

प्रगति प्रतिवेदन
PROGRESS REPORT
2018-19



अखिल भारतीय समन्वित
गेहूँ एवं जौ अनुसंधान परियोजना

**AICRP on
Wheat and Barley**



जौ नैटवर्क

BARLEY NETWORK

भा.कृ.अनु.प.-भारतीय गेहूँ एवं जौ अनुसंधान संस्थान, करनाल
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All India Coordinated Research Project on Wheat and Barley

PROGRESS REPORT 2018-2019

BARLEY IMPROVEMENT

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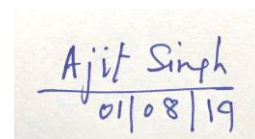
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01/08/19

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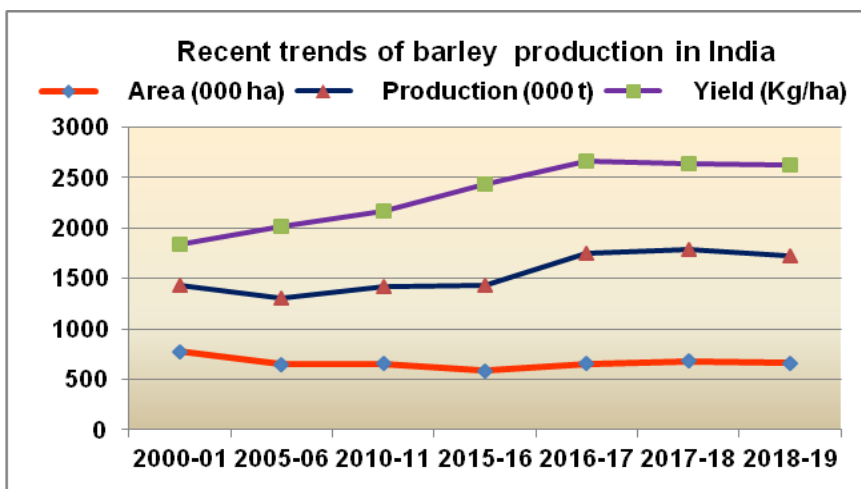
CONTENTS

1.	Research highlights of Barley Improvement	1.1 – 1.8
2.	Crop Improvement	2.1 - 2.69
	Breakup of the 2018-19 barley network yield trials as proposed, conducted, data received, and data not reported	2.1
	Performance of the centres during 2018-19	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 - 2.15
	Irrigated Trials (Feed barley) AVTs	2.16 - 2.17
	Irrigated Trials (Malt barley)	2.18- 2.21
	Soil Salinity Tolerance Trials	2.22 - 2.23
	Irrigated Trials (Feed barley) IVTs	2.24 – 2.33
	Irrigated Trials (Feed barley)-Hulless	2.34- 2.39
	Dual Purpose Barley Trials	2.40 - 2.45
	Trials rejected	2.46 - 2.47
	International/National Nurseries Evaluation	2.48 - 2.60
	Breeder Seed Production	2.61 - 2.65
	Molecular Report AVT Entries	2.66-2.69
3.	Crop Protection	3.1 - 3.42
4.	Resource Management	4.1 - 4.35
5.	Quality Evaluation	5.1 - 5.47
6.	Zonal Monitoring Reports	6.1 - 6.10
7.	Barley FLDs	7.1 - 7.2

58th All India Wheat and Barley workers Meet (24-26 August 2019)

RESEARCH HIGHLIGHTS OF BARLEY IMPROVEMENT

According to 3rd advance estimates for Rabi 2018-19, nearly 1730 thousand tons of barley was produced in 662.0 thousand ha area with a productivity of 26.17 q/ha. In India Rajasthan is the largest state having >45% in production and 40% area followed by Uttar Pradesh. A concern is usually raised at various platforms for barley area decline, however, in last 18 years, the area has stabilized and there has been gain in production and productivity resulting in higher production. Though the MSP of barley (Rs.1440/-) is much lower than wheat (Rs.1840/-), but during current season the market price of barley remained higher (>Rs 1600/q). The monitoring teams surveyed the major barley growing areas during the season observed 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.



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

State	Area (000 ha)			Production (000 T)			Yield (q/ ha)		
	2016-17	2017-18	2018-19*	2016-17	2017-18	2018-19*	2016-17	2017-18	2018-19*
Rajasthan	275.9	274.0	255.8	840.5	876.3	755.4	30.46	31.98	29.53
U. P.	170.0	144.0	176.0	460.0	403.0	493.0	27.06	27.98	28.01
M.P.	116.0	130.0	121.0	252.9	297.6	290.8	21.80	22.89	24.03
Haryana	20.0	20.0	18.1	73.0	69.0	57.99	36.50	34.50	32.04
Punjab	8.3	7.5	11.0	31.5	28.4	41.8	37.95	37.86	38.00
Bihar	10.8	10.6	10.6	16.3	16.0	15.56	15.05	15.05	14.65
H.P.	20.4	19.5	19.2	35.8	29.6	33.90	17.53	15.20	17.70
Uttarakhand	22.0	20.0	23.0	26.0	256.0	30.34	1.182	12.50	13.19
J&K	6.8	6.6	6.4	4.3	4.0	4.21	6.32	6.57	6.55
West Bengal	2.5	2.8	0.5	3.6	3.9	0.70	14.20	14.28	14.00
Others	1.0	1.05	1.03	1.2	1.5	1.17	11.58	14.27	11.29
All India	656.3	661.7	662.5	1747.5	1772.9	1733.6	26.63	26.79	26.17

*3rd advance estimates

Release and Identification of new barley variety

Two barley varieties was released and notified by CVRC for commercial cultivation during 2018.

Sr.No	Variety	Parentage	Zone	Developed at	Production condition	Av. Yield
2.	RD2899	RD2592/RD2035//RD2715	CZ	RARI Durgapura	Irrigated timely sown	42.19
3.	RD2907	RD103/RD2518//RD2592	NWPZ & NEPZ	RARI Durgapura	Salinity conditions	35.25

Registration of genetic stocks-

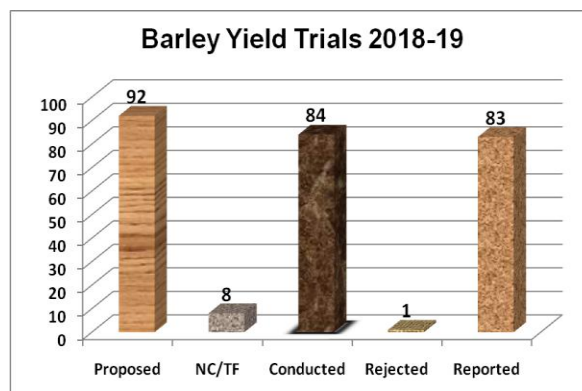
Five genetic stocks namely DWRB152, DWRB174, DWRB190, DWRB 191 and DWRB 192 were registered with ICAR-NBPGR for unique traits.

Genetic stock	INGR No.	Year	Trait
DWRB152	18019	2018	Highly resistant to stripe rust at seedling and adult plant stages
DWRB174	18021	2018	Extra early heading coupled with short plant height
DWRB1190	18020	2018	Moderately resistant for spot blotch
DWRB191	19012	2019	High grain zinc content
DWRB192	19013	2019	High grain iron content

CROP IMPROVEMENT

Coordinated Yield Evaluation Trials

- Out of 92 yield evaluation trials proposed 94 (91%) trials were conducted. Six trials were either not conducted/failed and data were not received in time. After the analysis, only 83 trials (99% of proposed, 83% of conducted) were found good for reporting.
- These trials were conducted at 11 main centres and 28 testing centres (including ICAR, SAUs and State Department of Agriculture) during *Rabi* 2018-19.
- In all 98 test entries contributed by 11 centres, were evaluated against 25 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 2018-19

Based upon the promotion criteria i.e. significantly superior at 10%, monitoring reports and disease and pest reactions, the entries namely DWRB196, DWRB197, PL906, RD2994, UPB 1080, KB1707, DWRB204 and DWRB 182 were found suitable for the promotion into advanced varietal evaluation in different trials.

Sr. No.	Trial name	Zone	Entry
1	IVT-MB-TS	NWPZ	DWRB196, DWRB197
2	AVT-MB-TS	NWPZ	DWRB182*
4	IVT/AVT- Hls	CZ	DWRB204
5	IVT-FB	NWPZ	KB1707, PL906, RD2994, UPB1080

*Based on quality parameters

AVT-MB-TS:

- The trial was proposed at 8 centres data of 6 locations were pooled for statistical analysis. The trial comprised of 03 test entries viz., DWRB160, DWRB182 and DWRB184 and 05 check varieties.
- The zonal mean grain yield was exhibited as 54.82 q/ha and ranged from 43.83 q/ha (Hisar) to 62.15 q/ha (Durgapura).
- The final year entry DWRB160 ranked first (56.65 q/ha) followed by first year entry DWRB184 (56.59q/ha), whereas the best two row check RD2849 depicted mean grain yield of 56.37 q/ha.

