.10	0.00	-0.10
		NDB 1020 ^(Narendra Barley 3)	2002	1.20	1.20	0.00	-1.20	0.10	0.00	-0.10
		NBD 1445 ^(Narendra Barley 1445)	2014	40.00	40.00	6.00	-34.00	2.00	0.11	-1.89
				43.60	43.60	7.10	-36.50	2.30	0.11	-2.19
9	PAU, Ludhiana	PL 172	1987	8.20	8.20	14.70	+6.50	0.50	1.00	+0.50
		PL 426	1996	102.75	102.75	103.00	+0.25	5.00	6.00	+1.00

		PL 751	2007	4.95	4.95	5.20	+0.25	0.25	1.00	+0.75
		PL 807	2011	20.35	20.35	21.00	+0.65	5.75	7.25	+1.50
				136.25	136.25	143.90	+7.65	11.50	15.25	+3.75
10	RARI, Durgapura	RD 2035	1994	98.50	98.50	194.00	+95.50	5.00	3.50	-1.50
		RD 2552	2000	41.40	41.40	46.50	+5.10	2.00	1.50	-0.50
		RD 2660	2006	15.00	15.00	60.00	+45.00	0.75	0.70	-0.05
		RD 2624	2005	0.60	0.60	0.00	-0.60	0.03		-0.03
		RD 2715	2009	10.00	10.00	39.00	+29.00	0.50	3.50	3.00
		RD 2786	2012	170.00	170.00	289.00	+119.00	8.50	7.00	-1.50
		RD 2794	2016	133.00	133.00	117.90	-15.10	7.00	5.50	-1.50
		RD 2849	2016	5.80	5.80	6.50	+0.70	0.25		-0.25
		RD 2899		-	-	-	-	1.00	2.50	+1.50
		RD 2907		-	-	-	-	1.00	1.50	+0.50
						474.30	474.30	752.90	+278.60	26.03
	Total			1048.25	1048.25	1452.20	+403.95	61.49	84.81	+23.32

BARLEY CROP PROTECTION

Status of barley diseases

The barley crop was surveyed by scientist from different cooperating centres for recording the presence of barley diseases and insects in their command area throughout the crop season 2017-18. The scientists from cooperating centre RARI, Durgapura, Jaipur surveyed in the areas of Chomu, Rampura, Takarda, and Nagal areas of district Jaipur to know the status of barley diseases on farmer's field. Rust was not observed in any surveyed area. Loose smut was noted *in traces* to 5 percent in some fields and covered smut and stripe diseases were also noted in traces on some fields. Overall the crop was healthy.

Survey was also conducted in the areas of Haryana and Punjab by the scientist of IIWBR, Karnal. Isolated field of barley was observed. No rust was recorded during the survey in these areas. Overall barley crop was healthy in all the barley growing areas in India.

Incidence of barley rusts and pathotype distribution during 2017-18

The natural incidence of barley rusts was insignificant in most of the barley growing areas. Seven samples of barley yellow rust (*P. striiformis* f. sp. *hordei*) were analyzed from Himachal Pradesh, Uttarakhand and Nepal during 2017-18. *P. striiformis* f. sp. *hordei* pathotypes OSO (57) and ISO (M) were identified on four and three samples, respectively.

Observation of any new barley diseases/ insect pests:

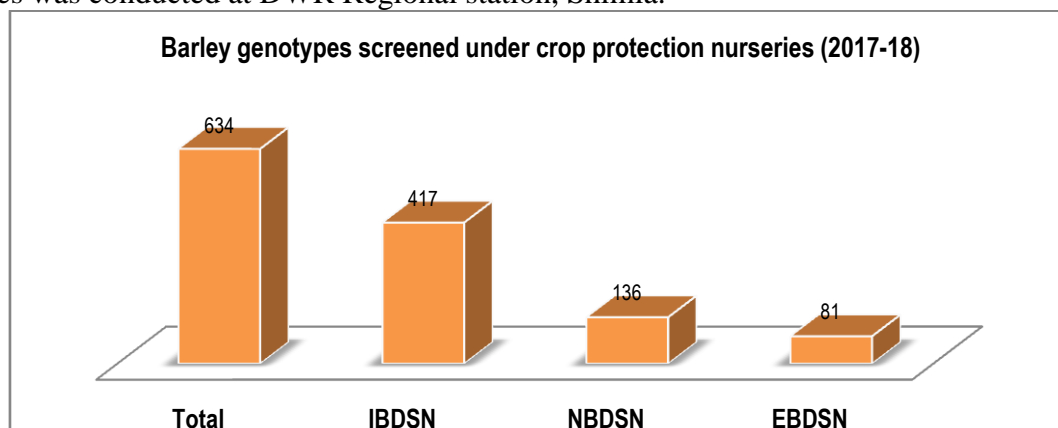
To observe the appearance of any quarantine pests on barley crop the nurseries were observed for any new symptoms during the crop season till the harvest. There was no report from any centre for presence of any of following quarantined pests (disease / insect pest) in their respective areas during the crop season 2017-18.

- | | | | |
|------|----------------------|---|----------------------------|
| i. | Glume rot | - | Not reported by any centre |
| ii. | Barley stripe mosaic | - | Not reported by any centre |
| iii. | Ergot | - | Not reported by any centre |

Status of resistance in breeding lines and advanced entries:

Adult plant resistance (APR)

During the crop season 2017-18 a total 634 entries were screened under various nurseries (IBDSN, NBDSN and EBDSN) for resistance against various diseases, aphid and CCN at different cooperating centers. There were 417 entries under IBDSN, 136 were for NBDSN and 81 for EBDSN. Seedling Resistance Test (SRT) for NBDSN and EBDSN entries was conducted at DWR Regional station, Shimla.



Besides the screening of barley germplasm for disease resistance, experiments on chemical control of blight were conducted at various locations to evaluate the efficacy of various fungicides for management of foliar blight. NBDSN entries were also screened for aphid at five locations viz., Vijapur, Ludhiana, Kanpur, Karnal and Durgapura and for CCN resistance at three locations Ludhiana, Hisar, and Durgapura.

Initial Barley Disease Screening Nursery (IBDSN) 2017-18

During the current season 2017-18 a total 417 entries under IBDSN were screened for resistance against major diseases viz., stripe rust and leaf blight at various coordinating centres. The screening of stripe rust was done at Durgapura, Ludhiana, Almora, Bajaura, Dhaulakuan, Jammu and Karnal. The yellow rust severity remained very low at Almora and Dhaulakuan so these data are not included. Leaf rust screening was done at Ludhiana but due to poor rust development the entries could not be screened properly for leaf rust resistance. The screening for leaf blight was done at Dharwad, Pantnagar, Varanasi, Kanpur and Faizabad.

To create the epiphytotic condition for yellow rust the inocula were supplied by IIWBR Regional Station, Flowerdale, Shimla and multiplied in respective centres for creating epiphytotics in the main field from tillering to flag leaf stage. The scoring of disease was done based on response and severity. Leaf blight inoculum supplied by IIWBR, Karnal centre and inoculation by centres in the field was done during Jan.- Feb. 2018 and the scoring of blight disease was done at dough stage in double digit scale on flag leaf (F) and F-1 leaf. For the rusts, average coefficient of infection (ACI) was calculated along with highest score. The entries showing ACI up to 10.00 for rusts were considered resistant (R). For leaf blight, average disease score in double digit system was calculated along with highest score, the genotypes showed an average score of 00-13 with highest score upto 35 at multilocation were considered resistant and genotypes with average score of 14-35 with HS 57 were considered moderately resistant (MR).

A total 417 entries were evaluated during 2017-18, among these, 39 entries were found free from yellow rust (ACI = 0) and 132 entries showed resistant reaction have ACI less than 10. In case of leaf blight screening, 132 entries were found moderately resistant against leaf blight with an average score (double digit) 14-35 and HS < 57.

Yellow rust, ACI = 0, Entries – 39	BBM777, BBM781, BBM782, BBM786, BBM787, BD1763, BD1766, BD1769, BD1770, BD1773, BD1774, BD1776, BD1779, BD1781, BD1783, BD1785, BD1786, BD1787, BD1788, BD1790, BH1733, BH1743, BK1704, BK1714, BL1335, BL1411, BL1413, DWRFB11, DWRFB12, DWRFB14, HB843, HB846, HB851, HB853, HB858, HB863, JB374, JB379 and JB383
Yellow rust, ACI > 0 to 10, Entries – 132	BBM770, BBM771, BBM773, BBM774, BBM775, BBM776, BBM778, BBM783, BBM784, BBM785, BBM788, BBM789, BBM790, BBM791, BBM792, BBM794, BD1752, BD1755, BD1756, BD1757, BD1758, BD1759, BD1760, BD1761, BD1762, BD1764, BD1765, BD1767, BD1768, BD1771, BD1772, BD1775, BD1777, BD1778, BD1780, BD1782, BD1784, BH1702, BH1703, BH1708, BH1713, BH1724, BH1741, BH1742, BK1701, BK1702, BK1703, BK1705, BK1706, BK1707, BK1708, BK1709, BK1710, BK1711, BK1712, BK1713, BK1715, BK1716, BK1717, BK1718, BK1719, BK1726, BK1731, BL1309, BL1313, BL1314, BL1319, BL1322, BL1325, BL1340, BL1369, BL1397, BL1400, BL1403, BL1404, BL1416, BL1420, BL1421, BL1429, BL1440, BL1443, BL1451, BL1470, BL1473, BL1474, BL1491, BL1493, BL1494, BL1497, BLK47, DWRFB10, DWRFB13, DWRFB15, DWRFB19, DWRFB20, DWRFB27, DWRFB28, DWRFB29, HB842, HB844, HB845, HB847, HB848, HB849, HB850, HB852, HB854, HB855, HB856, HB857, HB859, HB860, HUBL1715, JB372, JB373, JB375, JB380, NDB1709, NDB1723, PKB1706, PKB1707, PKB1731, PKB1743, PKB1750, PKB1751, UPBM11, UPBM8, UPBM9, VB1702, VB1710, VB1716 and VB1725
Leaf blight, Avg. 14-35 with HS	BBM771, BBM783, BBM790, BD1751, BD1752, BD1754, BD1755, BD1756, BD1757, BD1758, BD1760, BH1710, BH1714, BH1715, BH1718, BH1719, BH1723,

< 57, Entries - 120	BH1734, BH1738, BH1741, BH1742, BK1713, BK1716, BK1719, BK1720, BK1723, BK1724, BK1725, BK1726, BK1727, BK1728, BK1729, BK1730, BK1732, BL1319, BL1322, BL1340, BL1367, BL1378, BL1400, BL1413, BL1420, BL1421, BL1440, BL1443, BL1451, BL1470, BL1488, BL1489, BL1491, BL1492, BL1493, BL1494, BL1495, BL1496, BL1498, BL1499, BLK44, BLK45, BLK47, DWRFB23, DWRFB27, DWRFB28, DWRFB29, DWRFB3, HB852, HB854, HB859, HUBL1701, HUBL1702, HUBL1710, HUBL1711, HUBL1712, HUBL1714, HUBL1715, JB381, NDB1707, NDB1712, NDB1723, PKB1703, PKB1704, PKB1717, PKB1719, PKB1720, PKB1721, PKB1731, PKB1734, PKB1735, PKB1739, PKB1746, PKB1748, PKB1749, PKB1751, PKB1752, PKB1753, PKB1755, PKB1756, PKB1757, PKB1758, PKB1759, PKB1760, PKB1764, UPBM10, UPBM12, UPBM13, UPBM14, UPBM5, UPBM6, UPBM7, UPBM8, UPBM9, VB1703, VB1704, VB1705, VB1716, VB1717, VB1719, VB1720, VB1726 and VB1727
------------------------	---

Reactions of different entries of barley in Initial Barley Disease Screening Nursery (IBDSN), 2017-18

S. No.	IBDSN Entries (2017- 18)	Yellow Rust		Leaf Blight	
		ACI	HS	Avg.	HS
1	BL1499	17.60	40S	35	57
2	BL1498	11.20	40S	34	57
3	BL1497	6.00	20MR	45	67
4	BL1496	13.00	30S	35	47
5	BL1495	28.00	40S	34	35
6	BL1494	9.68	20S	35	47
7	BL1493	6.36	15S	24	57
8	BL1492	12.04	20S	35	57
9	BL1491	4.80	10S	35	57
10	BL1490	15.60	40S	34	67
11	BL1489	18.80	40S	34	57
12	BL1488	11.80	20S	35	57
13	BL1474	0.80	5MS	45	68
14	BL1473	6.08	30S	46	67
15	BL1470	3.16	15S	34	46
16	BL1451	8.00	40S*	34	46
17	BL1443	8.80	40S*	35	47
18	BL1440	8.00	40S*	35	47
19	BL1430	13.84	60S*	45	57
20	BL1429	0.44	5MR	35	67
20A	Infector	84.00	100S	89	89
21	BL1421	0.20	5R	34	46
22	BL1413	0.00	0	35	57
23	BL1411	0.00	0	35	67
24	BL1404	7.60	20S	35	67
25	BL1420	1.60	10MS	35	57
26	BL1416	5.20	15S	45	67
27	BL1390	11.76	20S	46	57

28	BL1378	12.04	20S	35	47
29	BL1400	10.00	20S	35	56
30	BL1403	8.04	20S	46	67
31	BL1397	8.00	40S*	35	68
32	BL1367	24.00	60S	35	56
33	BL1369	9.20	30S	46	78
34	BL1368	19.60	60S	35	67
35	BL1375	25.00	40S	34	67
36	BL1363	15.00	40S	25	58
37	BL1322	3.20	10MS	35	57
38	BL1325	6.04	30S	35	67
39	BL1340	3.00	10S	35	47
40	BL1335	0.00	0	46	78
40A	Infector	80.00	100S	89	89
41	BL1338	16.00	60S	45	56
42	BL1314	6.16	30S	57	78
43	BL1313	0.08	TR	47	78
44	BL1309	4.04	20S	45	68
45	BL1319	6.80	30S	34	57
46	BL1301	23.60	60S	35	78
47	BK1701	5.40	10S	46	78
48	BK1702	3.40	10S	45	67
49	BK1703	0.20	TMR	35	67
50	BK1704	0.00	0	56	79
51	BK1705	1.28	5MS	46	78
52	BK1706	2.16	10S	46	68
53	BK1707	1.00	5S	46	68
54	BK1708	3.80	10S	46	68
55	BK1709	3.76	10S	35	78
56	BK1710	0.16	TMS	35	67
57	BK1711	6.04	20S	45	68
58	BK1712	4.00	20S	56	89
59	BK1713	1.08	5MS	35	57
60	BK1714	0.00	0	57	89
60A	Infector	80.00	100S	89	89
61	BK1715	6.36	20S	46	57
62	BK1716	4.00	20S	35	46
63	BK1717	4.00	20S	35	68
64	BK1718	6.40	30S	35	58
65	BK1719	9.60	40S*	24	47
66	BK1720	36.04	80S	35	57
67	BK1721	15.00	60S	45	78

68	BK1722	12.00	40S	24	58
69	BK1723	26.00	60S	24	47
70	BK1724	24.20	40S	35	57
71	BK1725	14.00	30S	35	46
72	BK1726	9.80	20S	24	57
73	BK1727	15.40	40S	34	57
74	BK1728	30.80	60S	34	57
75	BK1729	10.04	20S	24	57
76	BK1730	13.80	40S	24	57
77	BK1731	4.00	20S	34	68
78	BK1732	15.60	40S	34	57
79	BK1733	22.50	60S	23	68
80	PKB1765	38.00	60S	35	78
80A	Infector	76.00	100S	89	89
81	PKB1764	42.00	80S	24	57
82	PKB1763	46.00	80S	35	67
83	PKB1762	12.00	60S*	47	78
84	PKB1761	52.00	80S	36	57
85	PKB1760	32.00	80S	24	46
86	PKB1759	23.64	80S	23	46
87	PKB1758	36.04	80S	35	57
88	PKB1757	15.76	60S	35	47
89	PKB1756	40.00	80S	35	57
90	PKB1755	30.00	80S	35	47
91	PKB1754	12.80	30S	24	68
92	PKB1753	33.00	60S	34	57
93	PKB1752	12.60	30S	35	57
94	PKB1751	9.00	30S	35	47
95	PKB1750	8.20	20S	46	58
96	PKB1749	32.00	80S	34	46
97	PKB1748	52.04	100S	35	57
98	PKB1747	60.00	100S	34	67
99	PKB1746	60.00	100S	35	57
100	PKB1745	68.00	100S	45	68
100A	Infector	80.00	100S	89	89
101	PKB1744	56.00	80S	45	79
102	PKB1743	4.00	10S	45	78
103	PKB1742	60.00	80S	45	78
104	PKB1741	36.00	80S	35	67
105	PKB1740	48.00	80S	45	68
106	PKB1739	48.00	80S	34	57
107	PKB1738	52.00	80S	35	67

108	PKB1737	32.00	80S	45	57
109	PKB1736	48.00	100S	46	58
110	PKB1735	23.60	60S	34	46
111	PKB1734	48.00	100S	34	57
112	PKB1733	30.00	60S	45	99
113	PKB1732	48.00	100S	35	68
114	PKB1731	8.00	20S	34	57
115	PKB1730	60.00	100S	36	68
116	PKB1729	64.00	100S	46	68
117	PKB1728	68.00	100S	35	78
118	PKB1727	24.04	40S	45	68
119	PKB1726	28.00	80S	46	68
120	PKB1725	40.00	80S	35	68
120A	Infector	84.00	100S	89	89
121	PKB1724	68.00	100S	46	68
122	PKB1723	40.00	60S	35	78
123	PKB1722	60.00	100S	45	57
124	PKB1721	60.00	100S	35	57
125	PKB1720	68.00	100S	35	47
126	PKB1719	56.00	100S	35	57
127	PKB1718	56.00	100S	45	78
128	PKB1717	68.00	100S	36	46
129	PKB1716	49.00	100S	35	68
130	PKB1715	53.00	100S	46	68
131	PKB1714	45.00	80S	34	67
132	PKB1713	11.20	20S	45	58
133	PKB1712	60.00	100S	36	58
134	PKB1711	56.00	100S	57	69
135	PKB1710	13.60	60S	57	99
136	PKB1709	32.00	80S	45	79
137	PKB1708	48.00	80S	46	79
138	PKB1707	9.60	40S*	46	89
139	PKB1706	2.16	10MS	35	67
140	PKB1705	44.00	100S	45	78
140A	Infector	72.00	100S	89	89
141	PKB1704	60.00	100S	35	57
142	PKB1703	22.00	80S	35	57
143	PKB1702	54.00	100S	56	67
144	PKB1701	36.00	60S	46	78
145	HUBL1701	60.00	100S	35	57
146	HUBL1702	56.00	100S	24	46
147	HUBL1703	64.00	100S	46	78

148	HUBL1704	68.00	100S	46	67
149	HUBL1705	68.00	100S	46	89
150	HUBL1706	68.00	100S	45	68
151	HUBL1707	60.00	100S	46	78
152	HUBL1708	48.00	80S	46	78
153	HUBL1709	56.00	100S	47	67
154	HUBL1710	34.00	60S	35	47
155	HUBL1711	60.00	80S	35	57
156	HUBL1712	48.00	80S	35	57
157	HUBL1713	29.60	60S	34	67
158	HUBL1714	30.00	60S	24	57
159	HUBL1715	0.40	5MR	34	47
160	HUBL1716	10.80	30S	46	57
160A	Infector	72.00	100S	89	89
161	HUBL1717	68.00	100S	57	78
162	HUBL1718	64.00	100S	68	89
163	HUBL1719	64.00	100S	67	89
164	HUBL1720	60.00	100S	46	57
165	HUBL1721	72.00	100S	35	67
166	HUBL1722	64.00	100S	35	68
167	UPBM15	21.60	40S	46	57
168	UPBM14	44.00	60S	35	57
169	UPBM13	16.00	40S	34	47
170	UPBM12	32.00	40S	35	47
171	UPBM11	9.60	40S*	35	67
172	UPBM10	15.60	30S	35	57
173	UPBM9	2.00	5S	35	57
174	UPBM8	2.32	10S	35	47
175	UPBM7	40.00	80S	34	46
176	UPBM6	28.00	40S	35	47
177	UPBM5	13.60	40S	35	57
178	UPBM4	21.60	60S	46	67
179	UPBM3	46.00	80S	57	69
180	UPBM2	42.00	60S	46	78
180A	Infector	76.00	100S	89	89
181	UPBM1	36.00	80S	46	68
182	BH1701	30.00	60S	46	67
183	BH1702	10.00	20S	46	57
184	BH1703	8.80	20S	35	68
185	BH1704	26.00	60S	46	58
186	BH1705	18.00	30S	46	57
187	BH1706	26.00	60S	46	57

188	BH1707	12.40	40S	35	67
189	BH1708	6.60	20MS	35	78
190	BH1709	36.00	60S	47	79
191	BH1710	26.00	60S	35	57
192	BH1711	24.80	60S	46	67
193	BH1712	18.40	40S	35	68
194	BH1713	0.40	5MR	36	78
195	BH1714	11.60	40S*	35	57
196	BH1715	29.00	60S	34	57
197	BH1716	23.00	60S	35	78
198	BH1717	24.40	60S	57	79
199	BH1718	20.00	40S	35	57
200	BH1719	16.80	30S	35	47
200A	Infector	72.00	100S	89	89
201	BH1720	28.80	80S	47	67
202	BH1721	26.00	60S	46	68
203	BH1722	20.80	60S	57	79
204	BH1723	34.00	80S	35	57
205	BH1724	10.00	30S	45	57
206	BH1725	18.40	60S	46	68
207	BH1726	13.60	60S*	35	58
208	BH1727	28.00	60S	46	78
209	BH1728	20.40	40S	35	68
210	BH1729	16.00	60S	46	47
211	BH1730	18.40	40S	46	58
212	BH1731	26.00	40S	46	78
213	BH1732	15.60	40S	56	78
214	BH1733	0.00	0	46	68
215	BH1734	10.40	30S	35	57
216	BH1735	21.40	40S	46	57
217	BH1736	20.40	60S	35	68
218	BH1737	36.00	80S	46	68
219	BH1738	40.00	60S	35	57
220	BH1739	40.00	80S	34	58
220A	Infector	72.00	100S	89	89
221	BH1740	48.00	100S	46	68
222	BH1741	1.60	10MS	34	46
223	BH1742	6.00	10S	35	47
224	BH1743	0.00	0	46	78
225	BLK47	7.60	30S	24	47
226	BLK46	12.64	30S	46	47
227	BLK45	15.60	30S	35	57

228	BLK44	11.40	30S	24	47
229	BLK43	18.04	60S	45	57
230	BLK42	46.00	60S	45	67
231	BBM770	0.08	TR	45	57
232	BBM771	1.20	10MR	36	56
233	BBM772	11.68	40S	46	68
234	BBM773	0.88	5MR	67	87
235	BBM774	0.48	5MR	67	99
236	BBM775	0.04	TR	67	89
237	BBM776	0.16	TMS	57	89
238	BBM777	0.00	0	57	79
239	BBM778	9.80	30S	46	78
240	BBM779	14.00	40S	46	69
240A	Infector	76.00	100S	89	89
241	BBM780	52.00	80S	34	67
242	BBM781	0.00	0	46	57
243	BBM782	0.00	0	46	89
244	BBM783	8.60	30S	35	57
245	BBM784	0.04	TR	46	89
246	BBM785	6.28	15S	46	68
247	BBM786	0.00	0	46	68
248	BBM787	0.00	0	45	99
249	BBM788	1.76	5MS	46	78
250	BBM789	3.00	10S	45	89
251	BBM790	5.20	20S	35	47
252	BBM791	8.00	20S	34	78
253	BBM792	6.00	20S	46	89
254	BBM793	38.00	100S	36	58
255	BBM794	2.00	10S	46	89
256	HB863	0.00	0	35	78
257	HB862	10.04	30S	46	67
258	HB861	17.04	40S	46	57
259	HB860	5.00	10S	45	68
260	HB859	10.00	40S*	35	57
260A	Infector	76.00	100S	89	89
261	HB858	0.00	0	46	99
262	HB857	5.60	20S	45	99
263	HB856	2.80	10MS	45	79
264	HB855	0.08	TMR	35	68
265	HB854	0.08	TMR	35	57
266	HB853	0.00	0	45	68
267	HB852	0.88	10MR	35	57

268	HB851	0.00	0	46	57
269	HB850	0.16	TMS	45	78
270	HB849	1.25	5MS	34	89
271	HB848	0.40	5MR	34	89
272	HB847	7.60	20S	35	79
273	HB846	0.00	0	35	89
274	HB845	0.20	5R	35	78
275	HB844	1.00	5S	46	89
276	HB843	0.00	0	35	68
277	HB842	9.00	40S*	36	69
278	JB372	0.04	TR	57	67
279	JB373	0.04	TR	47	69
280	JB374	0.00	0	57	89
280A	Infector	76.00	100S	89	89
281	JB375	0.16	TMR	68	78
282	JB376	36.00	80S	46	67
283	JB377	42.00	100S	56	89
284	JB378	14.40	40S	46	57
285	JB379	0.00	0	57	68
286	JB380	0.04	TR	67	99
287	JB381	42.00	80S	35	57
288	JB382	48.00	80S	35	68
289	JB383	0.00	0	45	78
290	JB384	40.00	80S	57	99
291	JB385	52.00	80S	45	78
292	JB386	46.00	80S	57	57
293	NDB1725	36.00	60S	46	67
294	NDB1724	29.68	80S	57	78
295	NDB1723	8.68	20S	35	47
296	NDB1722	42.00	80S	56	78
297	NDB1721	32.60	80S	46	57
298	NDB1720	43.20	80S	45	67
299	NDB1719	29.20	80S	46	78
300	NDB1718	23.60	60S	45	57
300A	Infector	76.00	100S	89	89
301	NDB1717	21.36	60S	45	78
302	NDB1716	30.04	80S	45	78
303	NDB1715	39.20	80S	35	67
304	NDB1714	19.80	60S	46	68
305	NDB1713	10.40	20S	46	58
306	NDB1712	19.60	40S	34	47
307	NDB1711	12.80	40S	35	67

308	NDB1710	23.68	60S	45	78
309	NDB1709	2.28	20MR	45	57
310	NDB1708	16.80	60S	36	68
311	NDB1707	34.04	60S	34	46
312	NDB1706	60.00	80S	45	89
313	NDB1705	34.00	60S	24	68
314	NDB1704	44.00	80S	45	58
315	NDB1703	33.60	80S	46	68
316	NDB1702	34.04	80S	45	79
317	NDB1701	40.00	80S	36	58
318	BD1751	19.00	40S	24	47
319	BD1752	2.40	10MS	34	57
320	BD1753	10.40	20S	35	58
320A	Infector	76.00	100S	89	89
321	BD1754	10.80	30S	24	47
322	BD1755	0.80	5MS	35	47
323	BD1756	4.80	20S	24	47
324	BD1757	6.00	10S	24	46
325	BD1758	0.04	TR	24	47
326	BD1759	0.56	5MR	46	78
327	BD1760	1.76	10MS	34	57
328	BD1761	2.00	10MS	57	79
329	BD1762	0.40	5MR	57	78
330	BD1763	0.00	0	57	78
331	BD1764	0.36	TMR	78	89
332	BD1765	0.16	TMR	78	89
333	BD1766	0.00	0	78	99
334	BD1767	0.16	TMR	89	99
335	BD1768	0.80	5MR	89	99
336	BD1769	0.00	0	89	89
337	BD1770	0.00	0	68	89
338	BD1771	0.04	TR	57	79
339	BD1772	0.04	TR	57	78
340	BD1773	0.00	0	46	78
340A	Infector	76.00	100S	89	89
341	BD1774	0.00	0	46	67
342	BD1775	0.16	TMS	57	78
343	BD1776	0.00	0	46	68
344	BD1777	2.20	10S	67	79
345	BD1778	0.20	5R	67	87
346	BD1779	0.00	0	67	89
347	BD1780	2.80	10S	57	89

348	BD1781	0.00	0	57	89
349	BD1782	0.04	TR	57	78
350	BD1783	0.00	0	57	79
351	BD1784	0.40	5MR	68	89
352	BD1785	0.00	0	68	89
353	BD1786	0.00	0	68	79
354	BD1787	0.00	0	57	89
355	BD1788	0.00	0	68	89
356	BD1789	19.60	10S	57	78
357	BD1790	0.00	0	68	99
358	VB1731	22.80	60S	35	68
359	VB1730	17.20	60S	35	67
360	VB1729	28.04	60S	57	68
360A	Infector	76.00	100S	89	89
361	VB1728	21.20	60S	35	78
362	VB1727	40.00	60S	34	57
363	VB1726	12.96	60S*	35	56
364	VB1725	0.16	TMR	46	47
365	VB1724	11.80	30S	45	67
366	VB1723	16.40	40S	46	68
367	VB1722	12.40	40S	57	78
368	VB1721	24.20	40S	46	68
369	VB1720	36.20	60S	35	57
370	VB1719	19.00	40S	35	47
371	VB1718	14.00	30S	35	68
372	VB1717	16.00	40S	35	47
373	VB1716	5.76	20S	34	57
374	VB1715	12.16	20S	36	57
375	VB1714	42.00	60S	57	89
376	VB1713	26.00	60S	56	99
377	VB1712	25.60	60S	45	99
378	VB1711	16.00	20S	46	68
379	VB1710	9.20	30S	57	68
380	VB1709	11.24	40S	46	89
380A	Infector	76.00	100S	89	89
381	VB1708	16.40	60S	57	68
382	VB1707	20.80	60S	46	78
383	VB1706	11.20	30S	46	68
384	VB1705	16.00	30S	35	57
385	VB1704	30.00	60S	35	57
386	VB1703	25.60	60S	35	47
387	VB1702	10.00	30S	46	68

388	VB1701	15.20	60S	56	68
389	DWRFB1	42.00	80S	57	68
390	DWRFB2	42.00	80S	46	58
391	DWRFB3	18.40	60S	35	57
392	DWRFB4	26.00	60S	35	68
393	DWRFB5	35.60	60S	34	78
394	DWRFB6	28.20	40S	57	78
395	DWRFB7	28.00	60S	57	68
396	DWRFB8	20.20	40S	46	68
397	DWRFB9	38.00	80S	45	78
398	DWRFB10	0.16	TMS	57	89
399	DWRFB11	0.00	0	46	78
400	DWRFB12	0.00	0	46	68
400A	Infector	72.00	100S	89	89
401	DWRFB13	2.00	10S	46	68
402	DWRFB14	0.00	0	46	57
403	DWRFB15	4.00	20S	46	67
404	DWRFB16	44.00	80S	46	57
405	DWRFB17	13.00	40S	46	56
406	DWRFB18	11.40	40S	46	68
407	DWRFB19	0.12	TR	46	78
408	DWRFB20	0.04	TR	46	67
409	DWRFB21	26.00	100S	46	68
410	DWRFB22	28.00	40S	35	67
411	DWRFB23	19.60	40S	35	57
412	DWRFB24	19.60	60S	45	89
413	DWRFB25	26.00	60S	46	57
414	DWRFB26	26.00	60S	46	58
415	DWRFB27	8.16	40S*	35	57
416	DWRFB28	0.04	TR	34	46
417	DWRFB29	7.04	20S	35	57

HS- Highest Score, AV- Average, ACI- Average Coefficient of Infection, R- Resistant, MR- Moderately Resistant, MS- Moderately Susceptible, S- Susceptible

National Barley Disease Screening Nursery (NBDSN, 2017-18)

During the crop season 2017-18, under the NBDSN trial a total 136 entries from AVT and IVT yield trials including checks were screened against stripe rust, stem rust, leaf blight, aphids and cereal cyst nematode (CCN) at hot spot locations.

The NBDSN entries were screening for stripe rust resistance at hot spot centers that include Durgapura, Ludhiana, Hisar, Almora, Bajaura, Dhaulakuan, Jammu and Karnal. The yellow rust severity remained very low at Hisar, Almora and Dhaulakuan so these data are not included in final calculation of ACI. Leaf rust screening was done at Ludhiana but due to poor rust development the entries could not be screened properly for leaf rust resistance. The leaf blight screening was done at Dharwad, Pantnagar, Varanasi, Kanpur and Faizabad. The disease pressure was low at Kanpur center hence the data are not included. CCN screening was done at Hisar, Durgapura and Ludhiana centers. For CCN, the number of nematode cysts / plant was counted and entries having 0-4 cysts/ plant in pot were considered as resistant (R) whereas those with cysts/plant 4.1-9.0 were Moderately Resistant (MR). The entries with galls between 9.1 and 20.0 were treated as susceptible (S) and the entries with more than 20.0 galls per plant were treated as highly susceptible (HS).

Out of 136 entries evaluated during 2017-18, 19 entries were found free from yellow rust (ACI = 0) and 65 entries showed resistant reaction have ACI less than 10. In case of leaf blight screening, 21 entries were found moderately resistant against leaf blight with an average score (double digit) 14-35 and HS < 57.

Yellow rust, ACI = 0, Entries – 19	DWRB184, DWRB186, HBL812, HBL814, JB360, PL900, PL902, RD2969, RD2971, RD2975, RD2976, RD2977, RD2980, RD2981, RD2982, RD2983, HUB113 ©, RD2794 © and RD2899 ©
Yellow rust, ACI > 0 to 10, Entries – 65	BH1020, BHS462, BHS463, BHS464, BHS465, BHS466, BHS467, BHS468, DWRB180, DWRB182, DWRB183, DWRB185, HBL789, HBL793, HBL802, HBL804, HBL818, HBL821, HBL822, HUB260, HUB262, JB357, JB362, JB364, KB1605, KB1606, KB1616, KB1632, KB1633, KB1634, NDB1682, NDB1683, NDB1698, PL891, PL892, PL898, RD2948, RD2972, RD2973, RD2974, RD2978, RD2986, RD2988, UPB1070, UPB1071, UPB1073, UPB1074, VLB157, VLB159, VLB160, BH946 ©, BHS352 ©, BHS380 ©, BHS400 ©, DWRB101 ©, DWRB123 ©, DWRB137 ©, HBL113 ©, HBL276 ©, RD2552 ©, RD2715 ©, RD2786 ©, RD2849 ©, RD2907 © and VLB118 ©
Leaf blight, Avg. 14-35 with HS < 57, Entries - 21	ABI Voyager, Andreia, BHS465, BHS466, DWRB180, DWRB182, DWRB184, HUB253, KB1628, KB1632, KB1633, NDB1680, PL891, RD2979, RD2985, RD2987, UPB1071, UPB1073, BH902 ©, BHS400 © and DWRB101 ©

Reactions of different entries of barley in National Barley Disease Screening Nursery (NBDSN), 2017-18

S. No.	NBDSN Entries	Yellow Rust		Leaf Blight		CCN	Aphid
		ACI	HS	Avg.	HS	HS	HS
1	ABI Voyager	18.80	60S	34	57	HS	5.00
2	Andreia	20.04	60S	34	46	S	5.00
3	BH1020	3.00	10S	46	57	HS	5.00
4	BH1021	30.00	60S	57	78	HS	4.67
5	BHS461	14.80	40S	35	68	HS	5.00
6	BHS462	2.20	5S	57	89	HS	5.00
7	BHS463	0.08	TMR	45	99	HS	4.67

8	BHS464	1.60	5MS	56	99	HS	5.00
9	BHS465	4.00	20MS	35	57	HS	5.00
10	BHS466	0.48	10R	35	46	HS	4.67
11	BHS467	2.20	5S	46	99	HS	5.00
12	BHS468	1.80	10MR	46	99	HS	5.00
13	Danielle	48.00	80S	45	99	S	5.00
14	DWRB160	17.60	60S*	46	57	S	4.33
15	DWRB180	7.60	20S	25	46	HS	5.00
16	DWRB181	10.80	40S	46	57	S	5.00
17	DWRB182	0.16	TMR	35	47	S	4.67
18	DWRB183	4.00	10S	45	57	HS	4.33
19	DWRB184	0.00	0	35	46	HS	4.33
20	DWRB185	0.08	TMR	45	57	S	5.00
21	DWRB186	0.00	0	46	67	S	5.00
22	DWRB187	50.00	80S	46	68	HS	5.00
23	DWRB188	12.88	60S*	57	89	HS	5.00
24	Explorer	33.60	60S	35	68	S	5.00
25	HBL789	4.96	20MS	46	89	HS	5.00
26	HBL793	4.80	20S	36	57	HS	5.00
27	HBL797	13.04	60S*	57	99	HS	5.00
28	HBL802	2.20	5S	56	99	HS	5.00
29	HBL804	4.00	20S	67	99	HS	5.00
30	HBL812	0.00	0	56	99	HS	5.00
31	HBL814	0.00	0	56	99	HS	5.00
32	HBL818	7.28	30S	56	99	S	5.00
33	HBL821	2.00	S	57	78	HS	5.00
34	HBL822	0.16	TMR	35	68	HS	5.00
35	HUB253	23.60	40S	35	57	HS	5.00
36	HUB260	4.08	20S	46	67	HS	5.00
37	HUB261	40.00	60S	47	67	HS	5.00
38	HUB262	7.00	20S	36	57	HS	5.00
39	HUB263	16.40	60S	45	67	HS	4.67
40	HUB264	20.60	60S	35	68	S	4.67
41	JB357	0.04	TR	79	89	HS	5.00
42	JB360	0.00	0	36	57	S	5.00
43	JB362	2.20	5S	45	68	HS	5.00
44	JB363	44.00	80S	35	78	HS	5.00
45	JB364	8.04	40S*	56	78	HS	5.00
46	KB1531	12.00	40S	46	67	HS	5.00
47	KB1605	9.00	20S	46	68	HS	5.00
48	KB1606	2.00	10S	46	67	HS	5.00
49	KB1616	1.40	10MR	35	58	S	5.00

50	KB1628	20.80	60S	35	46	HS	4.67
51	KB1632	6.00	10S	35	47	HS	5.00
52	KB1633	0.24	TMR	35	57	HS	5.00
53	KB1634	0.04	TR	46	67	HS	5.00
54	KB1636	14.60	40S	56	99	HS	5.00
55	KB1638	21.60	60S	56	68	HS	5.00
56	KB1640	10.20	30S	46	57	HS	5.00
57	NDB1680	14.20	40S	35	57	S	5.00
58	NDB1682	8.00	40S*	47	79	HS	5.00
59	NDB1683	3.24	10MS	56	67	HS	4.33
60	NDB1698	0.04	TR	57	79	S	5.00
61	NDB1699	14.96	60S*	35	58	S	4.67
62	PL891	10.00	30S	35	47	HS	5.00
63	PL892	2.40	10S	46	57	HS	5.00
64	PL898	3.56	10MS	46	57	S	4.67
65	PL900	0.00	0	57	68	HS	5.00
66	PL902	0.00	0	57	78	S	5.00
67	PL903	10.16	20S	56	68	HS	5.00
68	PL904	14.04	40S	45	68	HS	5.00
69	PL905	18.80	60S	45	68	HS	5.00
70	Planet	39.20	80S	47	89	S	5.00
71	RD2948	0.20	5R	45	57	S	5.00
72	RD2969	0.00	0	57	78	S	5.00
73	RD2970	22.00	60S	56	78	HS	5.00
74	RD2971	0.00	0	57	68	HS	4.67
75	RD2972	0.08	TMR	68	79	S	5.00
76	RD2973	0.80	5MR	89	99	HS	5.00
77	RD2974	9.76	40S*	79	99	HS	5.00
78	RD2975	0.00	0	89	99	S	5.00
79	RD2976	0.00	0	89	99	HS	5.00
80	RD2977	0.00	0	46	57	S	5.00
81	RD2978	0.20	5R	67	89	S	5.00
82	RD2979	14.00	30S	35	57	HS	4.67
83	RD2980	0.00	0	46	67	S	4.67
84	RD2981	0.00	0	46	57	S	5.00
85	RD2982	0.00	0	56	89	HS	5.00
86	RD2983	0.00	0	57	68	HS	5.00
87	RD2984	12.08	20S	46	57	HS	5.00
88	RD2985	16.00	40S	34	57	HS	5.00
89	RD2986	2.40	10MS	56	68	HS	5.00
90	RD2987	13.80	60S*	35	57	HS	5.00
91	RD2988	8.00	40S*	57	79	S	5.00

92	Traveller	10.40	40S*	45	89	HS	5.00
93	UPB1070	0.04	TR	46	78	HS	5.00
94	UPB1071	0.72	5MR	35	57	HS	5.00
95	UPB1072	18.08	40S	56	99	HS	5.00
96	UPB1073	2.20	5S	35	46	HS	5.00
97	UPB1074	4.56	10S	67	79	HS	5.00
98	UPB1075	52.00	80S	57	78	HS	5.00
99	VLB155	15.56	40S	46	57	HS	5.00
100	VLB156	16.80	60S	56	99	HS	5.00
101	VLB157	2.00	10S	46	99	HS	5.00
102	VLB158	12.00	40S	46	99	HS	5.00
103	VLB159	0.92	5MR	46	79	HS	5.00
104	VLB160	8.20	20S	35	68	HS	5.00
105	Xanadu	48.00	80S	46	89	S	5.00
106	AZAD ©	56.00	100S	46	68	HS	5.00
107	BH902 ©	14.44	20S	35	57	HS	5.00
108	BH946 ©	2.60	10MS	46	67	S	5.00
109	BH959 ©	15.04	60S*	46	67	S	4.67
110	BHS352 ©	3.20	10MS	56	68	HS	5.00
111	BHS380 ©	0.36	5R	36	68	HS	5.00
112	BHS400 ©	5.16	15S	35	57	S	5.00
113	DWRB101 ©	0.08	TMR	35	47	HS	5.00
114	DWRB123 ©	1.60	5MS	36	47	HS	4.00
115	DWRB137 ©	0.20	5R	67	79	HS	5.00
116	HBL113 ©	1.40	5MR	56	99	S	5.00
117	HBL276 ©	0.08	TR	56	99	HS	5.00
118	HUB113 ©	0.00	0	46	67	HS	4.67
119	JYOTI ©	56.00	80S	46	68	HS	5.00
120	K508 ©	24.00	60S	46	68	HS	5.00
121	K603 ©	64.00	100S	46	67	S	5.00
122	KARAN 16 ©	29.00	40S	36	57	HS	5.00
123	LAKHAN ©	60.00	100S	46	78	HS	5.00
124	NDB1173 ©	41.00	80S	35	58	HS	5.00
125	NDB1445 ©	36.00	60S	46	67	HS	5.00
126	NDB943 ©	52.00	100S	36	57	S	5.00
127	PL751 ©	13.00	40S	46	46	S	5.00
128	RD2035 ©	52.00	100S	67	89	S	5.00
129	RD2552 ©	0.16	TMS	57	78	HS	4.67
130	RD2715 ©	10.00	30S	56	89	HS	4.00
131	RD2786 ©	0.04	TR	89	89	HS	5.00
132	RD2794 ©	0.00	0	36	57	HS	4.00
133	RD2849 ©	4.00	10S	46	57	HS	4.67

134	RD2899 ©	0.00	0	57	79	HS	4.67
135	RD2907 ©	0.20	5R	35	58	HS	4.00
136	VLB118 ©	4.16	20S	56	99	HS	5.00
137	Infector	88.00	100S	89	89	S	5.00

*HS from one centre

HS- Highest score, ACI- Average Coefficient of Infection; CCN- Cereal Cyst Nematode, HS- Highly susceptible, S- Susceptible, MR- Moderately Resistant, R- Resistant, © - Released Checks, ND- Not Determined, NG – Not germinated.

Elite Barley Disease Screening Nursery (EBDSN, 2017-18)

The nursery was constituted with entries showed resistance to different disease in previous years in NBDSN and EBDSN. During the crop season 2016-17, total 81 entries were screened in EBDSN. The screening of stripe rust was done at Durgapura, Ludhiana, Hisar, Almora, Bajaura, Dhaulakuan, Jammu and Karnal. The yellow rust severity remained very low at Hisar, Almora and Dhaulakuan so these data are not included. Leaf rust screening was done at Ludhiana but due to poor rust development the entries could not be screened properly for leaf rust resistance. The nursery was also screened for stem rust at Powarkheda center but disease severity remained very low. The leaf blight screening was done at Dharwad, Pantnagar, Varanasi, Kanpur and Faizabad. The foliar blight severity was very low at Kanpur hence data are not included.

Confirmed sources of resistance:

Out of 81 entries screened in EBDSN, the following entries were confirmed for resistance against the particular disease under AICW&BIP. A total 16 entries are found free from yellow rust, whereas 46 shown resistant reaction. One entry DWRB101 found resistant to foliar blight whereas, 22 entries also showed moderate level of resistance against leaf blight.