AVT-IR-NEPZ:

- The trial comprised of 01 test entries viz., RD2969 and 05 check varieties.

- The zonal mean grain yield was exhibited as 37.90 q/ha and varied from 33.01 q/ha (Varanasi) to 44.72 q/ha (Faizabad).
- The check variety DWRB137 ranked first (41.78 q/ha) and test genotype showed mean grain yield of 36.64 q/ha.

AVT-SST:

- The trial was proposed at 7 centres and data of all the locations were considered for pooled analysis. The trial comprised of 11 test entries and 05 check varieties.
- The zonal mean grain yield was exhibited as 34.09 q/ha, which ranged from 23.76 q/ha (IIWBR, Hisar) to 39.71 q/ha (Vallabhagar).
- The check variety NDB1445 ranked first (38.49 q/ha) followed by another check RD252 (38.43 q/ha).

IVT-MB-TS:

- The trial was proposed at 9 centres data of 7 locations were pooled for statistical analysis. The trial comprised of 13 test entries and 04 check varieties.
- The trial mean grain yield was observed as 59.04 q/ha, which ranged from 40.65 q/ha (Hisar) to 87.17 q/ha (SG Nagar), suggested varied genotypic performances across the locations. The two rowed entry DWRB197 ranked first (66.54 q/ha) followed by the six row entry PL908 (65.21 q/ha) and DWRB196 (63.58 q/ha).

IVT-RF-NEPZ:

- The trial was proposed at 8 centres in NEPZ and data from all the locations were pooled for zonal mean compilation.
- The trial comprised of 14 test entries and 2 checks viz. K603 and Lakhan.
- The trial mean grain yield was observed as 30.48 q/ha, which ranged from 22.14 q/ha (Varanasi) to 38.69 q/ha (Faizabad). The check variety K603 ranked first (36.36 q/ha) followed by the entry RD3003 (35.71 q/ha).

IVT-FB-NWPZ/NEPZ/CZ:

- In NWPZ, four test entries KB1707, PL906, RD2994 and UPB1080 gave statistically higher grain yields over the best check variety RD2552.
- The highest general mean for grain yield (67.4 q/ha) was obtained at Durgapura and the zonal mean across the entries for grain yield was 48.9 q/ha for this trial.
- In NEPZ and CZ, No test entry was found superior over the best check variety.

AVT-DP-NEPZ:

- In AVT dual purpose trial NEPZ, check varieties RD2552 and DWRB137 were the highest yielder for grain and forage. The only test entry UPB1074 was inferior to the best check.

AVT/IVT-Hulless-NWPZ/NEPZ/CZ:

- In AVT/IVT hulless NWPZ trial, no test entry was superior to this check. Karan 16 was best check with grain yield of 37.8q/ha. In NEPZ,
- No test entry was superior to this check. NDB943 was best check with grain yield of 36.5q/ha.
- In CZ, Three test entries namely, DWRB204, KB1750 and DWRB188 gave significantly superior grain yields over the best check variety NDB 943(45.7q/ha).

AVT-RF-NHZ:

- In NHZ trial, no test entry gave significantly higher grain yield over this best check variety of the zone. Among the checks BHS 400 was found to be the best check variety with 27.4 q/ha grain yield.

AVT-DP-NHZ:

- In dual purpose NHZ trial, test entry VLB 155 was superior in grain yield but in forage yield, check variety BHS 380 was better than the test entry.

Breeder seed production

An indent of 827.85q breeder seed of 29 varieties was received from DAC&FW, Ministry of Agriculture & Farmers Welfare, Govt. of India. The indent included requirement of eight states (Haryana, Himachal Pradesh, Jharkhand, Madhya Pradesh, Rajasthan, Uttar Pradesh, Punjab and Uttarakhand), two public sector agencies (IIFDC, National Seeds Corporation) and one private agency (National Seed Association of India) for the Rabi 2018-19. The highest indent was placed by NSAI (330.35q) followed by Rajasthan (210.00q), Uttar Pradesh (130.00q) and National Seed Corporation (85.00q). From variety point of view, the highest indenting varieties were RD 2786 (142.00q) followed by RD2794 (97.00), PL426 (83.25q), RD2035 (81.40q) and BH393 (71.20q). A net production of 1421.05q breeder seed was reported, which was surplus of (+594.10q). The nucleus seed 49.72q was produced against the targeted quantity of 36.25q of 27 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 nine cooperating centres. A National Barley Genetic Stock Nursery (NBGSN) was constituted with 18 promising entries, received from coordinated centres, were also evaluated at nine locations. In addition, four sets each of the two International trials and nurseries which comprised a total of 347 entries were received from ICARDA during Rabi 2018-19. These international trials and nurseries were evaluated along with suitable Indian checks. One set each of these nurseries and trials was sown at ICAR-IIWBR, Karnal, and barley breeders from SAUs and ICAR institutes were given an opportunity to select desirable germplasm during a Field Day organized on 29th March, 2019 at Indian Institute of Wheat and Barley Research, Karnal, and a total of 241 germplasm lines were selected.

International trials and nurseries evaluated during crop season 2018-19

Sr. No.	Trial/Nurseries	Genotypes received from ICARDA	Indian National check	Number of Sets	Locations
1.	IBYT-HI-2019	24	BH946	4	Karnal, Durgapura, Hisar, Ludhiana
2.	6 th GSYT-2019	24	K603	4	Karnal, Hisar, Pantnagar, Kanpur
3.	IBON-HI-2019	138	BH946	4	Durgapura, Pantnagar, Ludhiana, Karnal
4.	6 th GSBON-2019	161	Lakhan	4	Karnal, Kanpur, Faizabad, Bajaura

Zonal Monitoring

The teams constituted for monitoring of Barley Yield Trials & Nurseries in Central zone, NWPZ, NEPZ and NH Zone, visited different locations 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. 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	15-16 Feb., 2019	Udaipur, Vallabhagar, Vijapur
NEPZ	21-24 Feb., 2019	Kanpur, Dalipnagar, Faizabad, Varanasi, Saini
NWPZ	05-08 March, 2019	Ludhiana, Bhatinda, Hisar, Bawal, Durgapura, Kumher,

&CZ		Mathura
NHZ I	24-26 April, 2019	Ranichauri Majhera, Hawalbagh (Almora)
NHZ II	08-13 April, 2019	Shimla, Berthein, Kangra, Malan, Palampur, Bajaura, Katrain

BARLEY CROP PROTECTION

- Barley fields were surveyed by different scientists of cooperative centers and no rust was recorded during the survey whereas loose smut, covered smut and bacterial streak were recorded *in traces* in some fields. Overall barley crop was healthy in all the barley growing areas in India.
- The incidence of insect-pests and their natural enemies also observed, the aphid and its population was found to be moderate to high in barley fields in some of the locations. Among natural enemies, coccinellid beetles, chrysoperla and syrphid fly were frequently noticed predated on barley aphids.
- A total 538 entries were screened under various nurseries (IBDSN, NBDSN and EBDSN) for resistance against various diseases, aphid and CCN at different cooperating centers. Among these, 372 entries were evaluated under IBDSN, 19 were found free from yellow rust and 206 entries showed resistant reaction. In case of leaf blight screening, 35 entries were found moderately resistant against leaf blight.
- Out of 107 entries evaluated under NBDSN, 16 entries were found free from yellow rust and 65 entries showed resistant reaction. Among these, 32 entries were found moderately resistant against leaf. Among 59 entries screened in EBDSN, 10 entries were found free from yellow rust, whereas 46 shown resistant reaction. 11 entries 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. Three entries (BH1024, KB1762, RD3008) were resistant to brown and black rusts. BHS474, HBL845, HBL863, RD2786(C), RD2991 and RD3003 possessed resistance to brown & yellow rusts whereas DWRB182, HBL812 to black & yellow rusts..
- None of the EBDSN entries was resistant to all the tested pathotypes of black, brown and yellow rusts pathogens. HBL814 was resistant to black & yellow rusts whereas RD2786, RD2972, RD2973, RD2875, RD2976 were resistant to brown & yellow rusts.
- 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 equally effective against foliar blight and significantly superior over control.
- A total 166 entries that includes 107 of NBDSN and 59 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.
- A total of 125 barley NBDSN entries were screened against foliar aphid at three locations (Ludhiana, Kanpur, Karnal) during 2018-19. Majority of the entries at all the locations harboured aphids in different range depending upon their incidence level.
- This year, entries were found to be in all the category grades i.e. 3 to 5. five entries viz., DWRB182, DWRB184, PL911, RD3005 and HBL 845 were found to be moderately resistant (grade 3). At Ludhiana, seven entries; BH1025, PL909, RD2992, RD2994, BH 902 (c), DWRB 123 (c) and K 508 (c) were found moderately resistant (grade 3). None of the entry was found to be in moderately resistant (grade 3) category at Kanpur location.
- A total of eight treatments were tested for their efficacy against foliar aphid in barley. At all locations, it was found that treated plots harboured lower number of aphids as compared to control plots. Treatments of quinalphos 25% EC @100 g a.i/ha and acetamiprid 20 SP @ 20 g a.i/ha were found to be the best among tested treatments.