Yellow rust, ACI = 0, Entries – 16	DWRB137, PL892, BH1013, BH1018, BH1019, HBL113, HBL764, RD2917, RD2947, RD2949, RD2951, RD2956, RD2966, BCU7811, RD2941 and VLB153
Yellow rust, ACI > 0 to 10, Entries – 46	DWR47, DWRB165, DWRB178, BK1601, BK1622, BK1626, PL890, PL895, BH1009, BH1011, BH1014, BH1017, RD2786, RD2899, RD2948, RD2954, RD2955, RD2957, RD2959, RD2961, RD2964, JB350, DWRB127, DWRB147, DWRB149, DWRB150, DWRB152, BK1516, BK1518, BK1525, HBL757, HUB247, BCU7719, BCU7746, BCU7819, DWRB101, VLB130, PL890, BHS454, BHS459, DWRB136, DWRB150, DWRB168, VLB150, HUB113 and PL751
Leaf blight, Avg. 13-35 with HS < 57, Entries - 23	DWRB165, DWRB170, DWRB178, PL890, BH1013, BH1014, BH1017, BH1018, DWRB127, DWRB147, DWRB149, DWRB150, DWRB152, BCU7719, DWRB101, VLB130, PL890, DWRB150, PL895, VLB151, BHS400, DWRB73 and HBL113

Reactions of different entries of barley in Elite Barley Disease Screening Nursery (EBDSN), 2017-18

S. No.	EBDSN Entries (2017- 18)	Yellow Rust		Leaf Blight		CCN
		ACI	HS	Avg.	HS	HS
1	DWR47	2.56	10MS	46	89	HS
2	DWRB165	3.16	15S	25	36	HS
3	DWRB170	12.28	60S	35	57	S
4	DWRB178	3.28	10S	35	57	HS
5	BK1601	0.88	10MR	45	57	HS

6	BK1622	4.12	20S	57	89	S
7	BK1626	9.00	30S	46	47	HS
8	BK1633	25.00	60S	46	57	S
9	DWRB137	0.00	0	46	68	S
10	PL751	10.20	40S	45	57	S
11	PL890	0.68	5MR	35	47	HS
12	PL892	0.00	0	45	67	S
13	PL895	0.08	TR	45	68	HS
14	BH1009	1.80	10MS	45	57	HS
15	BH1011	0.52	5R	45	46	HS
16	BH1013	0.00	0	35	47	S
17	BH1014	0.16	TMS	35	46	S
18	BH1017	0.04	TR	35	47	HS
19	BH1018	0.00	0	35	47	S
20	BH1019	0.00	0	45	57	HS
20A	Infector	72.00	100S	89	89	S
21	HBL113	0.00	0	57	89	S
22	HBL764	0.00	0	56	89	S
23	KB1531	18.40	60S	45	57	HS
24	RD2786	1.08	5S	67	78	HS
25	RD2794	34.00	100S	45	78	S
26	RD2899	0.20	5R	46	78	HS
27	RD2917	0.00	0	56	78	HS
28	RD2947	0.00	0	79	89	HS
29	RD2948	0.08	TMR	57	78	S
30	RD2949	0.00	0	67	79	S
31	RD2951	0.00	0	47	68	HS
32	RD2954	0.04	TR	78	89	HS
33	RD2955	0.20	5R	89	99	S
34	RD2956	0.00	0	89	89	S
35	RD2957	0.08	TMR	78	89	S
36	RD2959	4.00	20S	79	89	S
37	RD2961	0.48	5MR	68	79	HS
38	RD2964	4.80	20S	56	79	HS
39	RD2966	0.00	0	46	89	HS
40	JB350	0.68	5MR	46	78	HS
40A	Infector	72.00	100S	89	89	S
41	DWRB127	2.24	10S	35	57	S
42	DWRB147	2.08	10S	35	47	MR
43	DWRB149	4.08	5S	24	35	S
44	DWRB150	0.60	TS	35	46	S
45	DWRB152	0.20	5R	35	57	S

46	BK1516	10.00	40S	46	78	S
47	BK1518	4.00	10S	57	78	S
48	BK1525	4.20	10S	57	67	S
49	HBL757	0.10	TMR	46	68	S
50	HUB247	0.04	TR	56	78	HS
51	BCU7719	3.04	15S	35	47	HS
52	BCU7746	0.20	5R	46	68	HS
53	BCU7811	0.00	0	36	69	S
54	BCU7819	0.08	TMR	46	56	HS
55	DWRB101	2.00	5S	01	01	S
56	VLB130	0.50	5R	24	36	S
57	RD2941	0.00	0	78	89	HS
58	PL890	4.80	20S	34	46	HS
59	BHS447	12.20	40S	45	57	S
60	BHS454	4.00	20S	47	58	S
60A	Infector	76.00	100S	89	89	S
61	BHS459	2.80	10MS	46	58	S
62	DWRB136	9.80	40S	46	47	S
63	DWRB150	7.40	30S	35	47	S
64	DWRB168	6.80	30S	45	57	S
65	PL892	46.00	100S	46	57	S
66	PL895	10.16	40S	35	47	S
67	VLB147	42.00	100S	35	78	HS
68	VLB150	6.08	30S	35	68	HS
69	VLB151	16.00	60S	34	57	S
70	VLB152	14.20	40S	45	68	S
71	VLB153	0.00	0	57	89	HS
72	VLB154	10.40	40S	46	78	S
73	BHS380	15.80	30S	46	67	S
74	BHS400	16.00	60S	24	46	HS
75	DWRB101	16.08	40S	35	58	HS
76	DWRB73	28.20	60S	35	57	HS
77	DWRB91	36.00	80S	45	99	S
78	HBL113	12.00	60S	23	45	MR
79	HUB113	8.00	40S	45	68	S
80	PL751	0.04	TR	46	78	HS
80A	Infector	80.00	100S	89	89	S
81	VLB118	28.00	60S	46	79	S

HS- Highest score, ACI- Average Coefficient of Infection; CCN- Cereal Cyst Nematode, HS- Highly susceptible, S- Susceptible, MR- Moderately Resistant, R- Resistant, © - Released Checks, ND- Not Determined, NG – Not germinated.

Center wise reactions of different entries of barley in National Barley Disease Screening Nursery (NBDSN), 2017-18

S. No.	NBDSN Entries (2017-18)	Yellow Rust					Leaf Blight				CCN*		
		Durgapura	Jammu	Ludhiana	Bajaura	Karnal	Dharwad	Varanasi	Pantnagar	Faizabad	Ludhiana	Durgapura	Hisar
1	ABI Voyager	40MR	0	40MR	60S	5MR	12	57	23	35	S	S	HS
2	Andreia	40MR	TR	40MR	60S	10MS	12	46	23	46	S	S	R
3	BH1020	10S	0	5S	0	0	56	47	34	57	S	S	HS
4	BH1021	60S	0	10S	60S	20S	46	68	46	78	S	S	HS
5	BHS461	20MS	0	10MS	40S	10S	01	68	23	46	S	S	HS
6	BHS462	5S	5R	5S	0	0	12	47	89	58	S	S	HS
7	BHS463	0	TMR	0	0	0	24	99	00	45	S	S	HS
8	BHS464	10MR	0	5MS	0	0	34	99	45	46	MR	HS	HS
9	BHS465	20MS	0	5MS	0	0	34	57	23	35	S	S	HS
10	BHS466	TR	10R	TR	0	0	12	46	45	46	S	S	HS
11	BHS467	5S	5R	5S	0	0	12	99	25	57	S	S	HS
12	BHS468	10MR	5R	10MR	0	0	12	99	25	36	S	HS	S
13	Danielle	80S	0	80S	60S	20S	12	99	13	45	S	S	R
14	DWRB160	10MR	20S	10MR	60S*	0	46	57	25	57	S	S	S
15	DWRB180	20S	0	10S	0	10MS	24	35	03	46	S	S	HS
16	DWRB181	40S	5MR	10S	0	5MR	34	57	34	57	S	S	MR
17	DWRB182	TMR	0	TMR	0	0	12	47	23	46	S	S	S
18	DWRB183	10S	0	10S	0	0	24	57	34	46	S	S	HS
19	DWRB184	0	0	0	0	0	34	46	25	46	S	HS	HS
20	DWRB185	0	TMR	0	0	0	34	57	24	46	S	S	R
21	DWRB186	0	0	0	0	0	34	47	24	67	S	S	R
22	DWRB187	80S	20S	80S	60S	10S	24	57	35	68	S	S	HS
23	DWRB188	10MR	0	TMR	60S*	0	34	89	26	67	S	S	HS
24	Explorer	60S	0	60S	40S	10MS	12	68	25	36	S	S	R
25	HBL789	20MS	0	TMS	0	10MS	24	89	24	46	S	HS	HS
26	HBL793	5MR	0	5MR	20S	0	24	57	27	36	S	S	HS
27	HBL797	60S*	TR	5S	0	0	24	99	56	57	S	S	HS
28	HBL802	5S	5R	5S	0	0	12	99	56	46	S	S	HS
29	HBL804	0	0	0	0	20S	12	99	69	67	S	S	HS
30	HBL812	0	0	0	0	0	24	99	56	46	S	S	HS
31	HBL814	0	0	0	0	0	24	99	35	46	S	S	HS
32	HBL818	10MR	TMR	5MR	30S	0	24	99	23	67	S	S	S
33	HBL821	5S	0	5S	0	0	34	57	78	57	S	S	HS
34	HBL822	TMR	0	TMR	0	0	12	68	23	46	S	S	HS
35	HUB253	40S	20S	10S	40S	10MS	12	57	24	46	S	MR	HS
36	HUB260	0	TMR	0	0	20S	24	58	34	67	S	S	HS

37	HUB261	60S	20S	40S	60S	20S	46	46	27	67	S	S	HS
38	HUB262	20S	5R	10S	0	5MS	24	47	24	57	S	S	HS
39	HUB263	15S	0	5S	60S	5MR	34	46	23	67	S	S	HS
40	HUB264	30S	5R	10S	60S	5MR	12	47	02	68	S	S	R
41	JB357	0	TR	0	0	0	79	89	78	68	S	S	HS
42	JB360	0	0	0	0	0	24	47	24	57	S	S	R
43	JB362	5S	5R	5S	0	0	24	57	12	68	MR	S	HS
44	JB363	80S	20S	20S	60S	40S	24	35	02	78	S	S	HS
45	JB364	0	TR	0	0	40S	34	57	35	78	S	S	HS
46	KB1531	0	20S	0	0	40S	34	46	25	67	S	S	HS
47	KB1605	20MS	5R	10MS	20S	0	56	46	24	68	S	S	HS
48	KB1606	0	10S	0	0	0	24	47	46	67	S	S	HS
49	KB1616	10MR	5R	5MR	0	0	01	46	35	58	S	S	S
50	KB1628	20S	5MS	10S	60S	10S	12	46	25	45	S	S	HS
51	KB1632	10MS	10S	10MS	0	5MS	12	47	46	45	S	HS	S
52	KB1633	TMR	TMR	TMR	0	0	24	46	23	57	S	S	HS
53	KB1634	0	TR	0	0	0	34	57	25	67	S	S	HS
54	KB1636	20S	5R	10S	40S	5MR	24	99	23	68	S	S	HS
55	KB1638	30S	0	10S	60S	10MS	46	68	34	67	S	S	HS
56	KB1640	10S	5R	10S	30S	0	34	47	24	57	S	S	HS
57	NDB1680	20S	5R	10S	0	40S	12	47	24	57	S	S	S
58	NDB1682	0	0	0	0	40S	24	79	25	68	S	S	HS
59	NDB1683	10MS	TR	5MS	0	5MS	34	57	67	46	S	S	HS
60	NDB1698	0	TR	0	0	0	46	57	56	79	S	S	S
61	NDB1699	10S	0	TMS	60S*	5MS	12	58	26	35	S	S	R
62	PL891	20MS	0	5MS	30S	0	24	47	12	35	S	S	HS
63	PL892	0	5MR	0	0	10S	34	47	35	57	S	S	HS
64	PL898	10MS	5R	TMS	0	10MS	56	47	25	57	MR	S	R
65	PL900	0	0	0	0	0	46	57	46	68	S	S	HS
66	PL902	0	0	0	0	0	34	68	36	78	S	S	R
67	PL903	20S	TMS	10S	20S	0	34	68	56	67	S	S	HS
68	PL904	0	TR	0	30S	40S	34	68	24	45	S	S	HS
69	PL905	20MS	0	20MS	60S	5MR	12	68	34	46	S	S	HS
70	Planet	80S	20MS	20S	60S	20S	24	89	26	58	S	S	R
71	RD2948	0	5R	0	0	0	34	36	34	57	S	S	R
72	RD2969	0	0	0	0	0	67	46	27	78	S	S	R
73	RD2970	40S	0	10S	60S	0	34	57	35	78	S	S	HS
74	RD2971	0	0	0	0	0	56	68	47	68	S	S	HS
75	RD2972	0	TMR	0	0	0	67	79	25	79	S	S	R
76	RD2973	5MR	0	5MR	0	0	99	99	79	78	MR	S	HS
77	RD2974	10MS	0	TMS	40S	0	78	99	69	68	S	MR	HS
78	RD2975	0	0	0	0	0	67	99	89	79	S	S	R

79	RD2976	0	0	0	0	0	89	99	89	78	S	MR	HS
80	RD2977	0	0	0	0	0	56	57	24	57	S	R	R
81	RD2978	0	5R	0	0	0	56	89	34	78	S	S	R
82	RD2979	20S	0	10S	30S	10S	12	57	25	46	S	S	HS
83	RD2980	0	0	0	0	0	24	47	34	67	S	S	R
84	RD2981	0	0	0	0	0	34	57	26	46	S	S	R
85	RD2982	0	0	0	0	0	34	89	45	57	S	S	HS
86	RD2983	0	0	0	0	0	56	57	25	68	S	S	HS
87	RD2984	20S	TMR	20S	0	20S	46	57	23	57	S	R	HS
88	RD2985	20S	0	20S	40S	0	12	57	23	45	S	S	HS
89	RD2986	10MS	0	5MS	0	0	46	68	23	67	MR	S	HS
90	RD2987	5MS	5R	5MS	60S*	0	24	57	00	57	S	S	HS
91	RD2988	0	0	0	40S	0	56	79	45	57	S	S	R
92	Traveller	5S	0	5S	40S	5MR	12	89	23	67	MR	S	HS
93	UPB1070	0	TR	0	0	0	12	68	34	78	S	S	HS
94	UPB1071	TMS	0	TMS	0	5MR	24	57	24	46	S	S	HS
95	UPB1072	20S	TMR	10S	40S	20S	24	99	34	57	S	S	HS
96	UPB1073	10MR	5S	5MR	0	0	34	46	25	46	S	S	HS
97	UPB1074	5S	TMS	5S	10S	5MR	34	68	79	67	S	S	HS
98	UPB1075	80S	20S	40S	60S	60S	34	57	78	68	S	S	HS
99	VLB155	40MR	5R	TMS	40S	20S	34	57	26	57	S	HS	HS
100	VLB156	10S	5R	5S	60S	10MS	34	99	56	46	S	S	HS
101	VLB157	0	0	0	10S	0	12	99	24	57	S	S	HS
102	VLB158	10S	5R	5S	40S	5MS	24	99	13	57	S	S	HS
103	VLB159	TMS	5R	TMS	0	5MR	24	79	12	57	S	S	HS
104	VLB160	10S	5R	10S	20S	0	24	68	00	46	S	S	HS
105	Xanadu	80S	20S	40S	60S	40S	24	89	25	57	S	S	R
106	AZAD ©	100S	40S	40S	40S	60S	24	68	24	67	S	R	HS
107	BH902 ©	20MS	TR	20MS	20S	20S	24	47	23	57	S	S	HS
108	BH946 ©	10MS	5R	5MS	0	0	67	46	24	57	S	MR	R
109	BH959 ©	10S	TR	5S	60S*	0	34	57	24	67	S	R	R
110	BHS352 ©	10MS	0	10MS	0	0	56	68	24	57	S	S	HS
111	BHS380 ©	TMR	5R	TMR	0	0	24	68	25	35	S	S	HS
112	BHS400 ©	15S	TMS	10S	0	0	12	57	24	46	S	S	S
113	DWRB101 ©	0	TMR	0	0	0	34	47	23	35	S	S	HS
114	DWRB123 ©	5MS	0	5MS	0	0	34	47	25	46	S	MR	HS
115	DWRB137 ©	0	5R	0	0	0	79	68	34	67	S	HS	R
116	HBL113 ©	5MR	5R	5MR	0	5MR	34	99	34	35	S	S	S
117	HBL276 ©	TR	0	TR	0	0	34	99	25	45	S	S	HS
118	HUB113 ©	0	0	0	0	0	34	57	24	67	S	S	HS
119	JYOTI ©	80S	60S	40S	60S	40S	46	46	34	68	S	S	HS
120	K508 ©	60S	0	10S	30S	20S	24	68	36	67	S	S	HS

121	K603 ©	100S	40S	100S	40S	40S	34	57	24	67	S	S	R
122	KARAN 16 ©	40S	20S	5S	40S	40S	24	46	26	57	S	S	HS
123	LAKHAN ©	100S	40S	40S	60S	60S	34	46	24	78	S	S	HS
124	NDB1173 ©	80S	60S	5S	40S	20S	12	46	23	58	S	S	HS
125	NDB1445 ©	60S	60S	40S	0	20S	46	57	14	67	S	S	HS
126	NDB943 ©	100S	60S	40S	0	60S	24	57	25	46	S	S	S
127	PL751 ©	20S	0	5S	40S	0	46	46	24	46	S	S	R
128	RD2035 ©	100S	20S	40S	60S	40S	46	89	56	78	S	S	R
129	RD2552 ©	0	TMS	0	0	0	46	68	45	78	S	S	HS
130	RD2715 ©	0	0	0	30S	20S	34	89	45	67	S	S	HS
131	RD2786 ©	0	TR	0	0	0	79	89	89	78	S	S	HS
132	RD2794 ©	0	0	0	0	0	24	47	24	57	S	S	HS
133	RD2849 ©	5S	0	5S	10S	0	34	57	24	47	S	S	HS
134	RD2899 ©	0	0	0	0	0	46	79	25	57	S	S	HS
135	RD2907 ©	0	5R	0	0	0	12	58	24	57	S	HS	HS
136	VLB118 ©	TMR	0	TMR	0	20S	12	99	36	67	S	S	HS
137	Infector	100S	80S	100S	80S	80S	NG	89	NG	N G	S	S	S

Out of 163 entries, few check varieties were found place in many trials and only one check is retained in NBDSN thus resulting 136 entries under NBDSN.

HS- Highest score, ACI- Average Coefficient of Infection; CCN- Cereal Cyst Nematode, HS- Highly susceptible, S- Susceptible, MR- Moderately Resistant, R- Resistant, © - Released Checks, ND- Not Determined, NG – Not germinated.

Center wise reactions of different entries of barley in Elite Barley Disease Screening Nursery (EBDSN), 2017-18

S. No.	EBDSN Entries	Yellow Rust					Leaf Blight				CCN		
		Durgapura	Jammu	Ludhiana	Bajaura	Karnal	Dharwad	Varanasi	Pantnagar	Faizabad	Ludhiana	Durgapura	Hisar
1	DWR47	5MS	0	TMS	0	10MS	24	89	24	46	S	S	HS
2	DWRB165	TMR	0	TMR	15S	0	12	NG	36	36	S	S	HS
3	DWRB170	TR	5R	TR	60S	0	24	57	13	46	S	S	R
4	DWRB178	5MR	TMR	5MS	10S	0	12	57	14	36	S	S	HS
5	BK1601	0	TMR	0	10MR	0	24	57	23	57	S	S	HS
6	BK1622	TR	TR	TR	20S	0	24	89	35	68	S	S	S
7	BK1626	10S	0	5S	30S	0	24	47	45	46	S	S	HS
8	BK1633	30S	5S	10S	60S	20S	24	57	46	46	S	S	S
9	DWRB137	0	0	0	0	0	34	68	13	57	S	S	R
10	PL751	5S	5R	5S	40S	0	34	57	12	57	S	S	R
11	PL890	5R	TMR	5MR	0	0	34	47	13	46	S	S	HS
12	PL892	0	0	0	0	0	24	57	12	67	S	S	S
13	PL895	TR	0	TR	0	0	34	47	12	68	S	HS	R

14	BH1009	0	5R	0	0	10MS	34	57	12	57	S	MR	HS
15	BH1011	TMS	5R	TMS	0	0	34	46	45	46	S	S	HS
16	BH1013	0	0	0	0	0	46	47	12	36	S	S	S
17	BH1014	TMS	0	0	0	0	46	35	13	45	S	S	S
18	BH1017	0	TR	0	0	0	46	47	12	46	S	S	HS
19	BH1018	0	0	0	0	0	24	46	23	47	S	S	S
20	BH1019	0	0	0	0	0	34	57	23	57	S	S	HS
20A	Infector	100S	60S	60S	80S	60S	NG	89	NG	NG	S	S	S
21	HBL113	0	0	0	0	0	34	89	67	36	S	S	S
22	HBL764	NG	NG	0	0	0	NG	89	34	35	S	NG	S
23	KB1531	60S	5MR	10S	0	20S	56	46	12	57	MR	S	HS
24	RD2786	0	TMR	5S	0	0	56	78	78	67	S	S	HS
25	RD2794	100S	10S	20S	0	40S	34	47	12	78	S	R	R
26	RD2899	0	5R	0	0	0	34	57	23	78	S	S	HS
27	RD2917	0	0	0	0	0	24	46	78	57	S	S	HS
28	RD2947	0	0	0	0	0	79	78	89	79	MR	S	HS
29	RD2948	0	TMR	0	0	0	34	47	78	67	MR	S	R
30	RD2949	0	0	0	0	0	67	46	56	79	S	R	S
31	RD2951	0	0	0	0	0	24	47	38	68	S	S	HS
32	RD2954	0	TR	0	0	0	89	78	67	78	MR	MR	HS
33	RD2955	0	5R	0	0	0	89	99	67	79	S	MR	S
34	RD2956	0	0	0	0	0	89	89	78	78	S	S	S
35	RD2957	0	TMR	0	0	0	89	89	56	68	S	R	R
36	RD2959	0	0	0	20S	0	79	89	78	78	S	S	S
37	RD2961	5MR	0	TMR	0	0	56	78	79	57	S	S	HS
38	RD2964	5MR	0	5MR	20S	0	46	79	34	46	S	S	HS
39	RD2966	0	0	0	NG	0	34	89	23	46	S	S	HS
40	JB350	5R	TMR	5MR	0	0	24	78	34	57	S	S	HS
40A	Infector	100S	60S	60S	80S	60S	NG	89	NG	NG	S	S	S
41	DWRB127	0	5R	TR	10S	0	NG	57	12	46	S	S	R
42	DWRB147	0	TMR	0	10S	0	NG	47	12	36	MR	NG	NG
43	DWRB149	10S	TMR	5S	5S	0	NG	NG	12	35	NG	S	NG
44	DWRB150	TS	5R	TS	0	0	NG	46	12	36	NG	S	S
45	DWRB152	0	5R	0	0	0	NG	57	12	46	S	S	NG
46	BK1516	NG	0	0	40S	0	NG	78	13	36	S	NG	NG
47	BK1518	10S	0	10S	0	0	NG	78	47	46	NG	S	NG
48	BK1525	10S	5R	10S	0	0	NG	67	46	57	S	S	NG
49	HBL757	NG	TMR	0	0	0	NG	68	23	36	S	S	NG
50	HUB247	0	TR	0	0	0	NG	67	12	78	S	R	HS
51	BCU7719	0	TR	0	15S	0	NG	47	13	36	S	S	HS
52	BCU7746	0	5R	0	0	0	NG	68	13	46	S	S	HS
53	BCU7811	0	0	0	0	0	NG	69	13	35	NG	S	S

54	BCU7819	0	TMR	0	0	0	NG	46	56	46	S	S	HS
55	DWRB101	5S	0	5S	0	0	NG	NG	01	NG	S	S	NG
56	VLB130	NG	5R	NG	NG	0	NG	NG	12	36	S	S	NG
57	RD2941	0	0	0	0	0	NG	89	78	68	NG	S	HS
58	PL890	5MR	0	5MR	20S	0	NG	NG	12	46	S	MR	HS
59	BHS447	0	5R	0	20S	40S	NG	57	12	57	S	S	S
60	BHS454	0	0	0	20S	0	NG	47	58	46	S	S	S
60A	Infector	100S	80S	60S	80S	60S	NG	89	NG	NG	S	S	S
61	BHS459	0	5R	5S	0	10MS	NG	58	45	46	S	S	S
62	DWRB136	5R	5MS	5MS	40S	0	NG	47	35	46	S	S	S
63	DWRB150	5MS	5R	5MR	30S	0	NG	47	13	46	MR	S	S
64	DWRB168	5MR	0	5MR	30S	0	NG	57	34	35	S	S	NG
65	PL892	100S	20S	10S	60S	40S	NG	57	23	57	S	S	S
66	PL895	TMR	0	TMR	40S	10S	24	47	12	35	S	S	S
67	VLB147	100S	20S	10S	40S	40S	24	78	12	36	S	S	HS
68	VLB150	0	TMR	0	0	30S	24	68	12	46	S	S	HS
69	VLB151	10S	0	10S	60S	0	12	46	12	57	S	S	R
70	VLB152	10S	5R	10S	40S	10S	24	46	23	68	S	S	S
71	VLB153	0	0	0	0	0	34	89	26	68	S	S	HS
72	VLB154	5MR	0	5MR	40S	10MS	12	46	57	78	S	MR	S
73	BHS380	15S	5MS	10S	30S	20S	24	67	13	58	S	MR	S
74	BHS400	10S	5R	5S	60S	5MS	12	24	12	46	S	S	HS
75	DWRB101	20S	TMR	10S	40S	10S	12	46	12	58	S	S	HS
76	DWRB73	40S	5R	20S	60S	20S	24	47	12	57	S	S	HS
77	DWRB91	80S	0	10S	80S	10S	12	99	12	46	MR	S	R
78	HBL113	0	0	0	60S	0	12	NG	12	45	NG	NG	MR
79	HUB113	0	0	0	40S	0	12	68	12	68	MR	S	S
80	PL751	0	TR	0	0	0	12	78	34	68	S	S	HS
80A	Infector	100S	80S	60S	80S	80S	NG	89	NG	NG	S	S	S
81	VLB118	40S	0	20S	60S	20S	12	79	23	68	S	S	NG

HS- Highest score, ACI- Average Coefficient of Infection; CCN- Cereal Cyst Nematode, HS- Highly susceptible, S- Susceptible, MR- Moderately Resistant, R- Resistant, © - Released Checks, ND- Not Determined, NG – Not germinated.

Evaluation for seedling rust resistance against three rusts of barley

To identify rust resistant lines, 136 entries of NBDSN and 81 entries of EBDSN were screened at seedling stage against six pathotypes (M, 7S0, 6S0, 24, 57 and G) of *P. striiformis* f. sp. *Hordei* (barley yellow/stripe rust), five pathotypes {79G31(11), 62G29(40A), 117-6 (37G19), 122 (7G11) and 295 (7G43)} of *P. graminis tritici* (Black/stem rust) and five isolates (H1, H2, H3, H3, H4 and H5) of *P. hordei* (Brown/leaf rust) under controlled conditions of light and temperature. One week old seedlings were inoculated and incubated in saturated humidity chambers for 48 hours. Subsequently these plants were transferred to the greenhouse benches where sufficient day light (more than 10,000 Lux) and temperature of 16±2°C (for yellow rust), 22±2°C (for brown rust) 24±2°C (for black rust) and relative humidity of 60-80% were maintained. Observations on rust scores were taken after about two weeks of inoculation. All the entries were characterized as resistant or susceptible based on the response of each accession to pathotypes of barley rusts. The results of these experiments are summarized below:-

Rust resistance in NBDSN lines

None of the NBDSN entry was found to have resistance to all the tested pathotypes of black, brown or yellow rust pathogens. Resistance to all the pathotypes of black and yellow rust pathogens was observed only in DWRB182. Similarly seven entries (HBL804, HBL812, JB357, RD2786 (C), RD2973, RD2974 and RD2976) conferred resistance to yellow and brown rust pathogens. Thirty one, nineteen and two entries were resistant to all the pathotypes of yellow, brown and black rust pathogens, respectively.

Rust resistance in NBDSN lines

Resistant to	Number of Lines	Detail of Lines
Yellow and Brown	07	HBL804, HBL812, JB357, RD2786 (C), RD2973, RD2974, RD2976
Yellow and black	01	DWRB182
Yellow	31	DWRB137 (C), DWRB185, DWRB186, HBL814, HUB113 (C), HUB260, JB360, JB364, KB1606, KB1634, NDB1682, NDB1683, NDB1698, PL892, PL900, PL902, RD2552 (C), RD2715 (C), RD2899 (C), RD2907(C), RD2948, RD2969, RD2971, RD2972, RD2975, RD2977, RD2978, RD2981, RD2982, RD2983, UPB1070
Brown	19	BHS380 (C), BHS400 (C), BHS462, BHS465, BHS466, BHS467, BHS468, DWRB184, HBL113, HBL789, HBL821, KB1632, UPB1072, UPB1073, VLB118, (C), VLB155, VLB157, VLB158, VLB160
Black	02	DWRB188, HBL793

Rust resistance in EBDSN lines

None of the EBDSN entries was resistant to all the tested pathotypes of black, brown and yellow rusts pathogens. There were seven entries (RD2786, RD2941, RD2949, RD2955, RD2956, RD2957 and VLB153) showing resistance to all the pathotypes of yellow and brown rust pathogens. There was no entry showing resistance to all the pathotypes of black and brown rusts or black and yellow rusts. Eleven EBDSN entries conferred resistance to all the five isolates of the *P. hordei*. Resistance to all the pathotypes of *P. g. f.sp. tritici* was not observed in any of the EBDSN entries.

Rust resistance in EBDSN lines

Resistant to rusts	Number of Lines	Detail of Lines
Yellow and Brown	07	RD2786, RD2941, RD2949, RD2955, RD2956, RD2957, VLB153
Yellow	11	BH1009, BH1017, BH1019, BK1622, DWRB137, PL892, RD2899, RD2947, RD2948, RD2951, RD2954
Brown	11	BCU7746, BK1601, BK1626, BK1633, DWRB127, DWRB178, HBL113, PL895 (S.No. 66), RD2959, VLB151, VLB154

Infection types (ITs) of the NBDSN and EBDSN lines is presented Tables given below:
Seedling rust resistance of EBDSN entries to three rusts evaluated during 2017-18

S. N.	Lines	Pathotypes															
		Brown rust					Yellow rust					Black rust					
		H1	H2	H3	H4	H5	M	7S0	6S0	24	57	G	11	40A	117-6	122	295
1.	ABI Voyager	S	S	S	MR	MR	MR	S	R	MS	MIX	MR	R	MS	R	MR	R
2.	Andreia	MR	S	R	R	S	R	S	R	S	R	R	S	R	MS	R	S
3.	BH1020	MR	MS	MS	MS	R	R	R	R	S	S	S	S	MS	R	R	MS
4.	BH1021	MR	MS	S	MR	S	MS	S	S	S	S	S	S	R	R	MR	R
5.	BHS461	R	S	R	R	R	MS	S	R	S	S	MR	S	S	R	MS	MS
6.	BHS462	R	R	R	R	R	MR	S	R	MIX	R	MS	S	MS	R	MS	MS
7.	BHS463	S	S	MS	MS	S	S	S	S	S	S	MS	MR	R	R	MR	R
8.	BHS464	MR	R	MR	R	MS	S	R	S	S	MS	S	R	R	R	R	MS
9.	BHS465	R	R	R	R	R	S	S	S	S	R	S	S	MS	R	R	MR
10.	BHS466	R	R	R	R	R	R	R	R	MR	R	MR	R	S	R	MR	R
11.	BHS467	R	R	R	R	R	MS	S	MS	S	R	MS	NG	MR	R	S	R
12.	BHS468	R	R	R	R	R	S	R	MIX	S	S	S	S	R	MS	S	S
13.	Danielle	R	R	S	R	MR	R	R	R	NG	S	S	S	MS	MS	R	R
14.	DWRB160	MR	S	S	R	S	R	R	S	S	R	R	S	R	MS	NG	S
15.	DWRB180	R	R	MR	R	MR	S	S	MIX	S	R	R	MS	R	R	R	R
16.	DWRB181	MR	R	S	MS	R	S	R	S	S	R	R	MS	S	R	R	R
17.	DWRB182	MS	MR	MR	MR	R	R	R	R	R	R	R	R	R	R	R	R
18.	DWRB183	S	S	S	S	R	S	R	R	R	R	S	S	S	MR	R	MS
19.	DWRB184	R	R	R	R	R	S	S	R	R	R	MS	MS	S	S	S	S
20.	DWRB185	MS	S	S	MS	S	R	R	R	R	R	R	S	S	R	R	S
21.	DWRB186	S	S	S	R	S	R	R	R	R	R	R	MS	S	MS	R	MS
22.	DWRB187	NG	NG	R	R	MS	S	S	S	S	S	S	MR	S	MR	R	R
23.	DWRB188	R	NG	R	R	R	R	S	R	R	R	R	R	R	R	R	R
24.	Explorer	MS	R	MR	MR	R	S	S	R	S	R	S	S	MR	MS	S	R
25.	HBL789	R	R	R	R	R	R	R	S	S	R	S	R	R	R	MR	MR
26.	HBL793	S	MS	S	MS	NG	NG	NG	R	NG	MS	S	R	R	R	R	R
27.	HBL797	S	NG	R	MS	S	S	S	R	S	NG	MS	R	S	NG	NG	R
28.	HBL802	NG	R	R	NG	MR	NG	NG	NG	NG	NG	NG	NG	R	NG	R	R
29.	HBL804	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	MS
30.	HBL812	R	R	R	R	R	R	R	R	R	R	R	S	MS	R	MS	S
31.	HBL814	MR	R	R	MR	R	R	R	R	R	R	R	S	MS	R	R	MS
32.	HBL818	NG	R	R	R	R	R	R	R	S	R	NG	R	R	R	MR	MR
33.	HBL821	R	R	R	R	R	R	R	S	R	R	MIX	S	R	R	R	MR
34.	HBL822	NG	R	R	R	R	R	S	R	R	R	R	R	NG	R	NG	NG
35.	HUB253	S	S	S	MS	R	MR	S	R	S	S	S	S	S	MS	MS	S
36.	HUB260	MR	MR	R	MR	MS	R	R	R	R	R	R	S	S	MR	MR	MS
37.	HUB261	MR	S	R	MR	S	S	S	R	S	S	S	S	MS	R	MR	S
38.	HUB262	MR	MS	S	MS	S	R	R	R	MR	MS	R	R	R	R	R	MS
39.	HUB263	MR	MR	S	S	S	S	R	S	S	S	S	S	MS	R	R	S
40.	HUB264	MS	MR	S	R	S	MR	R	R	S	S	S	MS	R	R	S	R
41.	JB357	R	R	R	R	R	R	R	R	R	R	R	MS	R	S	S	S
42.	JB360	MS	MS	MR	R	R	R	R	R	R	R	R	S	MR	MS	R	MR
43.	JB362	R	MS	MR	MS	S	R	S	R	MR	MIX	MR	S	S	MS	MR	R
44.	JB363	MS	S	S	MR	S	S	R	S	S	S	S	S	S	MS	MR	R
45.	JB364	S	MR	S	S	MS	R	R	R	R	R	R	S	R	R	MS	MR
46.	KB1531	S	S	MS	MR	S	MS	S	S	S	S	S	R	S	MS	R	MS
47.	KB1605	S	R	R	R	R	MS	S	S	MR	MR	MR	S	MS	R	MR	S
48.	KB1606	MR	MS	R	MS	R	R	R	R	R	R	R	MS	R	MS	S	MS
49.	KB1616	MS	R	R	R	R	MS	S	R	S	S	MR	S	S	R	R	S
50.	KB1628	S	S	S	S	R	S	S	R	S	R	MR	S	R	MS	R	S
51.	KB1632	R	R	R	R	R	S	S	MS	S	S	MR	S	S	S	MR	MS
52.	KB1633	MS	R	R	R	R	R	R	R	S	R	MR	MS	MS	R	R	MR
53.	KB1634	S	MR	MS	R	S	R	R	R	R	R	R	S	MS	S	S	MS
54.	KB1636	R	MS	R	R	MR	S	S	R	S	R	S	R	S	R	S	MS
55.	KB1638	S	S	S	S	R	MS	S	R	S	R	MS	S	S	MS	MS	R
56.	KB1640	MR	MS	R	MR	S	S	S	S	MR	R	S	S	S	R	MS	S
57.	NDB1680	R	S	S	R	MS	S	R	R	S	S	S	S	MS	MS	MS	MS
58.	NDB1682	MR	S	S	S	S	R	R	R	R	R	R	S	R	MS	S	MS
59.	NDB1683	MS	MR	MR	MS	S	R	R	R	R	R	R	S	MS	MS	S	MR
60.	NDB1698	S	R	R	MR	MS	R	R	R	R	R	R	S	R	MS	R	S

61.	NDB1699	S	MS	S	S	S	S	S	R	S	R	MIX	MS	S	MS	R	S
62.	PL891	R	NG	R	NG	R	S	NG	NG	R	S	R	NG	R	R	R	R
63.	PL892	MR	S	R	R	R	R	R	R	R	R	R	S	MS	NG	R	MR
64.	PL898	MR	MR	S	R	R	S	R	R	S	S	S	MS	S	S	MR	S
65.	PL900	S	S	S	MR	S	R	R	R	R	R	R	R	R	R	MS	MR
66.	PL902	MS	MS	R	MR	MR	R	R	R	R	R	R	S	MR	R	MS	MS
67.	PL903	MS	MS	S	R	MS	R	S	R	S	S	R	S	R	R	MR	R
68.	PL904	MR	S	R	S	MS	R	S	R	R	R	R	S	S	S	S	S
69.	PL905	R	MR	S	R	MR	MR	S	R	MR	R	R	S	MS	R	MS	MS
70.	Planet	R	S	MS	MS	S	S	S	R	S	S	S	R	R	R	R	S
71.	RD2948	S	R	MS	MS	S	R	R	R	R	R	R	S	S	MR	MR	MS
72.	RD2969	S	S	S	MS	S	R	R	R	R	R	R	S	MR	R	S	MR
73.	RD2970	R	MR	R	MR	MS	S	R	R	S	S	S	R	R	R	R	MA
74.	RD2971	MR	S	S	MR	S	R	R	R	R	R	R	S	MS	S	R	R
75.	RD2972	R	MS	R	R	R	R	R	R	R	R	R	S	MS	MS	MS	R
76.	RD2973	R	R	R	R	R	R	R	R	R	R	R	S	R	R	S	MR
77.	RD2974	R	R	R	R	R	R	R	R	R	R	R	S	S	R	MS	S
78.	RD2975	MR	R	R	MR	R	R	R	R	R	R	R	S	MS	S	MR	MS
79.	RD2976	R	R	R	R	R	R	R	R	R	R	R	R	MS	R	MR	MR
80.	RD2977	MS	MR	S	MS	S	R	R	R	R	R	R	S	S	S	S	S
81.	RD2978	MS	R	R	MS	MS	R	R	R	R	R	R	S	MS	MS	R	MS
82.	RD2979	R	MS	MS	R	R	S	R	S	S	S	MS	MS	R	R	R	MS
83.	RD2980	MS	MR	MS	S	S	R	R	R	R	MR	R	S	S	S	R	R
84.	RD2981	S	S	R	R	S	R	R	R	R	R	R	S	S	MS	MS	MS
85.	RD2982	R	R	S	R	R	R	R	R	R	R	R	MS	S	R	MR	R
86.	RD2983	MS	R	R	R	R	R	R	R	R	R	R	MS	R	MS	R	MR
87.	RD2984	MR	MR	S	R	R	R	R	R	R	MIX	R	S	S	MS	MS	S
88.	RD2985	MR	S	R	R	R	R	R	R	S	R	S	S	MS	MS	MS	S
89.	RD2986	MS	MR	S	S	MS	S	R	S	S	MIX	S	S	S	R	R	S
90.	RD2987	R	MS	R	R	R	MS	R	R	S	S	S	S	MS	MR	S	R
91.	RD2988	MR	MR	MR	R	MR	S	S	S	R	MR	MR	S	R	S	R	S
92.	Traveller	S	MR	S	MS	S	S	S	S	MR	R	S	R	MR	R	MR	S
93.	UPB1070	MS	S	S	R	R	R	R	R	R	R	R	S	MR	R	MR	MR
94.	UPB1071	R	MR	MR	MR	R	MS	R	R	MIX	MIX	S	S	S	R	MR	S
95.	UPB1072	R	R	R	R	R	MS	R	R	S	R	R	S	R	R	MS	MS
96.	UPB1073	R	R	R	R	R	MS	S	R	MS	R	MS	MR	R	R	S	MS
97.	UPB1074	MS	R	S	MS	S	MS	S	S	S	S	MS	MS	S	MS	MR	MS
98.	UPB1075	S	R	S	MS	S	S	S	S	S	S	S	MS	MR	R	MR	MR
99.	VLB155	R	R	R	R	R	S	R	R	S	MS	MR	MS	R	R	S	S
100.	VLB156	R	MS	S	R	S	S	R	S	NG	S	S	MS	R	MS	MS	MS
101.	VLB157	R	R	R	R	R	R	R	R	MS	R	R	S	MR	MS	S	R
102.	VLB158	R	R	R	R	R	S	MS	R	MR	MS	MS	S	MR	MS	MS	MR
103.	VLB159	R	R	NG	R	R	MS	R	R	R	NG	R	S	R	R	R	MR
104.	VLB160	R	R	R	R	R	S	S	S	S	R	S	R	MS	S	R	MR
105.	Xanadu	R	MR	MS	R	S	S	S	R	S	S	S	R	MS	R	MR	MS
106.	AZAD (C)	MS	MS	S	MR	R	R	S	S	S	S	S	S	MS	R	MR	MR
107.	BH902 (C)	S	MS	R	MS	R	S	S	R	R	R	S	S	S	S	MR	S
108.	BH946 (C)	S	S	MS	MS	R	R	R	R	S	S	S	MS	NG	R	MS	MS
109.	BH959 (C)	S	MR	R	S	S	S	S	S	S	S	S	S	S	S	MS	MS
110.	BHS352 (C)	S	R	NG	NG	R	R	NG	R	S	R	MS	S	NG	R	NG	MR
111.	BHS380 (C)	R	R	R	R	R	MS	S	MIX	S	MS	R	S	MR	MR	S	R
112.	BHS400 (C)	R	R	R	R	R	S	S	S	R	S	S	S	R	MR	MR	MS
113.	DWRB101 (C)	MR	S	MS	MS	S	S	S	R	S	S	S	S	MR	MR	MR	MS
114.	DWRB123 (C)	S	MR	R	MS	R	S	R	R	R	R	R	MS	MS	MS	S	R
115.	DWRB137 (C)	MS	MS	R	S	R	R	R	R	R	R	R	S	S	S	S	R
116.	HBL113 (C)	R	R	R	R	R	MS	S	R	R	R	R	MS	MR	R	R	MR
117.	HBL276 (C)	S	MS	S	R	S	MS	R	MS	S	R	S	MS	R	R	R	MS
118.	HUB113 (C)	MR	S	S	R	R	R	R	R	R	R	R	S	MS	MS	R	R
119.	JYOTI (C)	MS	MS	MR	S	R	S	S	S	S	S	S	R	S	S	MR	R
120.	K508 (C)	S	S	MS	MR	MS	S	S	S	S	S	S	S	MS	S	S	S
121.	K603 (C)	MS	MR	R	S	S	R	R	R	S	S	S	S	S	S	S	S
122.	KARAN 16 (C)	MR	S	S	R	R	S	NG	S	R	S	S	S	R	S	R	R
123.	LAKHAN (C)	S	MS	S	MS	S	S	S	S	S	R	S	R	R	MS	MR	S
124.	NDB1173 (C)	MR	MR	R	R	R	S	R	S	S	R	S	MS	R	R	MR	S
125.	NDB1445 (C)	MR	MS	MS	R	R	MS	R	R	S	R	R	S	S	S	MS	R
126.	NDB943 (C)	S	S	S	MR	R	R	S	S	S	S	S	S	R	S	MR	MR

127.	PL751 (C)	MR	MR	S	MS	MR	S	S	S	S	S	S	MR	S	S	R	R
128.	RD2035 (C)	S	S	S	MS	S	R	S	R	S	S	S	S	S	R	MR	S
129.	RD2552 (C)	S	MR	S	MS	R	R	R	R	R	R	R	S	R	MS	S	S
130.	RD2715 (C)	R	R	MR	MR	MR	R	R	R	R	R	R	S	S	MS	MR	NG
131.	RD2786 (C)	R	R	R	R	R	R	R	R	R	R	R	MS	R	S	MR	MS
132.	RD2794 (C)	MS	MR	S	R	R	S	S	S	S	S	MS	MS	MS	MR	MR	
133.	RD2849 (C)	MR	R	R	S	R	S	R	R	S	R	R	R	R	R	R	MR
134.	RD2899 (C)	MS	MS	MR	MR	MS	R	R	R	R	R	R	S	MS	MS	MS	S
135.	RD2907 (C)	S	MS	MS	MS	R	R	R	R	R	R	R	S	MS	S	S	MS
136.	VLB118 (C)	R	R	R	R	R	S	S	R	S	R	S	S	MS	R	S	

Seedling rust resistance of EBDN entries to three rusts evaluated during 2017-18

S. No.	Lines	Pathotypes															
		Brown rust					Yellow rust						Black rust				
		H1	H2	H3	H4	H5	M	7S0	6S0	24	57	G	11	40A	117-6	122	295
1.	DWR47	MR	S	S	MS	S	S	S	R	MS	S	S	MS	R	R	MR	MS
2.	DWRB165	R	NG	R	NG	NG	S	R	NG	R	R	NG	R	R	R	NG	MS
3.	DWRB170	R	MS	MS	MR	S	MR	S	MIX	R	R	NG	R	S	R	MS	MS
4.	DWRB178	R	R	R	R	R	R	S	S	R	R	MR	S	S	R	MR	MR
5.	BK1601	R	R	R	R	R	MS	S	NG	R	MS	MS	S	S	R	MR	S
6.	BK1622	MS	S	R	R	R	R	R	R	R	R	R	S	R	R	R	S
7.	BK1626	R	R	R	R	R	R	S	S	MR	MS	S	S	S	R	R	MS
8.	BK1633	R	R	R	R	R	R	R	MS	S	S	R	R	MS	R	R	MR
9.	DWRB137	MS	MR	S	MS	S	R	R	R	R	R	R	S	S	R	MR	MR
10.	PL751	MS	R	S	MS	S	S	S	S	S	S	S	MS	S	MS	R	MR
11.	PL890	MS	S	MS	R	S	S	R	S	R	S	MR	MS	MS	R	R	R
12.	PL892	S	S	S	R	S	R	R	R	R	R	R	S	R	R	MR	MR
13.	PL895	S	NG	S	R	NG	R	R	R	R	NG	MR	S	MS	MR	NG	MR
14.	BH1009	S	R	MR	MS	S	R	R	R	R	R	R	S	R	MS	MR	R
15.	BH1011	S	S	MS	R	R	MS	R	MIX	R	S	MS	R	R	R	R	MR
16.	BH1013	S	S	MR	R	R	S	S	S	R	R	MS	S	R	R	R	MR
17.	BH1014	S	MS	MR	MS	R	MR	R	R	R	MR	MS	S	MS	MS	R	MS
18.	BH1017	S	MR	S	MR	MR	R	R	R	R	R	R	R	R	S	R	MS
19.	BH1018	S	MR	S	MS	R	R	R	R	MR	R	R	R	R	MS	MR	MR
20.	BH1019	MS	MS	MS	MR	S	R	R	R	R	R	R	S	R	S	MS	S
21.	HBL113	R	R	R	R	R	R	S	R	R	R	R	MR	MR	R	R	MS
22.	HBL764	R	NG	NG	NG	R	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG
23.	KB1531	S	S	MR	R	S	S	S	S	S	S	S	MR	S	MS	R	MR
24.	RD2786	R	R	R	R	R	R	R	R	R	R	R	MS	R	R	R	MR
25.	RD2794	S	S	MS	R	S	S	S	S	S	S	S	S	MS	S	MS	S
26.	RD2899	S	S	R	R	S	R	R	R	R	R	R	S	MS	S	S	S
27.	RD2917	S	MS	MS	S	S	S	S	MS	R	R	R	R	R	S	R	MS
28.	RD2947	S	S	R	R	R	R	R	R	R	R	R	MS	R	S	R	MR
29.	RD2948	S	MR	R	MR	S	R	R	R	R	R	R	MS	MR	S	MR	MS
30.	RD2949	R	R	R	R	R	R	R	R	R	R	R	MS	MS	S	R	MS
31.	RD2951	MS	MR	MR	MR	S	R	R	R	R	R	R	MS	MS	S	R	MS
32.	RD2954	MS	S	R	R	R	R	R	R	R	R	R	S	MR	S	R	MR
33.	RD2955	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
34.	RD2956	R	R	R	R	R	R	R	R	R	R	R	S	S	MS	MR	MR
35.	RD2957	R	R	R	R	R	R	R	R	R	R	R	S	R	MS	MR	S
36.	RD2959	R	R	R	R	R	MR	R	R	R	R	R	R	R	S	R	S
37.	RD2961	MR	MS	MR	R	R	S	S	R	MS	MS	R	S	S	S	R	MS
38.	RD2964	S	MR	MS	MR	S	S	S	MR	R	MS	MR	S	S	MS	MS	S
39.	RD2966	R	S	MS	R	R	S	S	R	R	MR	MR	R	R	MS	MS	MS
40.	JB350	R	S	MR	MR	R	S	S	S	MR	MS	MR	R	S	S	S	MR
41.	DWRB127	R	R	R	R	R	NG	R	NG	R	NG	NG	R	R	MS	MS	NG
42.	DWRB147	NG	NG	NG	R	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG
43.	DWRB149	R	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	R
44.	DWRB150	NG	NG	S	NG	R	NG	R	R	NG	R	NG	R	NG	MS	NG	NG
45.	DWRB152	R	NG	NG	R	NG	MS	S	NG	NG	R	R	R	NG	NG	NG	NG
46.	BK1516	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG
47.	BK1518	NG	NG	NG	NG	NG	R	S	NG	NG	NG	NG	R	R	NG	R	NG
48.	BK1525	NG	NG	NG	R	NG	NG	NG	NG	NG	NG	NG	NG	NG	MS	NG	NG
49.	HBL757	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG
50.	HUB247	MR	R	R	MR	S	MS	R	R	R	R	R	R	R	S	R	MR
51.	BCU7719	R	R	NG	NG	R	MS	MS	R	NG	NG	R	MS	R	R	NG	R
52.	BCU7746	R	R	R	R	R	R	R	NG	MR	MR	NG	MS	NG	R	NG	NG
53.	BCU7811	NG	R	R	R	R	R	R	NG	MR	MR	R	R	NG	R	R	NG
54.	BCU7819	NG	R	R	R	R	R	S	S	S	S	R	R	NG	S	MS	S

55	DWRB101	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	R	NG	NG	NG
56	VLB130	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG
57	RD2941	R	R	R	R	R	R	R	R	R	R	R	R	S	MR	S	MR	R
58	PL890	NG	NG	NG	R	R	NG	NG	NG	NG	S	NG	NG	NG	NG	NG	NG	R
59	BHS447	MS	NG	MS	R	R	NG	R	S	R	NG	R	MR	S	S	S	R	
60	BHS454	NG	NG	S	NG	NG	NG	S	NG	R	S	NG	R	NG	NG	R	NG	
61	BHS459	S	R	NG	R	R	NG	NG	NG	R	R	NG	R	R	MS	NG	R	
62	DWRB136	NG	NG	NG	R	MS	NG	S	NG	NG	NG	NG	NG	NG	NG	NG	R	
63	DWRB150	S	MR	MS	R	MS	NG	S	S	R	S	NG	NG	NG	NG	NG	R	
64	DWRB168	R	NG	NG	MS	R	NG	NG	NG	NG	NG	NG	MS	R	NG	R	NG	
65	PL892	S	R	S	NG	R	R	R	R	R	R	R	MR	MR	MR	R	MR	
66	PL895	R	R	R	R	R	MR	S	NG	S	R	R	R	R	MS	MS	R	
67	VLB147	S	NG	S	R	R	MS	S	S	S	S	S	MS	R	MS	R	MR	
68	VLB150	S	R	NG	R	R	NG	S	S	S	S	MIX	NG	MR	MS	R	MR	
69	VLB151	R	R	R	R	R	MS	S	MIX	S	S	R	R	R	MS	MR	R	
70	VLB152	R	R	R	NG	R	S	NG	S	R	S	S	R	NG	MS	R	R	
71	VLB153	R	R	R	R	R	R	R	R	R	R	R	MR	R	NG	R	MS	
72	VLB154	R	R	R	R	R	NG	R	MIX	NG	R	R	MS	R	S	NG	R	
73	BHS380	NG	R	NG	R	NG	NG	S	NG	R	NG	R	MR	MS	S	NG	R	
74	BHS400	R	NG	R	R	R	S	S	R	R	MIX	MIX	S	MR	S	MR	S	
75	DWRB101	R	R	NG	S	R	S	S	R	S	S	MS	MS	MS	R	MS	S	
76	DWRB73	S	MS	NG	NG	NG	NG	S	R	S	S	NG	MS	NG	S	NG	MR	
77	DWRB91	MR	MS	S	R	NG	S	S	R	S	S	S	R	MS	MS	R	MR	
78	HBL113	NG	R	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	
79	HUB113	S	NG	NG	NG	S	R	NG	R	MIX	NG	R	MS	MS	MS	R	NG	
80	PL751	S	S	R	NG	S	S	NG	NG	S	S	S	NG	S	R	NG	R	
81	VLB118	MR	MR	R	R	NG	S	R	S	S	NG	MR	MS	NG	S	R	NG	

EXPERIMENT - CHEMICAL CONTROL OF BARLEY FOLIAR BLIGHT

Objective: To validate the effectiveness of various fungicides against foliar blight

Locations: Dharwar, Kanpur and Faizabad

The experiment was conducted in RBD with three replications. Leaf blight susceptible variety was planted in 2 x 2 m plots at row to row distance of 23 cm and recommended packages of practices were followed. The fungicides were sprayed after first appearance of blight and the blight observation was taken at various intervals.

Among different fungicidal treatments, ST with Vitavax power + Propiconazole @ 0.1% spray and ST with Vitavax power + Tebuconazole (Folicur) @ 0.1% spray found superior and equally effective at Kanpur and Faizabad centers whereas, ST with Tebuconazole (Raxil) + spray of Propiconazole @ 0.1% found superior at Dharwad center. All the treatment found significantly superior over control.

CHEMICAL CONTROL OF LEAF BLIGHT (Kanpur)

Variety: RD2503; Plot size: 2 x 2 m; Replications : 3

Date of sowing: 10.12.2017

Date of Inoculum spray: 02.01.18, 15.01.18 Date of first appearance of blight: 25.01.18

Date of fungicide application: 12.02.18, 22.02.18 Date of harvest: 10.04.18

S. No.	Treatment	% germination	Blight severity with date of observation			1000 grain weight	Grain yield (q/ha)	Yield increase over check (q/ha)
			I 11.02.18	II 21.02.18	III 07.03.18			
1.	Seed treatment with Vitavax @2g/Kg seed	91	67	67	57	36.0	35.9	5.5
2.	Seed treatment with Raxil @ 2g/Kg	95	57	57	46	35.2	31.9	1.5
3.	ST with Vitavax 2g/Kg + Tilt spray @0.1%	90	46	36	24	37.1	43.2	12.8
4.	ST with Vitavax 2g/Kg + Folicur spray @0.1%	90	48	35	24	36.6	36.7	6.3
5.	ST with Raxil @ 2g/Kg + Tilt spray @0.1%	95	57	46	36	36.9	38.0	7.6
6.	ST with Raxil @ 2g/Kg + Folicur spray @0.1%	93	68	46	35	35.6	33.4	3.0
7.	Tilt spray @0.1% only	84	57	48	48	34.6	32.7	2.3
8.	Folicur spray @0.1%	85	67	57	46	34.6	33.9	3.5
9.	Control without seed treatment	80	68	78	89	32.9	30.4	-

CHEMICAL CONTROL OF LEAF BLIGHT (Faizabad)

Variety: RD2503; Plot size: 2 x 2 m; Replications : 3								
Date of sowing: 21/12/2017								
Date of inoculum spray: 15/02/18, 25/02/18				Date of first appearance of blight:05/02/18				
Date of fungicide application: 20/02/18				Date of harvest:02/05/18				
S. No.	Treatment	% germination	Blight severity with date of observation (Av. of 3 Rep.)			1000 grain weight	Grain yield (q/ha)	Yield increase over check %
			I	II	III			
1	Seed treatment with Vitavax @2g/Kg seed	90	24	45	68	34.7	39.0	8.96
2	Seed treatment with Raxil @ 2g/Kg	88	24	46	68	32.7	36.5	0.60
3	ST with Vitavax 2g/Kg + Tilt spray @0.1%	92	24	35	35	37.8	45.5	28.27
4	ST with Vitavax 2g/Kg + Folicur spray @0.1%	90	24	35	36	37.2	44.5	24.13
5	ST with Raxil @ 2g/Kg + Tilt spray @0.1%	90	24	45	46	36.5	41.5	16.55
6	ST with Raxil @ 2g/Kg + Folicur spray @0.1%	88	24	45	56	36.2	41.5	17.24
7	Tilt spray @0.1% only	80	35	46	67	35.6	36.0	0.68
8	Folicur spray @0.1%	82	35	46	56	35.0	37.0	0.60
9	Control without seed treatment	80	46	68	89	33.0	36.0	-----

CHEMICAL CONTROL OF LEAF BLIGHT OF BARLEY (Dharwad)

Location: MARS, UAS, Dharwad				Variety: Jyoti				
Date of sowing: 08.12.2017				No. of replications: 3				
Date of insecticide sprays: 02.01.2018				No. of treatments: 9				
Date of first appearance of leaf blight:				Plot size: Gross plot: 3.0m X 2.4m Net plot:3.0m X 2.0m				
Date of harvest: 03.04.2018								
S. No.	Treatments	Plant height (cm)	Disease severity (DD)			Grain yield (q/ha)	TGW (g)	Biomass (t/ha)
			RI	RII	RIII			
1	Seed treatment (ST) with Carboxin - Thiram (Vitavax power) 2g/Kg	88.00	24	24	34	14.90	43.08	10.28
2	ST with Tebuconazole (Raxil) @ 2g/Kg	88.11	24	24	24	14.97	43.52	10.56
3	ST Vitavax power + Propiconazole (Tilt) spray @ 0.1%	90.22	12	12	12	16.96	44.52	11.11
4	ST Vitavax power + Tebuconazole (Folicur) spray @ 0.1%	86.44	12	12	12	16.11	44.92	10.98
5	ST Tebuconazole + Propiconazole (Tilt) spray @ 0.1%	86.89	12	12	12	17.98	45.07	11.39
6	ST Tebuconazole + Tebuconazole (Folicur) spray @ 0.1%	90.67	12	01	01	17.48	45.88	11.18
7	Propiconazole (Tilt) spray @ 0.1% only	90.56	12	12	12	16.69	45.16	11.50
8	Tebuconazole (Folicur) spray @ 0.1% only	91.11	12	01	12	16.98	45.51	11.67
9	Control without treatment	87.56	34	34	46	13.71	43.40	10.00
	SEM±	1.55	-	-	-	0.63	0.57	0.76
	CD (p=0.05)	4.66	-	-	-	1.89	1.70	2.28
	CV (%)	3.03	-	-	-	6.76	2.20	11.99

BARLEY ENTOMOLOGY

During the cropping season of 2017-18, following experiments were allotted for entomology discipline. These are listed as below:-

Experiment	Title	Centres
1	Screening of NBDSN barley entries (2017-18) against foliar aphids	Ludhiana, Kanpur, Karnal and Durgapura
2.	Eco friendly management of foliar aphid	Ludhiana, Vijapur, Kanpur, Karnal and Durgapura
3.	Survey and surveillance of insect-pests and their natural enemies in barley	All centres

Experiment 1: Screening of NBDSN barley entries (2017-18) against foliar aphids

A total of one hundred and thirty six barley entries were screened against aphids at four locations as per the planned programme of work during 2017-18. The seeds were supplied by IIWBR, Karnal. Aphid population per shoot was recorded at weekly interval from all these entries and grades were given according to 5 point system described below.

Grade/ Score	Approx. numbers of aphids/shoot	Rating
1	0	Immune (I)
2	1-5	Resistant (R)
3	6-10	Moderately resistant (MR)
4	11-20	Susceptible (S)
5	21 and above	Highly susceptible (HS)

Majority of the entries at all the locations harboured aphids in different range depending upon their incidence level. The number of aphids recorded per shoot was converted into scale of 1-5. Based on the scale, the entries were categorized either as immune (grade 1) or resistant (grade 2), or moderately resistant (grade 3) or either susceptible (grade 4) or highly susceptible (grade 5) to aphids.

During cropping season 2017-18, data on screening of NBDN against aphids was only obtained from three centres. The aphid incidence was not recorded at Durgapura so the screening against aphid was not performed. This year, entries were found to be in all the category grades i.e. 1 to 5. At Karnal centre, three entries viz., DWRB182, DWRB183 and KB1638 were found to be moderately resistant (grade 3). At Ludhiana, four entries; RD2715, KB1633, PL891 and AZAD were found moderately resistant (grade 3). Five entries viz., DWRB183, DWRB182, RD2988, JYOTI and DWRB160 were found immune (grade 1) at Kanpur location. In addition, one entry; DWRB184 was found resistant and two entries; RD2794 and HUB263 were found to be moderately resistant (grade 3) at Kanpur location.

The differential response of aphids to various entries can be due to availability of biotypes of foliar aphids in various locations in addition to weather factors that responsible for pest multiplication and development.

Screening of National Barley Disease Screening Nursery (NBDSN) entries against foliar aphids during season 2017-18

S. No.	NBDSN Entries (2017-18)	Aphid score (1-5)				Average Score
		Ludhiana	Kanpur	Karnal	HS*	
1.	ABI Voyager	4.00	4.00	5.00	5.00	4.33
2.	Andreaia	5.00	4.00	5.00	5.00	4.67
3.	BH1020	4.00	4.67	5.00	5.00	4.56
4.	BH1021	4.00	4.67	4.00	4.67	4.22
5.	BHS461	5.00	4.67	4.00	5.00	4.56
6.	BHS462	5.00	4.67	4.00	5.00	4.56
7.	BHS463	4.33	4.67	4.00	4.67	4.33
8.	BHS464	4.67	4.33	5.00	5.00	4.67
9.	BHS465	5.00	4.67	4.00	5.00	4.56
10.	BHS466	4.67	4.33	4.00	4.67	4.33
11.	BHS467	5.00	4.33	4.00	5.00	4.44
12.	BHS468	5.00	4.67	5.00	5.00	4.89
13.	Danielle	4.00	4.33	5.00	5.00	4.44
14.	DWRB160	3.33	1.67	4.33	4.33	3.11
15.	DWRB180	5.00	4.33	5.00	5.00	4.78
16.	DWRB181	5.00	4.33	5.00	5.00	4.78
17.	DWRB182	4.67	1.00	3.00	4.67	2.89
18.	DWRB183	4.33	1.00	3.00	4.33	2.78
19.	DWRB184	4.33	2.33	4.33	4.33	3.66
20.	DWRB185	4.33	4.67	5.00	5.00	4.67
21.	DWRB186	5.00	4.00	5.00	5.00	4.67
22.	DWRB187	4.33	4.00	5.00	5.00	4.44
23.	DWRB188	4.00	4.67	5.00	5.00	4.56
24.	Explorer	5.00	4.33	4.00	5.00	4.44
25.	HBL789	5.00	4.33	4.00	5.00	4.44
26.	HBL793	5.00	4.67	5.00	5.00	4.89
27.	HBL797	5.00	4.67	4.00	5.00	4.56
28.	HBL802	5.00	4.67	5.00	5.00	4.89
29.	HBL804	5.00	4.67	5.00	5.00	4.89
30.	HBL812	5.00	5.00	5.00	5.00	5.00
31.	HBL814	5.00	4.33	4.00	5.00	4.44
32.	HBL818	5.00	4.67	5.00	5.00	4.89
33.	HBL821	5.00	4.67	4.00	5.00	4.56
34.	HBL822	5.00	4.33	5.00	5.00	4.78
35.	HUB253	4.00	4.67	5.00	5.00	4.56
36.	HUB260	4.67	4.67	5.00	5.00	4.78
37.	HUB261	5.00	5.00	5.00	5.00	5.00
38.	HUB262	5.00	5.00	4.00	5.00	4.67
39.	HUB263	4.00	3.33	4.67	4.67	4.00
40.	HUB264	3.67	4.67	3.33	4.67	3.89
41.	JB357	5.00	4.33	4.00	5.00	4.44
42.	JB360	5.00	4.67	5.00	5.00	4.89
43.	JB362	5.00	4.33	5.00	5.00	4.78
44.	JB363	4.00	4.67	5.00	5.00	4.56
45.	JB364	5.00	4.67	5.00	5.00	4.89

S. No.	NBDSN Entries (2017-18)	Aphid score (1-5)				Average Score
		Ludhiana	Kanpur	Karnal	HS*	
46.	KB1531	5.00	5.00	5.00	5.00	5.00
47.	KB1605	4.00	4.33	5.00	5.00	4.44
48.	KB1606	4.33	4.67	5.00	5.00	4.67
49.	KB1616	4.00	4.67	5.00	5.00	4.56
50.	KB1628	4.33	4.00	4.67	4.67	4.33
51.	KB1632	5.00	4.00	5.00	5.00	4.67
52.	KB1633	3.00	4.33	5.00	5.00	4.11
53.	KB1634	3.67	4.00	5.00	5.00	4.22
54.	KB1636	3.67	4.00	5.00	5.00	4.22
55.	KB1638	5.00	4.33	3.00	5.00	4.11
56.	KB1640	5.00	4.67	5.00	5.00	4.89
57.	NDB1680	4.67	4.67	5.00	5.00	4.78
58.	NDB1682	4.33	4.67	5.00	5.00	4.67
59.	NDB1683	4.00	4.33	4.00	4.33	4.11
60.	NDB1698	4.00	5.00	5.00	5.00	4.67
61.	NDB1699	4.67	4.00	4.67	4.67	4.45
62.	PL891	3.00	4.33	5.00	5.00	4.11
63.	PL892	4.67	5.00	5.00	5.00	4.89
64.	PL898	4.00	4.67	4.33	4.67	4.33
65.	PL900	4.00	5.00	4.00	5.00	4.33
66.	PL902	4.67	4.67	5.00	5.00	4.78
67.	PL903	5.00	5.00	5.00	5.00	5.00
68.	PL904	4.00	4.33	5.00	5.00	4.44
69.	PL905	5.00	4.00	5.00	5.00	4.67
70.	Planet	5.00	4.33	4.00	5.00	4.44
71.	RD2948	5.00	4.67	4.67	5.00	4.78
72.	RD2969	4.00	5.00	5.00	5.00	4.67
73.	RD2970	4.33	4.67	5.00	5.00	4.67
74.	RD2971	4.00	4.67	4.00	4.67	4.22
75.	RD2972	4.33	4.33	5.00	5.00	4.55
76.	RD2973	4.67	4.00	5.00	5.00	4.56
77.	RD2974	4.00	4.00	5.00	5.00	4.33
78.	RD2975	5.00	4.00	5.00	5.00	4.67
79.	RD2976	4.33	4.33	5.00	5.00	4.55
80.	RD2977	4.00	5.00	5.00	5.00	4.67
81.	RD2978	5.00	4.67	5.00	5.00	4.89
82.	RD2979	4.00	4.00	4.67	4.67	4.22
83.	RD2980	4.33	4.67	4.00	4.67	4.33
84.	RD2981	4.67	4.33	5.00	5.00	4.67
85.	RD2982	4.00	5.00	5.00	5.00	4.67
86.	RD2983	3.67	4.67	5.00	5.00	4.45
87.	RD2984	4.00	4.00	5.00	5.00	4.33
88.	RD2985	4.33	4.33	5.00	5.00	4.55
89.	RD2986	5.00	4.00	5.00	5.00	4.67
90.	RD2987	4.67	4.33	5.00	5.00	4.67
91.	RD2988	5.00	1.00	5.00	5.00	3.67
92.	Traveller	5.00	4.33	5.00	5.00	4.78

S. No.	NBDSN Entries (2017-18)	Aphid score (1-5)				Average Score
		Ludhiana	Kanpur	Karnal	HS*	
93.	UPB1070	5.00	4.67	5.00	5.00	4.89
94.	UPB1071	5.00	4.33	5.00	5.00	4.78
95.	UPB1072	5.00	4.67	5.00	5.00	4.89
96.	UPB1073	4.00	4.67	5.00	5.00	4.56
97.	UPB1074	4.00	4.00	5.00	5.00	4.33
98.	UPB1075	4.33	4.67	5.00	5.00	4.67
99.	VLB155	5.00	4.67	5.00	5.00	4.89
100.	VLB156	5.00	4.67	5.00	5.00	4.89
101.	VLB157	5.00	4.33	4.00	5.00	4.44
102.	VLB158	5.00	4.67	5.00	5.00	4.89
103.	VLB159	5.00	4.67	4.00	5.00	4.56
104.	VLB160	5.00	5.00	4.00	5.00	4.67
105.	Xanadu	5.00	4.33	4.00	5.00	4.44
106.	AZAD ©	3.00	4.67	5.00	5.00	4.22
107.	BH902 ©	4.33	4.67	5.00	5.00	4.67
108.	BH946 ©	4.33	4.33	5.00	5.00	4.55
109.	BH959 ©	4.33	4.00	4.67	4.67	4.33
110.	BHS352 ©	5.00	4.00	5.00	5.00	4.67
111.	BHS380 ©	5.00	4.00	5.00	5.00	4.67
112.	BHS400 ©	5.00	4.33	4.00	5.00	4.44
113.	DWRB101 ©	4.00	4.00	5.00	5.00	4.33
114.	DWRB123 ©	4.00	4.00	4.00	4.00	4.00
115.	DWRB137 ©	5.00	4.67	4.67	5.00	4.78
116.	HBL113 ©	5.00	4.67	5.00	5.00	4.89
117.	HBL276 ©	4.67	4.67	5.00	5.00	4.78
118.	HUB113 ©	4.67	4.67	4.67	4.67	4.67
119.	JYOTI ©	5.00	1.00	5.00	5.00	3.67
120.	K508 ©	5.00	5.00	5.00	5.00	5.00
121.	K603 ©	5.00	4.67	5.00	5.00	4.89
122.	KARAN 16 ©	5.00	4.67	5.00	5.00	4.89
123.	LAKHAN ©	5.00	4.33	5.00	5.00	4.78
124.	NDB1173 ©	4.67	4.00	5.00	5.00	4.56
125.	NDB1445 ©	5.00	4.00	4.00	5.00	4.33
126.	NDB943 ©	5.00	4.67	5.00	5.00	4.89
127.	PL751 ©	4.00	4.00	5.00	5.00	4.33
128.	RD2035 ©	4.00	4.33	5.00	5.00	4.44
129.	RD2552 ©	4.67	4.67	4.33	4.67	4.56
130.	RD2715 ©	3.00	4.00	4.00	4.00	3.67
131.	RD2786 ©	4.00	4.67	5.00	5.00	4.56
132.	RD2794 ©	3.67	3.33	4.00	4.00	3.67
133.	RD2899 ©	4.67	4.67	4.67	4.67	4.67
134.	RD2899 ©	4.67	4.67	4.67	4.67	4.67
135.	RD2907 ©	3.67	4.00	4.00	4.00	3.89
136.	VLB118 ©	5.00	4.33	5.00	5.00	4.78
137.	Infector	5.00	5.00	5.00	5.00	5.00

*HS = Highest Score, **No aphid infestation was observed at Durgapura location

Experiment 2: Eco friendly management of foliar aphid (*Rhopalosiphum maidis*)

Objective: The objective of conducting this experiment was to find out eco-friendly and high potent molecules, which are more efficient, at lower doses than presently recommended molecules.

Methodology: The experiment was conducted at five locations Durgapura, Ludhiana, Vijapur, Kanpur and Karnal during 2017-18 season with eight treatments. The details of each treatment along with their dosages are given below.

Five tillers were tagged from each plot and the experiment was replicated three times. The aphids were counted from these tagged plants before spray and after spray to know the efficacy of each treatment. The grain yield was recorded to know the amount preventable losses by these treatments.

Detail of treatments used for the management of foliage feeding aphid (*Rhopalosiphum maidis*) during season 2017-18.

S. No.	Treatments	Dose ml or g / ha	Dosages (g a.i./ha)
1.	Imidacloprid 200 SL(Confidor 17.8)	100 ml	20
2.	Quinalphos 25 % EC	400 ml	100
3.	Acetamiprid 20 SP(Pride)	100 gm	20
4.	Azadirachtin 1500 ppm	3 ml/ Lit.	-
5.	<i>Verticillium lecanii</i> (2 X 10 ⁸ cfu /gm ²)	3 g / Lit.	-
6.	<i>Beauveria bassiana</i> (2 X 10 ⁸ cfu /gm ²)	5 g/ Lit.	-
7.	<i>Metarhizium anisopliae</i>	3 g/ Lit.	-
8.	Untreated Check	-	-

Summary of Results:

A total of eight treatments were tested for their efficacy against foliar aphid in barley. No aphid incidence was recorded at Durgapura location therefore, efficacy trial was not conducted. At all locations, it was found that treated plots harboured lower number of aphids as compared to control plots. At Ludhiana, chlorantranilipride (1.19 aphids/tiller) was found to be the best treatment fifteen days after treatment and it was at par with other insecticidal treatments. At Vijapur centre, observation taken after 15th day after spray revealed lowest aphid population in the plots treated with of imidacloprid 200 SL (Confidor 17.8) @ 20 g a.i/ha and it was at par with all the treatments except control.

At Kanpur location, treatments of Fame (Flubendamide 480 SC) was found highly effective in reducing aphid population followed by imidacloprid 200 SL (Confidor 17.8) @ 20 g a.i/ha. Treatments with four insecticides; chlorantranilipride, acetamiprid, quinalphos 25, and imdacroprid gave similar results in curbing aphid population at Karnal. The efficacy of bio-pesticides viz., Azadirachtin, *Beauveria bassiana* and *Metarhizium anisopliae* was comparatively lower than chemical pesticides. Out of three bio-pesticides, Azadirachtin 1000 ppm was comparatively better than *Beauveria bassiana* and *Metarhizium anisopliae*. There were no significant differences between the yields obtained from treated and control plots at most of the tested locations.

Ludhiana

The trial was conducted under irrigated conditions at Plant Breeding Research Farm, PAU, Ludhiana. The wheat variety PL 426 was sown on 12th Nov.2017 in the plots of 6 rows of 6m long in a replicated trial. There were seven treatments including untreated check and each was replicated three times. For recording observations, five tiller were ear marked in each plot and from these plants observations were recorded 1 day before spray and then 1, 2, 7 and 15 days after spray.

Aphid population did not differ significantly among all treatments one day before treatment. When observed one day after spray, acetamiprid (1.66 aphids/tiller) recorded minimum aphids/tiller and was at par with all other insecticidal treatments and significantly lower than three bio-rational treatments and untreated control (31.98 aphids/tiller). Similar results were recorded 2, 7 and 15 days after.

Management of foliar aphid (*Rhopalosiphum maidis*) through biopesticides & chemicals (2017-2018). (Location: Ludhiana)

S. No.	Treatments	Dose ml or g / ha	Dosages (g a.i./ha)	Aphid population per earhead					Grain Yield (q/ha)
				Before spray	After spray				
					1 day	2 days	7 days	15 days	
1	Imidacloprid 17.8 SL (Confidor)	100 ml	20	37.00	1.80 (1.67)	1.69 (1.64)	1.02 (1.42)	1.30 (1.51)	52.35
2	Flubendamide 480 SC (Fame)	250 ml	20	37.16	1.94 (1.71)	1.48 (1.57)	0.94 (1.39)	1.27 (1.50)	51.77
3	Acetamiprid 20SP (Pride)	100 gm	20	36.33	1.66 (1.62)	1.97 (1.72)	0.95 (1.39)	1.22 (1.48)	53.20
4	Chlorantranilipride 18.5 SC (Coragen)	100 ml	20	35.86	1.83 (1.68)	1.70 (1.63)	0.96 (1.40)	1.19 (1.48)	52.44
5	Azadirachtin 10000 ppm	3.0 (ml/l)	-	35.93	8.91 (3.14)	8.47 (3.07)	4.92 (2.42)	4.37 (2.31)	48.04
6	<i>Beauveria bassiana</i> (2 x 10 ⁸ c.f.u)	5 g/l	-	36.30	13.68 (3.82)	12.40 (3.60)	5.95 (2.63)	7.66 (2.94)	46.22
7	<i>Metarhizium anisopliae</i>	3 g/l	-	35.76	13.40 (3.79)	12.18 (3.62)	6.56 (2.74)	7.83 (2.97)	47.91
8	Control	-	-	36.33	31.98 (8.74)	31.36 (5.68)	23.10 (4.90)	18.45 (4.40)	43.46
CD (p=0.05)				NS	(0.17)	(0.18)	(0.16)	(0.19)	2.74

• Figures within parentheses are transformed means

Date of sowing : 12.11.2017
 Date of insecticidal application : 23.02.2018
 Date of harvest : 20.04.2018

Plot size : 7.5 m²
 Variety : PL 807
 Replications : Three

Grain yield (q/ha) obtained was maximum (53.20) from acetamiprid treated plots followed by chlorantranilipride (52.44) treated plots. However, all the foliar insecticidal treatments recorded significantly higher than grain yield than untreated check (43.46).

Vijapur

An experiment on ecofriendly management of foliage feeding aphids on barley was conducted at Wheat Research Station, Vijapur under irrigated condition. The barley variety RD 2052 was sown on 25-11-2017. Aphid populations did not differ statistically among all treatments during 24 hrs before spraying. On 1st day after spray, there were overall decreased in numbers of aphids/shoot in all the treatments as compared to untreated check. While, observation taken after 2nd day of spray has revealed that the minimum aphid population was noticed in imidacloprid 200 SL (Confidor 17.8) @ 20 g a.i/ha as compared to untreated check. On 7th day after spray, minimum no. of aphid population was recorded in imidacloprid 200 SL (Confidor 17.8) @ 20 g a.i/ha and it was at par with the insecticidal treatments of quinalphos 25% EC @ 100 g a.i/ha, acetamiprid 20 SP (Pride) @ 20 g a.i/ha and azadirachtin 1500 ppm @ 3 ml/lit. Observation taken after 15th day after spray found that the significantly lowest aphid population was reported in imidacloprid 200 SL (Confidor 17.8) @ 20 g a.i/ha and it was at par with all the treatments as compared to untreated control. Insecticidal as well as bio-pesticide treatments had significantly lower aphid populations than untreated check. The grain yield (q/ha) showed significant differences among the treatments. The significantly maximum grain yield was recorded in treatment of imidacloprid 200 SL (Confidor 17.8) @ 20 g a.i/ha followed by acetamiprid 20 SP (Pride) @ 20 g a.i/ha.

Kanpur

It was observed that lowest population of 0.93 aphids/shoot was observed in flubendamide 480 SC (Fame) @ 20 g a.i/ha treatment followed by imidacloprid 200 SL (Confidor 17.8) @ 20 g a.i/ha (2.26 aphid/shoot) after 15 days of spraying. The bio-rational pesticides (*Verticillium lecanii*, *Beauveria bassiana*, *Metarhizium anisopliae* and *Azadirachtin*) were not as effective as chemical pesticides in managing aphid population.

Highest grain yield of 51.11 q/ha was recorded in treatment of flubendamide 480 SC (Fame) @ 20 g a.i/ha followed by yield of 50.13 q/ha in imidacloprid 200 SL (Confidor 17.8). All the insecticidal treatment recorded significantly higher than untreated check (43.51 q/ha) (Table 5).

Table 4 Management of foliar aphid (*Rhopalosiphum maidis*) through biopesticides & chemicals (2017-2018) (Location: Vijapur)

Sr. No.	Treatment	Dose ml or g / ha	Doses g.a.i./ha	Aphid population per shoot					Grain yield (q/ha)	Yield increase over check (q/ha)
				Before spray (days)	After spray (days)					
					1 st	2 nd	7 th	15 th		
1.	Imidacloprid 200 SL (Confidor 17.8)	100 ml	20	22.93	15.20	10.80	9.47a	7.67a	28.99a	13.70
2.	Quinalphos 25 % EC	400 ml	100	30.47	24.67	14.33	12.40ab	9.67a	22.32b	7.03
3.	Acetamiprid 20 SP (Pride)	100 gm	20	23.27	21.80	12.13	12.80ab	8.80a	28.62a	13.33
4.	Azadirachtin 1500 ppm	3 ml/ Lit.	-	21.13	17.07	14.73	13.07ab	10.07a	21.67b	6.38
5.	<i>Verticillium lecanii</i> (2 X 10 ⁸ cfu /gm ²)	3 g / Lit.	-	25.07	20.27	15.13	15.27b	10.00a	20.87b	5.58
6.	<i>Beauveria bassiana</i> (2 X 10 ⁸ cfu /gm ²)	5 g/ Lit.	-	25.13	18.93	16.53	15.00b	11.27a	19.49bc	4.20
7.	<i>Metarhizium anisopliae</i>	3 g/ Lit.	-	30.33	25.73	18.53	17.13b	11.67a	19.20bc	3.91
8.	Untreated Check	-	-	20.13	20.60	22.20	24.00c	25.87b	15.29c	-
	S. Em ± C.D. at 5%) C.V. %			2.64 NS -	2.28 NS -	2.23 NS -	1.64 4.96 -	1.40 4.24 -	1.55 4.71 12.20	

* Figures followed with same letter(s) are not differed statistically

Date of sowing	:	25.11.2017	Plot size	:	6.0m x 1.2m (6 rows)
Date of insecticidal application	:	02.01.2018	Variety	:	RD 2052
Date of harvest	:	22.03.2018	Replications	:	Three
Design	:	R.B.D	Condition	:	Irrigated

Table 5 Management of foliar aphid (*Rhopalosiphum maidis*) through biopesticides & chemicals (2017-2018). ((Location: Kanpur)

S.No.	Treatments	Dose ml or g / ha	Doses g.a.i./ha	Aphid population per main shoot					Grain yield (q/ha)	Increase yield (q/ha) over untreated
				Before spray	After spray					
					1 day	1day	2 days	7 days		
1.	Imidacloprid 200 SL (Confidor 17.8)	100ml	20	13.77	6.80 (15.12)	6.07 (14.18)	2.08 (8.13)	2.26 (8.53)	50.55	7.04
2.	Flubendamide 480 SC (Fame)	250ml	20	13.43	6.18 (14.30)	5.18 (13.05)	3.55 (10.78)	0.93 (5.53)	51.11	7.60
3.	Acetamiprid 20 SP (Pride)	100g	20	14.23	9.80 (18.24)	17.33 (24.58)	9.89 (18.24)	5.03 (12.92)	49.63	6.12
4.	Chlorantranilipride 18.5 SC (Coragen)	100ml	20	14.65	8.68 (17.05)	15.64 (23.26)	25.10 (30.07)	5.10 (13.05)	48.96	5.45
5.	Azadirachtin 1500 ppm	3ml/lit.	-	13.52	9.52 (17.95)	15.33 (23.03)	13.26 (21.30)	17.21 (24.50)	47.22	3.71
6.	<i>Verticillium lecanii</i>	3ml/lit.	-	13.93	12.65 (20.79)	17.23 (24.50)	13.70 (21.72)	33.88 (35.55)	48.51	5.00
7.	<i>Beauveria bassiana</i>	5ml/lit.	-	14.20	12.17 (20.36)	19.40 (26.13)	16.44 (23.89)	33.83 (35.55)	48.69	5.18
8.	<i>Metarhizium anisopliae</i>	3.0g/lit.	-	14.32	11.59 (19.82)	19.33 (26.06)	13.20 (21.30)	20.88 (27.13)	47.29	3.78
9.	Rogor (Dimethoate 30EC)	1000ml	300	13.49	7.25 (15.56)	6.99 (15.23)	14.33 (22.22)	16.44 (23.89)	48.33	4.82
10.	Control	-	-	14.36	26.00 (30.66)	50.88 (45.46)	126.03	119.0	43.51	-
S.Em ±			-	NS	0.52	0.37	1.09	1.96	0.26	-
CD 5%			-	-	1.71	1.21	3.76	6.51	0.87	-

Date of sowing : 25.11.2017
 Date of insecticidal application : 20.01.2018
 Date of harvest : 20.04.2018
 Design : R.B.D.

Plot size : 3 x 3m = 9 m²
 Variety : K551
 No. of rows/plot : 14
 Replication : Three

Location: Karnal

It was observed that after 1 day of spraying, the plots treated with acetamiprid 20 SP @ 20g a.i./ha registered significantly lower (2.33 aphids/shoot) number of aphids/shoot followed by Chlorantranilipride 18.5 SC (Coragen) @ 20 g a.i/ha (2.78 aphids/shoot) and imidacloprid 200 SL (Confidor 17.8) @ 20 g a.i/ha (2.80 aphids/shoot). Similar trends of reduction in aphid population was observed after 2nd, 7th and 15th day of spraying. The bio-rational pesticides (*Verticillium lecanii*, *Beauveria bassiana*, *Metarhizium anisopliae* and *Azadirachtin*) were not as effective as chemical pesticides in managing aphid population. The aphid population in all the insecticidal treatments were significantly lower than untreated check (16.45 aphids/shoot after 15th day of spraying).

The highest grain yield of 49.21 q/ha was recorded in acetamiprid 20 SP @ 20g a.i./ha followed by 47.31 q/ha yield in imidacloprid 200 SL (Confidor 17.8) @ 20 g a.i/ha treatment (45.62 q/ha). All the insecticidal treatment recorded significantly higher than untreated check (39.89 q/ha) (Table 6).

Experiment 3: Survey and surveillance of insect-pests and their natural enemies in barley

During the 2017-18, survey was conducted to determine the incidence of insect-pests and their natural enemies on barley crop. At Vijapur, the aphid population was found to be moderate to high in barley fields. Among natural enemies, *Campolatis chlorideae*, a larval parasite of *H. armigera* was observed. Predators like coccinellid beetles, chrysoperla and syrphid fly were frequently noticed preying on wheat and barley aphids. Barley infestation was observed to be 50-60 aphids/plant in variety K 551 at Kanpur location. At Ludhiana and Karnal locations, aphid was the main insect-pest that was found infesting barley crop. The natural enemies viz. grubs and adults of coccinellid beetles, syrphid fly and chrysoperla were observed in some of the fields infested with aphids.

Table 6. Management of foliar aphid (*Rhopalosiphum maidis*) through biopesticides & chemicals (2017-2018). (Location-Karnal)

S. No.	Treatments	Dose ml or g / ha	Dosages (g a.i./ha)	Aphid population per earhead					Grain Yield (q/ha)
				Before spray	After spray				
					1 day	1 day	2 days	7 days	
1	Imidacloprid 17.8 SL (Confidor)	100 ml	20	47.00	2.80 (1.95)	2.58 (1.89)	1.22 (1.49)	1.30 (1.52)	47.31
2	Quinalphos 25 % EC	400 ml	100	46.16	3.74 (2.18)	2.48 (1.87)	0.92 (1.39)	1.27 (1.51)	46.80
3	Acetamiprid 20SP (Pride)	100 gm	20	45.33	2.33 (1.82)	2.08 (1.75)	0.96 (1.40)	1.22 (1.49)	49.21
4	Chlorantranilipride 18.5 SC (Coragen)	100 ml	20	47.86	2.78 (1.94)	2.70 (1.92)	0.97 (1.40)	1.19 (1.48)	45.41
5	Azadirachtin 10000 ppm	3.0 (ml/l)	-	45.93	10.61 (3.41)	9.50 (3.24)	4.92 (2.43)	4.37 (2.32)	44.60
6	<i>Beauveria bassiana</i> (2 x 10 ⁸ c.f.u)	5 g/l	-	46.30	15.66 (4.08)	13.30 (3.78)	7.05 (2.84)	6.56 (2.75)	44.20
7	<i>Metarhizium anisopliae</i>	3 g/l	-	40.00	16.50 (4.18)	14.18 (3.90)	9.66 (3.26)	8.84 (3.14)	43.90
8	Control	-	-	46.00	39.88 (8.74)	30.16 (5.58)	22.00 (4.80)	16.45 (4.13)	39.89
CD (p=0.05)				NS	(0.19)	(0.16)	(0.18)	(0.17)	2.72

* Figures in parentheses indicate V_{n+1} transformed value

Date of sowing : 16-11-2017 Plot size : Six row of six meter length at 25 cm spacing
 Date of insecticide application : 27-02-2016 Variety : DWRUB64
 Date of harvest : 18-04-2017 Replication : Three

CO-OPERATORS

Plant Pathology		
S N	Centre	Cooperators
1	Karnal	Dr. Sudheer Kumar
2	Dhaulakuan	Dr. V. K. Rathee
3	Ludhiana	Dr. Jaspal Kaur
4	Durgapura	Dr. P. S. Shekhawat
5	Bajaura	Dr. Rakesh Devlash
6	Hisar	Dr. R.S. Beniwal
7	Almora	Dr. K. K. Mishra
8	Jammu	Dr. M. K. Pandey
9	Pantnagar	Dr. Deepshikha
10	Kanpur	Dr. Javed Bahar
11	Faizabad	Dr. S.P. Singh
12	Varanasi	Dr. S.S. Vaish
13	Dharwad	Dr. P.V. Patil
14	Flowerdale, Shimla	Dr. S.C. Bardwaj Dr. O.P.Gangwar Dr. P. Prasad
15	Indore	Mr. T.L. Prakasha
16	Powarkheda	Dr. K.K. Mishra

Entomology		
S N	Centre	Cooperators
1	Karnal	Dr. Poonam Jasrotia
2	Vijapur	Dr. A .A. Patel
3	Ludhiana	Dr. Beant Singh
4	Kanpur	Dr. J. Kumar
5	Pantnagar	Dr. R. S. Bisht
6	Durgapura	Dr. A. S. Baloda

Nematology		
S N	Centre	Cooperators
1	Durgapura	Dr. S. P Bishnoi
2	Hisar	Ms. Priyanka Duggal
3	Ludhiana	Dr. Ramanna Koulagi

RESOURCE MANAGEMENT

Varietal evaluation and updating of package and practices under different agro climatic conditions with resource efficient production technologies is of continuous nature under resource management programme. Different centres under AICRP Wheat and Barley are energetically engaged for this purpose in various zones of India. Input management viz. water, nutrients under resource scarce conditions, fine-tuning of spacing and nutrient requirements of different varieties under changing climatic conditions, role of plant growth regulators, lodging, crop management are the priority researchable areas in barley agronomy. In spite of the fact that the crop is being grown mostly on fringe and problematic lands, the productivity increased during recent years. This reveals the role of newly developed improved technologies.

This year there was no entry in AVT 2nd year evaluation, so no agronomic experiment was constituted. In special trials, 39 trials were proposed, conducted and reported at different locations. The details of the special trials are reported in Table 1.

Table 1 Details of barley coordinated and special trials during 2017-18

Trial Name	Number of trials				
	Proposed locations	Not conducted/Failed	Data Received	Trial/data Rejected	Data Reported
Special trials					
Tillage x Varieties (NWPZ & NHZ)	7	-	7	-	7
Seed rate x Variety (NHZ)	2	-	2	-	2
DOS x Additives (NEPZ, NWPZ)	8	-	8	-	8
INM (NHZ)	2	-	2	-	2
N levels X PGRs (NEPZ, NWPZ)	8	-	8	-	8
Weed management (NEPZ, NWPZ, NHZ ,CZ)	10	-	9	1	9
Pusa Hydrogel and herbal hydrogel (NWPZ)	1	-	1	-	1
Foliar application of water soluble fertiliser(NWPZ)	1	-	1	-	1
Total	39	-	38	1	38

UPDATING OF PRODUCTION TECHNOLOGIES

To increase production, productivity, income of the barley growing farmers and area under barley is need of the hour, so, updating of package of practices of barley

crop is need of the hour. So, eight special trials were conducted in different zones. The results from these trials are summarised below.

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

The trial was conducted with an objective to evaluate different barley varieties under conservation agriculture practices. Three tillage practices (ZT, CT and ZT+Residue@ 6t/ha) with five varieties were undertaken in split plot design at five locations (Agra, Durgapura, Ludhiana, Hisar and Karnal) in NWPZ and two locations (Bajaura and Malan) in NHZ.

Table 2 **NWPZ POOLED 2017-18**
SPL-1 Tillage Varieties

Varieties	Tillage Practices						Mean	
	ZT		CT		ZT+Residue@6 tha ⁻¹		Yld.	Rk.
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
Yield, kg/ha								
BH902	48.56	3	46.89	4	48.94	3	48.13	3
BH946	49.35	2	48.30	1	49.23	2	48.96	2
RD2552	49.62	1	48.24	2	50.34	1	49.40	1
DWRB101	46.79	5	46.41	5	47.75	5	46.98	5
DWRUB52	47.04	4	47.10	3	48.31	4	47.48	4
MEAN	48.27		47.39		48.91		48.19	
CD (0.05)	Tillage(A) 1.18		Varieties (B) 1.27		B within A NS		A within B NS	
Earhead/ m²								
BH902	342	5	338	5	339	5	340	5
BH946	348	4	342	4	351	4	347	4
RD2552	355	3	354	3	362	3	357	3
DWRB101	402	2	397	2	403	2	401	2
DWRUB52	408	1	408	1	413	1	410	1
MEAN	371		368		374		371	
CD (0.05)	Tillage (A) NS		Varieties (B) 11		B within A NS		A within B NS	
Grains/Earhead								
BH902	36.64	3	36.22	3	36.65	2	36.50	3
BH946	36.93	2	36.71	2	36.13	3	36.59	2
RD2552	39.94	1	39.27	1	39.43	1	39.55	1
DWRB101	30.14	5	29.88	5	30.90	5	30.31	5
DWRUB52	30.92	4	30.81	4	32.15	4	31.29	4
MEAN	34.91		34.58		35.05		34.85	
CD (0.05)	Tillage (A) NS		Varieties (B) 1.22		B within A NS		A within B NS	
1000 Grain Weight, g								
BH902	44.69	3	43.81	3	45.92	2	44.81	3
BH946	42.46	4	42.70	4	42.92	5	42.70	4
RD2552	40.78	5	40.60	5	43.74	4	41.71	5
DWRB101	45.25	2	45.39	2	45.73	3	45.46	2
DWRUB52	45.53	1	45.80	1	45.94	1	45.76	1
MEAN	43.74		43.66		44.85		44.08	
CD (0.05)	Tillage (A) NS		Varieties (B) 1.33		B within A NS		A within B NS	

Centres: Agra, Durgapura, Ludhiana, Hisar, Karnal

Pooled data presented in Table 2 revealed that RD 2552 recorded highest grain yield (49.4 q ha⁻¹) which was at par with all the other varieties except DWRB 101 and DWRUB 52. Maximum grain yield (48.91 q ha⁻¹) was realised in zero till sowing with rice residue retention which was statistically at par to zero tillage and conventional

methods of sowing. Significantly more grains per ear head were also recorded by RD 2552 as compared to all other varieties.

Table 2(a) **NHZ** **POOLED** **2017-18**
SPL-1 Tillage Varieties

Varieties	Tillage Practices						Mean	
	ZT		CT		ZT+Residue@6 tha ⁻¹		Yld.	Rk.
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
Yield, q/ha								
VLB118	28.52	2	35.08	2	35.08	2	32.89	2
BHS 400	33.07	1	42.95	1	38.43	1	38.15	1
HBL 113	28.13	3	32.41	3	32.89	3	31.14	3
BHS 352	19.16	4	24.37	4	21.48	4	21.67	4
HBL 276	19.07	5	23.07	5	21.09	5	21.08	5
MEAN	25.59		31.57		29.79		28.99	
CD (0.05)	Tillage (A) 1.36		Varieties (B) 1.7		B within A 2.94		A within B NS	
Earhead/ m²								
VLB118	277	3	330	3	302	3	303	3
BHS 400	287	2	352	1	340	2	326	2
HBL 113	319	1	346	2	360	1	342	1
BHS 352	229	5	261	5	217	5	235	5
HBL 276	237	4	270	4	257	4	255	4
MEAN	270		312		295		292	
CD (0.05)	Tillage (A) 25		Varieties (B) 22		B within A NS		A within B NS	
Grains/Earhead								
VLB118	22.4	2	23.3	2	25.2	2	23.6	2
BHS 400	27.0	1	28.3	1	26.0	1	27.1	1
HBL 113	21.8	4	22.8	4	22.7	3	22.4	3
BHS 352	21.8	3	22.9	3	21.4	4	22.0	4
HBL 276	20.5	5	22.4	5	21.2	5	21.4	5
MEAN	22.7		23.9		23.3		23.3	
CD (0.05)	Tillage (A) NS		Varieties (B) 1.5		B within A NS		A within B NS	
1000 Grain Weight, g								
VLB118	43.0	1	44.3	1	43.6	1	43.6	1
BHS 400	41.5	2	43.3	2	43.0	2	42.6	2
HBL 113	36.6	4	37.2	5	37.9	4	37.2	5
BHS 352	35.8	5	38.9	3	38.3	3	37.7	4
HBL 276	37.9	3	38.0	4	37.6	5	37.8	3
MEAN	39.0		40.3		40.1		39.8	
CD (0.05)	Tillage (A) 0.9		Varieties (B) 1.3		B within A NS		A within B NS	

Centres: Bajaura and Malan

In NHZ, significantly higher grain yield (31.57 q ha⁻¹) and ear head m⁻² were recorded under conventional tillage practice over conservation agricultural practices and BHS 400 registered significantly higher grain yield (42.95 q ha⁻¹) compared to all other varieties. BHS 400 also recorded significantly more grains per ear head (Table 2 a).