- 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.
- During the 2018-19, survey was 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 at all the locations. Among natural enemies, coccinellid beetles, chrysoperla and syrphid fly were frequently noticed preying on barley aphids.

RESOURCE MANAGEMENT

Resource management group conducted experiments for varietal evaluation in AVTs and for updating the package of practices of barley crop in different zones. A total of 47 trials were proposed and conducted. The significant findings are:

- In malt barley AVT trial, the grain yield of test entry DWRB 160 (51.20 q ha⁻¹) was statistically at par with the newly released malt barley varieties although BH 946 a six row variety registered significantly highest grain yield (54.46 q ha⁻¹). In hulless barley trial, the test entry PL 891 recorded significantly highest grain yield (41.97 q ha⁻¹) as compared to the other varieties.
- In special trial of residue management and tillage in NWPZ, Maximum grain yield (BH 946, 55.80 q ha⁻¹) was realised in zero till sowing with rice residue retention which was significantly higher than other methods of sowing. In NHZ, maximum grain yield (32.24 q ha⁻¹) was recorded under zero till sowing with rice residue retention which was at par to conventional tillage sowing with variety BHS 400 and registered significantly highest grain yield (40.86 q ha⁻¹).
- In seed rate and varieties, grain yield was at par when varieties were sown using seed @ 100 and 125 kg ha⁻¹ and significantly more compared to using seed @ 75 kg ha⁻¹ in NHZ. Barley variety BHS 400 registered significantly highest grain yield (42.20 q ha⁻¹) as compared to other varieties.
- In NWPZ, all the additives except mulch @ 6 t ha⁻¹ 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 t ha⁻¹ served the purpose to realize at par yield using all other additives. Grain yield reduced significantly due to delay in sowing. Similar results were observed in NEPZ, also.
- Grain yield in Halauxifen methyl + Florasulam + Carfentrazone + Surfactant, Metsulfuron + Carfentrazone + Surfactant and 2,4-D E + Carfentrazone treatments was significantly superior to other herbicide treatments and weedy check condition. The grain yield reduction due to weeds in weedy check was 25.8 % as compared to weed free conditions in NWPZ. Almost similar results were observed in NEPZ also. All the herbicide treatments controlled the broad leaf weeds very effectively in CZ, which resulted in grain yield statistically at par to weed free condition. 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, Metsulfuron methyl 20 WG + surfactant, Metsulfuron + Carfentrazone + Surfactant, 2,4-D E + Carfentrazone and weed free condition.
- Application of Pusa Hydrogel @ 2.5 kg ha⁻¹ and New Hydrogel @ 2.5 kg ha⁻¹ resulted in significantly higher grain yield as compared to control conditions in NWPZ. Highest grain

yield (54.62 q ha⁻¹) was recorded with three irrigations which was significantly higher than other irrigation levels.

- Application of NPK @ 60:30:40 kg ha⁻¹ resulted in significantly highest grain yield as compared to application of FYM alone @ 10 t ha⁻¹ or in combination with NPK @ 30:40:30 kg ha⁻¹. BHS 400 recorded highest grain yield (37.33 q ha⁻¹) as compared to all other varieties.
- Application of recommended doses of fertilizer resulted in significantly highest grain yield (48.0 qha⁻¹) as compared to application of FYM alone @ 15 t ha⁻¹ or combination of FYM @ 10 t ha⁻¹ and half of the recommended doses of fertilizer in NWPZ. DWRB 123 recorded highest grain yield (46.95 q ha⁻¹) as compared to all other varieties except RD 2849.
- Application of FYM @ 10 t ha⁻¹ and half of the recommended doses of fertilizer resulted in significantly highest grain yield (42.66 q ha⁻¹) in CZ as compared to application of FYM alone @ 15 t ha⁻¹ or recommended doses of fertilizer. DWRB 92 recorded

QUALITY EVALUATION

MALTING QUALITY

The Barley Improvement Unit took up the malting quality 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. The grain samples (150) were received from six locations (Hisar, Karnal, Ludhiana, Bathinda, Durgapura and Pantnagar). There were 13 test entries in IVT (TS) which were analyzed with four checks, in case of AVT (TS), three entries (DWRB 160, DWRB182 and DWRB 184) with five checks were analyzed.

Promising entries* for individual malting quality trait

Traits	Promising entries
Bold Grains (%)	DWRB 160, PL 907, DWRB 199, BH 1025, DWRB 196
Thousand grain weight	DWRB 160, DWRB 196, BH 1025, PL 907, DWRB 199, DWRB 198
Husk Content	RD 3008
Grain Beta glucan	DWRB 182, KB 1743, KB 1707
Malt Friability	DWRB 182, DWRB 184, RD 3008, BH 1025
Hot water extract	RD 3010, DWRB 184
Filtration Rate	PL 907, RD 3009, DWRB 199, RD 3008, RD 3007, DWRB 196
Diastatic Power	DWRB 198, KB 1743, RD 3008, DWRB 199
Kolbach Index	PL 908, DWRB 196, DWRB 197, RD 3008, BH 1025
FAN Content	RD 3009, DWRB 197, RD 3008, RD 3010, RD 3007
Wort beta glucan	DWRB 182, PL 908, KB1743, DWRB197, RD 3008, BH1025, RD 3009
Over all MQ	DWRB 182, DWRB 160, BH1025, RD3008

*Superior or at par to best check

FEED BARLEY

The feed grain samples from various trials and grown at different locations were analysed for physical parameters and protein content. A total of 617 samples were received encompassing ten trials grown in different zones. The entries with highest value for each of the parameter analyzed are listed below:

No.	Trial	Zone	Test weight	Thousand grain weight	Bold grain (%)	Thin grain (%)
1	IVT/AVT (HL)	NWPZ/NEP Z/CZ	K1149 (c)	PL 891	PL 891	PL 891
2	IVT FB (IR)	NWPZ/NEP Z/CZ	DWRB 203, BH 1023	DWRB137 (c)	DWRB137 (c)	BH 946 (c)
3	AVT (IR)	NEPZ	DWRB 137 ©	DWRB 137 ©	DWRB 137 ©	DWRB 137 ©

4	AVT (SAL/ALK)	NWPZ/NEP Z	KB 1754, HUB 268, HUB 267, RD 3002, KB 1706, RD 3000	DWRB 207, RD 3002, RD 3000, DWRB 201, RD 2999	RD 3002, RD 3000, DWRB 207, KB 1762, HUB 268, DWRB 201	RD 3002, RD 3000, DWRB 207, HUB 268, NDB 1708, DWRB 201
5	AVT-IR- DP	NEPZ	DWRB 137 ©	DWRB 137 ©	DWRB 137 ©	DWB 137 ©
6	IVT-RF	NEPZ	PL910, DWRB203, DWRB202, DWRB200, PL911	PL910 RD3004 NDB1712	RD3004, DWRB202, NDB1712, DWRB200, KB1743, PL911, PL910, KB1762, DWRB203, HUB265	NDB1712 RD3004 DWRB202 KB1743 HUB265 PL910 DWRB200 DWRB203 PL911 RD3005 KB1762
7	IVT-RF	NHZ	HBL 858	BHS 477 VLB 162 HBL 848	UPB 1077	UPB 1077 VLB 164 BHS 477 HBL 851
8	AVT- DP	NHZ	HBL 276 ©	VLB 155	VLB 118 ©	VLB 118 ©

New initiatives were undertaken to improve productivity and quality of malt and food purpose barley. Awareness programmes were organized to popularise 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.

Performance of test sites during Rabi 2018-19

No.	Centres	No. of Trials		Trials Rejected		
		Allotted	Conducted	No.	Name	Reason
(A) MAIN CENTRES						
1.	Almora	2	2	-	-	-
2.	Bajaura	2	2	-	-	-
3.	Durgapura	4	4	-	-	-
4.	Faizabad	6	6	-	-	-
5.	Hisar	5	5	-	-	-
6.	Kanpur	5	5	-	-	-
7.	Karnal	5	5	-	-	-
8.	Ludhiana	4	4	-	-	-
9.	Shimla	2	2	-	-	-
10.	Varanasi	5	5	-	-	-
11.	Pantnagar	4	4	-	-	-
	Total (A)	44	44	-	-	-

Contd....

Performance of test sites during Rabi 2018-19 (contd....)