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

The trial was conducted in NHZ with an objective to optimise the seed rate of different barley varieties to harvest higher productivity. Three seed rates (75,100 and 125 kg ha⁻¹) with four varieties were undertaken in split plot design.

Table 3

NHZ Pooled 2017-18
SPL-2 Varieties x Seed rate

Seed rate (Kg ha ⁻¹)	Varieties									
	VLB118		BHS 400		HBL 113		BHS 352		Mean	
	Yield q/ha									
	Yield	Rk	Yield	Rk	Yield	Rk	Yield	Rk	Yield	Rk
75	32.71	3	38.11	3	31.44	3	22.01	3	31.07	3
100	36.04	2	41.99	2	33.39	2	24.61	2	34.01	2
125	38.69	1	42.17	1	36.34	1	25.68	1	35.72	1
MEAN	35.81		40.76		33.72		24.10		33.60	
CD (0.05)	Varieties(A)		Seed rate(B)		B within A		A within B			
	2.41		1.57		NS		NS			
	Earhead/ m ²									
75	288	3	323	3	379	3	250	3	310	3
100	319	2	367	1	398	2	274	2	339	2
125	337	1	361	2	413	1	292	1	351	1
MEAN	315		350		397		272		333	
CD (0.05)	Varieties(A)		Seed rate(B)		B within A		A within B			
	17		21		NS		NS			
	Grains/Earhead									
75	27.3	3	29.8	1	20.8	3	22.9	3	25.2	3
100	27.6	1	29.3	2	21.9	2	24.1	1	25.7	2
125	27.6	2	29.3	3	23.8	1	23.5	2	26.0	1
MEAN	27.5		29.5		22.2		23.5		25.7	
CD (0.05)	Varieties(A)		Seed rate(B)		B within A		A within B			
	1.6		NS		NS		NS			
	1000 Grain Weight, g									
75	41.3	1	39.8	3	37.3	1	36.9	1	38.8	1
100	40.2	3	41.4	1	36.2	2	36.3	3	38.5	2
125	40.7	2	40.4	2	34.8	3	36.3	2	38.0	3
MEAN	40.8		40.5		36.1		36.5		38.5	
CD (0.05)	Varieties(A)		Seed rate(B)		B within A		A within B			
	0.9		NS		NS		NS			

Grain yield was at par when varieties were sown using seed @ 100 and 125 kg ha⁻¹ and significantly more compared to seed @ 75 kg ha⁻¹. Barley variety BHS 400 registered significantly higher grain yield (40.76 q ha⁻¹) and grains per earhead as compared to other varieties (Table 3).

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

The trial was conducted with an objective to study effect of manures, mulch and foliar spray of chemicals on the productivity of barley. Two date of sowing (Timely and late) with six additive combinations were undertaken in split plot design at five locations (Durgapura, Ludhiana, Hisar, Agra and Karnal) in NWPZ and three locations (Kanpur, Varanasi and Faizabad) in NEPZ. Foliar spray was done as per treatments.

Table 4	NWPZ				POOLED	2017-18
SPL 3 DOSx Additives						
Treatments	Sowing Time				Mean	
	Timely		Late		Yld.	Rk
Yld.	Rk	Yld.	Rk.			
Yield, q/ha						
Recommended dose of Fertilizer	48.75	6	40.78	5	44.77	6
T1 + FYM @5 t/ha	50.58	5	42.08	4	46.33	4

T1+Mulch@ 6 t/ha	50.87	4	40.17	6	45.52	5		
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	52.31	1	42.32	3	47.32	3		
T4+ spray of ZnSo4 @ 0.5 %	51.43	3	43.52	2	47.47	2		
T4 + Two spray of Kcl @ 0.5 %	51.45	2	43.62	1	47.53	1		
MEAN	50.90		42.08		46.49			
CD (0.05)	Sowing Time (A)		Additives (B)		B within A		A within B	
	1.23		1.55		NS		NS	
Earhead/ m²								
Recommended dose of Fertilizer	347	4	302	6	325	5		
T1 + FYM @5 t/ha	343	5	315	3	329	4		
T1+Mulch@ 6 t/ha	341	6	309	5	325	6		
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	353	1	313	4	333	3		
T4+ spray of ZnSo4 @ 0.5 %	351	2	321	2	336	2		
T4 + Two spray of Kcl @ 0.5 %	351	3	322	1	336	1		
MEAN	348		314		331			
CD(0.05)	Sowing Time (A)		Additives (B)		B within A		A within B	
	9		9		NS		NS	
Grains/Earhead								
Recommended dose of Fertilizer	37.51	5	39.17	1	38.34	1		
T1 + FYM @5 t/ha	38.96	1	37.06	3	38.01	3		
T1+Mulch@ 6 t/ha	38.95	2	33.25	6	36.10	6		
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	38.54	3	38.09	2	38.31	2		
T4+ spray of ZnSo4 @ 0.5 %	37.88	4	36.85	5	37.36	4		
T4 + Two spray of Kcl @ 0.5 %	37.03	6	36.91	4	36.97	5		
MEAN	38.14		36.89		37.51			
CD(0.05)	Sowing Time (A)		Additives (B)		B within A		A within B	
	NS		NS		NS		NS	
1000 Grain Weight, g								
Recommended dose of Fertilizer	39.68	6	35.68	6	37.68	6		
T1 + FYM @5 t/ha	40.93	4	37.64	5	39.28	4		
T1+Mulch@ 6 t/ha	40.67	5	37.66	4	39.17	5		
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	41.23	3	37.77	3	39.50	3		
T4+ spray of ZnSo4 @ 0.5 %	41.84	2	39.15	1	40.49	2		
T4 + Two spray of Kcl @ 0.5 %	43.24	1	38.71	2	40.98	1		
MEAN	41.27		37.77		39.52			
CD(0.05)	Sowing Time (A)		Additives (B)		B within A		A	
within B	0 .99		1.45		NS		NS	

Centres: Durgapura, Ludhiana, Hisar, Karnal and Agra

Pooled data presented in Table 4 clearly revealed that use of all the additives resulted in significantly higher grain yield as compared to recommended dose of fertilizer, although application of recommended dose of fertilizers coupled with FYM application @ 5 ton/ ha, mulch and ZnSo4 @ 0.5 % produced better results. Grain yield reduced significantly due to delay in sowing.

In NEPZ use of additives had significant effect on grain yield as compared to application of recommended dose of fertilizer under timely and late sowing conditions. Application of recommended dose of fertilizers coupled with foliar spray of ZnSo4@ 0.5% or two foliar sprays of KCl @ 0.5 % resulted in significantly higher grain yield as compared to other treatments (Table 4a). Grains per ear head were also better due to use of these additives.

Table 3 (a)	NEPZ				POOLED	2017-18	
SPL 3 DOSx Additives							
Treatments	Sowing Time				Mean		
	Timely		Late		Yld.	Rk	
	Yld.	Rk	Yld.	Rk.			
Yield, q/ha							
Recommended dose of Fertilizer	37.15	6	30.03	6	33.59	6	
T1 + FYM @5 t/ha	39.77	4	31.93	5	35.85	4	
T1+Mulch@ 6 t/ha	39.41	5	31.94	4	35.68	5	
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	41.46	3	32.99	3	37.22	3	
T4+ spray of ZnSo4 @ 0.5 %	43.08	1	34.94	1	39.01	1	
T4 + Two spray of Kcl @ 0.5 %	42.74	2	34.51	2	38.63	2	
MEAN	40.60		32.72		36.66		
CD (0.05)	Sowing Time (A)		Additives (B)		B within A		A within B
	0.56		0.92		NS		NS
Earhead/ m²							
Recommended dose of Fertilizer	358	6	344	6	351	6	
T1 + FYM @5 t/ha	376	1	348	5	362	4	
T1+Mulch@ 6 t/ha	367	5	352	4	359	5	
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	373	4	359	2	366	2	
T4+ spray of ZnSo4 @ 0.5 %	376	2	366	1	371	1	
T4 + Two spray of Kcl @ 0.5 %	373	3	355	3	364	3	
MEAN	371		354		362		
CD(0.05)	Sowing Time (A)		Additives (B)		B within A		A within B
	8		8		NS		NS
Grains/Earhead							
Recommended dose of Fertilizer	35.4	6	30.8	6	33.1	6	
T1 + FYM @5 t/ha	36.6	5	32.7	4	34.7	5	
T1+Mulch@ 6 t/ha	37.5	4	31.9	5	34.7	4	
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	38.6	3	33.9	3	36.3	3	
T4+ spray of ZnSo4 @ 0.5 %	40.4	2	35.5	2	38.0	2	
T4 + Two spray of Kcl @ 0.5 %	41.3	1	36.3	1	38.8	1	
MEAN	38.3		33.5		35.9		
CD(0.05)	Sowing Time (A)		Additives (B)		B within A		A within B
	0.8		1.5		NS		NS
1000 Grain Weight, g							
Recommended dose of Fertilizer	39.39	5	37.32	6	38.35	6	
T1 + FYM @5 t/ha	39.41	4	37.86	5	38.64	5	
T1+Mulch@ 6 t/ha	39.13	6	38.21	4	38.67	4	
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	41.52	3	39.27	3	40.39	3	
T4+ spray of ZnSo4 @ 0.5 %	41.58	2	39.93	2	40.75	2	
T4 + Two spray of Kcl @ 0.5 %	41.81	1	40.54	1	41.18	1	
MEAN	40.47		38.85		39.66		
CD(0.05)	Sowing Time (A)		Additives (B)		B within A		A within B
	0.34		1.23		NS		NS

Centres: Kanpur, Varanasi and Faizabad

SPL-4 Integrated Nutrient Management in Barley (NHZ)

The trial was conducted in NHZ with an objective to reduce the dependency on chemical fertilizers and their effect on barley productivity. Three doses of fertilizers (50% recommended dose of fertilizer(RDF),75% RDF and 100% RDF) with four bio-fertilizers (Azotobacter, Phosphosolublizing bacteria, Azotobacter + Phosphosolublizing bacteria, Biomix) and one control treatment were undertaken in split plot design.

Pooled data presented in Table 5 indicated that the grain yield was at par with the application of 75 % and 100 % recommended dose of fertilizer. Use of Azotobacter

+ PSB resulted in significantly higher grain yield (35.05 q ha⁻¹) as compared to other treatments. Similar trends were observed in yield attributing characters.

Table 5 NORTH Hill ZONE POOLED 2017-18								
SPL-4 Integrated Nutrient Management								
Recommended dose of Fertilizer(RDF)								
Bio fertilizers	50% RDF		75% RDF		100% RDF		Mean	
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
Yield, q/ha								
Azotobacter (AZO)	30.14	2	33.06	2	34.73	2	32.64	2
Phosphosolublizing bacteria(PSB)	28.10	4	31.81	4	33.52	4	31.14	4
AZO + PSB	32.45	1	35.70	1	37.01	1	35.05	1
Biomix	28.19	3	31.93	3	33.92	3	31.35	3
Control	26.99	5	30.28	5	31.42	5	29.56	5
MEAN	29.17		32.56		34.12		31.95	
CD (0.05)	Fertilizer Levels(A)		Bio fertilizer (B)		B within A		A within B	
	2.93		2.15		NS		NS	
Earhead/ m²								
Azotobacter (AZO)	302	2	310	2	325	2	312	2
Phosphosolublizing bacteria(PSB)	290	3	309	3	317	3	305	3
AZO + PSB	308	1	325	1	335	1	323	1
Biomix	279	4	298	5	313	4	297	5
Control	273	5	305	4	312	5	297	4
MEAN	290		309		320		307	
CD (0.05)	Fertilizer Levels(A)		Bio fertilizer (B)		B within A		A within B	
	22		15		NS		NS	
Grains/Earhead								
Azotobacter (AZO)	23.6	4	25.7	3	25.6	3	25.0	3
Phosphosolublizing bacteria(PSB)	23.3	5	24.6	5	25.6	4	24.5	5
AZO + PSB	25.0	1	26.5	1	26.8	1	26.1	1
Biomix	24.7	2	26.0	2	26.6	2	25.8	2
Control	24.4	3	24.8	4	24.8	5	24.7	4
MEAN	24.2		25.5		25.9		25.2	
CD (0.05)	Fertilizer Levels(A)		Bio fertilizer (B)		B within A		A within B	
	NS		NS		NS		NS	
1000 Grain Weight, g								
Azotobacter (AZO)	41.8	3	41.9	2	41.5	2	41.7	2
Phosphosolublizing bacteria(PSB)	42.0	2	41.6	3	41.5	3	41.7	3
AZO + PSB	42.6	1	42.0	1	42.1	1	42.2	1
Biomix	41.5	4	41.2	4	40.9	4	41.2	4
Control	40.9	5	40.5	5	40.7	5	40.7	5
MEAN	41.8		41.4		41.3		41.5	
CD (0.05)	Fertilizer Levels(A)		Bio fertilizer (B)		B within A		A within B	
	NS		NS		NS		NS	

Centres: Bajoura and Malan

Three year yield data, q/ha								
Azotobacter (AZO)	28.86		32.19		33.20		31.41	
Phosphosolubilizing bacteria(PSB)	27.16		30.36		32.23		29.92	
AZO + PSB	30.86		34.43		35.73		33.67	
Biomix	27.81		31.33		32.83		30.66	
Control	26.36		29.85		31.14		29.12	
MEAN	28.21		31.63		33.03		30.96	
CD (0.05)	Fertilizer Levels(A)		Bio fertilizer (B)		B within A		A within B	
	2.08		0.90		NS		NS	

Three year pooled data resulted that the grain yield was at par with the application of 75 % and 100 % recommended dose of fertilizer. Use of Azotobacter + PSB resulted in significantly higher grain yield as compared to other treatments.

SPL-5 N levels X PGRs (NWPZ, NEPZ)

The trial was conducted in NWPZ and NEPZ with an objective to observe the effect of different plant growth regulators on barley productivity. Three levels of nitrogen (100% recommended dose of nitrogen (RDN), 125% RDN and 150% RDN) with three PGRs (Chlormequat-chlorid (CCC) @1.25 L ha⁻¹ at GS₃₀₋₃₁, Ethephon(Cerone) @1.0 L ha⁻¹ at GS₃₉₋₄₀, CCC fb Ethephon) and one control treatment were undertaken in split plot design.

Pooled data presented in Table 6 revealed that significantly higher grain yield (53.12 q ha⁻¹) was obtained with the application of chlormequat-chlorid (CCC) @1.25 L ha⁻¹ at GS₃₀₋₃₁ followed by ethephon (Cerone) @1.0 L ha⁻¹ at GS₃₉₋₄₀ compare to all other treatments except ethephon application. Ear head m⁻² were also significantly more under the same treatment.

Table 6 NORTH WESTERN PLAINS ZONE POOLED 2017-18								
SPL-5 N levels X PGRs								
Recommended dose of Nitrogen(RDN)								
PGRs	100% RDN		125% RDN		150% RDN		Mean	
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
Yield, q/ha								
Chlormequat-chlorid (CCC)	50.00	3	51.28	3	52.63	3	51.31	3
Ethephon(Cerone)	50.43	2	52.62	2	54.07	2	52.37	2
CCC followed Ethephon	50.71	1	54.06	1	54.59	1	53.12	1
Control	48.23	4	50.98	4	52.28	4	50.50	4
MEAN	49.84		52.24		53.39		51.82	
CD (0.05)	N Levels(A)		PGRs (B)		B within A		A within B	
	1.12		1.11		NS		NS	
Earhead/ m ²								
Chlormequat-chlorid (CCC)	337	2	341	4	350	4	343	3
Ethephon(Cerone)	331	3	349	2	358	2	346	2
CCC fb Ethephon	348	1	366	1	373	1	362	1
Control	330	4	346	3	351	3	342	4
MEAN	337		350		358		348	
CD (0.05)	N		PGRs (B)		B within A		A within B	

	Levels(A)							
	7		8		NS		NS	
Grains/Earhead								
Chlormequat-chlorid (CCC)	39.68	2	39.35	4	39.84	4	39.62	4
Ethephon(Cerone)	39.48	3	40.87	3	40.74	3	40.36	3
CCC fb Ethephon	39.37	4	42.16	1	41.68	2	41.07	2
Control	39.79	1	42.06	2	42.62	1	41.49	1
MEAN	39.58		41.11		41.22		40.64	
CD (0.05)	N Levels(A)		PGRs (B)		B within A		A within B	
	1.15		1.07		NS		NS	
1000 Grain Weight, g								
Chlormequat-chlorid (CCC)	40.28	3	40.82	1	40.56	2	40.55	2
Ethephon(Cerone)	40.98	1	40.19	2	40.88	1	40.68	1
CCC fb Ethephon	40.04	4	39.65	4	40.22	3	39.97	4
Control	40.91	2	40.05	3	40.06	4	40.34	3
MEAN	40.55		40.18		40.43		40.39	
CD (0.05)	N Levels(A)		PGRs (B)		B within A		A within B	
	NS		NS		NS		NS	

Centres: Durgapura, Agra, Hisar, Ludhiana and Karnal

Three years pooled Yield, q/ha								
Chlormequat-chlorid (CCC)	46.28		47.03		47.17		46.82	
Ethephon(Cerone)	46.20		48.42		48.01		47.55	
CCC followed Ethephon	47.83		49.35		49.17		48.78	
Control	43.70		45.42		45.39		44.84	
MEAN	46.00		47.55		47.44			
CD (0.05)	N Levels(A)		PGRs (B)		B within A		A within B	
	4.29		0.80		NS		NS	

Three year data revealed a significantly higher grain yield under plant growth regulator treatments compared to control. The best yield was observed in chlormequat-chlorid (CCC) @1.25 L ha⁻¹ at GS₃₀₋₃₁ followed by ethephon (Cerone) @1.0 L ha⁻¹ at GS₃₉₋₄₀. There was not much effect of dose of nitrogen application.

NEPZ pooled data presented in Table 6a revealed that the significantly higher grain yield was obtained with the application of PGRs as compared to control. Significantly higher grain yield (38.5 q ha⁻¹) was obtained with the application of chlormequat-chlorid (CCC) @1.25 L ha⁻¹ at GS₃₀₋₃₁ followed by ethephon (Cerone) @1.0 L ha⁻¹ at GS₃₉₋₄₀. Grain yield increased significantly with increase in dose of nitrogen. The similar trend was observed in yield attributing characters.

Table 6 (a) NORTH EASTERN PLAINS ZONE POOLED 2017-18								
SPL-5 N levels X PGRs								
Recommended dose of Nitrogen(RDN)								
PGRs	100% RDN		125% RDN		150% RDN		Mean	
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
Yield, q/ha								

Chlormequat-chlorid (CCC)	36.39	2	37.51	2	39.31	2	37.74	2
Ethephon(Cerone)	35.89	3	37.05	3	37.99	3	36.97	3
CCC fb Ethephon	37.04	1	38.67	1	39.77	1	38.50	1
Control	34.62	4	35.65	4	36.68	4	35.65	4
MEAN	35.99		37.22		38.44		37.21	
CD (0.05)	N Levels(A)		PGRs (B)		B within A		A within B	
	0.8		0.9		NS		NS	
Earhead/ m²								
Chlormequat-chlorid (CCC)	349	3	365	3	383	2	366	3
Ethephon(Cerone)	354	1	365	2	380	3	366	2
CCC fb Ethephon	347	4	374	1	388	1	370	1
Control	351	2	360	4	369	4	360	4
MEAN	350		366		380		365	
CD (0.05)	N Levels(A)		PGRs (B)		B within A		A within B	
	3		4		8		7	
Grains/Earhead								
Chlormequat-chlorid (CCC)	34.7	2	36.5	2	39.8	1	37.0	2
Ethephon(Cerone)	34.5	3	36.0	3	36.9	3	35.8	3
CCC fb Ethephon	37.0	1	38.2	1	39.3	2	38.2	1
Control	32.3	4	33.3	4	33.9	4	33.2	4
MEAN	34.6		36.0		37.5		36.0	
CD (0.05)	N Levels(A)		PGRs (B)		B within A		A within B	
	1.4		2.3		NS		NS	
1000 Grain Weight, g								
Chlormequat-chlorid (CCC)	39.67	1	39.02	4	38.98	3	39.22	3
Ethephon(Cerone)	39.40	3	39.11	3	38.68	4	39.06	4
CCC fb Ethephon	39.49	2	39.74	1	39.51	2	39.58	2
Control	39.14	4	39.58	2	40.08	1	39.60	1
MEAN	39.43		39.36		39.31		39.37	
CD (0.05)	N Levels(A)		PGRs (B)		B within A		A within B	
	NS		NS		NS		NS	

Centres: Kanpur, Varanasi, Faizabad

Three years pooled yield, q/ha								
Chlormequat-chlorid (CCC)	33.81		35.96		38.52		36.09	
Ethephon(Cerone)	34.48		36.47		37.48		36.14	
CCC followed Ethephon	36.70		38.32		39.60		38.21	
Control	31.93		33.39		34.69		33.34	
MEAN	34.23		36.03		37.57			
CD (0.05)	N Levels(A)		PGRs (B)		B within A		A within B	
	1.31		1.34		NS		NS	

Three year data revealed a significantly higher grain yield under plant growth regulator treatments compared to control. The best yield was observed in chlormequat-chlorid (CCC) @1.25 L ha⁻¹ at GS30-31 followed by ethephon (Cerone) @1.0 L ha⁻¹ at GS39-40. Grain yield increased significantly with increase in dose of nitrogen but 125 and 150% of RDN were at par.

SPL- 6 Weed management in Barley (NWPZ, NEPZ, CZ & NHZ):

The trial was conducted to manage the broad leaved weeds through herbicides in NWPZ, NEPZ, NHZ and CZ. Eleven treatments of Halauxifen-methyl Ester+ Florasulam 40.85% WG + Polyglycol 26-2 N, metsulfuron, carfentrazone, 2,4-D Na (80 WP) and 2,4-D E 38 EC in combination or alone, weedy check and weed free were practised.

The results revealed that the grain yield in Halauxifen methyl +Florasulam+Carfentrazone+ Surfactant, Halauxifen-methyl Ester+ Florasulam 40.85% WG + Polyglycol 26-2 N and 2,4-D E + Carfentrazone treatments was significantly superior to other herbicide treatments and weedy check condition. Among the herbicides the best treatment was Halauxifen methyl+Florasulam+Carfentrazone+ Surfactant, which produced grain yield at par with weed free treatment. The grain yield reduction due to weeds in weedy check was 29.2 % as compared to weed free conditions (Table 7). Similar results were observed in NEPZ and CZ also (Table 7a&7b). In NHZ grain yield was at par in application of Halauxifen methyl +Florasulam+Carfentrazone+ Surfactant, Halauxifen-methyl Ester+ Florasulam 40.85% WG + Polyglycol 26-2 N and weed free condition (Table 7c).

Table 7	NWPZ Pooled 2017-18			
	SPL 6– Weed management			
Treatments	Yield, q/ha	Earhead /m ²	Grains/ Earhead	1000 Grain Weight, g
Halauxifen-methyl Ester+ Florasulam 40.85% WG + Polyglycol 26-2 N	51.07	317	42.3	41.5
Metsulfuron methyl 20 WG + surfactant	45.77	298	41.3	40.7
Carfentrazone 40DF	46.19	300	41.0	40.9
2,4-D Na (80 WP)	46.50	301	41.6	40.5
2,4-D E 38 EC	48.70	309	40.9	41.8
Metsulfuron + Carfentrazone +Surfactant	48.72	325	41.3	41.9
2,4-D Na + Carfentrazone	48.12	313	41.3	41.5
2,4-D E + Carfentrazone	50.85	328	41.4	42.2
Halauxifen methyl+Florasulam+Carfentrazone+ Surfactant	52.25	324	42.9	41.9
Weedy check	38.81	284	37.4	39.5
Weed free	54.78	348	41.7	43.6
MEAN	48.34	313	41.2	41.5
CD (0.05)	1.82	15	2.2	1.7

Centres: Durgapura, Agra, Hisar, Ludhiana and Karnal

Table 7 (a)	NEPZ Pooled 2017-18			
	SPL 6– Weed management			
Treatments	Yield, q/ha	Earhead /m ²	Grains/ Earhead	1000 Grain Weight, g
Halauxifen-methyl Ester+ Florasulam 40.85% WG + Polyglycol 26-2 N	47.55	379	42.63	38.69
Metsulfuron methyl 20 WG + surfactant	43.78	361	39.03	39.84
Carfentrazone 40DF	42.44	348	44.05	37.29
2,4-D Na (80 WP)	39.56	352	37.01	40.14
2,4-D E 38 EC	39.70	371	34.20	40.81
Metsulfuron + Carfentrazone +Surfactant	45.55	366	42.13	38.90
2,4-D Na + Carfentrazone	44.80	364	41.70	38.63
2,4-D E + Carfentrazone	45.40	357	40.17	40.15
Halauxifen methyl+Florasulam+Carfentrazone+ Surfactant	47.16	345	44.92	38.89
Weedy check	31.11	343	29.97	38.45
Weed free	49.83	387	42.62	42.06
MEAN	43.35	361	39.86	39.44
CD (0.05)	1.85	19	6.93	3.50

Centres: Kanpur, Varanasi, Faizabad

Table 7 (b)**NHZ 2017-18
SPL 6– Weed management**

Treatments	Yield, q/ha	Earhead /m ²	Grains/ Earhead	1000 Grain Weight, g
Halauxifen-methyl Ester+ Florasulam 40.85% WG + Polyglycol : N	35.54	327	29.57	34.62
Metsulfuron methyl 20 WG + surfactant	33.62	315	29.88	35.48
Carfentrazone 40DF	31.51	299	30.99	34.87
2,4-D Na (80 WP)	31.37	310	29.83	35.05
2,4-D E 38 EC	29.26	287	30.59	35.03
Metsulfuron + Carfentrazone +Surfactant	31.05	301	30.85	35.40
2,4-D Na + Carfentrazone	32.08	336	31.32	35.95
2,4-D E + Carfentrazone	32.31	323	29.93	35.24
Halauxifen methyl+Florasulam+Carfentrazone+ Surfactant	36.18	326	31.86	35.09
Weedy check	23.69	265	28.01	33.75
Weed free	33.12	322	29.33	34.88
MEAN	31.79	310	30.19	35.03
CD (0.05)	4.04	33	1.48	1.08

Centres: Malan**Table 7 (c)****CZ 2017-18
SPL 6– Weed management**

Treatments	Yield, q/ha	Earhead /m ²	Grains/ Earhead	1000 Grain Weight, g
Halauxifen-methyl Ester+ Florasulam 40.85% WG + Polyglycol : N	39.00	312	38.00	45.52
Metsulfuron methyl 20 WG + surfactant	34.02	308	37.00	44.32
Carfentrazone 40DF	33.18	322	36.33	44.03
2,4-D Na (80 WP)	32.59	305	35.00	44.20
2,4-D E 38 EC	34.19	308	36.00	44.97
Metsulfuron + Carfentrazone +Surfactant	35.84	303	36.67	44.47
2,4-D Na + Carfentrazone	35.60	315	36.67	44.23
2,4-D E + Carfentrazone	35.80	297	37.00	44.33
Halauxifen methyl+Florasulam+Carfentrazone+ Surfactant	37.69	293	37.67	44.75
Weedy check	27.68	305	35.00	42.32
Weed free	41.51	307	40.33	45.95
MEAN	35.19	307	36.88	44.46
CD (0.05)	5.63	20	2.79	1.45

Centres: Udaipur**SPL-7 Evaluation of Pusa Hydrogel (NWPZ)**

The trial was conducted with four irrigation levels (No irrigation, one Irrigation 30-35 days after sowing, two irrigation 30-35 and 60-65 days after sowing and three irrigation 30-35, 60-65 and 90-95 days after sowing) in main plots and three hydrogel treatments in sub plots (control, Pusa Hydrogel 2.5 kg/ha and herbal hydrogel *i.e.* *Goond katira* seed treatment) to evaluate Pusa Hydrogel and herbal hydrogel (Gum Tragacantha *i.e.* *Goond katirira*) on in situ moisture conservation under different irrigation levels in barley to improve water use efficiency and barley productivity.

The results indicated that application of Pusa Hydrogel @ 2.5 kg ha⁻¹ and Herbal Hydrogel seed treatment resulted in significantly higher grain yield as compared to control conditions. Highest grain yield (41.87 q ha⁻¹) was recorded with three irrigations which was significantly higher than other irrigations level (Table 8). Effects of hydrogel on yield attributing characters was non-significant.

Table 8 NORTH WESTERN PLAINS ZONE Durgapura 2017-18
SPL-7 Irrigation x Hydrogel

Hydrogel	Irrigation numbers									
	No irrigation		One		Two		Three		Mean	
	Yield q/ha									
	Yield	Rk	Yield	Rk	Yield	Rk	Yield	Rk	Yield	Rk
Control	12.87	3	22.60	3	31.23	3	38.37	3	26.27	3
Pusa Hydrogel@ 2.5 kg ha ⁻¹	17.93	1	28.00	1	37.13	1	44.67	1	31.93	1
Herbal Hydrogel seed treatment	15.47	2	25.83	2	34.97	2	42.57	2	29.71	2
MEAN	15.42		25.48		34.44		41.87		29.30	
CD (0.05)	Irrigation levels(A)		Hydrogel(B)		B within A		A within B			
	3.82		2.80		NS		NS			
Earhead/ m ²										
Control	198	2	237	3	270	3	303	3	252	3
Pusa Hydrogel@ 2.5 kg ha ⁻¹	221	1	253	1	285	1	326	2	271	1
Herbal Hydrogel seed treatment	183	3	253	2	281	2	338	1	264	2
MEAN	200		248		279		322		262	
CD (0.05)	Irrigation levels(A)		Hydrogel(B)		B within A		A within B			
	30		NS		NS		NS			
Grains/Earhead										
Control	21	3	27	3	32	3	32	3	28	3
Pusa Hydrogel@ 2.5 kg ha ⁻¹	22	2	30	1	33	2	36	1	30	1
Herbal Hydrogel seed treatment	24	1	28	2	33	1	32	2	29	2
MEAN	22		28		32		34		29	
CD (0.05)	Irrigation levels(A)		Hydrogel(B)		B within A		A within B			
	4		NS		NS		NS			
1000 grains wt. (g)										
Control	31.73	3	35.40	3	36.73	3	39.57	1	35.86	3
Pusa Hydrogel@ 2.5 kg ha ⁻¹	37.53	1	36.97	1	40.50	1	38.47	3	38.37	1
Herbal Hydrogel seed treatment	34.80	2	36.50	2	38.10	2	39.40	2	37.20	2
MEAN	34.69		36.29		38.44		39.14		37.14	
CD (0.05)	Irrigation levels (A)		Hydrogel(B)		B within A		A within B			
	NS		NS		NS		NS			

SPL-8 Foliar spray of water soluble fertiliser

The trial was conducted with three treatments (100%, 75% and 50% of recommended dose of fertilizer) in main plots and four treatments (foliar spray of water soluble fertilizer (19-19-19 N-P-K)1.5% at 45 and 60 DAS, 1.5% at 45, 60 and 75 DAS, 2.0 % at 45 and 60 DAS, 2.0 % at 45, 60 and 75 DAS) in sub plot to evaluate the effect of foliar spray of water soluble fertiliser (19-19-19, N-P-K) on yield, growth and quality of barley.

The results revealed that foliar spray of 2.0% at 45,60 and 75 DAS resulted in significantly higher grain yield as compare to foliar spray of 1.5 % , although yield was at par with foliar spray of 2.0% at 45 and 60 DAS. Reduction in recommended fertilizer dose resulted a significant yield loss (Table 9).

Table 9 NORTH EASTERN PLAINS ZONE 2017-18
SPL-8 RDF X Foliar spray Durgapura

Foliar sprays	Recommended dose of Fertilizer(RDF)							
	100% RDF		75% RDF		50% RDF		Mean	
	Yld.	Rk.	Yld.	Rk	Yld.	Rk	Yld.	Rk.
Yield, kg/ha								
1.5% AT 45 AND 60 DAS	49.10	4	42.30	4	37.63	4	43.01	4
1.5% AT 45,60 AND 75 DAS	53.27	3	46.37	3	42.33	3	47.32	3
2.0% AT 45 AND 60 DAS	54.00	2	47.30	2	43.40	2	48.23	2
2.0% AT 45,60 AND 75 DAS	58.13	1	51.20	1	45.30	1	51.54	1
MEAN	53.63		46.79		42.17		47.53	

CD (0.05)	RDF(A)		FS (B)		B within A		A within B	
	4.82		3.92		NS		NS	
Earhead/ m²								
1.5% AT 45 AND 60 DAS	343	4	291	4	280	4	305	4
1.5% AT 45,60 AND 75 DAS	356	2	321	3	310	3	329	3
2.0% AT 45 AND 60 DAS	351	3	344	1	310	2	335	2
2.0% AT 45,60 AND 75 DAS	383	1	344	1	333	1	353	1
MEAN	359		325		309		331	
CD (0.05)	RDF(A)		FS (B)		B within A		A within B	
	NS		33		NS		NS	
Grains/Earhead								
1.5% AT 45 AND 60 DAS	35.8	4	37.5	1	35.8	1	36.4	3
1.5% AT 45,60 AND 75 DAS	37.2	2	37.1	3	34.8	4	36.4	4
2.0% AT 45 AND 60 DAS	38.9	1	35.1	4	35.4	2	36.5	2
2.0% AT 45,60 AND 75 DAS	37.2	3	37.4	2	35.1	3	36.6	1
MEAN	37.3		36.8		35.3		36.5	
CD (0.05)	RDF(A)		FS (B)		B within A		A within B	
	NS		NS		NS		NS	
1000 Grain Weight, g								
1.5% AT 45 AND 60 DAS	39.73	4	38.90	4	39.13	4	39.26	4
1.5% AT 45,60 AND 75 DAS	40.23	3	39.10	3	39.47	3	39.60	3
2.0% AT 45 AND 60 DAS	40.67	2	39.37	2	39.80	2	39.94	2
2.0% AT 45,60 AND 75 DAS	40.93	1	39.80	1	40.13	1	40.29	1
MEAN	40.39		39.29		39.63		39.77	
CD (0.05)	RDF(A)		FS (B)		B within A		A within B	
	NS		NS		NS		NS	

Annexure I

Centre wise Yield Tables

Table 2.1 **NWPZ** **Durgapura** **2017-18**
SPL-1 Tillagex Varieties

Varieties	Tillage Practices						Mean	
	ZT		CT	ZT+Residue@6 tha ⁻¹		Yld.		
	Yld.	Rk.	Yld.	Rk.	Yld.		Rk.	
Yield, Q/ha								
BH902	57.32	1	54.46	1	56.85	1	56.21	1
BH946	56.59	2	53.31	2	55.42	3	55.11	2
RD2552	55.48	3	52.86	3	55.46	2	54.60	3
DWRB101	53.36	5	52.59	4	53.58	5	53.18	5
DWRUB52	54.85	4	51.33	5	54.69	4	53.63	4
MEAN	55.52		52.91		55.20		54.54	
F. Test S.E.m C.D. C.V.(%)								
Tillage (A)	N.S.	1.55	6.10	11.04				
Varieties (B)	N.S.	1.66	4.83	9.10				
B within A	N.S.	2.87	8.37					
A within B		3.00	8.75					

Table 2.2 **NWPZ** **Ludhiana** **2017-18**
SPL-1 Tillagex Varieties

Varieties	Tillage Practices						Mean	
	ZT		CT	ZT+Residue@6 tha ⁻¹		Yld.		
	Yld.	Rk.	Yld.	Rk.	Yld.		Rk.	
Yield, Q/ha								
BH902	51.82	3	48.03	5	51.52	3	50.45	5
BH946	51.82	2	51.52	3	51.52	3	51.62	3
RD2552	56.58	1	55.30	1	56.97	1	56.28	1
DWRB101	49.88	4	49.24	4	52.27	2	50.46	4
DWRUB52	49.73	5	54.49	2	50.91	5	51.71	2
MEAN	51.96		51.72		52.64		52.11	
F. Test S.E.m C.D. C.V.(%)								
Tillage (A)	N.S.	0.77	3.02	5.72				
Varieties (B)	**	1.02	2.97	5.85				
B within A	N.S.	1.76	5.14					
A within B		1.75	5.12					

Table 2.3 **NWPZ** **Karnal** **2017-18**
SPL-1 Tillagex Varieties

Varieties	Tillage Practices						Mean	
	ZT		CT	ZT+Residue@6 tha ⁻¹		Yld.		
	Yld.	Rk.	Yld.	Rk.	Yld.		Rk.	
Yield, Q/ha								
BH902	47.38	2	48.01	2	48.64	2	48.01	2
BH946	48.35	1	49.14	1	49.80	1	49.10	1
RD2552	41.79	5	42.22	5	43.14	5	42.38	5
DWRB101	44.37	3	45.61	3	46.00	3	45.32	3
DWRUB52	42.39	4	42.85	4	44.37	4	43.20	4
MEAN	44.86		45.56		46.39		45.60	
F. Test S.E.m C.D. C.V.(%)								

Tillage	(A)	N.S.	0.52	2.04	4.41
Varieties	(B)	**	0.63	1.84	4.15
B within A		N.S.	1.09	3.19	
A within B			1.11	3.23	

Table 2.4 **NWPZ** Hisar **2017-18**
SPL-1 Tillagex Varieties

Varieties	Tillage Practices							
	ZT		CT		ZT+Residue@6 tha ⁻¹		Mean	
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, Q/ha							
BH902	44.63	5	43.78	5	42.81	5	43.74	5
BH946	51.40	1	50.41	1	48.53	2	50.11	1
RD2552	49.78	2	48.67	2	48.82	1	49.09	2
DWRB101	46.58	3	46.01	3	44.72	4	45.77	3
DWRUB52	45.34	4	45.50	4	45.00	3	45.28	4
MEAN	47.55		46.88		45.97		46.80	
	F. Test	S.E.m	C.D.	C.V.(%)				
Tillage	(A)	N.S.	0.47	1.84	3.88			
Varieties	(B)	**	0.81	2.35	5.16			
B within A		N.S.	1.40	4.07				
A within B			1.33	3.89				

Table 2.5 **NWPZ** Agra **2017-18**
SPL-1 Tillagex Varieties

Varieties	Tillage Practices							
	ZT		CT		ZT+Residue@6 tha ⁻¹		Mean	
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, Q/ha							
BH902	41.67	3	40.20	3	44.87	3	42.24	3
BH946	38.57	5	37.13	5	40.87	5	38.86	5
RD2552	44.50	1	42.17	1	47.30	1	44.66	1
DWRB101	39.77	4	38.60	4	42.17	4	40.18	4
DWRUB52	42.90	2	41.30	2	46.57	2	43.59	2
MEAN	41.48		39.88		44.35		41.90	
	F. Test	S.E.m	C.D.	C.V.(%)				
Tillage	(A)	*	0.71	2.80	6.59			
Varieties	(B)	**	0.55	1.60	3.92			
B within A		N.S.	0.95	2.77				
A within B			1.11	3.24				

Table 2.6 **NHZ** Bajaura **2017-18**
SPL-1 Tillagex Varieties

Varieties	Tillage Practices							
	ZT		CT		ZT+Residue@6 tha ⁻¹		Mean	
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha							
VLB118	40.17	3	47.15	3	47.73	2	45.02	3
BHS 400	42.28	2	49.80	1	45.96	3	46.01	2
HBL 113	42.98	1	48.57	2	47.79	1	46.45	1

BHS 352	27.69	4	32.83	4	29.26	4	29.93	4
HBL 276	24.51	5	28.22	5	26.01	5	26.25	5
MEAN	35.53		41.31		39.35		38.73	

		F. Test	S.E.m	C.D.	C.V.(%)
Tillage	(A)	**	0.65	2.56	6.51
Varieties	(B)	**	0.93	2.71	7.20
B within A		N.S.	1.61	4.70	
A within B			1.58	4.62	

Table 2.7 NHZ Malan 2017-18
SPL-1 Tillage Varieties

Varieties	Tillage Practices						Mean	
	ZT		CT		ZT+Residue@6 tha ⁻¹		Yld.	Rk.
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha							
VLB118	16.87	2	23.00	2	22.42	2	20.76	2
BHS 400	23.85	1	36.09	1	30.89	1	30.28	1
HBL 113	13.27	4	16.25	4	17.98	3	15.84	4
BHS 352	10.63	5	15.90	5	13.70	5	13.41	5
HBL 276	13.64	3	17.91	3	16.17	4	15.91	3
MEAN	15.65		21.83		20.23		19.24	

		F. Test	S.E.m	C.D.	C.V.(%)
Tillage	(A)	**	0.52	2.05	10.50
Varieties	(B)	**	0.75	2.19	11.69
B within A		N.S.	1.30	3.79	
A within B			1.27	3.72	

Table 3.1 NHZ 2017-18
SPL-2 Varieties x seed rate MALAN

Seed rate (Kg ha ⁻¹)	Varieties									
	VLB118		BHS 400		HBL 113		BHS 352		Mean	
	Yield	Rk	Yield	Rk	Yield	Rk	Yield	Rk	Yield	Rk
75	23.64	3	32.86	3	17.27	3	14.67	3	22.11	3
100	25.98	2	36.45	1	18.75	2	15.43	2	24.15	2
125	27.16	1	34.64	2	22.14	1	15.50	1	24.86	1
MEAN	25.59		34.65		19.39		15.20		23.71	

		F. Test	S.E.m	C.D.	C.V.(%)
Varieties	(A)	**	0.75	2.61	9.54
Seed rate	(B)	*	0.61	1.83	8.89
B within A		N.S.	1.22	3.65	
A within B			1.25	3.74	

Table 3.2 NHZ 2017-18
SPL-2 Varieties x seed rate Bajura

Seed rate (Kg ha ⁻¹)	Varieties									
	VLB118		BHS 400		HBL 113		BHS 352		Mean	
	Yield	Rk	Yield	Rk	Yield	Rk	Yield	Rk	Yield	Rk
75	41.77	3	43.35	3	45.62	3	29.35	3	40.02	3
100	46.09	2	47.52	2	48.04	2	33.80	2	43.86	2
125	50.22	1	49.70	1	50.54	1	35.86	1	46.58	1
MEAN	46.03		46.86		48.06		33.00		43.49	

		F. Test	S.E.m	C.D.	C.V.(%)
--	--	---------	-------	------	---------

Varieties	(A)	**	1.37	4.75	9.47
Seed rate	(B)	**	0.90	2.70	7.18
B within A		N.S.	1.80	5.40	
A within B			2.01	6.04	

Table 4.1 **NWPZ** **Durgapura 2017-18**
SPL 3 DOSx Additives

Treatments	Sowing Time				Mean	
	Timely		Late		Yld.	Rk.
	Yld.	Rk.	Yld.	Rk.		
	Yield, q/ha					
Recommended dose of Fertilizer	49.67	6	43.07	5	46.37	6
T1 + FYM @5 t/ha	60.66	3	43.22	4	51.94	2
T1+Mulch@ 6 t/ha	61.57	2	38.67	6	50.12	5
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	62.07	1	44.93	3	53.50	1
T4+ spray of ZnSo4 @ 0.5 %	54.81	4	48.83	1	51.82	3
T4 + Two spray of Kcl @ 0.5 %	54.26	5	48.54	2	51.40	4
MEAN	57.18		44.54		50.86	
	F. Test	S.E.m	C.D.	C.V.(%)		
Sowing time	(A)	*	1.58	7.09	13.14	
Additives	(B)	N.S.	1.98	5.88	9.54	
B within A		*	2.80	8.32		
A within B			3.00	10.19		

Table 4.2 **NWPZ** **Karnal 2017-18**
SPL 3 DOSx Additives

Treatments	Sowing Time				Mean	
	Timely		Late		Yld.	Rk.
	Yld.	Rk.	Yld.	Rk.		
	Yield, q/ha					
Recommended dose of Fertilizer	43.53	6	36.65	6	40.09	6
T1 + FYM @5 t/ha	44.11	4	37.61	4	40.86	4
T1+Mulch@ 6 t/ha	43.73	5	36.97	5	40.35	5
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	44.31	3	37.75	3	41.03	3
T4+ spray of ZnSo4 @ 0.5 %	45.01	2	38.28	2	41.65	2
T4 + Two spray of Kcl @ 0.5 %	45.95	1	40.49	1	43.22	1
MEAN	44.44		37.96		41.20	
	F. Test	S.E.m	C.D.	C.V.(%)		
Sowing time	(A)	**	0.26	1.17	2.69	
Additives	(B)	**	0.38	1.12	2.24	
B within A		N.S.	0.53	1.59		
A within B			0.55			

Table 4.3 **NWPZ** **Hisar 2017-18**
SPL 3 DOSx Additives

Treatments	Sowing Time				Mean	
	Timely		Late		Yld.	Rk.
	Yld.	Rk.	Yld.	Rk.		
	Yield, q/ha					
Recommended dose of Fertilizer	54.36	4	48.33	2	51.35	3
T1 + FYM @5 t/ha	51.73	6	45.61	5	48.67	5
T1+Mulch@ 6 t/ha	52.03	5	45.20	6	48.61	6
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	55.90	1	46.23	4	51.07	4
T4+ spray of ZnSo4 @ 0.5 %	54.42	3	49.07	1	51.74	1
T4 + Two spray of Kcl @ 0.5 %	54.54	2	48.30	3	51.42	2
MEAN	53.83		47.12		50.48	

		F. Test	S.E.m	C.D.	C.V.(%)
Sowing time	(A)	*	0.66	2.98	5.56
Additives	(B)	N.S.	1.15	3.41	5.57
B within A		N.S.	1.62	4.83	
A within B			1.62	5.24	

Table 4.4 **NWPZ** **Ludhiana 2017-18**
SPL 3 DOSx Additives

Treatments	Sowing Time				Mean	
	Timely		Late		Yld.	Rk.
	Yld.	Rk.	Yld.	Rk.		
	Yield, q/ha					
Recommended dose of Fertilizer	50.98	4	37.06	6	44.02	6
T1 + FYM @5 t/ha	49.95	6	44.24	1	47.10	1
T1+Mulch@ 6 t/ha	50.90	5	40.93	3	45.91	5
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	51.85	3	41.09	2	46.47	4
T4+ spray of ZnSo4 @ 0.5 %	54.05	2	39.30	5	46.68	3
T4 + Two spray of Kcl @ 0.5 %	54.46	1	39.37	4	46.92	2
MEAN	52.03		40.33		46.18	