No.	Centres	No. of Trials		Trials Rejected		
		Allotted	Conducted	No.	Name	Reason
(B)	TESTING CENTRES /SAU / DEPTT. OF AGRIC.					
1	Bawal	2	2	-	-	-
2	Banasthali	1	1	-	-	-
3	Bathinda	2	2	2	IVT-MB-TS, AVT-MB-TS	RMT
4	Berthein	1	1	-	-	-
5	Chiyanki	1	1	-	-	-
6	Dalipnagar	1	1	-	-	-
7	Gwalior	2	2	-	-	-
8	Kalyani	1	1	-	-	-
9	Kangra	1	1	-	-	-
10	Katrain	1	1	-	-	-
11	Kumher	1	1	-	-	-
12	Majhera	2	2	-	-	-
13	Malan	1	1	-	-	-
14	Mathura	2	2	2	IVT-MB-TS, AVT-MB-TS	RMT
15	Morena	2	2	-	-	-
16	Palampur	1	1	-	-	-
17	Pusa, CAU	5	4	-	-	-
18	Rajauri	1	1	-	-	-
19	Ranchi	5	2	-	-	-
20	Ranichauri	1	1	1	AVT-FB-NHZ	HCV
21	Sabour	5	5	-	-	-
22	Saini	1	1	-	-	-
23	Sriganganagar	1	1	-	-	-
24	Tabiji	1	1	-	-	-
25	Tikamgarh	1	1	-	-	-
26	Udaipur	2	2	-	-	-
27	Vallabh Nagar	1	1	-	-	-
28	Vijapur	2	2	-	-	-
	Total (B)	48	44	5		

RMT= rejected by monitoring team, HCV= High CV

Trial wise locations during Rabi 2018-19

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-DP-NEPZ	Kanpur, Faizabad, Varansi, Pusa (CAU), Sabour, Ranchi	6
4	AVT-IR- NEPZ	Kanpur, Faizabad, Varanasi, Pusa (CAU), Sabour, Ranchi	6
5	AVT-MB-TS	Bawal, Hisar, Karnal, Ludhiana, Bathinda, Durgapura, Mathura, Pantnagar	8
6	AVT-SST	Dalipnagar, Faizabad, Hisar, IIWBR Hisar, Kumher, Bansthali, Vallabh Nagar	7
7	IVT (IR-TS) Malt Barley	Bawal, Hisar, Karnal, Ludhiana, Bathinda, Durgapura, Mathura, Pantnagar, SG Nagar	9
8	IVT (IR-TS) Feed Barley	Hisar, Karnal, Ludhiana, Durgapura, Tabiji, Udaipur, Pantnagar, Kanpur, Varanasi, Faizabad, Kalyanai, Morena, Gwalior, Pusa (CAU), Sabour, Ranchi, Vijapur	17
9	IVT/AVT-Hulless	Hisar, Karnal, Ludhiana, Durgapura, Tikamgarh, Udaipur, Pantnagar, Kanpur, Varanasi, Faizabad, Morena, Gwalior, Pusa (CAU), Sabour, Ranchi, Vijapur	16
10	IVT (RF)-NEPZ	Kanpur, Varanasi, Faizabad, Pusa, Sabour, Saini, Ranchi, Chiyanki	8
	Total		92

Center wise Summary Rabi 2018-19

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(MB)TS, AVT-MB-TS, IVT/AVT-Hulless, IVT-IR-FB	4
4.	Faizabad	AVT-SST, IVT(RF)-NEPZ, AVT-IR-NEPZ, IVT-IR-FB, AVT (DUAL)NEPZ, IVT/AVT-Hulless	6
5.	Hisar	IVT(MB)TS, AVT (MB)-TS , IVT-IR-FB, AVT-SST, IVT/AVT-Hulless	5
6.	Kanpur	IVT(RF)-NEPZ, AVT-IR-NEPZ, IVT-IR-FB, AVT (DUAL)NEPZ, IVT/AVT-Hulless	5
7.	Karnal	IVT(MB)TS, AVT (MB)-TS , IVT-IR-FB, AVT-SST, IVT/AVT-Hulless	5
8.	Ludhiana	IVT(MB)TS, AVT (MB)-TS , IVT-IR-FB, IVT/AVT-Hulless	4
9.	Shimla	AVT(RF)-NHZ, AVT-RF(DUAL)-NHZ	2
10.	Varanasi	IVT(RF)-NEPZ, AVT-IR-NEPZ, IVT-IR-FB, AVT (DUAL)NEPZ, IVT/AVT-Hulless	5
11.	Pantnagar	IVT(MB)TS, AVT (MB)-TS , IVT-IR-FB, IVT/AVT-Hulless	4
		Sub Total	44
(B) TESTING CENTRES /SAU / DEPTT. OF AGRIC.			
S No.	Centre	Trials proposed	Total
1.	Bawal	IVT(MB)TS, AVT (MB)-TS	2
2.	Banasthali	AVT-SST	1
3.	Bathinda	IVT(MB)TS, AVT (MB)-TS	2
4.	Berthein	AVT(RF)NHZ	1
5.	Chiyanki	IVT-RF-NEPZ	1
6.	Dalipnagar	AVT-SST	1
7.	Gwalior	IVT-FB-IR, IVT/AVT-Hulless	2
8.	Kalyani	IVT-FB-IR	1
9.	Kangra	AVT(RF)NHZ	1
10.	Katrain	AVT(RF)NHZ	1
11.	Kumher	AVT-SST	1
12.	Majhera	AVT(RF)NHZ, AVT-DP-NHZ	2
13.	Malan	AVT-RF-NHZ	1
14.	Mathura	IVT(MB)TS, AVT (MB)-TS	2
15.	Morena	IVT-FB-IR, IVT/AVT-Hulless	2
16.	Palampur	AVT-DP-NHZ	1
17.	Pusa, CAU	IVT-FB-IR, IVT/AVT-Hulless, AVT-DP-NEPZ, AVT-FB-NEPZ, IVT-RF-NEPZ	5
18.	Rajauri	AVT-RF-NHZ	1
19.	Ranchi	IVT-FB-IR, IVT/AVT-Hulless, AVT-DP-NEPZ, AVT-FB-NEPZ, IVT-RF-NEPZ	5
20.	Ranichauri	AVT-RF-NHZ	1
21.	Sabour	IVT-FB-IR, IVT/AVT-Hulless, AVT-DP-NEPZ, AVT-FB-NEPZ, IVT-RF-NEPZ	5
22.	Saini	IVT-RF-NEPZ	1
23.	Sriganganagar	IVT-MB-TS	1
24.	Tabiji	IVT-IR-FB	1
25.	Tikamgarh	IVT/AVT-Hulless	1
26.	Udaipur	IVT-FB-IR, IVT/AVT-Hulless	2
27.	Vallabhnagar	AVT-SST	1
28.	Vijapur	IVT-FB-IR, IVT/AVT-Hulless	2
		SUB TOTAL	48
		G TOTAL (A+B)	92

PARENTAGE OF BARLEY STRAINS UNDER COORDINATED EVALUATION DURING RABI 2018-19

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	BHS472	BHS 365 /BHS 169
2	BHS474	BLG 132 / BHS 369
3	BHS475	BHS 385 / HBL 113//BHS 169
4	BHS476	BHS 365 /BHS 169
5	BHS477	BHS 369 / HBL 113
GBPUA&T, Pantnagar		
6	UPB1074	UPB 1006/Jyoti
7	UBP1077	AHOR1489.58//GLORIA-BAR/COPAL/3/PRO-/4/CAPUL/TOCTE/5/ICARO
8	UBP1078	BLLU/CANICAPA
9	UBP1079	CEV 96054/ DEFRA (Hulless)
10	UBP1080	AHOR1489.58//GLORIA-BAR/COPAL/3/PRO-/4/CAPUL/TOCTE/5/ICARO
11	UBP1082	UPB 1008/ RD 2794
ICAR-VPKAS, Almora		
12	VLB155	CEV 96060/3/ARUPO/K8755//MORA/4/CANELA
13	VLB161	INBON-54 (2015-16) (Hulless)
14	VLB162	ALELI/ESCOBA/3/ARUPO/K8755//MORA/4/CANELA/5/MSEL
15	VLB163	TR145/195039 H97054003 09/6T0007
16	VLB164	VMORALES P.STO/3/LIBIRAN/UNA80//LIGNEE640/4/BLLU/ 5/PETUNIA_1
CSKHPKV, RRS, Bajaura		
17	HBL 845	HBL 113 /HBL 276
18	HBL 848	IBON-72 (EIBGN 2015-16)
19	HBL 851	IBON-59 (EIBGN 2015-16)
20	HBL 858	HBL 316 /Dolma (Hulless)
21	HBL 863	HBL 276/ Dyar Local
CCSHAU, Hisar		
22	BH1023	NBGSN-4 (2011-12)/RD 2552
23	BH1024	NBGSN-12 (2011-12)/BH 393
24	BH1025	NBGSN-13 (2011-12)/BH 393
BHU, Varanasi		
25	HUB265	DL 70 / 25 TH IBYT-22-2
26	HUB266	DL 70 / 25 TH IBYT-22-1
27	HUB267	BH 550 / RD 2624
28	HUB268	YARADU / 22 ND IBYT-01-2-2-4-2
SKNAU, RARI, Durgapura		

29	RD2969	RD2552/RD2503//RD 2715
30	RD 2991	RD2592 /RD2503//RD 2715
31	RD 2992	RD2660 /13 th EMBGSN-4
32	RD 2994	RD2624 / NDB1173
33	RD 2999	RD2592 / RD2830
34	RD 3000	DWRUB64 / RD2503
35	RD 3002	RD2715 / RD2552
36	RD 3003	RD2592 / RD2794
37	RD 3004	RD2660 / 13th EMBGSN-4
38	RD 3005	DWR16 / RD2503 // RD2667
39	RD 3007	DWR39 / RD-2651
40	RD 3008	Clipper / RD2668 // DWRB73
41	RD 3009	DWR16 / RD2503 // RD2668
42	RD 3010	Clipper / RD2668 // DWRB73
PAU, Ludhiana		
43	PL891	IBON 343/12th HSBN-176 (Hulless)
44	PL906	RD2503/WSA353 (<i>H.spontaneum</i>)
45	PL907	PL829/DWR81
46	PL908	RD2740/RD2743
47	PL909	RD2740/BL194
48	PL910	VJM201/DWRUB52
49	PL911	RD2743/BL194
CSAUA&T, Kanpur		
50	KB1706	Jagriti/RD2785
51	KB 1707	Manjula/DWRUB52
52	KB1713	IBON-19 (2011-12)/RD2885
53	KB 1743	INBON-76 (2011-12)/RD2826
54	KB 1750	Sel. INBYT-HI-11 (2016-17) (Hulless)
55	KB 1754	LIGNEE527/GERBEL/3/BOY-B*2/SURB//CI12225.2D/4/BBSC/CONGONA
56	KB 1757	CHAMICO/TOCTE//CONGONA/3/PETUNIA2/4/PENCO/CHEVRON-BAR (Hulless)
57	KB 1762	PENCO/CHEVRON-BAR//KASOTA
NDUA&T, Faizabad		
58	NDB 1708	3 rd GSBYT-18 (2016)
59	NDB 1709	INBYT-HI-2 (2016)
60	NDB 1712	INBON-HI-11 (2016)
61	NDB 1713	INBON-HI-136 (2016)
62	NDB 1723	3 rd GSBSN-35 (2016)
ICAR-IIWBR, Karnal		
89	DWRB160	DWRB62/DWRB73
90	DWRB182	DWRUB52/DWRB78
91	DWRB184	DWRUB52/DWR81
92	DWRB188	PENCO/CHEVRON-BAR/3/LEGACY//PENCO/CHEVRON-BAR (Hulless)
93	DWRB196	DWRUB52/DWR81
94	DWRB197	DWRUB52/DWR84
95	DWRB198	DWR71/DWRB54
96	DWRB199	DWR71/DWRB74
97	DWRB200	DWRB73/ NDB1173
98	DWRB201	DWRUB52/BONMRA-73//Prestige/PL426
99	DWRB202	ECU1.31/SLOOP
100	DWRB203	P.STO/3/LBIRAN/UNA80//LIGNEE640/4/BLLU/5/PETUNIA 1/6/M111
101	DWRB204	ALELI/4/EGYPT4/TERAN78//P.STO/3/QUINA (Hulless)
102	DWRB205	CDC MANLEY/BCU2881
103	DWRB206	ZIGZIG/4/TOCTE//HIGO/LINO/3/PETUNIA1 (Hulless)
104	DWRB207	CDC MANLEY/BCU2881
Checks		
1	Azad	K12/K19
2	BH902	BH495/RD2552

3	BH946	BHMS22A/BH549//RD2552
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
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 EMBSN-9313

INITIAL VARIETAL TRIAL-RF-NEPZ

- The trial was proposed at 8 centres in NEPZ and data from all the locations were pooled for zonal mean compilation.
- The trial comprised of 14 test entries and 2 checks viz. K603 and Lakhan.
- The trial mean grain yield was observed as 30.48 q/ha, which ranged from 22.14 q/ha (Varanasi) to 38.69 q/ha (Faizabad). The check variety K603 ranked first (36.36 q/ha) followed by the entry RD3003 (35.71 q/ha).

ADVANCED VARIETAL TRIAL-(RAINFED)-NHZ

- This trial with 17-test entries and 4-check varieties, all in the first year of AVT, was allotted to ten locations, but was conducted at nine locations (at Rajori it was not conducted)
- Data of Ranichauri location was not considered for pooled analysis due to high CV obtained at these locations.
- Highest general mean for grain yield (27.78 q/ha) was obtained at Kangra followed by Berthin (23.5 q/ha) locations.
- Zonal mean for grain yield across the entries was 22.4 q/ha.
- Among the checks BHS 400 was found to be the best check variety of the zone with 27.4 q/ha grain yield with a first rank.
- No test entry gave significantly higher grain yield over this best check variety of the zone.

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

Varieties	Codes	Saini			Varanasi			Kanpur			Faizabad			Sabour			Ranchi			Chianki			CAU PUSA			NEPZ		
		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
DWRB200	IVTRFNEPZ-15	36.41	5	0	19.63	11	0	35.51	4	0	44.87	3	1	33.99	1	1	42.83	2	1	31.92	4	1	39.25	7	0	35.55	3	1
DWRB202	IVTRFNEPZ-10	34.78	7	0	17.80	15	0	36.59	3	0	27.05	16	0	26.36	6	0	5.79	15	0	33.61	3	1	30.25	12	0	29.49	10	0
DWRB203	IVTRFNEPZ-11	33.15	11	0	18.33	14	0	26.09	14	0	29.47	14	0	25.59	7	0	0.88	16	0	24.08	13	0	44.26	3	1	28.71	12	0
HUB265	IVTRFNEPZ-1	27.17	16	0	18.59	12	0	28.08	12	0	35.81	12	0	21.45	14	0	19.84	13	0	30.88	5	0	47.46	1	1	28.66	13	0
KB1743	IVTRFNEPZ-3	29.35	14	0	24.30	5	0	28.35	11	0	43.06	5	0	33.85	2	1	36.27	4	0	25.78	10	0	40.64	6	0	32.70	5	0
KB1754	IVTRFNEPZ-5	35.51	6	0	15.13	16	0	34.78	6	0	40.82	8	0	22.68	12	0	8.02	14	0	16.92	15	0	22.46	16	0	26.90	16	0
KB1762	IVTRFNEPZ-6	36.59	4	0	22.66	7	0	35.14	5	0	27.48	15	0	19.69	16	0	37.66	3	0	26.45	8	0	31.82	10	0	29.69	9	0
NDB1712	IVTRFNEPZ-4	34.78	7	0	18.59	13	0	26.45	13	0	40.82	9	0	20.91	15	0	22.56	12	0	24.52	12	0	28.56	15	0	27.15	15	0
NDB1713	IVTRFNEPZ-2	33.51	9	0	21.16	10	0	22.10	16	0	42.57	7	0	22.95	11	0	35.97	5	0	35.32	1	1	44.57	2	1	32.27	6	0
PL910	IVTRFNEPZ-8	29.53	13	0	25.59	4	0	30.98	8	0	37.74	11	0	27.23	5	0	28.03	11	0	13.66	16	0	28.93	13	0	27.71	14	0
PL911	IVTRFNEPZ-12	31.34	12	0	21.73	8	0	44.20	1	1	31.46	13	0	25.23	8	0	28.19	10	0	22.27	14	0	28.86	14	0	29.16	11	0
RD3003	IVTRFNEPZ-13	39.67	3	0	21.23	9	0	43.48	2	1	43.06	6	0	22.04	13	0	44.92	1	1	34.61	2	1	36.64	9	0	35.71	2	1
RD3004	IVTRFNEPZ-7	28.08	15	0	25.85	3	0	25.36	15	0	46.80	1	1	23.55	10	0	34.93	7	0	24.66	11	0	41.97	5	0	31.40	7	0
RD3005	IVTRFNEPZ-9	33.51	9	0	23.30	6	0	29.71	9	0	43.18	4	0	24.79	9	0	28.97	9	0	26.40	9	0	31.04	11	0	30.11	8	0
Lakhan (c)	IVTRFNEPZ-14	40.04	2	0	30.49	1	1	31.16	7	0	39.55	10	0	32.70	3	1	35.82	6	0	30.39	7	0	38.65	8	0	34.85	4	0
K 603 (c)	IVTRFNEPZ-16	46.56	1	1	29.89	2	1	29.71	9	0	45.29	2	1	31.55	4	0	33.08	8	0	30.82	6	0	43.96	4	1	36.36	1	1
G.M.		34.38			22.14			31.73			38.69			25.91			27.73			27.02			36.21			30.48		
S.E.(M)		1.82			0.88			1.53			1.44			0.91			2.25			1.87			1.56			0.56		
C.D.		4.32			2.10			3.64			3.41			2.15			5.34			4.43			3.71			1.31		
C.V.		10.59			7.99			9.65			7.42			6.99			16.20			13.81			8.64			30.48		
DOS		03-11-2018			09-11-2018			10-11-2018			02-11-2018			06-11-2018			14-11-2018			10-11-2018			10-11-2018					

INITIAL VARIETAL TRIAL-(RF)