		F. Test	S.E.m	C.D.	C.V.(%)
Sowing time	(A)	*	0.89	3.99	8
Additives	(B)	N.S.	1.48	4.38	8
B within A		N.S.	2.09	6.20	
A within B			2.10	6.81	

Table 4.5 **NWPZ** **Agra 2017-18**
SPL 3 DOSx Additives

Treatments	Sowing Time				Mean	
	Timely		Late		Yld.	Rk.
	Yld.	Rk.	Yld.	Rk.		
	Yield, q/ha					
Recommended dose of Fertilizer	45.19	6	38.81	6	42.00	6
T1 + FYM @5 t/ha	46.41	4	39.71	4	43.06	4
T1+Mulch@ 6 t/ha	46.15	5	39.07	5	42.61	5
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	47.45	3	41.59	2	44.52	3
T4+ spray of ZnSo4 @ 0.5 %	48.83	1	42.15	1	45.49	1
T4 + Two spray of Kcl @ 0.5 %	48.01	2	41.40	3	44.70	2
MEAN	47.01		40.45		43.73	

		F. Test	S.E.m	C.D.	C.V.(%)
Sowing time	(A)	**	0.15	0.69	1.50
Additives	(B)	**	0.31	0.93	1.75
B within A		N.S.	0.44	1.31	
A within B			0.43	1.36	

Table 4.6 **NEPZ** **Kanpur 2017-18**
SPL 3 DOSx Additives

Treatments	Sowing Time				Mean	
	Timely		Late		Yld.	Rk.
	Yld.	Rk.	Yld.	Rk.		
	Yield, q/ha					
Recommended dose of Fertilizer	40.52	6	32.3	6	36.41	6
T1 + FYM @5 t/ha	42.51	5	32.9	5	37.71	5
T1+Mulch@ 6 t/ha	43.09	4	33.5	4	38.30	4
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	44.28	3	34.41	3	39.35	3
T4+ spray of ZnSo4 @ 0.5 %	45.98	1	35.81	1	40.90	1

T4 + Two spray of Kcl @ 0.5 %	45.18	2	34.72	2	39.95	2
MEAN	43.59		33.94		38.77	
	F. Test	S.E.m	C.D.	C.V.(%)		
Sowing time (A)	**	0.21	0.96	2.33		
Additives (B)	**	0.65	1.92	4.09		
B within A	N.S.	0.91	2.72			
A within B		0.86	2.64			

Table 4.7 **NEPZ** **Varanasi 2017-18**
SPL 3 DOSx Additives

Treatments	Sowing Time				Mean	
	Timely		Late		Yld.	Rk.
	Yld.	Rk.	Yld.	Rk.		
	Yield, q/ha					
Recommended dose of Fertilizer	36.03	6	32.07	6	34.05	6
T1 + FYM @5 t/ha	37.87	5	35.40	4	36.63	4
T1+Mulch@ 6 t/ha	38.00	4	34.70	5	36.35	5
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	39.73	3	36.47	3	38.10	3
T4+ spray of ZnSo4 @ 0.5 %	40.40	1	38.07	1	39.23	1
T4 + Two spray of Kcl @ 0.5 %	39.83	2	37.53	2	38.68	2
MEAN	38.64		35.71		37.18	
	F. Test	S.E.m	C.D.	C.V.(%)		
Sowing time (A)	**	0.14	0.65	1.64		
Additives (B)	**	0.17	0.50	1.11		
B within A	*	0.24	0.71			
A within B		0.26	0.89			

Table 4.8 **NEPZ** **Faizabad 2017-18**
SPL 3 DOSx Additives

Treatments	Sowing Time				Mean	
	Timely		Late		Yld.	Rk.
	Yld.	Rk.	Yld.	Rk.		
	Yield, q/ha					
Recommended dose of Fertilizer	34.88	6	25.71	6	30.30	6
T1 + FYM @5 t/ha	38.93	4	27.50	5	33.21	4
T1+Mulch@ 6 t/ha	37.15	5	27.62	4	32.38	5
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	40.36	3	28.09	3	34.23	3
T4+ spray of ZnSo4 @ 0.5 %	42.86	2	30.95	2	36.90	2
T4 + Two spray of Kcl @ 0.5 %	43.21	1	31.28	1	37.25	1
MEAN	39.56		28.53		34.04	
	F. Test	S.E.m	C.D.	C.V.(%)		
Sowing time (A)	**	0.41	1.84	5.10		
Additives (B)	**	0.71	2.10	5.08		
B within A	N.S.	1.00	2.97			
A within B		1.00	3.23			

Table 5.1 NORTH Hill ZONE Malan 2017-18
SPL-4 Integrated Nutrient Management

Bio fertilizers	Recommended dose of Fertilizer(RDF)						Mean	
	50% RDF		75% RDF		100% RDF			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
Yield, q/ha								
Azotobacter (AZO)	26.80	2	27.51	3	28.43	2	27.58	2
Phosphosolublizing bacteria(PSB)	24.22	5	27.55	2	28.38	3	26.72	3
AZO+PSB	28.61	1	30.32	1	31.01	1	29.98	1
Biomix	24.75	3	26.82	4	28.34	4	26.64	4
Control	24.67	4	26.07	5	27.38	5	26.04	5
MEAN	25.81		27.65		28.71		27.39	
	F. Test	S.E.m	C.D.	C.V.(%)				
Fertilizer dose (A)	N.S.	0.92	3.63	13.07				
Biofertilizer (B)	*	0.79	2.30	8.64				
B within A	N.S.	1.37	3.99					
A within B		1.53	4.47					

Table 5.2 NORTH Hill ZONE Bajura 2017-18
SPL-4 Integrated Nutrient Management

Bio fertilizers	Recommended dose of Fertilizer(RDF)						Mean	
	50% RDF		75% RDF		100% RDF			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
Yield, q/ha								
Azotobacter (AZO)	33.48	2	38.62	2	41.03	2	37.71	2
Phosphosolublizing bacteria(PSB)	31.98	3	36.07	4	38.66	4	35.57	4
AZO+PSB	36.29	1	41.08	1	43.01	1	40.13	1
Biomix	31.63	4	37.04	3	39.50	3	36.06	3
Control	29.30	5	34.49	5	35.45	5	33.08	5
MEAN	32.54		37.46		39.53		36.51	
	F. Test	S.E.m	C.D.	C.V.(%)				
Fertilizer dose (A)	N.S.	1.54	6.05	16.35				
Biofertilizer (B)	*	1.29	3.76	10.58				
B within A	N.S.	2.23	6.51					
A within B		2.52	7.36					

Table 6.1 NORTH WESTERN PLAINS ZONE Ludhiana 2017-18
SPL-5 N levels X PGRs

PGRs	Recommended dose of Nitrogen(RDN)						Mean	
	100% RDN		125% RDN		150% RDN			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
Yield, q/ha								
Chlormequat-chlorid (CCC)	63.49	1	62.55	1	62.94	1	62.99	1
Ethephon(Cerone)	61.88	2	62.41	2	62.67	2	62.32	2
CCC+Ethephon	57.53	3	62.17	3	61.38	4	60.36	3
Control	56.66	4	60.94	4	62.28	3	59.96	4
MEAN	59.89		62.02		62.32		61.41	
	F. Test	S.E.m	C.D.	C.V.(%)				
Fertilizer dose (A)	N.S.	0.69	2.69	3.87				
PGRs (B)	**	0.61	1.81	2.97				
B within A	N.S.	1.05	3.13					
A within B		1.14	3.39					

Table 6.2 NORTH WESTERN PLAINS ZONE Durgapura 2017-18
SPL-5N levels X PGRs

PGRs	Recommended dose of Nitrogen(RDN)						Mean	
	100% RDN		125% RDN		150% RDN		Yld.	Rk.
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.		
Yield, q/ha								
Chlormequat-chlorid (CCC)	49.57	3	52.70	3	55.23	3	52.50	3
Ethephon(Cerone)	50.83	2	53.87	2	57.60	2	54.10	2
CCC+Ethephon	52.60	1	56.37	1	59.43	1	56.13	1
Control	43.50	4	47.97	4	50.77	4	47.41	4
MEAN	49.13		52.73		55.76		52.54	
	F. Test	S.E.m		C.D.		C.V.(%)		
Fertilizer dose (A)	N.S.	1.61		6.33		10.63		
PGRs (B)	*	1.66		4.92		9.46		
B within A	N.S.	2.87		8.52				
A within B		2.96		8.80				

Table 6.3 NORTH WESTERN PLAINS ZONE Karnal 2017-18
SPL-5 N levels X PGRs

PGRs	Recommended dose of Nitrogen(RDN)						Mean	
	100% RDN		125% RDN		150% RDN		Yld.	Rk.
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.		
Yield, q/ha								
Chlormequat-chlorid (CCC)	47.88	1	48.13	2	47.98	1	48.00	1
Ethephon(Cerone)	44.95	3	46.37	3	45.54	3	45.62	3
CCC+Ethephon	47.37	2	48.76	1	47.53	2	47.89	2
Control	43.39	4	43.61	4	43.55	4	43.52	4
MEAN	45.90		46.72		46.15		46.26	
	F. Test	S.E.m		C.D.		C.V.(%)		
Fertilizer dose (A)	N.S.	0.28		1.11		2.11		
PGRs (B)	**	0.46		1.36		2.97		
B within A	N.S.	0.79		2.36				
A within B		0.74		2.21				

Table 6.4 NORTH WESTERN PLAINS ZONE Hisar 2017-18
SPL-5 N levels X PGRs

PGRs	Recommended dose of Nitrogen(RDN)						Mean	
	100% RDN		125% RDN		150% RDN		Yld.	Rk.
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.		
Yield, q/ha								
Chlormequat-chlorid (CCC)	50.69	4	53.27	3	55.13	3	53.03	3
Ethephon(Cerone)	52.32	1	54.16	2	56.46	2	54.31	2
CCC+Ethephon	52.06	2	55.55	1	57.08	1	54.90	1
Control	51.05	3	51.85	4	52.62	4	51.84	4
MEAN	51.53		53.71		55.32		53.52	
	F. Test	S.E.m		C.D.		C.V.(%)		
Fertilizer dose (A)	*	0.65		2.57		4.24		
PGRs (B)	*	0.72		2.13		4.01		
B within A	N.S.	1.24		3.68				
A within B		1.26		3.73				

Table 6.5 NORTH WESTERN PLAINS ZONE Agra 2017-18
SPL-5 N levels X PGRs

PGRs	Recommended dose of Nitrogen(RDN)							
	100% RDN		125% RDN		150% RDN		Mean	
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
Yield, q/ha								
Chlormequat-chlorid (CCC)	38.38	4	39.78	4	41.85	4	40.00	4
Ethephon(Cerone)	42.14	3	46.28	3	48.07	2	45.50	3
CCC+Ethephon	44.00	2	47.45	2	47.54	3	46.33	2
Control	46.56	1	50.57	1	52.17	1	49.77	1
MEAN	42.77		46.02		47.41		45.40	
	F. Test	S.E.m	C.D.		C.V.(%)			
Fertilizer dose (A)	**	0.14	0.53		1.04			
PGRs (B)	**	0.30	0.88		1.95			
B within A	N.S.	0.51	1.52					
A within B		0.46	1.38					

Table 6.6 NORTH EASTERN PLAINS ZONE Kanpur 2017-18
SPL-5 N levels X PGRs

PGRs	Recommended dose of Nitrogen(RDN)							
	100% RDN		125% RDN		150% RDN		Mean	
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
Yield, q/ha								
Chlormequat-chlorid (CCC)	39.72	3	40.12	3	40.58	3	40.14	3
Ethephon(Cerone)	41.20	2	42.38	2	43.12	2	42.23	2
CCC+Ethephon	42.39	1	43.09	1	44.27	1	43.25	1
Control	37.20	4	37.81	4	38.00	4	37.67	4
MEAN	40.13		40.85		41.49		40.82	
	F. Test	S.E.m	C.D.		C.V.(%)			
Fertilizer dose (A)	N.S.	0.55	2.14		4.63			
PGRs (B)	**	0.55	1.62		4.01			
B within A	N.S.	0.95	2.81					
A within B		0.98	2.92					

Table 6.7 NORTH EASTERN PLAINS ZONE Varanasi 2017-18
SPL-5 N levels X PGRs

PGRs	Recommended dose of Nitrogen(RDN)							
	100% RDN		125% RDN		150% RDN		Mean	
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
Yield, q/ha								
Chlormequat-chlorid (CCC)	34.33	2	35.73	2	37.23	2	35.77	2
Ethephon(Cerone)	33.13	3	34.23	3	33.47	3	33.61	3
CCC+Ethephon	31.00	4	31.73	4	32.30	4	31.68	4
Control	35.17	1	37.23	1	38.00	1	36.80	1
MEAN	33.41		34.73		35.25		34.46	
	F. Test	S.E.m	C.D.		C.V.(%)			
Fertilizer dose (A)	**	0.18	0.70		1.80			
PGRs (B)	**	0.15	0.45		1.31			
B within A	**	0.26	0.78					
A within B		0.29	0.86					

Table 6.8

NORTH EASTERN PLAINS ZONE

Faizabad

2017-18

SPL-5 N levels X PGRs

PGRs	Recommended dose of Nitrogen(RDN)							
	100% RDN		125% RDN		150% RDN		Mean	
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha							
Chloromequat-chlorid (CCC)	35.12	2	36.67	2	40.12	2	37.30	2
Ethephon(Cerone)	33.33	3	34.52	3	37.38	3	35.08	3
CCC+Ethephon	37.74	1	41.19	1	42.74	1	40.56	1
Control	31.50	4	31.91	4	34.05	4	32.48	4
MEAN	34.42		36.07		38.57		36.36	
	F. Test	S.E.m		C.D.		C.V.(%)		
Fertilizer dose (A)	*	0.57		2.25		5.47		
PGRs (B)	**	0.76		2.25		6.26		
B within A	N.S.	1.31		3.90				
A within B		1.27		3.78				

Table 7.1	NORTH WESTERN PLAIN ZONE				Yield, q/ha	2017-18
SPL-6 Weed management						
Treatments	Hisar	Ludhiana	Agra	Durgapura	Karnal	
Halauxifen-methyl Ester+ Florasulam 40.85% WG + Polyglycol 26-2 N	51.10	46.94	42.85	55.52	50.37	
Metsulfuron methyl 20 WG + surfactant	49.34	52.96	40.87	46.42	45.79	
Carfentrazone 40DF	50.59	53.87	40.27	46.84	46.39	
2,4-D Na (80 WP)	49.16	52.19	41.13	48.09	46.03	
2,4-D E 38 EC	48.14	53.87	41.39	53.16	47.63	
Metsulfuron + Carfentrazone +Surfactant	53.00	54.80	42.32	48.23	51.81	
2,4-D Na + Carfentrazone	52.81	54.21	41.46	50.00	46.32	
2,4-D E + Carfentrazone	52.07	58.25	41.86	55.66	48.99	
Halauxifen methyl + Florasulam + Carfentrazone+ Surfactant	54.07	52.73	43.25	57.36	49.19	
Weedy check	42.04	42.21	34.48	36.63	44.27	
Weed free	54.66	60.10	44.95	60.97	52.33	
G.M.	50.63		41.35	50.81	48.10	
S.E.(M)	1.29	52.92	0.34	1.82	1.49	
C.D.	3.79	1.16	1.01	5.36	4.39	
C.V.	4.40	3.41	1.43	6.19	5.35	

Table 7.2	NORTH EASTERN PLAIN ZONE		Yield, q/ha	2017-18
SPL-6 Weed management				
Treatments			Faizabad	Varanasi
Halauxifen-methyl Ester+ Florasulam 40.85% WG + Polyglycol 26-2 N			43.10	52.00
Metsulfuron methyl 20 WG + surfactant			41.79	45.77
Carfentrazone 40DF			39.88	45.00
2,4-D Na (80 WP)			39.54	39.57

2,4-D E 38 EC	38.10	41.30
Metsulfuron + Carfentrazone +Surfactant	42.86	48.24
2,4-D Na + Carfentrazone	42.38	47.21
2,4-D E + Carfentrazone	40.95	49.84
Halauxifen methyl+Florasulam+Carfentrazone+ Surfactant	40.48	53.83
Weedy check	36.55	25.67
Weed free	45.24	54.42
G.M.	40.99	45.71
S.E.(M)	1.23	0.41
C.D.	3.63	1.20
C.V.	5.20	1.54

Table 7.3

**NORTH HILL AND CENTRAL ZONE
SPL 6 – Weed management Yield (q/ha)**

Treatments	Malan (NHZ)	Udaipur(CZ)
Halauxifen-methyl Ester+ Florasulam 40.85% WG + Polyglycol 26-2	35.54	39.00
Metsulfuron methyl 20 WG + surfactant	33.62	34.02
Carfentrazone 40DF	31.51	33.18
2,4-D Na (80 WP)	31.37	32.59
2,4-D E 38 EC	29.26	34.19
Metsulfuron + Carfentrazone +Surfactant	31.05	35.84
2,4-D Na + Carfentrazone	32.08	35.60
2,4-D E + Carfentrazone	32.31	35.80
Halauxifen methyl+Florasulam+Carfentrazone+ Surfactant	36.18	37.69
Weedy check	23.69	27.68
Weed free	33.12	41.51
G.M.	31.79	35.19
S.E.(M)	1.37	1.91
C.D.	4.04	5.63
C.V.	7.45	9.39

AICW&BIP CENTRES AND COOPERATING SCIENTISTS

Sr No. AICW&BIP Centre Cooperating Scientist Address

NORTHERN HILL ZONE

1. Almora Dr, Dibakar Mahanta, Scientist Agronomy, VPKAS, Almora-263 601 (Uttarakhand).
2. Palampur/ Malan Dr Sandeep Manuja, Scientist (Agronomy), CSK HPKV Rice-wheat Research Centre, , Malan, District Kangra, HP.
3. Bajaura Dr Gurudev Singh, Assitsnt Agronomist, CSKHVKV, HAREC, Bajaura-175 125 (HP).
4. Shimla Dr D P Walia, Principal Scientist, IARI RS, Tutikandi, Shimla-171 004, Himachal Pradesh.

NORTH WESTERN PLAIN ZONE

5. Karnal Dr Ajit Singh Kharub, Principal Scientist, PB NO. 158, DWR, Karnal -132 001
Dr. Anil Khippal, Senior Scientist, PB NO. 158, DWR, Karnal -132 001
6. Ludhiana Dr Hari Ram Saharan, Sr. Agronomist, Deptt. of Agronomy, PAU Ludhiana - 141 004
7. Agra Dr BP Singh, Head, Department of Agronomy, RBS College, Bichpuri, Agra, UP-283105.
8. Hisar Dr. Bhagat Singh, Barley Agronomist, Department of Plant Breeding, CCS HAU, Hisar (Haryana)-125 004
9. Durgapura Dr Sudesh Kumar, Sr. Agronomist (Barley), Govt. Agril. Res. Station, Durgapura, Jaipur (Rajasthan)

NORTH EASTERN PLAINS ZONE

10. Kanpur Asstt. Agronomist, Section of EB (Rabi Cereals), CSAUA&T, Kanpur (UP)- 208 002
11. Varanasi Dr RK Singh, Sr. agronomist (AICWIP), Institute of Agricultural Sciences, BHU, Varanasi (UP)- 221 005
12. Faizabad Dr. Rajesh Kumar, Wheat & barley Agronomist, Department of Agronomy, NDUA&T, Kumarganj, Faizabad (UP)- 224 229

CENTRAL ZONE

13. Udaipur Dr Jagdish Choudhary, Assitt. Professor (Agronomy), Department of Agronomy, College of Agriculture, Udaipur, Rajasthan-313 001.
14. Gwalior Dr SPS Tomar, Agronomist, Wheat Improvement Project, College of Agriculture, RVRSUA&T, Gwalior, 474002 (M.P.)

SOIL PHYSICO-CHEMICAL PROPERTIES

SOIL PROPERTY	Locations										
	1	2	3	4	5	6	7	8	9	10	11
	Malan	Bajaura	Durgapura	Hisar	Ludhiana	Karnal	Kanpur	Varanasi	Agra	Udaipur	Faizabad
SOIL GROUP	SILTY CLAY LOAM	SILTY LOAM	LOAMY SAND	Sandy loam	Loamy sand	Clay loam	Sandy Loam	Sandy clay loam	Sandy Loam	Clay-loam	Sandy loam
SAND, (%)	-	28.2	87	72	84.6		55	48.5	60.67	38.75	-
SILT, (%)	-	53.4	5.35	18.5	7.30		32	29.1	20.09	26.78	-
CLAY, (%)	-	18.4	6.80	9.5	8.0		14	22.4	18.09	34.47	-
BULK DENSITY, Mg m ⁻³	1.52	1.54	1.40	1.4	1.44		-	1.6	1.63	1.46	-
FIELD CAPACITY, (%)	31	-	10.30				-	20.2	18.50		-
PERMANENT WILTING POINT, (%)	14	-	3.15				-	5.4	9.50		-
ORGANIC CARBON, (%)	0.6	0.61	0.19	0.38	0.5	0.45	0.5	0.37	0.35	0.55	-
AVAILABLE N, Kg ha ⁻¹	454	348	158	122		-	-	170.3	187.40	287.52	-
AVAILABLE P ₂ O ₅ , kg ha ⁻¹	44	24	42.80	19	32.65	19.8	25	27.5	29.80	23.67	-
AVAILABLE K ₂ O, kg ha ⁻¹	226	162	223	306	240	238	100	225.8	311.00	365.15	-
PH (1:2)	5.3	6.4	7.8	7.8	7.8	8.2	7.5	7.3	8.40	7.87	-
EC(1:2)	-	5.5	0.25	0.22	0.2	0.27	0.15	0.35	1.64	0.9	-

Meteorological Information

Bajaura Latitude 31° 48' N Longitude 77° 00' E Height above MSL 1090 m

Malan Latitude 32° 1' N Longitude 76° 2' E Height above MSL 950 m

Julian weeks	Temperature		RH %		Rainfall	Pan Evap.	Sun Shine	Julian weeks	Temperature		RH %		Rainfall	Pan Evap.	Sun Shine
	Max.	Min.	Max.	mm	mm	mm	hrs/day		Max.	Min.	Max.	Min.	mm	mm	hrs/day
42 (15-21 Oct.)								42 (15-21 Oct.)							
43 (22-28 Oct)								43 (22-28 Oct)							
44 (29-04 Nov.)	25.4	4.9	92	36	0			44 (29-04 Nov.)							
45 (05-11 Nov.)	25.8	4.3	91	35	0			45 (05-11 Nov.)	29.7	10.7	64.1	61.6	Nil		
46 (12-18 Nov.)	22.3	4.5	89	53	1.2			46 (12-18 Nov.)	28.4	9.5	64.1	61.0	Nil		
47 (19-25 Nov.)	20.0	-0.3	93	33	10.2			47 (19-25 Nov.)	29.3	9.1	63.6	60.4	Nil		
48 (26-02 Dec.)	23.1	-0.5	93	58	0			48 (26-02 Dec.)	23.3	7.8	72.0	65.4	Nil		
49 (03-09 Dec.)	21.7	0.1	92	61	0			49 (03-09 Dec.)	23.3	6.8	74.9	73.7	65.3		
50 (10-16 Dec.)	16.3	3.2	87	67	28.6			50 (10-16 Dec.)	26.3	7.9	72.0	70.4	Nil		
51 (17-23 Dec)	21.5	-0.6	91	39	0			51 (17-23 Dec)	27.3	8.1	71.9	66.3	Nil		
52 (24-31 Dec)	18.9	-1.4	92	34	0			52 (24-31 Dec)	25.8	9.8	74.5	72.0	Nil		
1 (01-07 Jan)	18.6	-1.9	90	28	0			1 (01-07 Jan)	25.2	5.9	69.4	63.6	Nil		
2 (8-14 Jan)	18.1	-2.7	92	27	0			2 (8-14 Jan)	21.3	7.6	64.4	62.9	Nil		
3 (15-21 Jan)	21.6	-2.8	93	20	0			3 (15-21 Jan)	20.1	9.2	68.4	62.4	Nil		
4 (22-28 Jan)	18.1	-1.4	96	35	14			4 (22-28 Jan)	22.3	5.7	69.9	67.4	11.4		
5 (29-04 Feb.)	22.1	0.5	92	24	0			5 (29-04 Feb.)	20.0	6.1	67.6	62.6	Nil		
6 (05-11 Feb.)	20.3	1.7	87	23	0			6 (05-11 Feb.)	21.1	5.3	69.1	66.1	Nil		
7 (12-18 Feb.)	17.6	3.1	88	47	28.2			7 (12-18 Feb.)	21.5	5.8	74.3	69.6	18.0		
8 (19-25 Feb.)	22.8	4.4	86	38	13.6			8 (19-25 Feb.)	20.3	8.2	71.6	68.3	2.2		
9 (26-04 Mar.)	23.1	6.4	87	35	15.4			9 (26-04 Mar.)	23.7	9.4	73.0	68.7	Nil		
10 (05-11 Mar.)	23.8	3	85	26	7			10 (05-11 Mar.)	26.5	8.2	72.3	68.7	Nil		
11 (12-18 Mar.)	25.5	4.8	88	29	8.8			11 (12-18 Mar.)	27.7	9.0	71.0	66.3	4.0		
12 (19-25 Mar.)	24.5	6.4	85	41	11.6			12 (19-25 Mar.)	27.1	10.1	73.7	70.9	10.4		
13 (26-01 Apr.)	29.7	6.7	90	27	0			13 (26-01 Apr.)	28.6	10.3	73.8	68.9	Nil		
14 (02-08 Apr.)	28.7	9.9	88	35	18			14 (02-08 Apr.)	28.6	11.5	71.9	69.6	Nil		
15 (09-15 Apr.)	25.2	9.1	89	43	31.2			15 (09-15 Apr.)	29.2	12.7	75.3	71.1	Nil		
16 (16-22 Apr.)	25.7	7.2	88	42	28.6			16 (16-22 Apr.)	29.5	11.1	76.7	71.1	18.2		
17 (23-29 Apr.)	30.7	9.5	89	32	-			17 (23-29 Apr.)	31.6	10.7	71.1	66.6	6.3		
18 (30-06 May)	30.6	11.4	89	48	8.2			18 (30-06 May)	32.9	17.1	75.3	73.0	9.1		
19 (07-13 May)	27.1	12.3	92	48	11.8			19 (7-13 May)	31.2	13.8	74.3	70.4	14.8		
20 (14-20 May)								20 (14-20 May)	33.3	16.0	78.9	73.6	1.5		
21 (21-27 May)								21(21-27May)	35.9	17.9	73.3	68.6	Nil		

Agra Latitude 27°02' N Longitude 77° 09' E Height above MSL 163.4 m

Varanasi Latitude 25°18' N Longitude 83° 03' E Height above MSL 75.7m

Julian weeks	Temperature,C		RH %		Rainfall mm	Pan Evap. mm	Sun Shine hrs/day	Julian weeks	Temperature ,C		RH %		Rainfal l mm	Pan Evap. mm	Sun Shine hrs/day
	Max.	Min.	Max.	Min.					Max.	Min.					
40 (01-07 Oct.)								40 (01-07 Oct.)	33.3	25.2	89	71	0	3.3	7.8
41 (08-14 Oct.)								41 (08-14 Oct.)	32.7	24.8	86	70	0	3	7.7
42 (15-21 Oct.)								42 (15-21 Oct.)	30.7	21	88	71	0	2.3	8.1
43 (22-28 Oct)								43 (22-28 Oct)	34.1	17.4	88	41	0	2.8	8.6
44 (29-04 Nov.)								44 (29-04 Nov.)	30.1	16.8	92	52	0	2.3	8.5
45 (05-11 Nov.)	30.4	14.7	95.7	55.6	0	1.7	30.4	45 (05-11 Nov.)	30.3	15.8	92	50	0	2	6.1
46 (12-18 Nov.)	28.8	14.7	90.0	67.6	0	1.7	28.8	46 (12-18 Nov.)	29.1	15.1	91	48	0	2	6.9
47 (19-25 Nov.)	25.9	9.1	80.9	57.1	0	2.1	25.9	47 (19-25 Nov.)	24.7	11.4	85	37	0	3	7.7
48 (26-02 Dec.)	27.7	8.5	86.3	56.7	0	1.9	27.7	48 (26-02 Dec.)	26.4	8.5	91	37	0	1.7	7.6
49 (03-09 Dec.)	24.3	11.5	95.3	60.9	1.2	1.1	24.3	49 (03-09 Dec.)	25.7	9.3	90	54	0	1.8	7.6
50 (10-16 Dec.)	23.1	10.8	94.7	73.6	0	1.3	23.1	50 (10-16 Dec.)	26.2	11.2	86	46	0	1.8	7.2
51 (17-23 Dec)	24.2	7.9	90.9	71.3	0	1.7	24.2	51 (17-23 Dec)	23.5	8.8	84	50	0	1.4	4.3
52 (24-31 Dec)	23.1	7.0	95.4	67.3	0	1.1	23.1	52 (24-31 Dec)	21.2	8.2	92	61	0	1.2	5.4
1 (01-07 Jan)	17.0	6.4	-	57.6	0	0.4	17.0	1 (01-07 Jan)	16.1	6.2	93	69	0	0.7	0.8
2 (8-14 Jan)	23.0	5.1	37.3	58.1	0	1.7	23.0	2 (8-14 Jan)	19.4	5.9	96	57	0	1	5.7
3 (15-21 Jan)	24.5	6.4	12.3	59.4	0	1.4	24.5	3 (15-21 Jan)	23.1	6.4	94	49	0	1.2	8
4 (22-28 Jan)	19.8	6.8	-	68.3	0	0.6	19.8	4 (22-28 Jan)	2.1	7.7	94	60	0	2.1	7.3
5 (29-04 Feb.)	26.3	8.9	-	58.4	0	1.4	26.3	5 (29-04 Feb.)	24.9	9.1	86	47	0	2.3	8.8
6 (05-11 Feb.)	23.7	8.8	86.6	69.7	0	2.1	23.7	6 (05-11 Feb.)	24.4	9.5	80	38	0	2.5	7
7 (12-18 Feb.)	25.5	11.0	63.3	63.9	0	2.1	25.5	7 (12-18 Feb.)	24.6	11.8	87	55	0	2.4	6.7
8 (19-25 Feb.)	30.9	14.0	8.8	61.1	0	2.4	30.9	8 (19-25 Feb.)	29.6	13.2	90	42	0	2.6	8.6
9 (26-04 Mar.)	32.2	14.9	86.9	62.6	0	3.1	32.2	9 (26-04 Mar.)	30	14.9	88	43	0	3.5	9.3
10 (05-11 Mar.)	32.0	13.2	86.	62.6	0	3.6	32.0	10 (05-11 Mar.)	30.4	13.8	82	36	0	3.9	7.9
11 (12-18 Mar.)	33.7	15.6	87.7	54.7	0	4.0	33.7	11 (12-18 Mar.)	33.1	15.7	72	28	0	4.5	8.5
12 (19-25 Mar.)	34.0	16.6	85.0	60.6	0	4.0	34.0	12 (19-25 Mar.)	34.1	15.6	73	27	0	4.8	8.8
13 (26-01 Apr.)	38.0	18.0	67.1	42.1	0	5.4	38.0	13 (26-01 Apr.)	35.4	16.8	69	24	0	6.6	9
14 (02-08 Apr.)	38.7	23.3	80.7	49.3	26	6.1	38.7	14 (02-08 Apr.)	33.8	20	70	42	9.2	6.4	9.2
15 (09-15 Apr.)	35.6	19.9	76.7	48	89	4.1	35.6	15 (09-15 Apr.)	34.8	20.2	72	35	0	5.8	8.5
16 (16-22Apr.)	38.7	24.0	65.7	37	0	6.1	38.7	16 (16-22Apr.)							
17 (23-29Apr.)	40.4	22.9	75.0	36.4	0	7.3	40.4	17 (23-29Apr.)							
18 (30-06 May)								18 (30-06 May)							
19 (07-13 May)								19 (07-13 May)							
20 (14-20 May)								20 (14-20 May)							

Kanpurt Latitude 25° 28' N Longitude 80° 34' E Height above MSL 125.9 m

Faizabad Latitude 26° 47' N Longitude 82° 12' E Height above MSL 113 m

Julian weeks	Temperature,C		RH %		Rainfall mm	Pan Evap. mm	Sun Shine	Julian weeks	Temperature,C		RH %		Rainfall mm	Pan Evap. mm	Sun Shine hrs/day
	Max.	Min.	Max.	Min.					Max.	Min.	Max.	Min.			
40 (01-07 Oct.)	35.4	22.7	86.8	50.8	-	3.1	7.7	40 (01-07 Oct.)	33.5	24.8	93.4	66.4	0		8.6
41 (08-14 Oct.)	35.8	21.9	82.4	44.7	-	2.9	4.0	41 (08-14 Oct.)	33.0	33.9	92.1	66.1	0		7
42 (15-21 Oct.)	35.9	19.3	87.1	37.0	-	3.2	7.0	42 (15-21 Oct.)	33.7	21.4	92.1	91.4	0		7.6
43 (22-28 Oct.)	34.2	15.7	86.0	29.5	-	3.0	7.5	43 (22-28 Oct.)	32.7	16.7	94.2	40.8	0		6.5
44 (29-04 Nov.)	30.8	16.0	91.2	46.4	-	2.6	4.6	44 (29-04 Nov.)	29.9	17.0	94.5	56.0	0		5.8
45 (05-11 Nov.)	30.0	14.5	93.8	46.2	-	2.5	1.8	45 (05-11 Nov.)	29.2	15.3	94.4	52.8	0		4.3
46 (12-18 Nov.)	29.4	12.8	85.8	43.2	-	2.4	2.6	46 (12-18 Nov.)	29.3	13.9	91.1	42.2	0		4.5
47 (19-25 Nov.)	26.3	9.7	68.7	38.5	-	2.5	2.8	47 (19-25 Nov.)	26.8	11.9	86.2	45.8	0		5.6
48 (26-02 Dec.)	26.4	7.6	87.0	37.8	-	0.5	4.8	48 (26-02 Dec.)	25.9	8.1	87.4	38.5	0		5.6
49 (03-09 Dec.)	25.2	11.8	80.5	45.1	1.2	2.4	3.5	49 (03-09 Dec.)	26.1	9.8	91.2	42.1	0		5.7
50 (10-16 Dec.)	24.5	10.5	91.8	44.8	-	2.7	2.3	50 (10-16 Dec.)	25.5	10.1	94.8	47.7	0		5.5
51 (17-23 Dec)	23.2	8.1	89.4	53.0	-	2.2	3.0	51 (17-23 Dec)	23.3	8.1	95.2	61.2	0		3.9
52 (24-31 Dec)	21.0	6.8	97.3	65.5	-	1.6	2.1	52 (24-31 Dec)	19.4	8.4	97.1	74.1	0		2.2
1 (01-07 Jan)	17.2	5.6	98.2	69.2	-	1.3	1.4	1 (01-07 Jan)	15.1	4.7	97.5	71.1	0		0.6
2 (8-14 Jan)	20.3	5.3	96.7	61.1	-	1.2	5.4	2 (8-14 Jan)	13.8	5.2	97.8	77.8	0		0.5
3 (15-21 Jan)	22.7	6.4	93.0	53.7	-	1.4	7.5	3 (15-21 Jan)	21.8	4.8	97.8	50.4	0		4.1
4 (22-28 Jan)	21.6	5.6	96.8	62.2	4.2	1.4	6.4	4 (22-28 Jan)	21.3	5.9	96.7	53.0	1		4.1
5 (29-04 Feb.)	25.5	9.8	77.0	49.5	-	1.6	8.7	5 (29-04 Feb.)	24.3	7.2	95.0	45.1	0		4.7
6 (05-11 Feb.)	29.9	8.4	83.0	46.8	-	1.8	6.4	6 (05-11 Feb.)	34.3	8.1	86.7	34.8	0		4.6
7 (12-18 Feb.)	24.2	11.1	87.0	55.0	-	1.9	5.5	7 (12-18 Feb.)	24.7	10.7	91.7	52.7	0		3.5
8 (19-25 Feb.)	30.2	12.0	84.2	41.5	-	2.0	7.9	8 (19-25 Feb.)	28.7	11.8	88.8	43.8	0		6.5
9 (26-04 Mar.)	30.7	13.1	85.0	44.5	-	2.2	8.4	9 (26-04 Mar.)	30.1	14.1	92.4	42.2	0		6.6
10 (05-11 Mar.)	29.6	13.6	71.5	35.0	-	3.0	8.8	10 (05-11 Mar.)	31.1	12.3	91.0	38.5	0		6.6
11 (12-18 Mar.)	33.4	15.4	67.0	30.4	-	3.1	8.2	11 (12-18 Mar.)	32.8	13.7	81.7	34.8	0		7.1
12 (19-25 Mar.)	34.0	15.5	65.5	30.7	-	3.3	8.1	12 (19-25 Mar.)	34.2	14.2	83.4	25.7	0		7.1
13 (26-01 Apr.)	35.9	17.5	64.4	37.5	-	3.7	8.6	13 (26-01 Apr.)	35.2	15.5	85.0	23.8	0		7.3
14 (02-08 Apr.)	31.4	23.8	65.5	40.1	0.4	3.3	6.4	14 (02-08 Apr.)	35.3	18.7	81.0	35.0	0		7.4
15 (09-15 Apr.)	36.0	19.9	67.2	46.2	10.0	4.0	7.2	15 (09-15 Apr.)	34.4	18.3	74.0	32.4	0		7.1
16 (16-22 Apr.)	39.3	22.1	51.0	23.2	-	4.4	7.8	16 (16-22 Apr.)							
17 (23-29 April)	38.8	22.4	48.5	33.7	-	5.0	8.8	17 (23-29 April)							
								18(30-06 May)							

Hisar Latitude 29°10' N Longitude 75° 46' E Height above MSL 215.2 m

Durgapura Latitude 26° 51' N Longitude 75° 47' E Height above MSL 390 m

Julian weeks	Temperature,C		RH %		Rainfall	Pan Evap.	Sun Shine	Julian weeks	Temperature,C		RH %		Rainfall	Pan Evap.	Sun Shine
	Max.	Min.	Max.	Min.	mm	mm	hrs/day		Max.	Min.	Max.	Min.	mm	mm	hrs/day
40 (01-07 Oct.)	36.76	19.03	78.29	29.14	0	5.13	8.29	40 (01-07 Oct.)							
41 (08-14 Oct.)	35.29	18.83	88.57	30.29	0	3.57	6.83	41 (08-14 Oct.)							
42 (15-21 Oct.)	35.71	16.21	91.29	24.86	0	3.10	7.59	42 (15-21 Oct.)							
43 (22-28 Oct.)	33.76	15.50	83.86	25.57	0	3.07	5.91	43 (22-28 Oct.)							
44 (29-04 Nov.)	31.04	15.26	88.14	42.71	0	1.96	2.23	44 (29-04 Nov.)	33.2	17.1	50	17	0.0	5.0	8.2
45 (05-11 Nov.)	29.77	12.71	99.00	46.14	0	1.80	1.64	45 (05-11 Nov.)	31.0	16.0	68	22	0.0	3.1	7.2
46 (12-18 Nov.)	25.01	13.67	90.29	50.86	0	3.90	0.26	46 (12-18 Nov.)	28.6	16.3	60	32	0.0	2.6	5.5
47 (19-25 Nov.)	24.66	6.43	81.71	28.29	0	3.64	6.24	47 (19-25 Nov.)	25.3	10.4	54	16	0.0	3.1	6.8
48 (26-02 Dec.)	26.84	6.69	87.00	23.71	0	2.44	6.59	48 (26-02 Dec.)	28.3	11.0	59	16	0.0	3.1	8.7
49 (03-09 Dec.)	23.10	6.81	84.29	33.00	0	1.57	4.24	49 (03-09 Dec.)	24.4	11.4	64	30	0.0	3.2	4.5
50 (10-16 Dec.)	16.87	7.37	92.43	60.57	3.8	1.00	3.06	50 (10-16 Dec.)	23.8	10.0	65	33	5.4	2.1	6.6
51 (17-23 Dec.)	22.36	5.96	88.43	41.86	0	1.30	6.31	51 (17-23 Dec.)	25.0	8.4	62	19	0.0	3.0	7.2
52 (24-31 Dec.)	23.35	4.53	96.50	41.75	0	1.08	6.53	52 (24-31 Dec.)	24.9	7.9	79	24	0.0	2.3	8.5
1 (01-07 Jan)	17.51	4.01	100.0	55.86	0	0.74	3.77	1 (01-07 Jan)	22.5	6.0	88	24	0.0	1.9	7.9
2 (8-14 Jan)	21.91	2.64	94.43	42.71	0	1.40	6.87	2 (8-14 Jan)	23.8	6.4	80	18	0.0	2.4	9.1
3 (15-21 Jan)	22.91	4.99	93.86	48.29	0	1.37	6.87	3 (15-21 Jan)	26.7	8.1	71	18	0.0	3.9	8.9
4 (22-28 Jan)	18.17	7.17	96.86	75.29	10.9	1.50	3.83	4 (22-28 Jan)	23.9	8.0	84	29	1.4	3.9	8.2
5 (29-04 Feb.)	22.87	5.74	97.14	60.14	0	1.41	6.86	5 (29-04 Feb.)	27.5	10.9	61	19	0.0	4.1	8.8
6 (05-11 Feb.)	22.01	4.67	86.00	66.71	0	1.83	7.04	6 (05-11 Feb.)	24.6	9.8	50	19	0.0	3.6	6.6
7 (12-18 Feb.)	22.77	8.07	93.14	53.57	1.2	1.97	5.69	7 (12-18 Feb.)	25.8	10.0	69	23	0.0	4.3	8.4
8 (19-25 Feb.)	27.93	10.59	90.14	43.71	0	2.14	6.53	8 (19-25 Feb.)	31.1	14.6	65	22	0.0	4.1	8.7
9 (26-04 Mar.)	28.13	12.10	91.43	47.14	0	2.66	5.90	9 (26-04 Mar.)	31.9	16.4	63	21	0.0	5.6	8.6
10 (05-11 Mar.)	28.90	10.54	86.00	36.29	0	2.97	7.19	10 (05-11 Mar.)	31.5	15.4	53	17	0.0	6.1	9.3
11 (12-18 Mar.)	31.84	12.74	80.29	31.29	0	3.77	7.27	11 (12-18 Mar.)	33.2	16.9	45	13	0.0	6.1	8.9
12 (19-25 Mar.)	29.84	12.46	81.86	42.29	0	3.53	6.71	12 (19-25 Mar.)	32.2	17.3	53	20	0.0	6.7	8.3
13 (26-01 Apr.)	34.69	13.80	73.00	27.29	0	5.24	7.83	13 (26-01 Apr.)	37.5	18.2	40	8	0.0	8.5	10.0
14 (02-08 Apr.)	35.74	19.76	61.43	33.43	0	5.59	5.37	14 (02-08 Apr.)	38.3	23.0	40	15	1.4	8.6	9.0
15(09-15 Apr.)	33.64	18.04	72.00	39.14	14	5.40	7.01	15(09-15 Apr.)	36.1	23.9	44	24	5.0	7.9	8.7
16(16-22 Apr.)	37.64	19.36	56.29	31.00	0	7.70	8.26	16(16-22 Apr.)	38.2	25.0	28	12	0.0	9.6	9.0
17(23-29 Apr.)	39.26	21.53	52.14	27.00	0	6.86	8.47	17(23-29 Apr.)	39.6	25.0	27	8	0.0	10.8	11.1
18(30-06 May)	42.00		54.00		0	7.80	6.40								

Karnal Latitude 29° 43' N Longitude 76° 58' E Height above MSL 245

Ludhiana Latitude 30°56' N Longitude 75°⁵², E Height above MSL 247 m

Julian weeks	Temperature,C		RH %		Rainfall mm	Pan Evap. mm	Sun Shine	Julian weeks	Temperature,C		RH %		Rainfall mm	Pan Evap. mm	Sun Shine hrs/day
	Max.	Min.	Max.	Min.					Max.	Min.					
40 (01-07 Oct.)	33.9	19.7	90.6	49.9	0.0	23.8	8.7	40 (01-07 Oct.)	33.1	20.5	93	47	0	29	10.1
41 (08-14 Oct.)	34.0	19.6	92.6	43.3	0.0	25.5	5.5	41 (08-14 Oct.)	32.7	22	87	52	7	27	6.5
42 (15-21 Oct.)	33.9	16.4	92.6	34.9	0.0	25.8	7.2	42 (15-21 Oct.)	31.5	19.2	94	46	0	20.6	7.4
43 (22-28 Oct)	31.2	15.0	91.1	39.0	0.0	21.1	6.3	43 (22-28 Oct)	29.5	16.4	84	39	9	25	6.8
44 (29-04 Nov.)	28.1	15.5	95.4	55.7	0.0	17.2	0.4	44 (29-04 Nov.)	27.8	14.4	94	43	0	15.5	3.8
45 (05-11 Nov.)	26.2	13.4	100.0	62.4	0.0	14.9	2.1	45 (05-11 Nov.)	26.8	14.8	88	42	0	15.1	3.1
46 (12-18 Nov.)	23.3	12.2	94.6	59.1	1.8	9.0	1.3	46 (12-18 Nov.)	28	12.5	89	30	0	13.0	7.1
47 (19-25 Nov.)	24.1	7.8	85.9	29.7	0.0	12.0	7.1	47 (19-25 Nov.)	27	9.9	94	29	0	17.4	7.4
48 (26-02 Dec.)	25.0	6.8	91.4	31.4	0.0	14.6	7.6	48 (26-02 Dec.)	24.7	11.4	93	48	0	11.7	1.4
49 (03-09 Dec.)	23.4	8.4	86.1	35.7	0.0	11.1	3.3	49 (03-09 Dec.)	23.8	10	96	47	0	10.9	3.7
50 (10-16 Dec.)	19.3	9.1	98.6	66.1	5.2	10.3	2.6	50 (10-16 Dec.)	20	7.9	91	44	1.7	11.5	5.2
51 (17-23 Dec)	20.9	7.9	92.3	57.0	0.0	11.7	7.0	51 (17-23 Dec)	20	4.9	95	38	0	8.2	6.0
52 (24-31 Dec)	20.9	6.1	99.6	61.9	0.0	12.5	4.3	52 (24-31 Dec)	20.4	5.3	94	37	0	9.3	7.5
1 (01-07 Jan)	12.9	6.2	100.0	79.6	0.0	8.0	3.1	1 (01-07 Jan)	21.2	7.3	95.0	49.0	0.0	8.4	2.9
2 (8-14 Jan)	20.4	3.9	94.7	46.3	0.0	10.0	8.2	2 (8-14 Jan)	19.1	7.9	94.0	59.0	16.0	9.6	3.4
3 (15-21 Jan)	21.5	5.1	100.0	48.9	0.0	12.1	8.1	3 (15-21 Jan)	13.0	8.0	94.0	77.0	0.0	5.3	0.2
4 (22-28 Jan)	17.7	6.7	96.3	75.9	34.2	10.5	3.3	4 (22-28 Jan)	14.1	5.2	97.0	69.0	0.4	4.8	2.9
5 (29-04 Feb.)	21.9	7.8	92.7	51.3	0.0	16.0	8.0	5 (29-04 Feb.)	20.5	7.6	93.0	52.0	3.0	11.0	6.4
6 (05-11 Feb.)	21.0	5.3	92.6	41.4	0.0	17.4	7.7	6 (05-11 Feb.)	21.4	8.2	89.0	48.0	0.8	17.8	6.5
7 (12-18 Feb.)	21.4	8.6	94.1	57.7	29.0	15.7	7.9	7 (12-18 Feb.)	22.1	7.5	89.0	41.0	0.6	17.0	7.8
8 (19-25 Feb.)	24.7	10.4	95.0	55.9	0.0	23.5	7.6	8 (19-25 Feb.)	24.2	11.7	94.0	53.0	7.4	19.0	8.1
9 (26-04 Mar.)	26.8	13.0	93.1	51.6	0.0	23.6	8.0	9 (26-04 Mar.)	28.1	12.9	94.0	42.0	0.0	22.7	7.9
10 (05-11 Mar.)	27.5	11.0	89.7	44.1	0.0	25.4	9.7	10 (05-11 Mar.)	26.7	14.5	90.0	47.0	23.0	24.8	7.8
11 (12-18 Mar.)	29.6	12.7	86.6	38.3	0.0	27.5	10.3	11 (12-18 Mar.)	24.2	14.2	91.0	56.0	14.9	22.8	6.5
12 (19-25 Mar.)	29.5	13.7	86.3	39.6	0.0	30.7	10.3	12 (19-25 Mar.)	29.8	14.5	84.0	36.0	3.2	32.2	8.8
13 (26-01 Apr.)	32.4	15.2	71.7	36.1	0.0	37.4	10.7	13 (26-01 Apr.)	33.0	17.6	83.0	35.0	0.0	38.3	9.5
14 (02-08 Apr.)	34.3	17.5	68.4	40.4	0.0	37.6	10.7	14 (02-08 Apr.)	34.3	20.1	70.0	30.0	0.0	42.9	6.3
15 (09-15 Apr.)	32.7	17.2	76.6	38.7	15.2	34.9	8.8	15 (09-15 Apr.)	35.1	18.0	65.0	22.0	0.4	57.4	10.2
16 (16-22 Apr.)	37.1	19.3	51.9	14.0	0.0	57.6	10.6	16 (16-22 Apr.)	38.9	22.3	59.0	21.0	2.6	65.6	10.2
17 (23-29 April)	37.9	20.3	50.7	15.8	0.0	50.4	11.1	17 (23-29 April)	37.8	18.1	52.0	13.0	0.0	68.5	12.1
18(30-06 May)	36.6	23.0	62.9	34.4	8.0	48.2	10.1	18(30-06 May)	39.2	22.4	49.0	23.0	2.4	65.4	6.6

Udaipur Latitude 24°35' N Longitude 73° 42' E Height above MSL 582.17 m

Julian weeks	Temperature,C		RH %		Rainfall	Pan Evap.	Sun Shine
	Max.	Min.	Max.	Min.	mm	mm	hrs/day
40 (01-07 Oct.)	34.8	18.5	63.4	25.3	0.0	5.2	7.7
41 (08-14 Oct.)	34.7	18.7	68.3	24.6	0.0	5.5	6.5
42 (15-21 Oct.)	35.6	18.7	61.4	18.9	0.0	5.7	8.9
43 (22-28 Oct)	33.6	14.4	73.9	47.1	0.0	5.4	9.0
44 (29-04 Nov.)	32.4	13.5	78.6	58.6	0.0	4.4	8.4
45 (05-11 Nov.)	30.0	13.0	83.3	64.0	0.0	3.4	7.7
46 (12-18 Nov.)	28.6	12.0	84.1	61.1	0.0	3.0	6.6
47 (19-25 Nov.)	26.2	9.3	79.9	59.7	0.0	2.6	5.7
48 (26-02 Dec.)	28.6	8.8	80.1	58.0	0.0	2.3	8.2
49 (03-09 Dec.)	23.5	11.7	93.7	80.1	4.2	1.5	2.4
50 (10-16 Dec.)	24.9	9.6	89.3	68.3	0.0	1.8	6.0
51 (17-23 Dec)	25.4	7.8	83.6	55.0	0.0	2.0	5.5
52 (24-31 Dec)	26.2	6.3	91.5	52.4	0.0	2.2	8.6
1 (01-07 Jan)	24.2	5.2	89.9	44.6	0.0	2.3	8.1
2 (8-14 Jan)	25.2	7.4	87.3	40.7	0.0	2.1	7.2
3 (15-21 Jan)	27.8	7.3	90.4	35.1	0.0	3.2	8.8
4 (22-28 Jan)	25.4	6.1	84.3	31.9	0.0	3.3	8.7
5 (29-04 Feb.)	28.6	7.7	80.4	30.4	0.0	3.7	8.9
6 (05-11 Feb.)	25.7	8.5	81.1	35.9	0.0	3.1	5.7
7 (12-18 Feb.)	26.9	9.1	78.3	40.3	0.0	3.6	8.4
8 (19-25 Feb.)	31.7	12.0	77.3	23.1	0.0	4.8	8.6
9 (26-04 Mar.)	32.5	12.8	68.7	20.1	0.0	4.6	7.3
10 (05-11 Mar.)	32.3	12.0	56.4	22.9	0.0	5.8	7.5
11 (12-18 Mar.)	33.5	13.5	52.2	18.2	0.0	6.5	7.7
12 (19-25 Mar.)	32.6	14.2	58.4	21.3	0.0	5.8	7.2
13 (26-01 Apr.)	37.5	15.7	46.6	12.7	0.0	8.4	8.6
14 (02-08 Apr.)	37.8	17.6	46.0	18.0	2.2	7.9	7.5
15 (09-15 Apr.)	36.7	19.8	48.7	23.4	0.0	7.3	5.2
16 (16-22 Apr.)	34.6	19.2	29.1	14.9	0.0	10.2	8.3
17 (23-29 April)							
18(30-06 May)							

MALTING QUALITY EVALUATION

The Barley Network Unit took up the evaluation of grain samples of Advanced Varietal Trial (AVT) and Initial Varietal Trial (IVT) on malt barley received from various test sites at its central facility for malting quality evaluation. The malt barley varietal trials were conducted in NWPZ during Rabi 2017-18. The trial conducting centers were requested to provide about 500 gm grain sample of each genotype. The grain samples were received from seven locations (Hisar, Karnal, Bawal, Ludhiana, Bathinda, Durgapura and Pantnagar). This year a total of 133 samples were received. There were 13 test entries in IVT (TS) and one entry in AVT (DWRB 160) along with five checks.