ZONE: NEPZ

Summary of ancillary data

RABI – 2018-19

Sr. No.	Genotype	H. days Mean & Range	M. days Mean & Range	Height Mean & Range (cm)	Tillering per meter Mean & Range	Two/ Six Row	Colour	1000 grain wt. Mean & Range	H/N
1	DWRB200	76 (72-80)	123 (110-133)	77 (64-93)	80 (15-122)	6	Y	47 (40-54)	H
2	DWRB202	77 (72-82)	124 (110-139)	73 (59-83)	81 (15-125)	6	Y	43 (38-51)	H
3	DWRB203	76 (71-81)	125 (108-139)	78 (53-99)	83 (10-146)	6	Y	45 (40-54)	H
4	HUB265	79 (74-85)	125 (114-138)	79 (67-91)	71 (17-110)	6	Y	44 (29-52)	H
5	KB1743	73 (65-78)	122 (108-135)	82 (60-101)	73 (11-121)	6	Y	47 (39-52)	H
6	KB1754	81 (73-87)	125 (110-135)	81 (65-97)	79 (13-132)	6	A	41 (34-45)	HI
7	KB1762	75 (64-82)	122 (110-137)	84 (70-95)	70 (25-113)	6	Y	45 (33-54)	H
8	NDB1712	75 (73-78)	122 (108-133)	75 (63-93)	85 (9-127)	2	Y	50 (39-57)	H
9	NDB1713	74 (66-80)	122 (106-137)	85 (68-94)	80 (10-119)	6	Y	42 (36-46)	H
10	PL910	77 (71-85)	124 (110-134)	78 (64-89)	84 (8-127)	2	Y	48 (35-54)	H
11	PL911	79 (73-88)	123 (109-138)	69 (45-96)	75 (9-123)	6	Y	45 (37-53)	H
12	RD3003	77 (65-92)	123 (108-138)	79 (65-89)	74 (18-128)	6	Y	41 (29-47)	H
13	RD3004	73 (62-79)	122 (101-138)	75 (54-100)	68 (18-138)	6	Y	50 (40-58)	H
14	RD3005	80 (72-88)	125 (106-137)	70 (60-74)	83 (14-117)	6	Y	44 (32-54)	H
15	K 603 (c)	75 (64-81)	123 (108-137)	86 (66-99)	85 (16-129)	6	Y	46 (40-50)	H
16	Lakhan (c)	74 (65-84)	123 (107-134)	88 (70-100)	82 (13-119)	6	Y	45 (37-50)	H

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

Entry	Code	Berthin, HP			Kangra, HP			Almora			Bajaura			Malan		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
BHS 472	NHGBZ-1815	28.5	4	0	18.77	19	0	26.72	3	0	25.62	3	1	17.08	15	0
BHS 474	NHGBZ-1809	22.8	11	0	34.22	3	0	20.83	15	0	20.50	10	0	24.09	5	0
BHS 475	NHGBZ-1808	24.1	7	0	29.39	8	0	29.47	1	1	23.29	8	0	26.29	3	0
BHS 476	NHGBZ-1821	29.6	3	0	27.48	13	0	20.95	14	0	17.39	17	0	19.69	12	0
BHS 477	NHGBZ-1807	23.4	10	0	37.68	1	1	22.31	11	0	18.32	15	0	16.50	17	0
HBL 845	NHGBZ-1811	21.7	13	0	28.30	11	0	18.69	21	0	14.44	19	0	20.78	10	0
HBL 848	NHGBZ-1814	20.5	15	0	23.12	18	0	20.08	17	0	20.65	9	0	17.29	14	0
HBL 851	NHGBZ-1817	23.9	8	0	26.66	15	0	18.84	20	0	19.18	12	0	17.96	13	0
HBL 858	NHGBZ-1818	19.0	18	0	26.38	16	0	20.98	13	0	18.09	16	0	14.96	19	0
HBL 863	NHGBZ-1803	20.6	14	0	30.97	6	0	25.48	6	0	24.30	5	0	19.87	11	0
UPB 1077	NHGBZ-1812	20.2	17	0	15.05	21	0	22.74	9	0	19.95	11	0	15.17	18	0
UPB 1078	NHGBZ-1813	22.7	12	0	28.08	12	0	26.09	4	0	19.10	13	0	17.01	16	0
UPB 1082	NHGBZ-1802	25.7	6	0	16.00	20	0	21.23	12	0	18.87	14	0	20.86	9	0
VLB 161	NHGBZ-1801	18.8	20	0	33.91	4	0	19.47	19	0	16.38	18	0	10.79	21	0
VLB 162	NHGBZ-1810	33.0	2	1	36.50	2	1	28.56	2	1	25.31	4	1	21.57	8	0
VLB 163	NHGBZ-1805	18.9	19	0	30.51	7	0	24.21	8	0	24.15	7	0	21.84	6	0
VLB 164	NHGBZ-1806	26.0	5	0	28.64	9	0	20.53	16	0	13.66	20	0	13.02	20	0
BHS 352 (C)	NHGBZ-1820	15.7	21	0	28.37	10	0	20.05	18	0	11.10	21	0	21.70	7	0
BHS 400 (C)	NHGBZ-1819	34.8	1	1	26.96	14	0	25.60	5	0	24.30	5	0	33.15	2	1
HBL 113 (C)	NHGBZ-1804	20.3	16	0	31.48	5	0	24.61	7	0	27.10	1	1	25.11	4	0
VLB 118 (C)	NHGBZ-1816	23.5	9	0	24.92	17	0	22.46	10	0	26.09	2	1	33.70	1	1
	G.M.	23.5			27.78			22.85			20.37			20.40		
	S.E.(M)	1.8			0.60			0.92			1.00			1.04		
	C.D.	4.1			1.41			2.18			2.36			2.45		
	C.V.	14.9			4.30			8.06			9.79			10.17		
	DOS	27.10.2018			10.11.18			22.10.18			6.11.2018			9.11.18		

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

Entry	Code	Shimla			Majhera			Katrain			Pooled		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
BHS 352	NHGBZ-1820	17.86	15	0	16.30	16	0	21.74	14	0	19.1	20	0
BHS 472	NHGBZ-1815	26.65	1	1	15.49	20	0	22.05	10	0	22.6	9	0
BHS 474	NHGBZ-1809	21.40	7	0	20.52	11	0	22.36	9	0	23.3	6	0
BHS 475	NHGBZ-1808	20.49	9	0	22.10	10	0	16.05	21	0	23.9	5	0
BHS 477	NHGBZ-1807	18.80	13	0	16.03	17	0	21.84	13	0	21.9	13	0
HBL 845	NHGBZ-1811	16.27	17	0	20.02	12	0	24.84	7	0	20.6	17	0
HBL 848	NHGBZ-1814	13.59	21	0	25.36	7	0	27.95	3	1	21.1	16	0
HBL 851	NHGBZ-1817	14.25	20	0	31.88	1	1	24.95	6	0	22.2	11	0
HBL 858	NHGBZ-1818	15.73	18	0	19.38	14	0	22.05	10	0	19.6	19	0
HBL 863	NHGBZ-1803	22.22	4	0	14.95	21	0	21.01	15	0	22.4	10	0
UPB 1077	NHGBZ-1812	20.63	8	0	28.99	3	1	29.09	1	1	21.5	14	0
UPB 1078	NHGBZ-1813	23.22	3	0	30.25	2	1	20.19	18	0	23.3	7	0
UPB 1082	NHGBZ-1802	15.52	19	0	24.82	8	0	18.53	19	0	20.2	18	0
VLB 161	NHGBZ-1801	18.88	12	0	15.63	19	0	18.43	20	0	19.0	21	0
VLB 162	NHGBZ-1810	21.68	6	0	27.36	5	0	20.70	16	0	26.8	2	1
VLB 163	NHGBZ-1805	18.59	14	0	16.49	15	0	20.39	17	0	21.9	12	0
VLB 164	NHGBZ-1806	17.15	16	0	28.89	4	1	22.05	10	0	21.2	15	0
BHS 400 (C)	NHGBZ-1819	19.64	10	0	26.99	6	0	27.33	4	1	27.4	1	1
BHS 476 (C)	NHGBZ-1821	21.68	5	0	15.94	18	0	28.16	2	1	22.6	8	0
HBL 113 (C)	NHGBZ-1804	25.26	2	0	19.93	13	0	24.84	7	0	24.8	3	0
VLB 118 (C)	NHGBZ-1816	19.08	11	0	22.46	9	0	25.36	5	0	24.7	4	0
	G.M.	19.46			21.89			22.85			22.4		
	S.E.(M)	0.36			1.56			0.96			0.392		
	C.D.	0.84			3.68			2.29			0.9		
	C.V.	3.66			14.21			7.28			26.4		
	DOS	5.11.18			2.11.18			10.11.2018					

ADVANCED VARIETAL TRIAL (RAINFED)-NHZ
Summary of ancillary and disease data

Rabi 2018-19

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 & Ran ge	Two/ Six Row	Grai n Colo ur	1000 g.w Mean & Range	H/N	RUST			SMUT		Hel. Disease		Ap hi d
											Y L	BR	BL	L (%)	C (%)	Sp ot (%)	L B	
BHS 352	NHGBZ-1820	123 (112-149)	170 (150-194)	84 (72-105)	143	4	6	A	33 (29-38)	H								
BHS 472	NHGBZ-1815	127 (117-149)	169 (141-195)	96 (76-110)	177	4	6	Y	36 (32-40)	H						01		
BHS 474	NHGBZ-1809	126 (114-104)	172 (145-196)	84 (64-102)	153	4	6	Y	39 (36-45)	H								
BHS 475	NHGBZ-1808	128 (104-154)	174 (155-198)	88 (70-111)	202	3	6	Y	33 (26-38)	H								
BHS 477	NHGBZ-1807	124 (111-145)	170 (145-191)	87 (70-108)	175	4	2	Y	45 (39-51)	H				10%	11			
HBL 845	NHGBZ-1811	130 (117-154)	173 (150-198)	86 (71-107)	181	3	2	Y	40 (34-46)	H	T S							
HBL 848	NHGBZ-1814	125 (110-149)	173 (151-195)	91 (76-106)	146	3	6	Y	41 (37-45)	H	S S			20%				
HBL 851	NHGBZ-1817	122 (109-147)	171 (152-195)	86 (70-107)	149	3	6	Y	36 (31-42)	H								
HBL 858	NHGBZ-1818	129 (115-153)	170 (142-196)	89 (73-103)	159	4	6	A	33 (28-39)	H				60%	01			
HBL 863	NHGBZ-1803	128 (119-148)	173 (152-195)	86 (65-112)	172	4	6	Y	32 (28-39)	H	T S							
UPB 1077	NHGBZ-1812	123 (109-147)	170 (141-194)	86 (69-109)	151	4	6	Y	37 (33-40)	H						01		
UPB 1078	NHGBZ-1813	128 (111-155)	172 (145-197)	83 (68-104)	168	3	6	Y	37 (33-42)	H						11		

UPB 1082	NHGBZ-1802	121 (110-146)	168 (144-190)	83 (65-104)	153	3	6	Y	37 (35-39)	H					20%			
VLB 161	NHGBZ-1801	129 (114-153)	170 (142-196)	90 (73-111)	160	3	2	A	35 (31-40)	H					10%			
VLB 162	NHGBZ-1810	128 (115-152)	171 (143-196)	93 (77-110)	186	4	2	Y	42 (38-47)	H					30%	01		
VLB 163	NHGBZ-1805	127 (115-150)	170 (144-195)	84 (66-106)	205	4	2	Y	40 (36-49)	H						01		
VLB 164	NHGBZ-1806	120 (107-147)	168 (140-194)	82 (67-98)	141	3	6	Y	38 (36-42)	H								
BHS 400 (C)	NHGBZ-1819	128 (110-155)	172 (145-196)	87 (69-111)	180	4	6	Y	39 (36-42)	H						01		
BHS 476 (C)	NHGBZ-1821	131 (121-155)	173 (151-198)	88 (73-111)	155	4	6	Y	36 (32-40)	H					50%			
HBL 113 (C)	NHGBZ-1804	130 (115-155)	171 (142-197)	82 (68-103)	198	3	2	Y	35 (31-39)	H						01		
VLB 118 (C)	NHGBZ-1816	122 (111-146)	169 (142-193)	83 (67-105)	194	3	6	Y	42 (39-45)	H						01		

AVT-IR-NEPZ:

- The trial comprised of 01 test entries viz., RD2969 and 05 check varieties.
- The zonal mean grain yield was exhibited as 37.90 q/ha and varied from 33.01 q/ha (Varanasi) to 44.72 q/ha (Faizabad). The check variety DWRB137 ranked first (41.78 q/ha) and test genotype showed mean grain yield of 36.64 q/ha.

AVT-MB-TS:

- The trial was proposed at 8 centres data of 6 locations were pooled for statistical analysis. The trial comprised of 03 test entries viz., DWRB160, DWRB182 and DWRB184 and 05 check varieties.
- The zonal mean grain yield was exhibited as 54.82 q/ha and ranged from 43.83 q/ha (Hisar) to 62.15 q/ha (Durgapura). The final year entry DWRB160 ranked first (56.65 q/ha) followed by first year entry DWRB184 (56.59q/ha), whereas the best two row check RD2849 depicted mean grain yield of 56.37 q/ha.

IVT-MB-TS:

- The trial was proposed at 9 centres data of 7 locations were pooled for statistical analysis. The trial comprised of 13 test entries and 04 check varieties.
- The trial mean grain yield was observed as 59.04 q/ha, which ranged from 40.65 q/ha (Hisar) to 87.17 q/ha (SG Nagar), suggested varied genotypic performances across the locations. The two rowed entry DWRB197 ranked first (66.54 q/ha) followed by the six row entry PL908 (65.21 q/ha) and DWRB196 (63.58 q/ha).

AVT-SST:

- The trial was proposed at 7 centres and data of all the locations were considered for pooled analysis. The trial comprised of 11 test entries and 05 check varieties.
- The zonal mean grain yield was exhibited as 34.09 q/ha, which ranged from 23.76 q/ha (IIWBR, Hisar) to 39.71 q/ha (Vallabh Nagar). The check variety NDB1445 ranked first (38.49 q/ha) followed by another check RD252 (38.43 q/ha).

AVT- IR-FB-NEPZ

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

Varieties	Codes	Varanasi			Faizabad			Kanpur			Ranchi			Sabour			NEPZ		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
RD2969	AVTIRNEPZ-4	24.99	6	0	33.77	5	0	44.11	3	0	43.34	2	1	36.98	2	0	36.64	4	0
DWRB137 (c)	AVTIRNEPZ-5	44.14	1	1	39.81	2	0	38.59	5	0	43.34	1	1	43.04	1	1	41.78	1	1
HUB113 (c)	AVTIRNEPZ-3	33.82	3	0	38.96	3	0	53.62	1	1	41.38	4	1	34.15	4	0	40.39	2	1
K508 (c)	AVTIRNEPZ-6	36.75	2	0	46.21	1	1	42.39	4	0	39.00	5	1	31.21	6	0	39.11	3	0
K1055 (c)	AVTIRNEPZ-2	30.09	4	0	28.26	6	0	52.17	2	1	24.34	6	0	35.01	3	0	33.97	6	0
RD 2552 (c)	AVTIRNEPZ-1	28.25	5	0	37.15	4	0	37.41	6	0	41.84	3	1	32.95	5	0	35.52	5	0
G.M.		33.01			37.36			44.72			38.87			35.56			37.90		
S.E.(M)		1.02			0.76			1.47			2.17			1.12			0.62		
C.D.		2.54			1.87			3.64			5.38			2.77			1.47		
C.V.		6.20			4.05			6.57			11.16			6.29					
DOS		24-11-2018			15-11-2018			21-11-2018			14-11-2018			25-11-2018					

Summary of ancillary and disease data

Rabi 2018-19

Sr. No.	ENTRY	AGRONOMIC CHARACTERS						GRAIN CHARACTERISTICS		
		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 grain wt. Mean & Range	H/N
1	RD2969	75 (68-84)	118 (116-120)	99 (83-109)	119 (72-154)	10 (7-17)	6	LY	42 (34-51)	H
2	DWRB137 (c)	74 (70-80)	117 (111-122)	77 (61-96)	109 (85-158)	9 (6-14)	6	LY	44 (38-53)	H
3	HUB113 (c)	77 (67-88)	121 (117-125)	88 (77-100)	117 (85-151)	10 (7-18)	6	LY	39 (33-49)	H
4	K508 (c)	74 (63-87)	118 (112-122)	86 (81-90)	112 (85-161)	9 (7-16)	6	LY	37 (33-44)	H
5	K1055 (c)	75 (66-85)	119 (115-123)	89 (76-101)	118 (90-159)	10 (7-18)	6	LY	41 (32-50)	H
6	RD 2552 (c)	78 (70-85)	121 (119-124)	87 (83-93)	129 (89-180)	9 (7-17)	6	LY	39 (37-45)	H

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

Varieties	Codes	Bawal			Durgapura			Hisar			Ludhiana			Pantnagar			Karnal			Zonal Mean**		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
DWRB160*	AVT-MB-TS-3	56.88	4	0	57.64	7	0	48.09	2	1	60.31	1	1	53.49	3	0	63.51	3	1	56.65	1	1
DWRB182	AVT-MB-TS-2	56.20	6	0	53.01	8	0	41.85	6	0	48.23	8	0	49.09	7	0	56.10	5	0	50.75	8	0
DWRB184	AVT-MB-TS-1	56.57	5	0	64.58	3	0	48.18	1	1	54.27	4	0	50.88	5	0	65.07	1	1	56.59	2	1
BH902 (c)	AVT-MB-TS-8	61.11	2	0	68.52	2	1	44.81	4	1	56.97	2	1	53.18	4	0	54.25	7	0	56.47	3	1
DWRB101(c)	AVT-MB-TS-7	53.76	8	0	60.88	5	0	40.96	7	0	50.54	7	0	49.10	6	0	57.08	4	0	52.05	7	0
DWRB123(c)	AVT-MB-TS-6	58.89	3	0	59.95	6	0	45.40	3	1	52.08	6	0	54.85	2	0	54.83	6	0	54.33	6	0
DWRB137(c)	AVT-MB-TS-5	54.68	7	0	71.53	1	1	37.84	8	0	56.20	3	1	47.97	8	0	63.97	2	1	55.36	5	1
RD2849(c)	AVT-MB-TS-4	70.56	1	1	61.11	4	0	43.52	5	0	52.34	5	0	59.58	1	1	51.13	8	0	56.37	4	1
G.M.		58.58			62.15			43.83			53.87			52.27			58.24			54.82		
S.E.(M)		2.57			2.74			1.85			1.82			1.08			1.70			0.83		
C.D.		6.25			6.66			4.49			4.42			2.62			4.13			1.95		
C.V.		8.77			8.81			8.42			6.74			4.12			5.83					
DOS		14-11-2018			10-11-2018			10-11-2018			10-11-2018			10-11-2018			13-11-2018					