Table-1 Details of grain samples received and analyzed for malting quality

State	Location	Trial	No. of Samples
Haryana	Hisar	AVT/IVT	19
	Karnal	AVT/IVT	19
	Bawal	AVT/IVT	19
Punjab	Ludhiana	AVT/IVT	19
	Bathinda	AVT/ IVT	19
Rajasthan	Durgapura	AVT/IVT	19
Uttarakhand	Pantnagar	AVT/IVT	19
Total			133

The grain samples were analyzed for different malting quality traits as shown in the table 2.

Table 2. Malting quality traits analyzed

Grain Quality	Malt Quality
- 1000 Grain Weight (g)	- Malt Yield (%)
- Test Weight (kg/hl)	- Malt Friability (%)
- Germinative Energy (at 72 hrs) (%)	- Hot Water extract % (F.g.d.b.)
	- Diastatic Power (⁰ L)
- Husk Content (%)	- Wort Filtration rate (ml/hr)
- Protein Content (%)	- Kolbach Index
- Beta glucan (%)	- Wort Colour (on EBC scale)
- Kernel Plumpness (%)	- Wort pH
- Proportion of bold grain (on 2.5 mm sieve)	- Saccharification rate
- Proportion of thin grain (through 2.2 mm sieve)	

The samples were first analyzed for physical and biochemical grain parameters important for malting based on the approved guidelines. The different traits (test weight, bold / thin proportion, germinative energy, 1000 grain weight and husk content) were analyzed as per EBC approved procedures. Crude protein content of grains was predicted using FOSS NIR system and is expressed on dry weight basis.

The processed grain samples (thin grains removed) were subjected to micro-malting on the "Joe White Micro-malting System" taking 100 gm sample from each variety. Micro-malting was done in three phases, which included steeping, germination and kilning. Steeping was done in four stages (wet stage for 8 hours at 25°C; air rest for 12 hours at 18°C; wet stage for 6 hours at 25°C and air rest for 10 hours at 18°C) in a total duration of 36 hours. Germination was done in three stages (24 hours at 18°C, 24 hours at 17°C and 12 hours at 16°C) in total of 60 hours. Kilning was done in a total of 8 stages for 24 hours

starting from 45°C and increasing 5°C incrementally after each duration of 3 hours with final temperature of 80°C.

The Analytical Guidelines for Barley Breeders in India (Annexure-1) approved by the "National Core Group on Malt Barley Development" (NCGMBD) were followed for the minimum standards of physical and biochemical properties of barley grain and malt, for evaluation of new genotypes. The analytical methods of EBC (Analytica EBC, 2003) were followed for determination of various quality parameters. The analysis of diastatic power (D.P.) of malt was done as per the IOB method and expressed in °Linter value.

The following important points may be considered during interpretation of the results.

- *Protein content and Kolbach index has been estimated using NIR system on dry weight basis.*
- *Husk content analysis was done by Sodium hypo-chlorite method (dry basis) as per EBC procedure.*
- *The steeping temperature during wet stages has been kept at 25°C.*
- *The wort was filtered through Whatman folded filter papers (2555 1/2, (dia 320 mm) to determine filtration rate and subsequent analysis of wort.*
- *Since in each micro-malting cycle, samples of two locations were taken, the differences in location values should be seen under this light also.*

Several genotypes were observed as good source for individual grain and malt quality traits (Table 3), though they may not have good values for remaining traits. The average zonal performance of the AVT and IVT entries for grain and malt quality traits is given in Tables 4(a & b). The location wise data for each physical and biochemical grain/malt quality parameter are given in annexure 2. The mean values were taken for identifying promising lines based on minimum standards determined by the 'NCGMBD' for malt barley in the country.

The interpretation of results for important grain and malt characters from different locations and other important observations are summarized below:

1000 grain weight (g)

Highest thousand grain weight was recorded by DWRB 160 (62 g), in total there were four entries having higher thousand grain weight as compared to the best check.

Test weight (Kg/hl)

The entries DWRB 160 and DWRB 181 had at par test weight (66 kg/hl) compared to best check.

Bold grain percentage

Barley grain used for malting should be uniform and plump to allow for consistent processing and for high yields of malt extract. Percentage of bold and thin grains determines the overall grain plumpness. The maximum limit for thin grains is 3% and minimum for bold grains is 90% and 80% for two rowed and six rowed barley, respectively. Six genotypes had better values for this trait in comparison to checks and the genotype DWRB 160 & PL 904 had the highest value of 97%.

Germination percentage

One of the key qualities of malting barley is its ability to germinate rapidly and synchronously. Germination check was done by petri plate test in an incubator at 18°C for 72 hrs during the month of June. All the genotypes were tested had satisfactory germination.

Husk content

Adhering husk is one of the key attributes which makes barley suitable for malting as it protects the growing acrospires from mechanical damage during malting operations. However lower values of husk are desirable to get better modification and higher product recovery. Three genotypes PL 905, RD 2986 and PL904 had lower average husk values as compared to the best check.

Protein content

Protein content is one of the important parameters in selecting malting barley. It is affected by genotype, cultural practices and growing environments. Malt barley with high protein content usually results in lower extracts. Crude protein content was predicted using NIR system. This year none of the entry had lower values of this trait as compared to best check.

β- glucan content

The major constituent of barley endosperm cell walls are β-D-(1-3), (1-4) glucans (75%). The level of β-glucan has been shown to have a relationship with other malt quality traits such as viscosity, speed of filtration and Kolbach index and may affect extract value. Entries from Karnal and Hisar centers only were screened for beta glucan content. Five genotypes had lower values of beta glucan as compared to best check, however, DWRB 182 and PL 905 were found promising having mean values of less than 4.0%.

Malt Yield (%)

In case of the malt yield, the absolute value is not an indicator, and the malt yield with acceptable ranges of malt friability and hot water extract should be taken into consideration. Since lower germination may also result in higher values of this trait. Overall malt yield ranged from 83.7 to 87.4.

Malt Friability (%)

The physical quality of malt is measured by malt friability. Two entries DWRB 184 and PL 905 and better friability values as compared to best check and values were more than 70%.

Hot Water Extract (HWE)

Hot water extract is one of the most important malting quality traits for the industry. Malt extract may be the most complex malting quality trait in terms of biochemistry and genetics. It is a comparable trait to grain yield in that they are both mega-traits influenced by a number of sub-traits. Further the time of micromalting (in relation to grain dormancy) and micromalting regime/conditions also affect all malt related traits. Therefore results should be interpreted under this light. Only one genotype PL 905 had the best average value for this trait as compared to the best check.

Diastatic Power (°L)

The diastatic power (DP) of barley malt represents the collective activity of several starch degrading enzymes that accumulate or activated during malting. The enzyme activities of β -amylase, α -amylase, limit dextrinase and α -glucosidase have been identified as being active during malting and mashing. The Diastatic Power (DP) was analyzed by IOB method and expressed in °L values. There are different standards/ preferences for the value of DP in different countries as per the end product requirements. In India the desirable limit has been fixed as > 90.0 °L. The entries RD 2986, DWRB 182 and DWRB 183 had higher values of DP when compared to the best check.

Wort Filtration (ml/hr)

The values ranged from 226 to 301 with two entries PL 904 and PL 905 having values better than the best check.

Kolbach Index (%)

The Kolbach Index (KI) is an important parameter that provides information on the level of protein modification (breakdown) that has occurred during the malting process and is a ratio of soluble nitrogen in wort to total nitrogen in malt. This was analyzed using NIR system. The values ranged from 36 to 41.

Other traits & overall better entries

Apart from the above traits, the other malt quality traits like wort colour, pH and Sachharification rate were also analyzed. The results are given in Annexure 2.

Since many of the grain and malt quality traits are negatively correlated and we have to look for the balanced optimal combination for these traits. There were several entries observed promising for individual traits, after the detailed analysis across locations in the NWP Zone. This was done by the system of scoring giving due weightage to important traits. (Table 6). Thus based on the ten important traits (a maximum possible score of 30), entries DWRB 160 and PL 905 were having better overall malting quality score under timely sown conditions.

Table 3. Promising entries* for individual malting quality trait

Traits	Promising entries
Test Weight	DWRB 160, DWRB 181
Bold Grains (%)	DWRB160, PL904, DWRB184, RD2986, DWRB181, RD2987
Thousand grain weight	DWRB160, PL904, RD2985, RD2988, RD2986
Husk Content	PL905, RD2986, PL904
Beta glucan	DWRB182, PL905, KB1638, RD2987, DWRB181
Malt Friability	DWRB184, PL905
Hot water extract	PL905
Filtration Rate	PL904, PL905
Diastatic Power	RD2986, DWRB182, DWRB183
Over all MQ	DWRB 160, PL 905

**Superior or at par to best check*

Table 4 a. Grain quality of IVT (Timely sown) malt barley entries in NWPZ

S.No.	Genotype	Test wt (kg/hl)	Bold (%)#	Thin (%)	1000GW (g)	Germ. (%)	Protein (%)	Husk (%)	Beta glu (%)
1	DWRB160**	66 (62-68)	97 (95-99)	0.6 (0.1-1.4)	62 (54-69)	97 (96-98)	10.7 (8.5-12.4)	10.3 (9.3-11.8)	5.5 (5.2-5.8)
2	DWRB181	66 (58-71)	94 (92-98)	1.2 (0.3-2.4)	49 (41-54)	96 (90-99)	12.5 (9.2-14.7)	10.6 (8.7-13.6)	4.4 (4.3-4.4)
3	DWRB182	62 (59-67)	83 (67-94)	3.4 (0.8-10.5)	42 (35-46)	98 (96-99)	11.6 (8.0-13.8)	13.4 (10.4-15.8)	3.5 (3.3-3.7)
4	DWRB183	65 (60-71)	93 (88-98)	1.4 (0.2-3.7)	48 (43-53)	97 (95-98)	11.2 (9.2-12.4)	10.2 (9.3-11.8)	4.6 (4.4-4.8)
5	DWRB184	65 (61-69)	96 (93-98)	0.7 (0.2-1.7)	50 (46-53)	98 (96-99)	10.2 (8.2-11.2)	10.1 (7.7-12.4)	5.1 (4.7-5.5)
6	DWRB187*	56 (50-61)	66 (33-83)	9.1 (1.6-25.9)	33 (28-40)	97 (96-98)	10.5 (6.9-13.3)	11.4 (9.4-13.4)	6.3 (6.1-6.4)
7	KB1634*	59 (54-64)	85 (57-97)	2.7 (0.5-7.0)	44 (40-50)	96 (94-98)	10.3 (8.0-12.3)	11.7 (8.7-13.4)	5.1 (5.0-5.2)
8	KB1638*	57 (54-62)	80 (58-94)	3.6 (0.9-9.7)	39 (36-42)	98 (97-99)	11.2 (9.2-12.7)	14.1 (11.2-15.7)	4.1 (3.9-4.3)
9	PL904	65 (59-71)	97 (91-99)	0.6 (0.1-2.4)	54 (46-58)	97 (95-99)	12.3 (10.8-14.7)	9.4 (7.4-12.9)	5.0 (4.6-5.4)
10	PL905	64 (60-70)	87 (78-96)	2.4 (0.5-4.6)	43 (39-49)	96 (95-98)	10.5 (8.7-12.2)	9.1 (7.7-13.0)	3.8 (3.6-3.9)
11	RD2985	64 (61-67)	91 (82-97)	1.3 (0.3-2.4)	53 (49-58)	97 (90-99)	12.0 (10.9-13.7)	10.1 (8.5-12.6)	6.7 (6.5-6.9)
12	RD2986	64 (58-69)	95 (80-99)	1.2 (0.1-5.9)	51 (39-58)	97 (96-98)	12.8 (11.0-15.6)	9.3 (8.1-11.9)	6.3 (6.1-6.5)
13	RD2987	59 (49-68)	93 (89-98)	1.3 (0.4-4.1)	49 (44-55)	97 (92-98)	12.4 (10.8-14.1)	12.3 (10.1-15.7)	4.3 (4.1-4.5)
14	RD2988	62 (57-66)	90 (77-97)	2.0 (0.7-5.7)	52 (46-61)	97 (95-99)	13.2 (8.8-14.7)	10.0 (7.8-13.7)	6.0 (6.0-6.1)
15	DWRB101 ©	66 (62-70)	92 (89-95)	1.2 (0.3-2.8)	48 (44-53)	98 (95-99)	10.7 (8.2-13.1)	9.5 (8.6-10.6)	4.6 (4.2-5.0)
16	DWRB123 ©	66 (63-69)	93 (87-97)	1.2 (0.4-2.5)	51 (47-53)	98 (96-98)	11.2 (9.3-11.9)	9.6 (8.1-12.0)	5.1 (4.7-5.5)
17	RD2849 ©	66 (62-71)	91 (85-99)	1.2 (0.4-1.8)	47 (44-51)	97 (95-98)	10.8 (9.2-12.5)	10.0 (8.4-12.9)	4.5 (4.2-4.7)
18	BH902 ©*	60 (56-64)	91 (77-96)	1.9 (0.8-4.9)	47 (44-50)	96 (92-99)	9.5 (7.8-11.1)	12.1 (9.5-15.5)	6.0 (6.0-6.1)
19	DWRB137 ©*	61 (59-65)	90 (84-95)	2.0 (0.7-3.0)	44 (41-48)	98 (96-99)	9.6 (7.9-11.0)	11.3 (8.9-14.9)	4.9 (4.8-5.1)

* = six- row barleys # = range in brackets ** AVT 1st year entry

Table 4 b. Malt quality of IVT (Timely sown) malt barley entries in NWPZ

S.No.	Genotype	MY (%)#	Frib (%)	FR (ml/hr)	HWE (%fgdb)	DP (^o L)	KI (%)
1	DWRB160**	86.7 (84.5-89.9)	63 (53-79)	253 (130-320)	80.5 (78.7-82.3)	98 (86-121)	40 (37-42)
2	DWRB181	86.5 (82.5-89.4)	67 (58-88)	280 (235-315)	78.4 (70.8-83.2)	101 (86-111)	36 (34-38)
3	DWRB182	87.1 (83.8-89.4)	66 (46-86)	266 (185-310)	79.7 (77.2-82.6)	106 (94-121)	37 (35-41)
4	DWRB183	86.3 (82.3-89.0)	65 (36-92)	259 (140-315)	80.4 (75.2-83.6)	104 (90-125)	39 (36-41)
5	DWRB184	85.6 (81.7-88.5)	75 (55-92)	236 (105-280)	80.2 (78.0-84.8)	96 (87-109)	39 (37-42)
6	DWRB187*	84.8 (80.0-89.4)	62 (44-74)	264 (110-305)	78.2 (69.3-83.3)	98 (87-108)	41 (38-45)
7	KB1634*	86.3 (76.8-89.9)	54 (37-76)	274 (205-310)	80.4 (78.6-83.3)	94 (86-104)	39 (36-41)
8	KB1638*	86.5 (82.1-89.7)	52 (24-69)	274 (105-320)	76.2 (67.9-80.8)	100 (87-109)	38 (32-42)
9	PL904	87.4 (84.2-89.6)	56 (46-69)	301 (280-320)	78.9 (74.2-81.1)	102 (85-125)	39 (35-44)
10	PL905	85.5 (78.2-88.9)	73 (54-89)	286 (160-315)	82.9 (80.0-86.1)	87 (67-102)	39 (32-41)
11	RD2985	87.2 (83.9-89.9)	51 (33-71)	251 (100-300)	79.3 (76.7-82.5)	101 (90-123)	38 (35-42)
12	RD2986	85.0 (80.8-87.5)	65 (48-83)	269 (110-320)	79.3 (74.6-83.4)	107 (93-121)	37 (32-40)
13	RD2987	86.0 (82.5-89.5)	61 (34-85)	276 (190-320)	76.8 (72.7-81.8)	93 (83-109)	38 (36-39)
14	RD2988	85.8 (79.8-89.5)	51 (24-78)	241 (135-305)	77.0 (72.9-83.7)	100 (91-109)	38 (34-41)
15	DWRB101 ©	83.7 (77.9-88.9)	69 (52-92)	260 (135-320)	81.3 (78.1-84.3)	91 (71-108)	39 (36-42)
16	DWRB123 ©	86.5 (83.4-89.3)	49 (29-71)	283 (250-315)	78.8 (76.9-82.2)	92 (80-116)	37 (35-40)
17	RD2849 ©	87.4 (84.4-89.5)	66 (32-88)	274 (215-305)	80.6 (76.5-82.7)	88 (62-109)	38 (35-41)
18	BH902 ©*	85.5 (80.8-88.7)	60 (43-75)	226 (160-275)	79.8 (75.8-82.4)	91 (68-108)	38 (32-42)
19	DWRB137 ©*	87.1 (84.1-89.2)	62 (39-76)	254 (200-305)	77.5 (73.8-83.6)	102 (85-125)	39 (37-42)

*= six- row barley # = range **AVT 1st year entry

Table 5. Weighted performances of IVT entries for malting quality (Timely sown)

No	Genotype	TW	Bol	Hus	Pro	BG	Fria	HW	FR	DP	KI	Total(30)
1	DWRB160**	3	3	3	3	0	1	3	3	3	3	25
2	DWRB181	3	3	1	2	1	2	3	2	3	1	21
3	DWRB182	1	1	2	0	2	2	3	2	3	1	17
4	DWRB183	2	3	2	3	0	1	3	2	3	2	21
5	DWRB184	2	3	3	3	0	3	2	2	2	2	22
6	DWRB187*	0	0	3	2	0	1	3	2	3	3	17
7	KB1634*	0	3	3	1	0	0	3	3	3	2	18
8	KB1638*	0	2	3	0	1	0	3	1	3	2	15
9	PL904	2	3	1	3	0	0	3	2	3	2	19
10	PL905	2	1	3	3	2	3	3	3	2	2	24
11	RD2985	2	2	1	3	0	0	3	2	3	2	18
12	RD2986	2	3	1	3	0	1	3	2	3	1	19
13	RD2987	0	3	1	1	1	0	3	1	3	2	15
14	RD2988	2	2	0	3	0	0	2	1	3	2	15
15	DWRB101 ©	3	2	3	3	0	2	3	3	3	2	24
16	DWRB123 ©	3	3	2	3	0	0	3	2	3	1	20
17	RD2849 ©	3	2	3	3	1	2	3	3	2	2	24
18	BH902 ©*	1	3	3	1	0	1	2	3	3	2	19
19	DWRB137 ©*	1	3	3	0	0	1	3	3	3	2	19

*= six- row barleys

**AVT 1st year entry

Score range

HW	<60=0, 60-63=1, >63-65=2, >65=3
Bold	(Two-Row) >92=3, 88-92=2, 80-87=1, <80=0 (Six-row) = >82=3, 78-82=2, 70-77=1, <70=0
Husk	<10.5=3, 10.6-11.5=2, 11.6-12.5=1, >12.5=0
Protein	Two-row= <11=3, 11-11.9=2, 12-13=1, >13=0 Six-row = <11.5=3, 11.5-12.4=2, 12.5-13.5=1, >13.5=0
B. glucan	3.5=3, 3.5-4.0=2, 4.1-4.5=1, >4.5=0
Friability	>70=3, 65-70=2, 60-65=1, <60=0
HWE	Two-row= >80.0=3, 78-80=2, 76-78=1, <76=0 Six-row = >78=3, 76-78=2, 74-76=1, <74=0
FR	>250=3, 200-250=2, 150-200=1, <150=0
DP	>90=3, 80-90=2, <80=1
KI	40-45 = 3, 37-39 & 46-48=2, 35-37=1, <35 & >48=0

HW= Hectolitre Weight (kg/hl), Bold= Bold grain (%), Husk= Husk (%), Protein= Protein % dwb, HWE= Hot water extract (%), FR= Filtration rate (ml/hr), DP= Diastatic power (°L), B Glucan= Beta glucan, KI= Kolbach index (%)

Annexure - 1

ANALYTICAL GUIDELINES FOR BARLEY BREEDERS IN INDIA (Revised on 05.03.2016)

No.	Parameter	2-row	6-row
BARLEY GRAIN			
1	Moisture (%)	<12.0	<12.0
2	Hectolitre Weight (kg/hl)	> 65.0	> 60.0
3	Kernel Size on 2.5 mm	Uniform plump >90%	Uniform plump >80%
	Through 2.2 mm	<3%	<5%
4	1000 grain weight(g)	42-45	>40
5	Husk Content	<11.0%	<11%
6	Protein Content(d.b.)	9.0-12.0%	9.0-12.0%
7	Germination Capacity	>96%	>96%
8	Germination Energy (72hrs)	>96%	>96%
9	Beta-glucan	<4.0%	<4.0%
MALT			
1	Malt Homogeneity	>90%	>90%
2	Malt Friability	>65%	>60%
3	Total Protein (d.b.)		
	Soluble Protein S/T/Ratio	4-5 % 40-44%	4-5 % 40-44%
4	Malt Extract (minimum)	80%	78%
5	Wort Viscosity	<1.5 mPas	<1.5 mPas
6	Wort turbidity	Clear	Clear
7	Diastatic Power(⁰ L)	>90	>90
8	Wort Beta-glucan	<200 ppm	<200 ppm
9	FAN	>150 ppm	>150ppm

* Finalized in first meeting of the "NATIONAL CORE GROUP ON MALT BARLEY DEVELOPMENT" at DWR, Karnal on 12 Dec., 1995 and revised during the annual workshop at IARI, New Delhi in August 2004 and further on 05.03.2016 at ICAR-IIWBR, Karnal.

Abbreviations used in different tables

MY=% Malt Yield, FB= % malt friability, HG= % malt Homogeneity, DP= malt diastatic power (⁰ L), HWE = % Hot water extract, FR= Wort filtration rate, KI= Kolbach Index, WC= Wort colour, SR= Sachharification rate (minutes), W pH= Wort pH

Annexure 2 : IVT-TS-MALT BARLEY
GRAIN PARAMETERS

Table 2.1 b : Thousand grain weight (g) of IVT (TS-MB) entries from different locations

S.No.	Genotype	Karnal	Hisar	Bawal	Bathinda	Ludhiana	Durgapura	Pantnagar	Average
1	DWRB160**	63	61	56	54	65	69	69	62
2	DWRB181	53	48	41	49	47	54	51	49
3	DWRB182	41	43	45	46	35	45	41	42
4	DWRB183	52	46	44	53	43	49	48	48
5	DWRB184	53	51	49	52	46	51	51	50
6	DWRB187*	36	28	31	35	30	30	40	33
7	KB1634*	50	46	43	46	40	41	44	44
8	KB1638*	40	36	39	39	38	42	42	39
9	PL904	57	46	51	55	57	58	58	54
10	PL905	45	41	43	49	39	46	42	43
11	RD2985	53	50	49	53	49	58	56	53
12	RD2986	58	46	39	52	52	58	54	51
13	RD2987	49	50	44	49	45	53	55	49
14	RD2988	54	50	53	51	46	61	51	52
15	DWRB101 ©	48	46	48	47	44	53	48	48
16	DWRB123 ©	53	47	52	52	48	53	52	51
17	RD2849 ©	47	46	47	48	44	51	48	47
18	BH902 ©*	49	45	50	46	44	44	49	47
19	DWRB137 ©*	48	43	43	45	41	44	46	44
	Mean	50	46	46	49	45	51	50	

*= 6 row barley

**AVT 1st year entry

Table 2.2 b : Test weight (kg/hl) of IVT (TS-MB) entries from different locations

S.No.	Genotype	Karnal	Hisar	Bawal	Bathinda	Ludhiana	Durgapura	Pantnagar	Average
1	DWRB160**	68	65	64	62	68	66	65	66
2	DWRB181	71	66	58	62	70	70	65	66
3	DWRB182	67	61	62	59	60	67	59	62
4	DWRB183	71	65	63	61	66	68	60	65
5	DWRB184	68	62	63	62	69	68	61	65
6	DWRB187*	61	50	54	56	57	57	58	56
7	KB1634*	64	61	54	56	60	63	56	59
8	KB1638*	58	57	56	54	56	62	54	57
9	PL904	71	64	60	59	68	68	63	65
10	PL905	70	63	63	60	69	61	64	64
11	RD2985	67	64	62	61	67	66	61	64
12	RD2986	69	62	58	62	69	69	62	64
13	RD2987	65	60	53	56	68	65	49	59
14	RD2988	66	62	58	57	63	66	63	62
15	DWRB101 ©	70	66	62	64	67	70	65	66
16	DWRB123 ©	69	63	64	63	68	68	63	66
17	RD2849 ©	70	66	64	62	67	71	64	66
18	BH902 ©*	64	61	60	57	62	62	56	60
19	DWRB137 ©*	64	62	60	59	65	61	59	61
	Mean	67	62	60	60	65	66	60	

*= 6 row barley

**AVT 1st year entry

Table 2.3 b : Proportion of bold grains (%) of IVT (TS-MB) entries from different locations

S.No.	Genotype	Karnal	Hisar	Bawal	Bathinda	Ludhiana	Durgapura	Pantnagar	Average
1	DWRB160**	99	97	95	96	98	97	99	97
2	DWRB181	96	94	92	93	93	92	98	94
3	DWRB182	78	83	94	91	67	77	91	83
4	DWRB183	98	92	90	96	88	90	95	93
5	DWRB184	98	98	95	96	93	96	98	96
6	DWRB187*	77	33	83	81	60	48	82	66
7	KB1634*	96	92	57	97	80	77	96	85
8	KB1638*	77	58	94	83	76	75	93	80
9	PL904	98	97	91	98	98	96	99	97
10	PL905	90	82	88	96	81	78	91	87
11	RD2985	93	85	95	96	82	91	97	91
12	RD2986	99	92	80	97	98	99	99	95
13	RD2987	97	92	90	97	89	91	98	93
14	RD2988	88	89	92	94	77	97	95	90
15	DWRB101 ©	93	90	92	92	89	94	95	92
16	DWRB123 ©	97	87	92	96	90	94	97	93
17	RD2849 ©	92	86	94	99	85	88	92	91
18	BH902 ©*	94	93	94	95	89	77	96	91
19	DWRB137 ©*	95	88	92	94	84	87	93	90
	Mean	92	86	89	94	85	86	95	

*= 6 row barley

**AVT 1st year entry

Table 2.4 b : Proportion of thin grains (%) of IVT (TS-MB) entries from different locations

S.No.	Genotype	Karnal	Hisar	Bawal	Bathinda	Ludhiana	Durgapura	Pantnagar	Average
1	DWRB160**	0.3	0.3	1.4	0.7	0.7	0.6	0.1	0.6
2	DWRB181	0.5	1.2	2.4	1.1	1.3	1.9	0.3	1.2
3	DWRB182	2.6	2.3	1.7	1.0	10.5	5.3	0.8	3.4
4	DWRB183	0.2	1.0	3.7	0.6	1.8	1.6	1.0	1.4
5	DWRB184	0.2	0.5	1.7	0.8	1.6	0.3	0.2	0.7
6	DWRB187*	2.3	25.9	2.3	3.2	9.4	19.2	1.6	9.1
7	KB1634*	0.5	1.5	3.4	0.5	5.3	7.0	0.8	2.7
8	KB1638*	3.9	9.7	1.7	1.8	3.8	3.7	0.9	3.6
9	PL904	0.3	0.3	2.4	0.4	0.3	0.6	0.1	0.6
10	PL905	1.2	2.6	4.6	0.5	3.2	3.9	1.1	2.4
11	RD2985	0.6	1.8	2.0	0.6	2.4	1.6	0.3	1.3
12	RD2986	0.1	1.4	5.9	0.6	0.3	0.3	0.2	1.2
13	RD2987	0.5	0.9	4.1	0.4	1.8	0.5	0.8	1.3
14	RD2988	1.4	1.7	2.8	0.7	5.7	0.8	0.7	2.0
15	DWRB101 ©	0.5	0.8	2.8	1.2	1.5	1.3	0.3	1.2
16	DWRB123 ©	0.5	1.8	2.5	0.9	1.8	0.4	0.7	1.2
17	RD2849 ©	0.9	1.5	1.8	0.4	1.6	1.7	0.6	1.2
18	BH902 ©*	0.8	1.0	1.7	0.9	2.8	4.9	1.1	1.9
19	DWRB137 ©*	0.7	2.2	2.2	1.3	3.0	2.8	1.8	2.0
	Mean	0.9	3.1	2.7	0.9	3.1	3.1	0.7	

*= 6 row barley

**AVT 1st year entry

Table 2.5 b : Germination (% 72hrs) of IVT (TS-MB) entries from different locations

S.No.	Genotype	Karnal	Hisar	Bawal	Bathinda	Ludhiana	Durgapura	Pantnagar	Average
1	DWRB160**	96	98	98	96	96	97	97	97
2	DWRB181	98	90	98	98	90	98	99	96
3	DWRB182	97	96	99	98	98	98	98	98
4	DWRB183	96	95	98	96	98	96	98	97
5	DWRB184	96	99	98	98	98	96	99	98
6	DWRB187*	96	98	97	97	97	97	98	97
7	KB1634*	94	96	96	96	94	98	98	96
8	KB1638*	99	98	97	98	97	98	97	98
9	PL904	95	95	99	96	96	98	98	97
10	PL905	95	96	97	95	97	98	96	96
11	RD2985	98	96	98	99	90	98	99	97
12	RD2986	97	96	96	97	96	98	98	97
13	RD2987	92	96	98	98	96	98	98	97
14	RD2988	96	98	98	98	95	96	99	97
15	DWRB101 ©	99	99	98	95	97	98	99	98
16	DWRB123 ©	96	98	98	98	97	98	98	98
17	RD2849 ©	97	96	98	98	95	98	98	97
18	BH902 ©*	99	98	96	97	92	96	97	96
19	DWRB137 ©*	98	96	99	98	98	97	98	98
	Mean	97	97	98	97	96	97	98	

*= 6 row barley

**AVT 1st year entry

Table 2.6 b : Protein content (%) # of IVT (TS-MB) entries from different locations

S.No.	Genotype	Karnal	Hisar	Bawal	Bathinda	Ludhiana	Durgapura	Pantnagar	Average
1	DWRB160**	9.9	11.9	10.1	12.4	10.6	11.8	8.5	10.7
2	DWRB181	12	11.9	14.2	12.2	13.0	14.7	9.2	12.5
3	DWRB182	11.2	10.7	11.9	12.6	13.8	12.8	8.0	11.6
4	DWRB183	11.3	12.1	11.3	12.4	10.8	11.6	9.2	11.2
5	DWRB184	11.2	9.8	11.0	10.8	9.7	10.6	8.2	10.2
6	DWRB187*	9.1	13.3	11.2	10.6	9.8	12.6	6.9	10.5
7	KB1634*	10	9.3	12.3	10.9	10.6	11.1	8	10.3
8	KB1638*	10.9	12.2	11.2	11.4	11.1	12.7	9.2	11.2
9	PL904	11.8	12.7	14.7	10.8	12.2	13.2	10.8	12.3
10	PL905	10.5	10.2	10.7	10.2	10.8	12.2	8.7	10.5
11	RD2985	11.02	12.1	12.1	12.1	12.1	13.7	10.9	12.0
12	RD2986	12.6	13.0	15.6	12.9	11.9	12.4	11.0	12.8
13	RD2987	11.7	11.9	13.3	12.6	12.2	14.1	10.8	12.4
14	RD2988	14.7	12.1	14.4	14.1	13.6	14.6	8.8	13.2
15	DWRB101 ©	10.1	10	11.2	12.2	10.1	13.1	8.2	10.7
16	DWRB123 ©	11.2	11.9	11.1	11.9	11.3	11.5	9.3	11.2
17	RD2849 ©	11.3	10.5	11.0	10.9	10.4	12.5	9.2	10.8
18	BH902 ©*	9.4	9.1	9.5	11.1	9.4	10.5	7.8	9.5
19	DWRB137 ©*	9.6	10.1	9.8	11	10.1	9.0	7.9	9.6
	Mean	11.0	11.3	11.9	11.7	11.2	12.4	9.0	

*= 6 row barley

Predicted values through NIR

**AVT 1st year entry

Table 2.7 b : Husk content (%) of IVT (TS-MB) entries from different locations***

S.No.	Genotype	Karnal	Hisar	Bathinda	Ludhiana	Durgapura	Pantnagar	Average
1	DWRB160**	10.3	9.3	11.0	9.3	11.8	10.0	10.3
2	DWRB181	9.0	8.7	13.6	9.0	10.5	12.9	10.6
3	DWRB182	15.8	10.4	14.8	14.4	12.2	12.8	13.4
4	DWRB183	9.7	9.3	11.8	9.3	9.3	11.7	10.2
5	DWRB184	9.0	10.3	11.7	9.8	7.7	12.4	10.1
6	DWRB187*	12.2	13.4	11.8	12.4	9.5	9.4	11.4
7	KB1634*	8.7	9.6	13.4	13.1	12.3	13.2	11.7
8	KB1638*	14.4	14.6	15.3	13.0	11.2	15.7	14.1
9	PL904	9.4	8.0	12.9	7.8	7.4	10.8	9.4
10	PL905	8.7	7.8	13.0	7.8	7.7	9.5	9.1
11	RD2985	10.5	8.9	11.4	8.6	8.5	12.6	10.1
12	RD2986	9.2	8.2	11.9	8.1	9.2	8.8	9.3
13	RD2987	12.4	12.2	13.3	10.4	10.1	15.7	12.3
14	RD2988	11.0	8.8	13.7	8.4	7.8	10.3	10.0
15	DWRB101 ©	9.8	8.7	10.6	9.0	8.6	10.4	9.5
16	DWRB123 ©	10.3	9.5	12.0	8.6	8.1	9.5	9.6
17	RD2849 ©	9.2	9.0	11.3	9.0	8.4	12.9	10.0
18	BH902 ©*	15.5	10.6	13.7	10.1	9.5	13.3	12.1
19	DWRB137 ©*	11.7	10.0	12.4	9.7	8.9	14.9	11.3
	Mean	10.9	9.9	12.6	9.9	9.4	11.9	

*= 6 row barley

**AVT 1st year entry

***Bawal location could not be done due to insufficient grains

Table 2.8 b : β -Glucan Content (% d.w.b.) of IVT(TS-MB) entries at two locations

S.No.	Genotype	Karnal	Hisar	Average
1	DWRB160**	5.2	5.8	5.5
2	DWRB181	4.4	4.3	4.4
3	DWRB182	3.3	3.7	3.5
4	DWRB183	4.4	4.8	4.6
5	DWRB184	5.5	4.7	5.1
6	DWRB187*	6.4	6.1	6.3
7	KB1634*	5.0	5.2	5.1
8	KB1638*	3.9	4.3	4.1
9	PL904	4.6	5.4	5.0
10	PL905	3.9	3.6	3.8
11	RD2985	6.5	6.9	6.7
12	RD2986	6.1	6.5	6.3
13	RD2987	4.5	4.1	4.3
14	RD2988	6.1	6.0	6.0
15	DWRB101 ©	5.0	4.2	4.6
16	DWRB123 ©	4.7	5.5	5.1
17	RD2849 ©	4.2	4.7	4.5
18	BH902 ©*	6.1	6.0	6.0
19	DWRB137 ©*	4.8	5.1	4.9
	Mean	5.0	5.1	

*six row barley **AVT 1st year entry

MALT PARAMETERS

Table 2.9 b : Malt yield (%) of IVT (TS-MB) entries from different locations

S.No.	Genotype	Karnal	Hisar	Bawal	Bathinda	Ludhiana	Durgapura	Pantnagar	Average
1	DWRB160**	88.6	89.9	84.5	85.1	85.7	88.2	85.2	86.7
2	DWRB181	89.4	88.9	82.5	85.7	84.7	88.2	85.9	86.5
3	DWRB182	88.1	87.7	83.8	89.4	86.9	89.1	84.5	87.1
4	DWRB183	88.9	89.0	82.3	84.5	86.6	88.4	84.2	86.3
5	DWRB184	87.9	88.2	84.1	82.7	81.7	88.5	85.9	85.6
6	DWRB187*	86.5	89.4	82.6	84.9	80.0	84.2	86.3	84.8
7	KB1634*	89.7	89.8	76.8	87.2	83.3	89.9	87.3	86.3
8	KB1638*	89.7	86.6	82.1	84.9	87.7	89.5	84.9	86.5
9	PL904	88.0	87.8	84.2	86.5	89.6	88.6	87.4	87.4
10	PL905	88.9	86.9	86.0	85.6	85.9	78.2	86.8	85.5
11	RD2985	89.5	89.3	83.9	86.8	84.1	89.9	86.9	87.2
12	RD2986	86.6	87.5	80.8	85.2	83.3	86.8	84.9	85.0
13	RD2987	89.5	88.0	83.5	86.9	82.5	88.0	83.8	86.0
14	RD2988	88.0	88.3	82.2	79.8	89.5	85.5	87.3	85.8
15	DWRB101 ©	88.9	87.4	83.3	87.3	77.9	80.0	81.4	83.7
16	DWRB123 ©	89.3	85.8	84.8	86.4	83.4	88.0	87.8	86.5
17	RD2849 ©	89.3	89.5	84.4	85.3	87.4	89.0	87.2	87.4
18	BH902 ©*	88.6	84.3	84.9	84.6	80.8	88.7	86.5	85.5
19	DWRB137 ©*	89.1	87.8	84.1	84.5	88.8	89.2	85.9	87.1
	Mean	88.7	88.0	83.2	85.4	84.7	87.3	85.8	

*= 6 row barley

**AVT 1st year entry

Table 2.10 b : Malt friability (%) of IVT (TS-MB) entries from different locations

S.No.	Genotype	Karnal	Hisar	Bawal	Bathinda	Ludhiana	Durgapura	Pantnagar	Average
1	DWRB160**	64	63	53	70	56	60	79	63
2	DWRB181	61	63	72	63	58	61	88	67
3	DWRB182	71	76	69	69	46	48	86	66
4	DWRB183	36	64	84	58	60	61	92	65
5	DWRB184	71	80	84	75	55	68	92	75
6	DWRB187*	74	50	65	74	44	55	73	62
7	KB1634*	39	51	76	57	43	37	72	54
8	KB1638*	24	50	69	52	59	43	68	52
9	PL904	57	46	55	69	60	46	62	56
10	PL905	55	72	89	65	54	87	86	73
11	RD2985	39	49	71	59	53	33	54	51
12	RD2986	66	67	57	68	54	48	83	63
13	RD2987	56	49	56	66	85	34	70	59
14	RD2988	39	59	76	53	31	24	78	51
15	DWRB101 ©	52	73	92	58	60	55	91	69
16	DWRB123 ©	50	41	71	54	33	29	67	49
17	RD2849 ©	60	68	84	78	32	57	88	66
18	BH902 ©*	57	52	72	62	43	56	75	60
19	DWRB137 ©*	43	67	76	69	39	67	76	62
	Mean	53	60	72	64	51	51	78	

*= 6 row barley

**AVT 1st year entry

Table 2.11 b : Hot water extract (% fgdb) of IVT (TS-MB) entries from different locations

S.No.	Genotype	Karnal	Hisar	Bawal	Bathinda	Ludhiana	Durgapura	Pantnagar	Average
1	DWRB160**	78.7	81.6	78.7	78.9	81.7	81.7	82.3	80.5
2	DWRB181	76.7	78.3	70.8	80.3	81.0	78.4	83.2	78.4
3	DWRB182	79.3	80.6	77.8	77.2	80.4	80.1	82.6	79.7
4	DWRB183	75.2	82.8	82.1	76.9	82.2	79.7	83.6	80.4
5	DWRB184	81.0	79.5	80.9	78.9	78.6	78.0	84.8	80.2
6	DWRB187*	83.3	77.7	76.5	81.4	78.9	69.3	80.1	78.2
7	KB1634*	79.8	78.6	78.9	81.6	83.3	80.4	80.0	80.4
8	KB1638*	67.9	74.3	76.6	76.8	80.8	76.5	80.4	76.2
9	PL904	78.8	81.1	74.2	78.2	79.8	80.2	79.9	78.9
10	PL905	82.7	83.8	83.3	80.0	80.8	83.7	86.1	82.9
11	RD2985	80.2	77.8	76.7	82.5	79.0	79.2	79.6	79.3
12	RD2986	80.0	74.6	76.7	79.1	82.7	78.6	83.4	79.3
13	RD2987	75.4	77.2	72.7	79.5	81.8	75.3	75.6	76.8
14	RD2988	72.9	76.4	79.3	76.6	74.3	75.6	83.7	77.0
15	DWRB101 ©	78.1	83.1	82.1	82.2	80.5	79.0	84.3	81.3
16	DWRB123 ©	78.8	79.6	78.3	78.2	76.9	77.4	82.2	78.8
17	RD2849 ©	81.4	82.1	79.6	82.6	76.5	79.6	82.7	80.6
18	BH902 ©*	79.3	78.1	75.8	81.2	80.2	82.4	81.2	79.8
19	DWRB137 ©*	73.8	78.9	75.8	80.6	74.4	75.6	83.6	77.5
	Mean	78.1	79.3	77.7	79.6	79.7	78.5	82.1	

*= 6 row barley

**AVT 1st year entry

Table 2.12 b : Wort filtration rate (ml/hr) of IVT (TS-MB) entries from different locations

S.No.	Genotype	Karnal	Hisar	Bawal	Bathinda	Ludhiana	Durgapura	Pantnagar	Average
1	DWRB160**	255	270	320	250	265	280	130	253
2	DWRB181	250	310	315	305	235	250	295	280
3	DWRB182	295	310	230	290	185	310	240	266
4	DWRB183	295	305	315	245	140	225	285	259
5	DWRB184	250	280	280	280	105	240	220	236
6	DWRB187*	305	270	280	280	110	300	305	264
7	KB1634*	260	300	310	270	205	295	280	274
8	KB1638*	310	295	320	310	105	285	290	274
9	PL904	320	310	305	280	280	310	300	301
10	PL905	315	305	310	300	160	310	300	286
11	RD2985	225	300	275	275	100	285	300	251
12	RD2986	315	280	320	295	110	265	295	269
13	RD2987	320	250	320	300	190	255	300	276
14	RD2988	250	305	225	285	135	270	220	241
15	DWRB101 ©	255	250	320	310	135	300	250	260
16	DWRB123 ©	250	315	260	280	255	310	310	283
17	RD2849 ©	265	260	305	300	275	295	215	274
18	BH902 ©*	185	240	250	205	160	265	275	226
19	DWRB137 ©*	275	275	305	285	210	225	200	254
	Mean	273	286	293	281	177	278	264	

*= 6 row barley

**AVT 1st year entry

Table 2.13 b : Saccharification rate (minutes) of IVT (TS-MB) entries from different locations

S.No.	Genotype	Karnal	Hisar	Bawal	Bathinda	Ludhiana	Durgapura	Pantnagar	Average
1	DWRB160**	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
2	DWRB181	5.0	10.0	5.0	5.0	10.0	5.0	5.0	6.4
3	DWRB182	5.0	10.0	5.0	5.0	10.0	5.0	5.0	6.4
4	DWRB183	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
5	DWRB184	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
6	DWRB187*	5.0	5.0	5.0	5.0	10.0	5.0	5.0	5.7
7	KB1634*	5.0	5.0	5.0	5.0	5.0	5.0	10.0	5.7
8	KB1638*	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
9	PL904	10.0	5.0	5.0	5.0	5.0	5.0	5.0	5.7
10	PL905	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
11	RD2985	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
12	RD2986	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
13	RD2987	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
14	RD2988	5.0	10.0	5.0	5.0	5.0	10.0	5.0	6.4
15	DWRB101 ©	5.0	5.0	5.0	5.0	10.0	5.0	5.0	5.7
16	DWRB123 ©	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
17	RD2849 ©	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
18	BH902 ©*	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
19	DWRB137 ©*	5.0	5.0	10.0	10.0	5.0	5.0	5.0	6.4
	Mean	5.3	5.8	5.3	5.3	6.1	5.3	5.3	

*= 6 row barley

**AVT 1st year entry

Table 2.14 b : Wort pH of IVT (TS-MB) entries from different locations

S.No.	Genotype	Karnal	Hisar	Bawal	Bathinda	Ludhiana	Durgapura	Pantnagar	Average
1	DWRB160**	5.9	5.9	5.9	5.7	5.9	5.9	5.9	5.8
2	DWRB181	5.9	5.9	5.8	5.9	6.0	5.8	6.0	5.9
3	DWRB182	6.0	5.8	5.9	5.7	5.8	5.8	5.9	5.8
4	DWRB183	5.9	5.8	5.8	5.8	5.9	5.9	5.8	5.9
5	DWRB184	5.9	5.9	5.8	5.7	5.8	5.9	5.8	5.8
6	DWRB187*	5.8	5.8	5.8	5.8	5.9	5.8	5.7	5.8
7	KB1634*	5.9	5.9	5.8	6.0	5.7	5.8	5.8	5.8
8	KB1638*	6.0	5.9	5.8	5.9	5.9	5.9	5.7	5.9
9	PL904	5.8	5.9	5.8	5.8	5.9	5.8	5.8	5.8
10	PL905	5.9	5.9	5.9	5.8	5.9	5.8	5.8	5.9
11	RD2985	5.9	5.8	5.8	5.8	5.8	5.7	5.9	5.8
12	RD2986	5.9	5.9	5.8	5.8	5.8	5.8	5.9	5.8
13	RD2987	5.9	5.8	5.8	5.7	5.7	5.9	5.9	5.8
14	RD2988	6.0	5.9	5.8	5.8	5.9	5.8	5.8	5.9
15	DWRB101 ©	6.0	5.9	5.8	5.8	5.9	5.6	5.9	5.8
16	DWRB123 ©	6.0	5.9	5.8	5.8	5.8	5.9	5.9	5.9
17	RD2849 ©	5.8	5.9	5.9	5.9	5.8	5.8	5.8	5.8
18	BH902 ©*	5.9	5.8	5.8	5.9	5.7	5.7	5.9	5.8
19	DWRB137 ©*	6.0	5.9	5.8	5.8	5.9	5.9	5.8	5.9
	Mean	5.9	5.9	5.8	5.8	5.8	5.8	5.8	

*= 6 row barley

**AVT 1st year entry

Table 2.15 b : Wort colour (EBC method) of IVT (TS-MB) entries from different locations

S.No.	Genotype	Karnal	Hisar	Bawal	Bathinda	Ludhiana	Durgapura	Pantnagar	Average
1	DWRB160**	2.0	2.0	2.0	2.0	2.5	2.0	2.0	2.1
2	DWRB181	2.0	2.0	2.5	2.0	2.0	2.0	2.5	2.1
3	DWRB182	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
4	DWRB183	2.0	2.0	2.5	2.0	2.5	2.0	2.0	2.1
5	DWRB184	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
6	DWRB187*	2.0	2.0	2.5	2.0	2.5	2.0	2.0	2.1
7	KB1634*	2.0	2.0	2.0	2.0	2.0	2.5	2.0	2.1
8	KB1638*	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
9	PL904	2.0	2.0	2.0	2.0	2.0	2.0	2.5	2.1
10	PL905	2.0	2.0	2.5	2.0	2.0	2.0	2.5	2.1
11	RD2985	2.0	2.0	2.0	2.0	2.5	2.0	2.0	2.1
12	RD2986	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
13	RD2987	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
14	RD2988	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
15	DWRB101 ©	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
16	DWRB123 ©	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
17	RD2849 ©	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
18	BH902 ©*	2.0	2.0	2.0	2.0	2.0	2.5	2.5	2.1
19	DWRB137 ©*	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
	Mean	2.0	2.0	2.1	2.0	2.1	2.1	2.1	

*= 6 row barley

**AVT 1st year entry

Table 2.16 b : Diastatic power (°L) of IVT (TS-MB) entries from different locations

S.No.	Genotype	Karnal	Hisar	Bawal	Bathinda	Ludhiana	Durgapura	Pantnagar	Average
1	DWRB160**	99	86	121	103	89	91	99	98
2	DWRB181	110	86	111	104	98	99	98	101
3	DWRB182	99	94	111	109	100	109	121	106
4	DWRB183	100	99	125	99	90	100	116	104
5	DWRB184	87	98	98	104	90	89	109	96
6	DWRB187*	91	100	108	105	87	99	100	98
7	KB1634*	90	86	89	95	91	99	104	94
8	KB1638*	95	93	103	104	87	108	109	100
9	PL904	109	89	125	109	85	94	104	102
10	PL905	67	76	94	102	95	88	90	87
11	RD2985	123	103	98	100	95	98	90	101
12	RD2986	104	103	121	111	93	99	116	107
13	RD2987	99	87	89	109	91	91	83	93
14	RD2988	109	109	91	105	93	94	99	100
15	DWRB101 ©	71	86	108	89	103	83	98	91
16	DWRB123 ©	80	83	89	94	98	82	116	92
17	RD2849 ©	62	73	89	95	91	100	109	88
18	BH902 ©*	68	83	108	98	93	94	93	91
19	DWRB137 ©*	86	85	125	111	89	104	115	102
	Mean	92	90	105	102	92	96	104	

*= 6 row barley

**AVT 1st year entry

Table 2.17 b : Kolbach Index (KI) # of IVT (TS-MB) entries from different locations

S.No.	Genotype	Karnal	Hisar	Bawal	Bathinda	Ludhiana	Durgapura	Pantnagar	Average
1	DWRB160**	38	42	37	41	39	39	42	40
2	DWRB181	35	36	37	38	35	34	37	36
3	DWRB182	35	38	39	37	35	36	41	37
4	DWRB183	36	39	39	41	37	40	39	39
5	DWRB184	39	39	39	37	38	40	42	39
6	DWRB187*	42	38	41	38	44	45	43	41
7	KB1634*	36	40	40	39	41	38	41	39
8	KB1638*	32	38	41	38	42	35	40	38
9	PL904	38	39	36	44	39	35	40	39
10	PL905	32	41	40	41	40	37	39	39
11	RD2985	40	37	39	36	42	35	39	38
12	RD2986	32	38	38	38	39	34	40	37
13	RD2987	38	39	39	36	38	37	39	38
14	RD2988	36	37	40	37	41	34	41	38
15	DWRB101 ©	36	42	41	36	39	37	41	39
16	DWRB123 ©	37	38	39	35	37	35	40	37
17	RD2849 ©	38	37	41	39	35	35	40	38
18	BH902 ©*	39	38	42	37	32	40	40	38
19	DWRB137 ©*	37	38	40	39	42	40	38	39
	Mean	37	39	39	38	39	37	40	

*= 6 row barley

**AVT 1st year entry

FEED BARLEY QUALITY EVALUATION

The feed grain samples from various trials and grown at different locations were analysed for few physical parameters and protein content. Each centre was requested to provide a grain sample of 250 g. The parameters analysed included test weight (kg/hl), thousand grain weight (g), grain plumpness and grain crude protein content (%). The details of samples received are as under:

Table-1 Details of grain samples received and analyzed for quality

Trial	Zone	Locations	Total (Samples)
AVT (RF)	NHZ	Almora, Bajaura, Malan, Shimla	84
AVT (DP)	NHZ	Almora, Bajaura, Shimla	57
AVT (IR)	NEPZ	Kanpur	7
IVT (IR)	NWPZ&NEPZ	Durgapura, Hisar, Karnal, Ludhiana, Pantnagar, Kanpur	180
IVT (RF)	NEPZ	Kanpur, Saini Farm	34
AVT(SAL/ALK)	NWPZ&NEPZ	Hisar, Saini Farm	34
IVT (DP)	NWPZ&NEPZ	Hisar, Durgapura, Kanpur	48
		Total	444

Hectolitre weight (test weight) was measured with ICAR-IIWBR Hectolitre Weight instrument. The crude protein content was estimated using FOSS NIR system and has been given on dry weight basis. The quality data has been presented trial wise (Annexure 1). The entries having highest test weight; grain plumpness and thousand grain weight have been listed in table no.2.

Table 2. Entries having highest test weight, thousand grain weight, bold grain percentage and lowest thin grain percentage in respective trials

No.	Trial	Zone	Test weight	Thousand grain weight	Bold grain (%)	Thin grain (%)
1	AVT (RF)	NHZ	BHS352 ©, HBL793	UPB1071	UPB1070	UPB1070
2	AVT (DP)	NHZ	HBL797	UPB1072	UPB1070	UPB1070
3	AVT (IR)	NEPZ	RD2948	JYOTI ©	DWRB137 ©	DWRB137 ©
4	IVT (IR)	NWPZ & NEPZ	HUB261	PL900	RD2786 ©	RD2786 ©
5	IVT (RF)	NEPZ	PL905	RD2981	RD2981	RD2981
6	AVT (SAL/ALK)	NWPZ & NEPZ	DWRB180	KB1632	HUB263	RD2979
7	IVT (DP)	NWPZ & NEPZ	AZAD ©	NDB1682	NDB1682	UPB1075

Annexure -1

Table 1. Test weight (kg/hl) of entries from AVT (Rain Fed) North Hill Zone

S.No.	Genotype	Almora	Bajaura	Malan	Shimla	Mean
1	BHS465	55.1	54.5	59.2	60.8	57.4
2	BHS466	60.5	58.0	61.8	67.1	61.9
3	BHS467	57.2	58.7	61.6	65.4	60.7
4	BHS468	56.2	56.4	60.5	61.0	58.5
5	HBL113	65.3	64.3	65.5	71.7	66.7
6	HBL789	63.1	60.5	64.9	68.7	64.3
7	HBL793	70.6	71.7	72.4	78.0	73.2
8	HBL802	70.4	57.3	58.4	66.2	63.1
9	HBL812	58.4	57.3	61.4	64.7	60.5
10	HBL814	58.8	58.2	63.1	67.6	61.9
11	UPB1070	60.7	53.5	61.3	59.4	58.7
12	UPB1071	61.4	61.0	66.5	70.6	64.9
13	UPB1072	72.8	54.1	64.5	65.3	64.2
14	VLB155	63.0	60.2	64.8	69.9	64.5
15	VLB156	60.5	57.0	58.8	62.8	59.8
16	VLB157	63.3	61.7	63.5	67.5	64.0
17	VLB158	59.1	57.6	62.9	63.2	60.7
18	VLB159	71.5	62.9	64.5	71.9	67.7
19	BHS352 ©	72.6	71.6	72.7	76.0	73.2
20	BHS400 ©	53.2	55.8	65.9	62.0	59.2
21	VLB118 ©	52.6	54.4	64.0	61.7	58.2
	Mean	62.2	59.4	63.7	66.7	

Table 2. Thousand grain weight of entries from AT (Rain Fed) North Hill Zone

S.No.	Genotype	Almora	Bajaura	Malan	Shimla	Mean
1	BHS465	29.6	31.5	34.4	32.2	31.9
2	BHS466	33.1	36.8	40.4	36.0	36.6
3	BHS467	35.3	44.7	44.0	42.4	41.6
4	BHS468	36.5	42.3	43.9	36.4	39.8
5	HBL113	29.5	38.2	40.0	35.6	35.8
6	HBL789	26.0	45.2	49.6	46.4	41.8
7	HBL793	22.9	30.1	34.3	31.0	29.6
8	HBL802	27.8	36.7	45.9	39.3	37.4
9	HBL812	38.7	30.5	32.7	31.6	33.4
10	HBL814	27.3	30.2	37.1	34.2	32.2
11	UPB1070	36.7	43.1	32.0	43.6	38.9
12	UPB1071	38.4	47.6	52.6	47.4	46.5
13	UPB1072	29.8	37.2	39.1	32.9	34.8
14	VLB155	38.3	43.8	50.4	43.0	43.9
15	VLB156	28.7	30.6	34.5	33.3	31.8
16	VLB157	38.8	49.9	49.1	40.6	44.6
17	VLB158	40.9	39.6	45.3	42.7	42.1
18	VLB159	36.7	42.3	45.8	40.4	41.3
19	BHS352 ©	24.0	32.4	37.4	32.1	31.5
20	BHS400 ©	40.8	39.4	51.6	39.8	42.9
21	VLB118 ©	36.1	41.3	43.0	42.1	40.6
	Mean	33.1	38.7	42.1	38.2	

Table 3. Bold grain (%) of entries from AVT (Rain Fed) North Hill Zone

S.No.	Genotype	Almora	Bajaura	Malan	Shimla	Mean
1	BHS465	35.5	49.2	46.1	32.9	40.9
2	BHS466	55.0	68.4	72.9	62.6	64.7
3	BHS467	55.8	92.8	88.0	77.9	78.6
4	BHS468	61.8	85.2	80.3	56.0	70.8
5	HBL113	42.6	85.3	84.9	63.4	69.1
6	HBL789	80.9	92.2	93.4	90.4	89.2
7	HBL793	3.7	11.4	5.7	14.5	8.8
8	HBL802	40.0	69.3	91.2	77.5	69.5
9	HBL812	31.9	56.4	63.5	53.8	51.4
10	HBL814	48.9	59.9	69.5	67.7	61.5
11	UPB1070	74.9	94.2	96.1	92.4	89.4
12	UPB1071	64.4	95.5	92.5	95.9	87.1
13	UPB1072	31.2	66.6	56.6	43.8	49.6
14	VLB155	36.0	80.8	83.9	82.2	70.7
15	VLB156	45.7	61.9	67.0	52.8	56.9
16	VLB157	54.9	93.9	89.7	69.8	77.1
17	VLB158	61.0	81.2	87.5	79.0	77.2
18	VLB159	10.3	38.1	57.5	43.1	37.3
19	BHS352 ©	1.0	10.7	23.7	20.7	14.0
20	BHS400 ©	42.8	67.9	85.5	64.1	65.1
21	VLB118 ©	72.7	90.3	84.2	78.0	81.3
	Mean	45.3	69.1	72.4	62.8	

Table 4. Thin grain (%) of entries from AVT (Rain Fed) North Hill Zone

S.No.	Genotype	Almora	Bajaura	Malan	Shimla	Mean
1	BHS465	17.2	11.0	9.6	23.3	15.3
2	BHS466	9.9	4.3	3.8	7.4	6.4
3	BHS467	13.3	1.2	1.5	4.5	5.1
4	BHS468	8.3	1.5	0.4	10.4	5.2
5	HBL113	14.4	1.5	2.2	10.0	7.0
6	HBL789	4.5	2.5	1.9	2.5	2.9
7	HBL793	74.9	45.0	40.4	52.1	53.1
8	HBL802	19.5	6.1	0.7	3.5	7.5
9	HBL812	37.2	13.5	10.4	18.6	19.9
10	HBL814	24.1	14.2	5.9	10.9	13.8
11	UPB1070	5.4	1.4	0.5	1.4	2.2
12	UPB1071	7.9	0.8	0.7	0.4	2.5
13	UPB1072	28.8	6.3	9.2	19.0	15.8
14	VLB155	14.0	3.0	1.8	2.9	5.4
15	VLB156	16.6	8.6	7.2	15.0	11.9
16	VLB157	20.0	0.7	0.9	4.8	6.6
17	VLB158	10.2	3.8	1.8	51.1	16.7
18	VLB159	61.0	10.6	8.0	11.7	22.8
19	BHS352 ©	71.7	44.4	28.8	41.6	46.6
20	BHS400 ©	20.2	4.2	2.5	9.4	9.1
21	VLB118 ©	6.3	1.7	2.3	4.4	3.7
	Mean	23.1	8.9	6.7	14.5	

Table 5. Crude protein content (% dwt) in grains of entries from AVT (Rain Fed) North Hill Zone

S.No.	Genotype	Almora	Bajaura	Malan	Shimla	Mean
1	BHS465	11.8	11.6	8.6	8.1	10.0
2	BHS466	14.8	9.0	9.6	8.8	10.6
3	BHS467	14.9	8.7	9.5	9.6	10.7
4	BHS468	12.8	8.4	9.4	9.2	10.0
5	HBL113	14.4	9.3	8.7	8.8	10.3
6	HBL789	15.7	10.2	11.1	11.8	12.2
7	HBL793	14.7	9.8	10.3	9.8	11.2
8	HBL802	16.2	10.6	9.6	9.3	11.4
9	HBL812	13.3	8.9	8.4	8.0	9.7
10	HBL814	13.7	9.3	8.7	8.8	10.1
11	UPB1070	12.8	9.9	9.0	7.7	9.9
12	UPB1071	13.0	11.8	11.4	10.8	11.8
13	UPB1072	13.6	9.9	10.2	8.5	10.6
14	VLB155	13.2	10.6	11.6	11.5	11.7
15	VLB156	12.9	8.7	9.6	8.3	9.9
16	VLB157	13.1	8.9	10.1	9.1	10.3
17	VLB158	15.0	10.3	9.2	8.4	10.7
18	VLB159	15.4	11.0	11.2	10.9	12.1
19	BHS352 ©	14.8	9.6	9.8	9.5	10.9
20	BHS400 ©	11.4	9.4	12.1	8.6	10.4
21	VLB118 ©	13.3	12.1	11.0	8.0	11.1
	Mean	13.8	9.9	10.0	9.2	

Table 6: Test weight (kg/hl) of entries from AVT (Dual Purpose) North Hill Zone

S.No.	Genotype	Almora	Bajaura	Shimla	Mean
1	BHS461	54.7	54.4	61.1	56.7
2	BHS462	60.6	54.4	62.4	59.1
3	BHS463	60.1	56.4	63.5	60.0
4	BHS464	56.4	54.3	62.0	57.6
5	HBL797	76.8	67.8	76.4	73.7
6	HBL804	57.9	55.9	61.8	58.5
7	HBL818	60.6	57.6	61.8	60.0
8	HBL821	58.5	56.4	62.0	59.0
9	HBL822	71.9	58.3	68.9	66.4
10	UPB1070	54.3	52.8	60.1	55.7
11	UPB1071	61.4	59.3	67.1	62.6
12	UPB1072	71.6	54.8	67.1	64.5
13	VLB155	61.1	58.9	67.3	62.4
14	VLB156	57.2	52.5	61.9	57.2
15	VLB157	58.7	55.9	67.0	60.5
16	VLB158	58.3	54.4	61.7	58.1
17	VLB160	57.5	54.4	60.6	57.5
18	BHS380 ©	59.5	55.3	60.9	58.6
19	HBL276 ©	72.6	68.5	74.1	71.7
	Mean	61.6	57.0	64.6	

Table 7: Thousand grain weight of entries from AVT (Dual Purpose) North Hill Zone

S.No.	Genotype	Almora	Bajaura	Shimla	Mean
1	BHS461	19.7	34.7	38.5	31.0
2	BHS462	24.6	30.8	38.4	31.3
3	BHS463	15.4	28.8	30.4	24.9
4	BHS464	7.2	37.8	41.9	29.0
5	HBL797	52.8	29.9	26.6	36.4
6	HBL804	60.7	28.1	31.5	40.1
7	HBL818	10.7	36.6	37.3	28.2
8	HBL821	20.0	36.0	37.9	31.3
9	HBL822	55.0	29.7	36.7	40.5
10	UPB1070	4.4	41.5	39.4	28.4
11	UPB1071	16.1	40.0	42.2	32.8
12	UPB1072	97.0	35.2	32.1	54.8
13	VLB155	26.8	37.0	40.1	34.6
14	VLB156	39.1	30.3	36.9	35.4
15	VLB157	22.0	34.7	46.3	34.3
16	VLB158	8.4	36.6	41.6	28.9
17	VLB160	8.2	36.1	42.9	29.1
18	BHS380 ©	19.1	33.8	33.2	28.7
19	HBL276 ©	10.5	24.8	22.6	19.3
	Mean	27.2	33.8	36.7	

Table 8: Bold grain (%) of entries from AVT (Dual Purpose) North Hill Zone

S.No.	Genotype	Almora	Bajaura	Shimla	Mean
1	BHS461	66.0	82.4	72.4	73.6
2	BHS462	63.3	77.2	80.8	73.8
3	BHS463	65.2	77.9	72.0	71.7
4	BHS464	79.9	75.7	83.9	79.8
5	HBL797	52.9	50.3	40.3	47.8
6	HBL804	42.6	60.7	54.3	52.5
7	HBL818	75.0	89.7	81.7	82.1
8	HBL821	70.0	75.9	76.0	74.0
9	HBL822	30.3	42.5	61.3	44.7
10	UPB1070	90.4	93.9	89.0	91.1
11	UPB1071	59.4	83.0	89.4	77.3
12	UPB1072	11.8	62.7	34.9	36.5
13	VLB155	50.2	63.9	65.4	59.8
14	VLB156	48.6	66.2	69.5	61.4
15	VLB157	53.7	81.7	85.2	73.5
16	VLB158	82.6	78.3	80.1	80.3
17	VLB160	82.7	78.5	81.0	80.7
18	BHS380 ©	61.0	69.6	56.6	62.4
19	HBL276 ©	15.2	20.6	16.7	17.5
	Mean	57.9	70.0	67.9	

Table 9: Thin grain (%) of entries from AVT (Dual Purpose) North Hill Zone

S.No.	Genotype	Almora	Bajaura	Shimla	Mean
1	BHS461	9.9	3.0	4.3	5.7
2	BHS462	12.3	5.2	2.8	6.8
3	BHS463	7.7	5.2	4.3	5.7
4	BHS464	3.6	3.7	1.9	3.1
5	HBL797	26.4	22.1	35.6	28.0
6	HBL804	30.3	18.5	15.8	21.5
7	HBL818	5.4	1.1	2.0	2.8
8	HBL821	10.0	5.4	4.8	6.7
9	HBL822	27.5	17.0	8.4	17.6
10	UPB1070	2.2	0.9	2.7	1.9
11	UPB1071	8.0	2.8	1.2	4.0
12	UPB1072	48.5	8.3	17.5	24.8
13	VLB155	13.4	7.3	4.2	8.3
14	VLB156	19.6	7.3	7.5	11.5
15	VLB157	11.0	3.5	1.5	5.3
16	VLB158	4.2	5.9	4.1	4.7
17	VLB160	4.1	5.1	4.1	4.4
18	BHS380 ©	9.6	4.4	10.6	8.2
19	HBL276 ©	52.8	44.4	52.6	49.9
	Mean	16.1	9.0	9.8	

Table 10: Crude protein content (% dwt) of entries from AVT (Dual Purpose) North Hill Zone

S.No.	Genotype	Almora	Bajaura	Shimla	Mean
1	BHS461	13.2	9.2	9.8	10.7
2	BHS462	13.0	9.9	9.0	10.6
3	BHS463	13.5	8.5	11.3	11.1
4	BHS464	13.8	10.2	12.1	12.0
5	HBL797	15.6	9.5	12.4	12.5
6	HBL804	11.8	8.2	9.7	9.9
7	HBL818	14.6	9.4	11.5	11.8
8	HBL821	13.8	9.1	11.2	11.4
9	HBL822	14.4	9.2	12.2	11.9
10	UPB1070	12.2	9.6	10.2	10.7
11	UPB1071	12.2	9.9	10.4	10.8
12	UPB1072	14.2	8.3	10.1	10.9
13	VLB155	12.9	9.3	11.9	11.4
14	VLB156	12.1	7.7	9.5	9.8
15	VLB157	12.2	8.4	9.2	9.9
16	VLB158	14.7	9.5	11.1	11.8
17	VLB160	14.2	8.5	10.8	11.2
18	BHS380 ©	13.5	9.5	12.3	11.8
19	HBL276 ©	14.4	9.3	11.8	11.8
	Mean	13.5	9.1	10.9	

Table 11. Quality of AVT (Irrigated)- Feed Barley (North Eastern Plain Zone) at Kanpur

S.No.	Varieties	Test wt (kg/ha)	TGW (g)	Bold grain (%)	Thin grain (%)	Protein (% dwt b)
1	KB1531	58.1	38.7	77.6	2.6	10.1
2	PL892	59.5	36.8	77.5	6.4	9.6
3	RD2948	59.7	39.5	68.0	8.5	11.6
4	DWRB137 ©	59.5	42.2	84.0	2.0	9.1
5	HUB113 ©	56.8	34.1	57.6	13.9	10.0
6	JYOTI ©	58.5	43.0	51.0	7.4	11.3
7	K508 ©	58.9	33.3	62.3	6.4	9.9
8	RD2552 ©	58.5	38.6	64.8	6.8	9.0

Table 21. Test weight (kg/hl) of entries from IVT (Irrigated Feed Barley)

S.No	Genotype	Durgapura	Hisar	Ludhiana	Karnal	Pantnagar	Kanpur	Mean
1	BH1020	62.8	58.9	57.2	56.9	57.3	58.3	58.6
2	BH1021	58.0	60.3	60.0	60.1	55.8	57.8	58.7
3	DWRB187	58.6	55.1	60.7	59.4	58.5	57.4	58.3
4	DWRB188	60.4	64.6	57.2	59.4	59.4	58.2	59.9
5	HUB260	61.2	59.9	60.1	60.3	55.6	58.6	59.3
6	HUB261	73.2	60.3	70.0	71.7	52.5	62.5	65.0
7	HUB262	55.2	61.1	60.7	57.9	56.2	60.0	58.5
8	JB357	57.9	58.7	58.3	55.4	55.5	56.0	57.0
9	JB360	62.5	61.9	63.9	60.2	59.4	61.9	61.6
10	KB1605	67.0	59.2	63.7	64.6	59.6	60.4	62.4
11	KB1606	74.2	55.5	72.4	63.4	55.2	52.6	62.2
12	NDB1698	74.9	56.8	74.7	61.5	56.5	56.5	63.5
13	PL891	59.1	68.8	57.4	55.4	57.7	57.0	59.2
14	PL900	62.6	59.8	61.8	61.0	62.0	57.8	60.8
15	PL902	57.0	59.4	56.5	55.5	54.8	61.9	57.5
16	PL903	55.5	62.1	57.0	55.2	52.6	60.6	57.2
17	RD2969	58.1	59.9	58.6	54.7	58.5	59.4	58.2
18	RD2970	60.8	60.3	57.7	56.5	55.7	59.3	58.4
19	RD2971	63.8	57.7	58.2	59.1	53.2	66.9	59.8
20	RD2972	60.8	61.8	60.6	62.9	60.4	60.7	61.2
21	UPB1073	60.5	59.9	60.6	58.6	58.7	58.5	59.5
22	UPB1074	61.8	56.9	58.7	58.1	57.9	56.8	58.4
23	UPB1075	76.5	58.8	69.7	61.6	57.9	59.9	64.1
24	BH946 ©	62.3	59.6	62.2	64.7	63.4	56.2	61.4
25	DWRB137 ©	60.4	62.2	59.0	60.7	54.7	58.9	59.3
26	KARAN 16 ©	63.0	64.2	56.7	58.7	57.0	71.7	61.9
27	NDB943 ©	59.2	69.8	53.7	61.1	57.6	66.5	61.3
28	RD2552 ©	48.4	58.8	57.4	52.1	57.4	57.2	55.2
29	RD2786 ©	60.9	59.7	61.3	56.7	56.1	57.5	58.7
30	RD2899 ©	60.0	58.8	64.1	58.5	54.9	56.6	58.8
	Mean	61.9	60.4	61.0	59.4	57.1	59.5	

Table 22. Thousand grain weight of entries from IVT (Irrigated Feed Barley)

S.No	Genotype	Durgapura	Hisar	Ludhiana	Karnal	Pantnagar	Kanpur	Mean
1	BH1020	33.7	41.0	33.0	41.3	43.9	38.4	38.6
2	BH1021	37.4	43.0	41.0	51.2	54.7	41.8	44.9
3	DWRB187	38.7	30.3	43.7	42.6	43.5	32.0	38.5
4	DWRB188	34.2	31.3	34.5	37.1	40.0	46.8	37.3
5	HUB260	36.6	38.4	37.8	35.9	41.9	29.2	36.6
6	HUB261	28.4	42.6	29.8	38.4	37.8	42.7	36.6
7	HUB262	26.0	39.3	32.3	33.8	35.1	37.1	33.9
8	JB357	35.9	40.4	34.4	41.6	46.2	40.5	39.8
9	JB360	37.6	28.2	43.2	48.7	46.1	40.8	40.8
10	KB1605	51.4	30.2	43.9	44.4	50.6	27.1	41.3
11	KB1606	43.0	37.9	39.0	46.8	50.2	33.8	41.8
12	NDB1698	30.9	33.1	27.7	27.6	35.5	35.0	31.6
13	PL891	41.5	31.4	45.6	40.3	48.5	41.5	41.5
14	PL900	42.9	47.0	40.9	45.3	48.6	45.6	45.1
15	PL902	31.8	47.2	31.0	39.0	40.9	43.8	39.0
16	PL903	34.8	38.4	36.8	40.8	38.0	38.0	37.8
17	RD2969	33.7	45.4	31.6	38.1	41.9	42.7	38.9
18	RD2970	37.9	42.6	38.1	48.3	43.0	39.3	41.5
19	RD2971	46.7	47.8	36.5	45.7	41.3	43.7	43.6
20	RD2972	42.3	44.4	42.6	42.0	52.3	39.5	43.9
21	UPB1073	30.3	35.0	27.8	41.9	33.0	36.4	34.1
22	UPB1074	39.7	36.3	36.0	41.5	38.1	38.4	38.3
23	UPB1075	35.5	38.4	31.8	49.8	36.1	37.7	38.2
24	BH946 ©	35.7	41.5	39.5	29.8	40.8	34.0	36.9
25	DWRB137 ©	38.5	42.7	41.1	39.4	37.5	38.6	39.6
26	KARAN 16 ©	46.7	30.4	40.5	36.5	36.9	38.5	38.3
27	NDB943 ©	35.3	36.9	34.0	35.2	39.3	35.6	36.1
28	RD2552 ©	28.7	36.5	34.9	43.1	42.9	36.6	37.1
29	RD2786 ©	49.5	40.9	43.2	48.0	50.5	37.3	44.9
30	RD2899 ©	40.4	42.1	40.1	38.0	47.4	40.6	41.4
	Mean	37.5	38.7	37.1	41.1	42.8	38.4	

Table 23. Bold grain (%) of entries from IVT (Irrigated Feed Barley)

S.No	Genotype	Durgapura	Hisar	Ludhiana	Karnal	Pantnagar	Kanpur	Mean
1	BH1020	56.7	89.9	11.1	68.8	91.7	70.9	64.9
2	BH1021	61.3	88.6	3.8	95.3	95.0	74.2	69.7
3	DWRB187	62.9	48.6	85.6	80.7	90.1	52.5	70.1
4	DWRB188	46.7	24.7	62.9	80.5	83.6	76.7	62.5
5	HUB260	68.8	86.6	80.4	72.6	58.0	53.0	69.9
6	HUB261	9.2	89.0	25.3	37.8	60.3	72.5	49.0
7	HUB262	29.5	75.4	8.8	69.6	71.4	57.1	52.0
8	JB357	50.3	88.3	9.5	86.7	93.2	67.0	65.8
9	JB360	56.9	91.2	2.7	81.8	85.2	82.8	66.8
10	KB1605	95.7	39.2	91.2	93.3	95.4	29.2	74.0
11	KB1606	48.9	53.2	42.7	61.9	82.0	28.2	52.8
12	NDB1698	17.7	61.9	37.8	32.5	40.8	48.4	39.9
13	PL891	70.0	63.4	3.2	83.6	89.5	84.4	65.7
14	PL900	83.3	93.5	81.7	83.9	94.9	78.2	85.9
15	PL902	40.8	95.0	51.6	64.6	81.1	82.4	69.3
16	PL903	56.0	77.3	77.7	75.3	67.4	56.4	68.4
17	RD2969	44.9	93.0	17.5	63.9	85.1	84.8	64.9
18	RD2970	67.0	89.3	5.1	79.6	93.9	66.5	66.9
19	RD2971	88.8	95.4	3.0	92.4	68.3	35.0	63.8
20	RD2972	77.0	95.7	3.2	89.4	91.4	84.6	73.6
21	UPB1073	36.1	79.0	18.4	48.3	64.5	61.8	51.4
22	UPB1074	70.6	65.2	6.6	67.0	78.0	49.9	56.2
23	UPB1075	35.7	75.5	20.5	87.3	60.4	53.8	55.5
24	BH946 ©	63.9	93.0	85.0	91.0	87.6	60.5	80.2
25	DWRB137 ©	75.8	91.4	89.6	76.8	82.8	71.5	81.3
26	KARAN 16 ©	83.5	29.4	87.1	82.4	92.3	29.8	67.4
27	NDB943 ©	44.2	47.0	67.6	79.3	83.4	37.2	59.8
28	RD2552 ©	11.6	76.0	46.1	55.8	66.2	54.3	51.7
29	RD2786 ©	93.4	85.0	89.2	94.3	96.8	67.5	87.7
30	RD2899 ©	70.2	88.3	89.4	88.9	94.9	69.8	83.6
	Mean	57.2	75.6	43.5	75.5	80.8	61.4	

Table 24. Thin grain (%) of entries from IVT (Irrigated Feed Barley)

S.No	Genotype	Durgapura	Hisar	Ludhiana	Karnal	Pantnagar	Kanpur	Mean
1	BH1020	16.3	1.4	11.1	8.7	1.5	4.6	7.3
2	BH1021	13.2	2.1	3.8	1.0	0.9	6.1	4.5
3	DWRB187	10.8	13.7	3.1	3.7	1.6	11.3	7.4
4	DWRB188	21.4	29.0	12.2	4.3	3.3	4.5	12.5
5	HUB260	4.0	2.7	3.7	4.3	9.1	17.5	6.9
6	HUB261	54.7	1.5	25.3	15.9	8.0	5.3	18.5
7	HUB262	32.4	5.4	8.8	4.3	4.1	11.6	11.1
8	JB357	15.4	2.5	9.5	3.6	1.6	6.6	6.5
9	JB360	12.8	2.0	2.7	5.0	2.4	3.5	4.7
10	KB1605	0.7	15.1	1.9	1.3	0.9	24.3	7.4
11	KB1606	10.5	7.8	15.5	7.3	1.5	23.3	11.0
12	NDB1698	39.2	12.1	37.8	29.4	24.7	16.6	26.6
13	PL891	6.6	4.7	3.2	3.3	1.3	2.0	3.5
14	PL900	3.3	1.2	3.9	2.5	0.5	3.7	2.5
15	PL902	27.0	0.8	17.5	8.9	3.7	3.4	10.2
16	PL903	13.2	5.7	6.7	7.3	8.4	12.9	9.0
17	RD2969	22.7	2.0	17.5	12.4	1.7	2.1	9.7
18	RD2970	8.2	1.7	5.1	3.4	0.9	9.0	4.7
19	RD2971	1.7	1.0	3.0	0.7	5.7	13.7	4.3
20	RD2972	6.8	0.4	3.2	7.8	1.8	2.5	3.8
21	UPB1073	23.5	2.3	18.4	12.4	6.6	6.3	11.6
22	UPB1074	4.6	4.0	6.6	6.7	2.8	9.8	5.8
23	UPB1075	17.7	4.6	20.5	1.6	6.5	9.3	10.0
24	BH946 ©	9.9	1.1	3.0	5.4	2.1	8.5	5.0
25	DWRB137 ©	6.5	1.8	2.4	0.9	3.8	7.6	3.8
26	KARAN 16 ©	4.0	42.4	3.0	4.0	1.2	19.9	12.4
27	NDB943 ©	16.3	8.8	9.9	3.4	2.1	13.8	9.1
28	RD2552 ©	49.7	5.4	16.0	15.4	4.9	14.3	17.6
29	RD2786 ©	1.4	3.1	2.1	1.5	0.6	6.4	2.5
30	RD2899 ©	8.7	2.5	1.8	2.5	1.0	8.7	4.2
	Mean	15.4	6.3	9.3	6.3	3.8	9.6	

Table 25. Grain crude protein content (% dwt) of entries from IVT (Irrigated Feed Barley)

S.No	Genotype	Durgapura	Hisar	Ludhiana	Karnal	Pantnagar	Kanpur	Mean
1	BH1020	10.5	10.9	9.0	12.1	7.9	10.4	10.1
2	BH1021	9.6	10.2	12.1	10.7	10.1	10.7	10.6
3	DWRB187	12.3	10.7	11.0	12.7	9.9	11.3	11.3
4	DWRB188	10.1	11.5	12.1	10.9	8.0	10.2	10.5
5	HUB260	11.1	9.2	13.5	11.1	8.7	11.0	10.8
6	HUB261	12.8	11.1	13.6	13.5	9.6	12.2	12.1
7	HUB262	12.2	11.3	10.4	9.2	7.5	12.7	10.6
8	JB357	12.1	10.8	11.5	10.1	9.0	11.3	10.8
9	JB360	13.8	9.9	11.3	13.4	10.4	10.4	11.5
10	KB1605	9.6	11.3	10.1	9.5	8.7	11.7	10.2
11	KB1606	12.9	9.5	12.3	13.8	10.2	10.3	11.5
12	NDB1698	12.6	10.1	11.8	12.4	9.1	9.6	10.9
13	PL891	11.6	10.0	9.5	11.0	8.4	10.4	10.2
14	PL900	11.1	9.6	11.7	10.6	8.1	10.8	10.3
15	PL902	10.4	9.4	11.8	11.3	8.0	9.8	10.1
16	PL903	11.4	9.8	12.5	13.3	9.4	9.0	10.9
17	RD2969	9.8	10.7	10.6	12.3	7.6	11.2	10.4
18	RD2970	11.0	10.7	11.8	11.0	9.3	11.7	10.9
19	RD2971	11.3	10.3	10.5	10.2	11.5	13.8	11.3
20	RD2972	10.0	9.2	10.4	11.2	9.2	10.6	10.1
21	UPB1073	11.3	11.6	12.3	10.5	9.5	11.5	11.1
22	UPB1074	10.8	12.0	11.9	11.0	8.6	12.1	11.1
23	UPB1075	12.8	10.0	13.1	10.8	11.8	11.0	11.6
24	BH946 ©	13.2	10.5	12.3	11.1	10.1	11.1	11.4
25	DWRB137 ©	11.0	10.1	9.9	10.9	9.3	11.1	10.4
26	KARAN 16 ©	9.5	11.9	12.9	12.6	9.9	16.3	12.2
27	NDB943 ©	11.5	13.9	13.3	10.0	9.3	12.1	11.7
28	RD2552 ©	13.9	9.6	12.0	13.0	8.8	9.5	11.1
29	RD2786 ©	10.1	10.6	10.8	10.7	8.3	12.0	10.4
30	RD2899 ©	11.5	10.5	10.5	10.7	9.6	10.7	10.6
	Mean	11.4	10.6	11.6	11.4	9.2	14.2	

Table 26. Quality of entries from IVT (Rainfed) NEPZ

S.No.	Genotype	Test wt (kg/ha)			TGW (g)		
		Saini	Kanpur	Mean	Saini	Kanpur	Mean
1	DWRB185	61.1	62.1	61.6	48.8	52.2	50.5
2	DWRB186	57.6	60.7	59.2	36.2	33.3	34.8
3	HUB253	59.7	60.2	60.0	43.9	38.9	41.4
4	HUB260	60.3	62.6	61.5	40.1	43.0	41.6
5	JB362	61.6	62.1	61.9	45.3	45.5	45.4
6	JB363	60.0	61.4	60.7	44.4	37.8	41.1
7	KB1606	53.5	61.1	57.3	37.2	38.5	37.9
8	KB1616	61.6	57.3	59.5	39.1	31.6	35.4
9	KB1633	59.8	62.9	61.4	41.0	41.2	41.1
10	NDB1680	60.1	60.6	60.4	39.3	36.6	38.0
11	PL905	64.9	63.9	64.4	44.6	41.6	43.1
12	RD2981	61.4	61.6	61.5	48.6	54.5	51.6
13	RD2982	59.3	60.6	60.0	50.1	47.8	49.0
14	RD2983	60.9	61.1	61.0	47.1	50.6	48.9
15	RD2984	60.9	62.9	61.9	47.8	49.7	48.8
16	K603 ©	59.5	61.1	60.3	44.0	45.4	44.7
17	LAKHAN ©	60.2	63.9	62.1	46.6	43.0	44.8
	Mean	60.1	61.5		43.8	43.0	

Table 27. Quality of entries from IVT (Rainfed) NEPZ-Continue

S.No.	Genotype	Bold grain (%)			Thin grains (%)			Protein (%)		
		Saini	Kanpur	Mean	Saini	Kanpur	Mean	Saini	Kanpur	Mean
1	DWRB185	95.2	95.9	95.6	0.9	1.1	1.0	9.1	8.6	8.9
2	DWRB186	74.7	74.4	74.6	6.4	6.4	6.4	9.6	8.7	9.2
3	HUB253	88.0	82.2	85.1	1.3	2.3	1.8	9.8	9.5	9.7
4	HUB260	72.3	73.8	73.1	5.0	5.5	5.3	9.5	8.3	8.9
5	JB362	88.1	89.8	89.0	1.6	1.3	1.5	9.4	9.0	9.2
6	JB363	89.0	83.1	86.1	1.6	3.1	2.4	10.1	9.7	9.9
7	KB1606	48.4	49.6	49.0	13.4	10.2	11.8	10.5	8.9	9.7
8	KB1616	67.5	46.5	57.0	5.6	9.8	7.7	10.6	9.2	9.9
9	KB1633	86.6	80.5	83.6	1.5	2.2	1.9	9.8	8.9	9.4
10	NDB1680	77.0	61.9	69.5	3.6	7.5	5.6	8.6	9.0	8.8
11	PL905	90.6	76.0	83.3	1.3	2.6	2.0	10.4	9.1	9.8
12	RD2981	96.0	97.4	96.7	0.7	0.4	0.6	9.9	8.8	9.4
13	RD2982	97.3	95.2	96.3	0.7	0.9	0.8	11.2	10.7	11.0
14	RD2983	95.3	97.5	96.4	0.9	0.5	0.7	9.0	8.4	8.7
15	RD2984	96.1	94.7	95.4	0.6	0.9	0.8	8.4	8.0	8.2
16	K603 ©	81.4	73.8	77.6	3.0	4.1	3.6	9.4	9.4	9.4
17	LAKHAN ©	79.9	61.0	70.5	2.7	5.8	4.3	9.5	9.1	9.3
	Mean	83.7	78.4		3.0	3.8		9.7	9.0	

Table 31. Quality of entries from AVT (SAL/ALK) in NWPZ/NEPZ

S.No.	Varieties	Test wt (kg/hl)			TGW (g)		
		Hisar	Dalipnagar	Mean	Hisar	Dalipnagar	Mean
1	DWRB180	62.3	61.3	61.8	33.1	36.7	34.9
2	DWRB187	55.0	51.9	53.5	30.7	28.5	29.6
3	HUB263	55.6	55.3	55.5	33.9	34.1	34.0
4	HUB264	59.0	55.5	57.3	37.9	44.7	41.3
5	KB1628	57.7	60.9	59.3	41.3	50.6	46.0
6	KB1632	57.0	58.0	57.5	33.4	33.7	33.6
7	NDB1683	61.4	57.9	59.7	43.0	45.6	44.3
8	NDB1699	57.3	57.3	57.3	40.6	38.6	39.6
9	RD2977	61.2	54.7	58.0	39.2	41.6	40.4
10	RD2978	62.0	55.5	58.8	43.4	39.1	41.3
11	RD2979	63.3	57.8	60.6	45.3	43.1	44.2
12	RD2980	60.4	60.9	60.7	46.3	50.6	48.5
13	KB1634	61.0	54.5	57.8	46.0	40.9	43.5
14	NDB1173 ©	60.2	55.7	58.0	37.8	34.8	36.3
15	NDB1445 ©	59.4	55.0	57.2	39.0	33.0	36.0
16	RD2552 ©	60.2	55.5	57.9	38.0	36.2	37.1
17	RD2794 ©	60.1	55.8	58.0	38.2	35.9	37.1
18	RD2907 ©	59.8	54.9	57.4	42.8	33.5	38.2
	Mean	59.6	56.6		39.4	39.0	

Table 32. Quality of entries from AVT (SAL/ALK) in NWPZ/NEPZ-Continued

Sr. No.	Varieties	Bold grains (%)			Thin grains (%)			Protein (% dwt)		
		Hisar	Dalipnagar	Mean	Hisar	Dalipnagar	Mean	Hisar	Dalipnagar	Mean
1	DWRB180	55.2	73.5	64.4	1.7	5.8	3.8	11.8	11.4	11.6
2	DWRB187	49.9	40.5	45.2	13.9	25.3	19.6	12.3	11.5	11.9
3	HUB263	59.0	56.7	57.9	12.5	11.7	12.1	11.6	10.8	11.2
4	HUB264	61.3	78.9	70.1	7.0	3.2	5.1	11.1	12.6	11.9
5	KB1628	83.9	91.3	87.6	4.7	0.9	2.8	10.9	10.8	10.9
6	KB1632	27.2	31.9	29.6	21.3	22.3	21.8	11.5	12.1	11.8
7	NDB1683	86.2	80.3	83.3	2.5	4.8	3.7	11.4	10.7	11.1
8	NDB1699	70.9	78.8	74.9	4.8	4.9	4.9	10.7	11.2	11.0
9	RD2977	84.5	74.2	79.4	3.0	5.2	4.1	11.0	11.2	11.1
10	RD2978	89.5	82.2	85.9	1.8	2.7	2.3	10.8	11.7	11.3
11	RD2979	80.7	86.0	83.4	2.8	1.4	2.1	14.8	11.1	13.0
12	RD2980	93.8	91.3	92.6	1.0	0.9	1.0	9.1	10.8	10.0
13	KB1634	94.2	77.9	86.1	1.0	4.4	2.7	9.3	11.6	10.5
14	NDB1173 ©	74.0	35.9	55.0	7.5	22.9	15.2	12.0	11.5	11.8
15	NDB1445 ©	65.1	40.9	53.0	8.5	22.7	15.6	11.2	12.1	11.7
16	RD2552 ©	76.9	62.1	69.5	6.4	11.0	8.7	10.3	10.1	10.2
17	RD2794 ©	74.6	66.3	70.5	4.4	6.9	5.7	11.0	10.8	10.9
18	RD2907 ©	91.5	49.6	70.6	1.2	11.0	6.1	12.6	11.3	12.0
	Mean	73.2	66.6		5.9	9.3		11.3	11.3	

Table 36. Quality of entries from IVT (Dual Purpose Barley)

S.No.	Genotype	Test wt (kg/ha)				TGW (g)				Bold grains (%)			
		Hisar	Durgapura	Kanpur	Mean	Hisar	Durgapura	Kanpur	Mean	Hisar	Durgapura	Kanpur	Mean
1	JB364	54.1	52.6	53.3	53.3	36.8	22.1	33.2	30.7	52.8	12.8	46.7	37.4
2	KB1636	57.0	50.6	58.8	55.5	26.2	22.5	34.6	27.8	31.5	40.5	59.7	43.9
3	KB1638	50.2	52.2	52.8	51.7	29.3	22.4	29.7	27.1	24.1	12.4	27.9	21.5
4	KB1640	51.7	53.7	52.5	52.6	27.5	26.7	25.9	26.7	17	32.9	13	21.0
5	NDB1682	56.8	49.1	54.3	53.4	38	23.7	39.3	33.7	69.1	34.7	49.2	51.0
6	RD2973	47.8	55.3	50.7	51.3	27.5	29.2	34.1	30.3	27.8	13.6	36.8	26.1
7	RD2974	53.5	54.2	53.8	53.8	29	24.7	29.1	27.6	35.4	28.5	37.3	33.7
8	RD2975	48.6	57.1	53.8	53.2	25.8	31.9	34.8	30.8	21.4	10.4	54.7	28.8
9	RD2976	50.8	46.5	53.7	50.3	32.2	20.5	29.5	27.4	51.7	19.4	68.2	46.4
10	UPB1073	51.4	50.4	52.4	51.4	25.4	25.2	25.8	25.5	26.1	17.1	28.2	23.8
11	UPB1074	52.8	52.6	52.7	52.7	29.6	25.7	32.4	29.2	29	44	28.2	33.7
12	UPB1075	55.2	52.5	57.7	55.1	31.8	26.9	36.3	31.7	34.9	36	45.8	38.9
13	AZAD ©	56.2	59.3	56.5	57.3	32.5	29.3	34.8	32.2	10.3	33.2	9.1	17.5
14	RD2035 ©	50.6	47.2	51.8	49.9	28	18.5	34.7	27.1	27.3	10.7	15.8	17.9
15	RD2552 ©	52.0	51.8	54.6	52.8	27.1	25.6	24.4	25.7	23.9	19.9	33.7	25.8
16	RD2715 ©	52.3	55.6	52.2	53.4	28.2	25	32	28.4	50.2	13.3	44.4	36.0
	Mean	52.6	52.5	53.9		29.7	25.0	31.9		33.3	23.7	37.4	

Table 39. Quality of entries from IVT (Dual Purpose Barley)

S.No.	Genotype	Thin grains (%)				Protein (% dwt)			
		Hisar	Durgapura	Kanpur	Mean	Hisar	Durgapura	Kanpur	Mean
1	JB364	15.7	58.1	18.2	30.7	11.7	14.1	11.0	12.3
2	KB1636	24.3	32	10.4	22.2	16.8	16.9	13.6	15.8
3	KB1638	32.1	49.7	27.1	36.3	12.2	14.3	12.6	13.0
4	KB1640	43.2	32.2	46.7	40.7	12.9	15	13.1	13.7
5	NDB1682	8.2	40	16.2	21.5	10.2	13.3	10.4	11.3
6	RD2973	36	43.9	29.5	36.5	14.6	14.1	12.1	13.6
7	RD2974	24.8	36.9	25.7	29.1	11.5	16.3	10.6	12.8
8	RD2975	38.7	46.5	18.2	34.5	16.3	15.1	11.8	14.4
9	RD2976	14.3	46.4	7.6	22.8	13.3	12.3	11.6	12.4
10	UPB1073	28	50.5	27.3	35.3	17.2	13.3	13.2	14.6
11	UPB1074	24	28.4	24.4	25.6	10.5	14.3	12.1	12.3
12	UPB1075	22.1	29.3	10.1	20.5	11.9	15.2	10.5	12.5
13	AZAD ©	34.9	20.9	32.8	29.5	15.3	15.6	11.2	14.0
14	RD2035 ©	39.9	63.8	48.1	50.6	14	14.6	10.1	12.9
15	RD2552 ©	40.6	38.7	28.6	36.0	13.2	16.5	10.6	13.4
16	RD2715 ©	16.4	47.2	18.4	27.3	11.9	16.8	11.4	13.4
	Mean	27.7	41.5	24.3		13.3	14.9	11.6	

BARLEY QUALITY SCREENING NURSERY

This year (2017-18 season) few huskless genotypes and few selected malt barley genotypes from IVT MB (2016-17) were grown at Karnal, Ludhiana, Durgapura and Pantnagar (malt barley genotypes at Kanpur also), with respect to grain physical quality traits. The traits analysed were hectolitre weight (kg/hl), grain plumpness, thousand grain weight (g) and protein content (% dry weight). Among the huskless genotypes BQSN-A-18 and in malt barley BQSN-B-7 were found best taking mean of all locations. The promising genotypes of having good grain traits will be further investigated for biochemical parameters with respect to food and malt barley quality traits.

Grain quality of BQSN genotypes (Huskless barley)

A. Test weight (kg/hl)

S. No	Genotype	Durgapura	Karnal	Ludhiana	Pantnagar	Mean
1	BQSN-A-15	73.5	71.3	69.5	66.9	70.3
2	BQSN-A-18	74.8	75.8	72.8	70.1	73.4
3	BQSN-A-19	73.1	72.6	67.4	66.7	70.0
4	BQSN-A-20	70.2	69.1	68.5	72.6	70.1
5	BQSN-A-21	69.6	66.5	65.8	67.9	67.4
6	BQSN-A-22	75.5	72.3	69.8	71.6	72.3
7	BQSN-A-24	73.5	73.2	67.2	61.4	68.8
8	BQSN-A-73	70.5	75.0	66.5	69.7	70.4
9	BQSN-A-77	71.0	71.7	69.6	71.9	71.0
10	BQSN-A-78	71.2	63.6	NA	56.9	63.9
	Mean	72.3	71.1	68.5	67.6	

B. Thousand grain weight (kg)

S.No	Genotype	Durgapura	Karnal	Ludhiana	Pantnagar	Mean
1	BQSN-A-15	40.0	41.0	42.4	46.0	42.3
2	BQSN-A-18	46.0	46.1	42.6	46.6	45.3
3	BQSN-A-19	38.6	44.6	38.5	44.9	41.6
4	BQSN-A-20	28.0	30.3	33.8	34.4	31.7
5	BQSN-A-21	42.0	46.7	39.2	47.1	43.7
6	BQSN-A-22	31.9	33.9	30.1	35.2	32.8
7	BQSN-A-24	31.4	36.6	30.5	33.8	33.1
8	BQSN-A-73	33.7	46.5	41.4	41.8	40.9
9	BQSN-A-77	25.4	29.2	28.2	31.1	28.5
10	BQSN-A-78	37.9	45.1	35.6	40.6	39.8
	Mean	35.5	40.0	36.3	40.1	

C. Bold grains (%)

S. No	Genotype	Durgapura	Karnal	Ludhiana	Pantnagar	Mean
1	BQSN-A-15	41.5	52.9	67.4	52.7	53.6
2	BQSN-A-18	71.3	73.0	72.3	80.5	74.3
3	BQSN-A-19	47.3	65.1	NA	82.1	64.8
4	BQSN-A-20	5.2	6.3	16.8	38.0	16.6
5	BQSN-A-21	39.1	56.5	47.7	59.8	50.8
6	BQSN-A-22	9.3	26.6	16.5	41.6	23.5
7	BQSN-A-24	19.8	37.1	31.0	44.1	33.0
8	BQSN-A-73	19.1	36.9	67.1	67.7	47.7
9	BQSN-A-77	5.0	10.4	13.5	6.9	9.0
10	BQSN-A-78	20.8	73.5	NA	71.3	55.2
	Mean	27.8	43.8	41.5	54.5	

D. Thin grains (%)

S. No	Genotype	Durgapura	Karnal	Ludhiana	Pantnagar	Mean
1	BQSN-A-15	21.1	14.1	5.8	15.7	14.2
2	BQSN-A-18	9.7	9.6	3.3	4.3	6.7
3	BQSN-A-19	15.7	9.9	NA	2.9	9.5
4	BQSN-A-20	69.3	62.2	48.6	27.4	51.9
5	BQSN-A-21	14.5	7.4	9.6	5.0	9.1
6	BQSN-A-22	42.6	21.7	36.7	10.4	27.8
7	BQSN-A-24	32.8	17.3	22.9	15.3	22.1
8	BQSN-A-73	43.0	17.9	14.4	6.1	20.3
9	BQSN-A-77	69.2	53.5	51.3	43.2	54.3
10	BQSN-A-78	36.4	4.7	NA	6.7	16.0
	Mean	35.4	21.8	24.1	13.7	

E. Protein (% dry weight basis)

S. No	Genotype	Durgapura	Karnal	Ludhiana	Pantnagar	Mean
1	BQSN-A-15	15.9	14.3	11.3	10.3	13.0
2	BQSN-A-18	16.1	15.4	13.3	12.2	14.2
3	BQSN-A-19	15.8	15.0	NA	11.0	13.9
4	BQSN-A-20	17.8	14.8	12.6	10.1	13.8
5	BQSN-A-21	18.0	14.3	14.8	11.5	14.6
6	BQSN-A-22	16.7	13.3	12.3	10.4	13.2
7	BQSN-A-24	16.5	12.7	11.5	10.0	12.7
8	BQSN-A-73	16.2	13.5	12.4	13.4	13.9
9	BQSN-A-77	16.9	15.1	13.3	9.8	13.8
10	BQSN-A-78	15.6	14.7	NA	11.8	14.1
	Mean	16.6	14.3	12.7	11.0	

Grain quality of BQSN genotypes (Malt barley)**A. Test weight (kg/hl)**

S.No.	Genotype	Durgapura	Karnal	Ludhiana	Pantnagar	Kanpur	Mean
1	BQSN-B-2	64.2	65.2	58.5	58.7	63.5	62.0
2	BQSN-B-5	68.2	67.0	63.8	64.7	65.3	65.8
3	BQSN-B-7	68.3	69.2	59.9	65.0	63.4	65.1
4	BQSN-B-8	66.7	66.6	61.9	65.6	62.3	64.6
5	BQSN-B-11	60.4	59.9	54.0	57.2	58.1	57.9
6	BQSN-B-13	68.8	69.6	61.5	64.5	64.6	65.8
7	BQSN-B-18	65.6	68.7	62.6	65.7	65.1	65.6
8	BQSN-B-19	62.6	65.2	58.9	60.8	60.1	61.5
9	BQSN-B-20	68.6	66.8	63.3	64.7	64.8	65.6
10	BQSN-B-21	67.8	65.0	62.0	62.7	62.5	64.0
11	DWR 39	62.3	63.9	58.8	64.4	60.1	61.9
	Mean	65.8	66.1	60.5	63.1	62.7	

B. Thousand grain weight (kg)

S.No.	Genotype	Durgapura	Karnal	Ludhiana	Pantnagar	Kanpur	Mean
1	BQSN-B-2	52.9	55.3	49.6	50.0	55.4	52.6
2	BQSN-B-5	45.7	46.7	45.6	47.5	47.5	46.6
3	BQSN-B-7	46.6	49.3	40.8	47.7	44.9	45.9
4	BQSN-B-8	47.0	53.2	46.2	48.4	45.1	48.0
5	BQSN-B-11	33.4	34.8	31.9	39.1	31.3	34.1
6	BQSN-B-13	46.9	50.0	39.0	45.8	44.4	45.2
7	BQSN-B-18	41.5	49.4	41.6	47.9	45.6	45.2
8	BQSN-B-19	33.7	40.8	37.9	40.2	42.1	38.9
9	BQSN-B-20	43.9	46.6	29.6	45.7	43.8	41.9
10	BQSN-B-21	41.8	48.1	44.1	46.3	44.2	44.9
11	DWR 39	41.2	44.2	38.1	44.2	39.7	41.5
	Mean	43.1	47.1	40.4	45.7	44.0	

C. Bold grains (%)

S.No.	Genotype	Durgapura	Karnal	Ludhiana	Pantnagar	Kanpur	Mean
1	BQSN-B-2	83.3	87.5	88.7	84.1	93.2	87.4
2	BQSN-B-5	76.3	77.6	86.9	90.2	78.3	81.9
3	BQSN-B-7	85.4	95.1	88.5	94.9	91.1	91.0
4	BQSN-B-8	77.6	93.3	88.9	87.7	84.7	86.4
5	BQSN-B-11	42.6	48.6	62.1	63.2	53.3	53.9
6	BQSN-B-13	81.6	90.2	80.2	87.7	83.0	84.5
7	BQSN-B-18	60.2	88.1	82.6	90.5	80.1	80.3
8	BQSN-B-19	56.9	82.8	89.5	89.1	78.8	79.4
9	BQSN-B-20	52.6	80.2	80.2	88.9	76.7	75.7
10	BQSN-B-21	58.4	79.7	81.0	93.2	82.4	78.9
11	DWR 39	63.9	73.2	83.1	86.2	81.5	77.5
	Mean	67.2	81.5	82.9	86.9	80.3	

D. Thin grains (%)

S.No.	Genotype	Durgapura	Karnal	Ludhiana	Pantnagar	Kanpur	Mean
1	BQSN-B-2	3.5	2.2	2.1	4.2	1.1	2.6
2	BQSN-B-5	4.3	4.2	1.4	1.0	3.1	2.8
3	BQSN-B-7	2.9	0.6	2.3	0.6	1.2	1.5
4	BQSN-B-8	4.1	0.9	1.7	1.5	1.8	2.0
5	BQSN-B-11	15.9	13.6	7.1	6.1	10.8	10.7
6	BQSN-B-13	2.8	1.2	3.6	2.8	2.0	2.5
7	BQSN-B-18	12.5	1.5	3.1	0.9	2.1	4.0
8	BQSN-B-19	12.5	2.7	3.2	1.6	4.1	4.8
9	BQSN-B-20	6.8	3.7	2.6	1.0	3.4	3.5
10	BQSN-B-21	10.1	4.8	2.7	0.9	3.2	4.3
11	DWR 39	7.6	7.4	2.6	2.1	3.1	4.6
	Mean	7.5	3.9	2.9	2.1	3.3	

E. Protein (% dry weight basis)

S.No.	Genotype	Durgapura	Karnal	Ludhiana	Pantnagar	Kanpur	Mean
1	BQSN-B-2	15.2	12.1	10.0	12.2	12.3	12.3
2	BQSN-B-5	14.6	13.4	9.8	10.0	13.0	12.2
3	BQSN-B-7	9.5	14.2	11.7	11.0	14.9	12.3
4	BQSN-B-8	16.0	12.9	10.2	10.7	14.1	12.8
5	BQSN-B-11	15.9	12.8	10.2	11.1	12.9	12.6
6	BQSN-B-13	14.3	11.9	9.9	10.2	13.5	11.9
7	BQSN-B-18	15.6	11.4	10.0	10.4	13.1	12.1
8	BQSN-B-19	15.5	11.3	10.1	8.7	13.3	11.8
9	BQSN-B-20	14.5	12.4	10.4	9.4	13.0	12.0
10	BQSN-B-21	15.7	13.2	10.0	9.2	12.5	12.1
11	DWR 39	18.6	14.6	9.7	11.0	13.2	13.4
	Mean	15.0	12.8	10.2	10.3	13.3	

Barley Front Line Demonstrations (BFLDs) during 2017-18

During Rabi 2017-18, 250 Barley Front Line Demonstrations (BFLDs) of one acre each were allotted to 21 different cooperating centers all over India in six states namely, HP, UP, Punjab, Haryana, Rajasthan and MP of which 228 were conducted covering 244.4 acres area of 238 farmers. Improved barley varieties with complete package of practices (irrigation management, fertilizer dose and method of application, weed control, seed treatment etc.) were demonstrated.

Centre wise distribution of FLDs during Rabi 2017-18

S.No.	Zone and Centre	Allotted (1 BFLD= 1 Acre)	Conducted (1 Acre basis)	Area sown (Acre)	No. of farmers/ locations
Northern Hills Zone (NHZ)					
1.	CSKHPKV, HAREC, Bajaura, Kullu (HP)	12	5	5	8
2.	IARI, RS, Amartara Cottage, Shimla (HP)	12	4	4	4
North Eastern Plains Zone (NEPZ)					
3.	NDUA&T, Narendranagar, Kumarganj, Faizabad (UP)	12	12	12	14
4.	KVK (IAS-BHU), Barkachha, Mirzapur (UP)	12	12	14.4*	9
5.	CSAUA&T, Kanpur (UP)	12	12	12	12
6.	BHU, Varanasi (UP)	12	5	5	5
North Western Plains Zone (NWPZ)					
7.	ICAR-IIFSR, Modipuram, Meerut (UP)	12	12	16*	16
8.	PAU, Ludhiana (Punjab)	8	8	8	8
9.	KVK, Mansa (Punjab)	12	12	12	12
10.	CCSHAU, Hisar (Haryana)	12	12	12	12
11.	KVK, Rampura, Rewari (Haryana)	12	12	12	12
12.	KVK (CCSHAU), Bhiwani (Haryana)	12	12	12	12
13.	RARI (SKNAU), Durgapura, Jaipur (Rajasthan)	16	16	16	11
14.	KVK, Tankarda, Chomu, Jaipur (Rajasthan)	10	10	10	7
Central Zone (CZ)					
15.	RCOA, MPUA&T, Udaipur (Rajasthan)	12	12	12	12
16.	KVK (MPUA&T), Dhoinda, Rajasmand (Rajasthan)	12	12	12	12
17.	ZARP, COA, JNKVV, Kuthulia Farm, Rewa (MP)	12	12	12	12
18.	KVK (JNKVV), Purushottampur, Panna (MP)	12	12	12	14
19.	KVK (JNKVV), Nowgaon, Chhattarpur (MP)	12	12	16*	16
20.	KVK (RVSKVV), Juara Khurd, AB Road, Morena (MP)	12	12	15*	15
21.	KVK (RVSKVV), Lahar, Bhind (MP)	12	12	15*	15
Total		250	228	244.4	238

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

Zone wise distribution of BFLDs conducted during rabi 2017-18

Zone	Allotted	Conducted	Area sown (ha)	No. of farmers/ locations
NHZ	24	9	9	12
NEPZ	48	41	43.4*	40
NWPZ	94	94	98*	90
CZ	84	84	94*	96
Total	250	228	244.4	238

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

State wise yield gain during rabi 2017-18

State	BFLDs yield (q/ha)	Check yield (q/ha)	% increase
HP	25.62	23.00	11.39 ^{NS}
UP	41.50	34.20	21.35 ^{***}
Punjab	46.50	42.42	09.62 ^{***}
Haryana	48.72	43.79	11.26 ^{***}
Rajasthan	46.84	40.29	16.26 ^{***}
MP	37.81	32.76	15.42 ^{***}

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

The highest increase in barley yield was recorded in UP (21.35 %) followed by Rajasthan (16.26 %), MP (15.42 %), HP (11.39 %) and Haryana (11.26 %). The lowest increase in yield was reported in Punjab (09.62 %).

Zone wise productivity over regional during rabi 2017-18

Zone	BFLDs yield (q/ha)	Regional mean yield (q/ha)	% Increase
NHZ	25.62	20.43	25.40 ^{**}

NEPZ	38.04	27.63	37.68***
NWPZ	49.27	40.96	20.29***
CZ	38.91	30.15	29.05***

*** - Significant at 1 per cent level, ** - Significant at 5 percent level

The yield gain due to improved varieties over regional mean yield was highest in NEPZ (37.68 %) followed by CZ (29.05 %), NHZ (25.40 %) and NWPZ (20.29 %).

Zone wise productivity over check during *rabi* 2017-18

Zone	BFLDs yield (q/ha)	Check mean yield (q/ha)	% Increase
NHZ	25.62	23.00	11.39 ^{NS}
NEPZ	38.04	29.92	27.14***
NWPZ	49.27	43.92	12.18***
CZ	38.91	33.74	15.32***

*** - Significant at 1 per cent level, NS- Non-significant

The yield gain due to improved varieties over check mean yield was highest in NEPZ (27.14 %) followed by CZ (15.32 %), NWPZ (12.18 %) and NHZ (11.39 %). Therefore, efforts should be made to increase barley yield in the NEPZ and CZ in collaboration with the state department of agriculture.

Variety wise performance of improved barley varieties during *Rabi* 2017-18

Zone and Centre	Improved variety	Average yield (q/ha)	Check variety	Average yield (q/ha)	% Increase over check
NHZ					
Bajaura	HBL 713	29.11	HBL 113	25.68	13.36 ^{NS}
IARI, RS, Shimla	BHS 400	24.00	Local	22.00	9.09 ^{NS}
	BHS 380	22.67	Local	20.67	9.68*
NEPZ					
Faizabad	RD 2794	33.79	Faizabad Local	25.43	32.87***
Mirzapur	RD 2794	42.67	Amber	31.56	35.20***
Kanpur	RD 2794	37.58	Azad	32.00	17.44***
Varanasi	HUB 113	42.59	Jyoti	34.27	24.28***
	HUB 113	42.94	RD 2552	35.07	22.44 ^{NS}
NWPZ					
Meerut	BH 946	50.14	Local	44.89	11.70***
Ludhiana	BH 946	45.88	PL 807	42.75	7.32***
	DWRB 123	50.88	DWRUB 52	48.50	4.91 ^{NS}
Mansa	BH 946	45.56	PL 807	40.81	11.64***
Hisar	BH 946	45.50	BH 393	41.25	10.30***
Rewari	BH 946	48.75	BH 393	45.00	8.33***
	DWRB 123	56.00	BH 393	45.00	24.44**
Bhiwani	BH 946	49.49	BH 393	45.13	9.66***
Durgapura-Jaipur	BH 946	53.41	Local	45.65	17.00***
Chomu-Jaipur	BH 946	53.07	RD 2035	44.84	18.35**
CZ					
Udaipur	BH 959	41.00	RD 2035	37.67	8.84***
Rajsamand	BH 959	43.03	Local	35.36	21.69***
Rewa	BH 959	32.39	JB 58	25.33	27.87***
Panna	BH 959	34.51	Munda Jawa	28.49	21.13***
Chhattarpur	BH 959	23.67	JB 58	20.00	18.35*
Chhattarpur	BH 959	23.50	JB1	20.63	13.91*
Morena	BH 959	49.93	Jyoti	44.15	13.09***
Bhind	BH 959	42.75	Local	39.55	8.09***

***-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 (25.68 q/ha) variety at Bajaura centre. In NEPZ, HUB 113 at Varanasi (42.94 q/ha), DWRB 123 at Rewari (56.00 q/ha) in NWPZ and BH 959 at Morena (49.93 q/ha) in CZ were the highest average yielding varieties.

Yield potential of barley varieties in different zones during *rabi* 2017-18

Zone	Centre	Variety	Yield(q/ha)
NHZ	Bajaura	HBL 713	32.37
NEPZ	Varanasi	HUB 113	44.27
NWPZ	Rewari	DWRB 123	60.00
CZ	Morena	BH 959	53.50

At particular farmers' field as well as on average basis HBL 713 (32.37 q/ha), HUB 113 (44.27 q/ha), DWRB 123 (60.00 q/ha) and BH 959 (53.50 q/ha) performed better than other varieties at Bajaura, Varanasi, Rewari and Morena centres in the NHZ, NEPZ, NWPZ and CZ, respectively.

**Barley Network (AICW&BIP)
Monitoring Report of NEPZ (2017-18)**

Duration: February 21-23, 2018

Locations Visited: Ranchi, Sabour and PUSA

Team: Dr AS Kharub, Principal Scientist & PI, Barley Network, ICAR-IIWBR, Karnal
Dr Vishnu Kumar, Scientist, Barley Network, ICAR-IIWBR, Karnal
Dr Sudhir Kumar, Asstt. Prof., BAU, Sabour, Bihar

The team III constituted by the Director, ICAR-IIWBR, Karnal for monitoring of Barley Network trials and nurseries in the NEPZ (Ranchi, Sabour and PUSA), assembled at Ranchi on 21st February 2018 and visited different locations of the zone from 21st to 23rd February 2018. Dr. Sudhir Kumar attended monitoring at Sabour only due to his unavoidable technical assignments. This team visited the experimental fields and meticulously observed the coordinated trials and observations are briefed hereunder trial wise.

AVT-FB-NEPZ: This trial was monitored at Ranchi, Sabour and PUSA locations. The trial conduction was good at all the locations. The entry AVT-FB-NEPZ-1 showed off type plants and needs purification and entries no. 03, 06 and 08 were also observed with some off type plants.

IVT-RF-NEPZ: The trial was monitored at Sabour and PUSA centres. The delayed sowing during December was observed at PUSA location of this rainfed trial due to late harvesting of previous paddy crop. In entry no. IVT-RF-NEP-07 rat damage was noticed and no incidence of brown rust was observed in the trial at both the locations. However, spot blotch was recorded in the entries IVT-RF-NEPZ-04 & 12 (89), 02 & 05 (78) and 09 (67), respectively.

IVT-IR-FB-NEPZ: This trial was conducted at Ranchi, Sabour and PUSA locations. The crop was in good condition. In four entries namely, IVTIRFB-06, 14, 17 and 24 segregation/mixture was observed. The entries IVTIRFB-02, 07, 08, 15 and 18 were observed with off type plants. The entries IVTIRFB-21 & 26 were recorded with leaf blight scores of 89 at Sabour.

The entries observed with segregation/mixtures and needs purification

Trail	Segregation /mixture	Needs purification
IVT-RF-NEPZ		
AVT-FB-NEPZ	-	AVT-FB-NEPZ-01
IVT-IR-FB	IVTIRFB-06, 14, 17 and 24	IVTIRFB-02, 07, 08, 15 and 18

Sd/-
AS Kharub
(PS & PI, BN, IIWBR)

Sd/-
Vishnu Kumar
(Scientist, SS, IIWBR)

Barley Network (AICW&BIP) Monitoring Report of NEPZ

Duration: 21st to 24th February 2018

Locations Visited: Kanpur, Dalipnagar, Faizabad, Varanasi and Saini

Team: Dr Chuni Lal, Principal Scientist, Barley Network, ICAR-IIWBR, Karnal
Dr PK Gupta, Barley Breeder, CSAUA&T, Kanpur
Dr S. P. Singh, Wheat Pathologist, CSAUA&T, Kanpur

The team constituted by the Director, IIWBR, Karnal for monitoring of Barley Network Trials and Nurseries in the NEPZ, assembled at CSAUA&T, Kanpur on 21st February 2018 and visited different locations of the zone from 21st to 24th February. Prof. L. C. Prasad, Barley Breeder, BHU, Varanasi did not join the team. However, Dr RPS Verma from ICARDA joined the team to monitor the International Trials and Nurseries of barley supplied to Kanpur, Faizabad and Varanasi locations through IIWBR, Karnal. This team visited the experimental fields and meticulously observed the trials and the other technical programme allotted to the centres in the last annual Wheat and Barley Workshop. The notable observations made by the team are briefed hereunder trial wise.

AVT-FB-NEPZ: This trial was monitored at Kanpur, Faizabad and Varanasi locations. The trial was laid out in accordance with the technical programme. At Faizabad centre the was poor. In AVT-FB-NEPZ-1 very high proportions of mixture of plants with tall and short height was observed, hence needs to be rejected. In entry AVT-FB-NEPZ-3 offtypes were observed at all the three locations. This entry AVT-FB-NEPZ-3 also scored for high incidence of covered smut.

AVT-Sal/ALK: This trial with test entries of IVT, AVT and checks was conducted at Dalipnagar and Faizabad (I&II) locations. The trial was laid out in accordance with the technical programme. The trial at Faizabad centre had, over all poor growth. Entry AVT-SST-3 had asynchronous expression for heading and tiller height. For entry AVT-SST-15 mixture was found w. r. t plant height, spike characters and maturity. Medium (20) to high (50) incidence of loose smut was observed in entry AVT-SST-14 at Faizabad and Dilipnagar locations respectively.

IVT-RF-NEPZ: This trial was conducted at Kanpur, Faizabad, Varanasi and Saini locations. The trial was laid out in accordance with the proposed sowing plan for these centres. The crop was in good condition. However, at Varanasi the first replication had poor growth, and this replication should not be included for analysis. In entry IVT-RF-NEPZ-8 off types for spike character were observed at all the locations which need purification. In IVT-RF-NEPZ-2 high incidence of lose smut (5% at Varanasi to 25% at Kanpur) were observed. Likewise in IVT-RF-NEPZ-13 high levels of leaf blight (47 at Faizabad to 68 at Varanasi) were observed.

IVT-IR-FB-NEPZ: This trial was conducted at Kanpur, Faizabad and Varanasi locations. Lay out of the trial was in line with the technical programme for these centres. The crop was in good condition. In four entries namely, IVT-FB-7, IVT-FB-10, IVT-FB-18 and IVT-FB-23 some off-types were observed. In entries IVT-FB-17, IVT-FB-24 and IVT-FB-25 as high as approximately 40%, 30% and 40 % segregations/mixtures were observed.

IVT-IR-Dual Purpose: This trial was conducted at Kanpur, Faizabad and Varanasi locations. In one entry namely, IVT-DP-12 multi-type of segregation/mixtures were observed. High incidences of leaf blight were noticed in the entries namely, IVT-DP-1 (69), IVT-DP-7 (99), IVT-DP-8 (69), IVT-DP-9 (79) and IVT-DP-11 (79).

International trials and nurseries: At Kanpur four (INBYT-HI, 5thGSBON, INBON-HI and 5thGSBYT), whereas at Faizabad two (5thGSBON and 5thGSBYT) international trials and nurseries were conducted. In addition, two nurseries NBGSN and EIBGN were also planted at Kanpur, Faizabad and Varanasi locations.

Barley Pathology:

Initial Barley Disease Screening Nurseries (IBDSN, NBDSN, EBDSN) were being screened for leaf rust at Kanpur and Faizabad and for leaf blight at Kanpur, Faizabad and Varanasi. Experiments for *chemical control of barley leaf blight* were conducted at Kanpur, Faizabad and Varanasi locations. Both the experiments on *screening of NBDSN against aphids* and *chemical control of foliar aphids* allotted to Kanpur centre were conducted satisfactory. At Faizabad location the sowing of nurseries was done very late and the crop was at very early stage. At Varanasi also the nurseries and trials were perfectly conducted.

Barley Agronomy:

At Varanasi, Kanpur, Faizabad locations the trials, ‘Improving barley productivity through use of organic manure, mulching and chemical sprays in NEPZ and NWPZ, and Maximisation of barley yield using PGRs and higher N levels’ were conducted. However, the trial ‘Evaluation of herbicides for control of broadleaved weeds in barley’ was conducted at Faizabad, Varanasi locations only. The trials were in good conditions. Only in cases where dates of sowing were used as treatment, the expression differences were clear with early sowing having good crop growth.

The entries observed with segregation/mixtures and needs purification

Trail	Segregation /mixture	Needs purification
AVT-Sal/ALK	AVT-SST-15	-
AVT-IR-FB	AVT-IR-FB-1	AVT-IR-FB-3
IVT-RF-NEPZ	-	IVT-RF-NEPZ-8
IVT-IR-FB	IVT-FB-17, 24, 25	IVT-FB-7, 10, 18, 23
IVT-IR-DP	IVT-DP-12	-

-sd-
Dr Chuni Lal,
Principal Scientist,
Barley Network, ICAR-
IIWBR, Karnal

-sd-
Dr PK Gupta,
Barley Breeder,
CSAUA&T, Kanpur

-sd-
Dr S. P. Singh
Wheat Pathologist,
NDUA&T, Faizabad

Monitoring Report of Central Zone (Barley) AICRP on wheat and barley

Duration: 26-27 February, 2018

Location visited: Udaipur, Vallabhnagar and Vijapur

Team Members

Dr. Jogendra Singh, Pr. Scientist (Plant Breeding) & Scientist Incharge, Seed Production & Research Unit, IIWBR, Karnal,

Dr. Abhay Dashora, Asstt. Prof., Deptt of Plant Breeding and Genetics, MpUAT, Udaipur (Raj).

A) BREEDING TRTALS:

A. Location wise observations:

Udaipur

Three barley coordinated trials (AVT-IR-FB, lw-IR-FB and IW-IR-Dual purpose) and one special trial (SPL) were monitored on 26th February, 2018 at the Centre. All the experiments were in good conditions. There was no incidence of rusts and leaf spot observed in any trial. However, minor incidence of loose and covered smut were observed in few entries.

Vallabhnagar

Only one trial, AVT-SAL/ALK was monitored at ARSS, Vallabhnagar on 26th February, 2018 and the trial was found in good condition.

Vijapur

One breeding trial i.e. AVT-IR-FB was monitored at Vijapur on 27th February, 2018. The trial was planted as per technical programme and found in good condition.

B. Disease / pest incidence:

There was no incidence of rusts and leaf spot observed in any trial during the season at Udaipur, Vallabhnagar and Vijapur. However, minor incidence of loose and covered smut were observed in few entries at Udaipur.

C. Trials reiected: Nil

D: Entries observed as seqreqatinq/mixtures:

The following entries were noticed to have significant amount of segregation/mixture in various trials. However, few entries were showing off type plants.

Trial Name	Entries with Segregation/ mixtures	Off types
AVT-IR-FB	AVT-IR-CZ-8	AVT-I R-CZ-1, AVT.I R-Cz.2, AVT-I R.CZ-5, AVT-I R-CZ-8
IVT-IR-FB	IVT-IR-FB-6, IVT-IR.FB-17, IVT-IR-FB-24	IVT-IR.FB-2, IVT-IR-FB-9, IVT-IR-FB-13, IVT-I R-FB-1 8, IVT-IR-FB-23, IW-IR.FB-25, IVT-IR-FB-28
AVTSAL/ALK	AVT-SST-3, AVT-SST-15	AW-SST-4, AW.SST-8, AVT-SST-10, AVT-SST-18

(ii) AGRONOMY TRIAL:

Among the stations visited, only one agronomy trial entitled "Evaluation of herbicides for control of broadleaved weeds in barlef" was conducted at Udaipur centre as per technical programme.

(iii) ENTOMOLOGY TRIAL:

Only one entomological trial entitled "Eco-friendly management of foliar aphid" was conducted at Vijapur centre as per technical programme.

Sd/-
Dr Abhay Dasora
MPUAT, Udaipur

Sd/-
Dr Jogendra Singh
ICAR-IIWBR, Karnal

Barley Network (AICW&BIP) Monitoring Report of NWPZ and CEN Zone

Duration: March 05-07, 2018

Locations: Morena, Gwalior, Kumher, Durgapura and Bawal

The zonal monitoring of the barley coordinated yield trials was conducted in Central and North western plains zone during March 05-07, 2018. During the monitoring, the centres namely Morena, Gwalior, Kumher, Durgapura and Bawal were visited by Drs. Vishnu Kumar, Jogendra Singh, PS Shekhawat and Sudesh Kumar. The special trial conducted for Soufflet company were also monitored at Gwalior, Morena and Durgapura in presence of their representative Mr. Rodolphe Kamouaa.

The trial wise observations are summarized below-

AVT-FB-CZ: The trial was monitored at Gwalior and Morena. The trial was good in shape and treatment differences were clear among the entries. Lodging was observed in entry 03 and 04 at Gwalior and entry no. 08 was observed with off types for plant height and waxy spikes.

AVT-Sal/Alk: The trial was monitored at Kumher centre. The trial was laid out as per the technical programme. First replication of the trial was rejected due to the poor plant stand. The entries AVT-SST-03 and 15 were observed with segregation/mixture.

IVT-MB-TS: The trial was monitored at Durgapura and Bawal locations. The trial was good in condition and laid out as per the technical programme. The entries namely IVT-MB-TS- 02, 06 and 10 were observed with mixture/segregation and entries 14 and 21 showed off types. The two rowed entry IVT-MB-TS-08 was impressive with long spikes (11-12 cm) and more number of grains (36-38) at both the locations.

IVT-IR-FB: This trial was monitored at Gwalior, Morena and Durgapura locations. The crop was in good condition. In four entries namely, IVTIRFB-06, 14, 17 and 24 segregation/mixture was observed. The entries IVTIRFB-02, 07, 08, 15 and 18 were observed with off type plants.

IVT-IR-DP: The trial was monitored at Durgapura. The trial was laid out as per the technical programme. The crop was in good condition and in one entry namely, IVTIRTSDP-04 stripe rust reaction of 30S was observed.

SPL-Trial-Soufflet: This trial was monitored at Gwalior, Morena and Durgapura locations. The entries namely SPL-01, 02 and 03 were observed with prolonged maturity than rest of the entries. The two rowed entries SPL-01 and 03 were noticed with off type plants and needs purification and entry SPL-07 was having few off type plants. The entries SPL- 01 and 02 showed stripe rust reaction of 10S under natural field conditions.

The following entries showed the segregation/mixtures (rejected) and off types (needs purification)-

Trial	Segregation/mixture	Offtypes
AVT-IR-FB-CZ	-	AVT-FB-CZ-08
AVT-SST	AVT-SST-03 and 15	-
IVT-IR-FB	IVTIRFB-06, 14, 17 and 24	IVTIRFB-02, 07, 08, 15 and 18
IVT-MB-TS	IVT-MB-TS- 02, 06 and 10	IVT-MB-TS- 14 and 21
SPL-MB-Soufflet	-	SPL-01 and 03

Sd/-
Vishnu Kumar
ICAR-IIWBR, Karnal

Sd/-
Jogendra Singh
ICAR-IIWBR, Karnal

Sd/-
Sudesh Kumar
RARI, Durgapura

Sd/-
PS Shekhawat
RARI, Durgapura

Zonal Monitoring Report : NHZ

Name of team members:

Name	Centre
Dr Chunni Lal, Dr P L Kashyap	ICAR-IIWBR, Karnal
Dr Lakshmi Kant, Dr K K Mishra	ICAR-VPKAS, Almora
Dr Gurudev Singh	CSK HPKV, HAREC Bajaura

Centres visited:

Centre	Date
Ranichauri, Majhera, Hawalbagh	23.04.18, 25.04.18 & 26.04.18

Breeding trials allocated & monitored:

Centre		Trial	Remark	
Ranichauri	Wheat	AVT-TS-RF	Good	
		IVT-TS-RF	Very Good	
		IVT/AVT-LS-RI	Good	
	Barley	AVT-TS-RF Grain	Very Good	
Majhera	Wheat	IVT/AVT-ES-RF	Very Good	
		AVT-TS-RF	Very Good	
		IVT/AVT-LS-RI	Good	
	Barley	AVT-TS-RF Grain	Very Good	
		AVT-TS-RF Dual	Very Good	
Hawalbagh	Wheat	IVT/AVT-ES-RF	Good	
		IVT-TS-RF	Very Good	
		IVT/AVT-LS-RI	Good	
		Barley	AVT-TS-RF	Good
			AVT-TS-IR	Very Good
			AVT-TS-RF Grain	Failed due to erratic germination owing to drought like conditions
		AVT-TS-RF Dual	Very Good	

Trials not conducted/rejected by monitoring team:

Centre	Trial	Remark
	Nil	

Entries recommended for purification

Trial	Entry	Remarks
Wheat		
AVT-TS-RF	NHTSZ 1703	Few tall plants
	NHTSZ 1706	Few tall plants
IVT-TS-RF	NHIVT 1702	Few tall plants
	NHIVT1706	Few tall plants
	NHIVT 1713	Few tall plants
IVT/AVT-LS-RI	NHLSZ 1702	Few tall plants
Barley		
AVT-TS-RF- Dual	NHDBZ 10	Few tall plants
	NHDBZ 11	Few erect plants

Entries recommended to be dropped from further testing:

Trial	Entry	Remarks
	NIL	

Entries exhibiting higher diseases/insect infestation:

Entry	Disease response
NHIVT 1707	-PM 7 in IVT-TS-RF at Ranichauri
NHIVT 1702	-PM 5 in IVT-TS-RF at Ranichauri
NHIVT 1708	-PM 5 in IVT-TS-RF at Ranichauri

NHIVT 1716	-PM 5 in IVT-TS-RF at Ranichauri
NHLSZ 1703	-PM 5 in IVT/AVT-LS-RI at Ranichauri

Report on Agronomical Trials:

Wheat

Trial	Centre	Remark
SPL-1- Evaluation of herbicides--- in wheat	Hawalbagh	Conducted properly but moderate weed infestation in weedy check.
SPL-2-Management of lodging----- nutrient expert		Conducted properly, treatment effects were visible but no lodging was observed.
SPL-10-Validation of Nutrient Expert in wheat		Conducted properly, treatment effects were visible

Barley

Trial	Centre	Remark
Enhancing barley productivity through use of bio-fertilizers SPL4	Almora	Not Conducted due Land shortage

Report on Pathological Nurseries:

Centre	Nursery	Remark
Hawalbagh		
	Wheat	
	LSSN	Conducted properly and disease pressure was very good.
	PMSN	Conducted properly and disease pressure was good.
	MDSN	Conducted properly but disease pressure was less for rust and blight but was good for powdery mildew.
	EPPSN	Conducted properly but disease pressure was less.
	SAARC	Conducted properly but disease pressure was moderate.
	HBSN	Conducted properly but disease pressure was less.
	Barley	
	NBDSN	Conducted properly but disease pressure was moderate.
	EBDSN	Conducted properly but disease pressure was moderate.
	IBDSN	Conducted properly but disease pressure was moderate.

Report on Physiology Trials MLHT-1 & 2:

Centre	Remark
NIL	

Special comments, if any

1. Conduct of all trials at Ranichauri was very good. The crop is still in milking stage, data may be expected by the end of June.
2. Due to no rains in general disease pressure was very less.
3. The Voluntary centers like Ranichauri and Majhera doing very good job may be invited for workshop to make them more aware about the coordinated system and trial conduction.

Signature of the monitoring team

-Sd-
Dr Chuni Lal
ICAR-IIWBR,
Karnal

-Sd-
Dr PL Kashyap
ICAR-IIWBR, Karnal

-Sd-
Dr Gurudev Singh
HAREC, Bajaura

-Sd-
Dr K K Mishra
ICAR-VPKAS
Almora

-Sd-
Dr Lakshmi Kant
ICAR-VPKAS
Almora

Zonal Monitoring Report NHZ (Barley Trials) 2017-18
Team-II

Period of visit: 9.4.18 to 13.4.18

Name of team members: Dr. Dharam Pal, ICAR-IARI Regional Station, Tutikandi Centre, Shimla
Dr. Vijay Rana, CSK-HPKV, RWRC, Malan, HP
Dr. Lokendra Kumar, ICAR-IIWBR, Karnal
Dr. Sudheer Kumar, ICAR-IIWBR, Karnal
Dr. Dibakar Mahanta, ICAR-VPKAS, Almora

Centres visited: Tutikandi Centre, Reg. Station, ICAR-IARI Shimla
RSS Berthin
SAREC Kangra, RWRC Malan, CSK-HPKV Palampur
HAREC, Bajaura, HAREC-RSS, Katrain

Breeding trials allocated & monitored: Centre	Trial	Remark*
Shimla	IVT/AVT-Barley- Grain, IVT/AVT-Barley- (Dual purpose)	Very Good
Palampur	IVT/AVT-Barley- (Dual purpose)	RMT
Berthin	IVT/AVT-Barley- Grain	Very Good
Kangra	IVT/AVT-Barley- Grain	Very Good
Bajaura	IVT/AVT-Barley- Grain, IVT/AVT-Barley- (Dual purpose)	Very Good

*Evaluated trials as very good, good and average based on conduction

Trials not conducted / rejected by monitoring team: Centre	Trial	Remark
Palampur	IVT/AVT-Barley- (Dual purpose)	Fodder cut was given 120 days after sowing (DAS) due to delayed germination instead of 70 DAS.

Entries showing promising performance in breeding trials: Trial	Entry	Remarks
IVT/AVT-Barley- Grain	NHGBZ-1701, NHGBZ-1715, NHGBZ-1711	Good agronomic visual score
IVT/AVT-Barley- (Dual purpose)	NHDBZ-1708, NHDBZ-17013, NHDBZ-1716	Good agronomic visual score

Entries recommended for purification: Trial	Entry	Remarks
IVT/AVT-Barley- Grain	NHGBZ-1708, NHGBZ-1714	Few off types waxy/non-waxy and plant height
IVT/AVT-Barley- (Dual purpose)	NHDBZ-1703, NHDBZ-1719	Few off types waxy/non-waxy and row type ears

Entries recommended to be dropped from further testing Trial	Entry	Remark
IVT/AVT-Barley- Grain	NHGBZ-1712	Due to variation for height, spike attitude, awn length
NHGBZ-1710		Due to variation for ear waxiness, drooping attitude and ear shape.

Entries exhibiting higher diseases incidence / insect infestation Trial	Entry	Remarks
IVT/AVT-Barley- Grain	NHGBZ-1714	Yellow rust (30S)
NHGBZ-1704		Yellow rust (10S)

**Report on Agronomical Trials:
Centre**

Trial

Remark

Malan

SPL 1, SPL 2, SPL 4, SPL 6*

Nicely conducted and responses were visible except SPL6 due to presence of weeds in weed free treatment.

Bajaura

SPL 1, SPL 2, SPL 4, SPL 6*

Nicely conducted and treatment effects were visible.

* SPL6 was rejected by the RMT due to inadvertent spray of 2,4-D and isoproturon in all the treatments.

Report on Pathological Nurseries:

Centre	Remark
Bajaura	All the pathological nurseries of barley were nicely conducted.

Special comments, if any –


Signature of the monitoring team members


(Dharam Pal)


(Vijay Rana)


(Lokendra Kumar)


(Sudheer Kumar)


(Dibakar Mahanta)



हर कदम, हर उमर
किसानों का ह्वासफर
भारतीय कृषि अनुसंधान परिषद

*Agri*search with a *human* touch



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