**Data of Bathinda (RMT) not included

AVT-MB-TS

Summary of ancillary and disease data

Zone: NWPZ

Rabi 2018-19

Sr. No.	ENTRY	AGRONOMIC CHARACTERS						GRAIN CHARACTERISTICS		
		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
1	DWRB160	87 (66-100)	134 (123-144)	99 (86-108)	141 (90-247)	12	2	Y	66 (53-78)	H
2	DWRB182	86 (66-103)	133 (126-142)	86 (68-99)	162 (75-217)	9	2	Y	48 (41-57)	H
3	DWRB184	90 (73-99)	136 (126-143)	84 (70-98)	158 (82-280)	8	2	Y	52 (46-58)	H
4	BH902 (c)	94 (78-103)	137 (127-145)	103 (90-113)	111 (68-146)	10	6	Y	47 (44-52)	H
5	DWRB 101 (c)	85 (67-95)	133 (125-140)	89 (75-101)	153 (89-209)	9	2	Y	49 (44-56)	H
6	DWRB123 (c)	86 (69-104)	133 (127-140)	90 (74-107)	149 (89-268)	9	2	Y	54 (46-60)	H
7	DWRB137 (c)	86 (67-99)	133 (120-144)	83 (68-101)	110 (82-149)	9	6	Y	49 (46-56)	H
8	RD2849 (c)	85 (66-97)	135 (127-140)	95 (85-106)	149 (101-201)	9	2	Y	52 (49-56)	H

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

Varieties	Codes	Bawal			Durgapura			Hisar			SG Nagar			Ludhiana			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
BH1025	IVT-MB-TS-1	59.95	11	0	59.72	6	0	43.71	5	0	88.89	7	0	49.90	12	0	51.86	5	0	63.40	10	0	59.63	8	0
DWRB196	IVT-MB-TS-3	65.56	4	1	55.09	10	0	40.97	7	0	85.57	11	0	66.36	3	0	59.62	1	1	71.88	1	1	63.58	3	0
DWRB197	IVT-MB-TS-5	72.31	1	1	59.26	7	0	40.12	8	0	100.62	1	1	63.79	4	0	58.75	2	1	70.90	3	1	66.54	1	1
DWRB198	IVT-MB-TS-7	62.50	5	0	54.40	11	0	33.64	17	0	86.42	10	0	57.36	6	0	51.62	6	0	71.11	2	1	59.58	9	0
DWRB199	IVT-MB-TS-9	54.54	16	0	50.93	16	0	40.05	9	0	90.12	6	0	53.50	11	0	44.31	14	0	66.67	6	1	57.16	11	0
KB1707	IVT-MB-TS-8	60.60	8	0	63.89	2	0	50.69	2	1	75.31	17	0	79.48	1	1	41.43	16	0	64.83	9	0	62.32	5	0
KB1743	IVT-MB-TS-6	62.36	7	0	61.57	3	0	34.38	16	0	82.41	13	0	46.04	14	0	48.26	10	0	52.99	16	0	55.43	13	0
PL907	IVT-MB-TS-2	53.52	17	0	45.83	17	0	34.65	14	0	77.78	16	0	56.33	9	0	50.35	8	0	55.96	14	0	53.49	16	0
PL908	IVT-MB-TS-4	67.73	3	1	61.34	4	0	50.23	3	1	96.84	2	1	68.42	2	0	44.93	13	0	66.96	5	1	65.21	2	1
RD3007	IVT-MB-TS-13	59.95	11	0	57.41	9	0	36.03	11	0	82.18	14	0	57.36	6	0	43.64	15	0	59.79	11	0	56.62	12	0
RD3008	IVT-MB-TS-11	70.09	2	1	53.24	12	0	35.73	12	0	80.25	15	0	37.29	17	0	51.21	7	0	53.23	15	0	54.43	15	0
RD3009	IVT-MB-TS-15	57.08	15	0	52.08	13	0	34.57	15	0	83.95	12	0	41.15	15	0	40.90	17	0	51.91	17	0	51.66	17	0
RD3010	IVT-MB-TS-17	57.59	14	0	61.11	5	0	34.95	13	0	87.04	9	0	40.38	16	0	45.86	12	0	57.01	13	0	54.85	14	0
BH946(c-6R)	IVT-MB-TS-10	62.36	6	0	70.37	1	1	50.77	1	1	91.13	4	0	62.24	5	0	47.24	11	0	57.78	12	0	63.13	4	0
DWRB101 (c)	IVT-MB-TS-12	60.37	10	0	51.39	15	0	43.52	6	0	87.96	8	0	57.36	6	0	54.19	3	0	65.69	7	0	60.07	7	0
DWRB123 (c)	IVT-MB-TS-14	60.46	9	0	51.62	14	0	40.05	9	0	94.44	3	1	49.13	13	0	52.75	4	0	67.22	4	1	59.38	10	0
RD2849 (c)	IVT-MB-TS-16	59.12	13	0	58.33	8	0	46.99	4	1	91.05	5	0	54.27	10	0	50.03	9	0	64.83	8	0	60.66	6	0
G.M.		61.54			56.92			40.65			87.17			55.31			49.23			62.48			59.04		
S.E.(M)		2.86			2.30			2.09			3.32			1.97			1.53			2.59			0.92		
C.D.		6.79			5.45			4.96			7.88			4.67			3.62			6.14			2.15		
C.V.		9.31			8.07			10.29			7.63			7.12			6.21			8.29					
DOS		17-11-2018			10-11-2018			10-11-2018			14-11-2018			10-11-2018			10-11-2018			13-11-2018					

*Data of Bathinda not included (RMT)

INITIAL VARIETAL TRIAL (TS) MALT BARLEY

ZONE: NWPZ

Summary of ancillary data

RABI 2018-19

Sr. No.	ENTRY	AGRONOMIC CHARACTERS						GRAIN CHARACTERISTICS		
		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
1	BH1025	93 (77-102)	136 (129-145)	102 (77-118)	133 (104-207)	8 (7-9)	2	Y	56 (51-63)	H
2	DWRB196	88 (68-97)	135 (125-143)	102 (83-116)	118 (93-169)	10 (10-11)	2	Y	65 (50-78)	H
3	DWRB197	92 (79-102)	136 (130-143)	90 (73-106)	148 (93-201)	7 (6-9)	2	Y	51 (47-58)	H
4	DWRB198	88 (68-96)	135 (128-144)	93 (79-102)	116 (72-150)	8 (7-10)	2	Y	55 (44-67)	H
5	DWRB199	91 (73-101)	136 (130-143)	97 (84-107)	161 (109-217)	8 (8-9)	2	Y	57 (49-65)	H
6	KB1707	98 (82-105)	136 (126-145)	104 (79-120)	111 (90-145)	9 (8-10)	6	Y	42 (28-54)	H
7	KB1743	82 (67-91)	131 (125-136)	107 (89-118)	99 (80-113)	9 (8-10)	6	Y	47 (40-56)	H
8	PL907	81 (63-94)	131 (125-139)	98 (78-109)	120 (100-184)	10 (9-11)	2	Y	57 (48-62)	H
9	PL908	93 (75-103)	136 (128-144)	106 (92-122)	93 (72-118)	8 (8-8)	6	Y	49 (45-51)	H
10	RD3007	93 (75-103)	135 (129-142)	92 (78-105)	142 (103-126)	8 (7-9)	2	Y	53 (45-59)	H
11	RD3008	82 (67-95)	131 (119-139)	97 (70-110)	157 (111-209)	9 (7-10)	2	Y	49 (44-52)	H
12	RD3009	76 (61-87)	129 (119-140)	93 (75-108)	149 (108-193)	8 (7-9)	2	Y	54 (49-61)	H
13	RD3010	87 (69-95)	133 (128-139)	97 (83-107)	129 (93-228)	9 (9-10)	2	Y	48 (45-52)	H
14	BH946 (c)	90 (69-101)	134 (126-142)	98 (80-117)	107 (88-126)	8 (7-10)	6	Y	44 (38-51)	H
15	DWRB101 (c)	85 (66-95)	134 (126-140)	91 (82-110)	159 (109-201)	8 (6-9)	2	Y	52 (47-57)	H
16	DWRB123 (c)	85 (67-101)	133 (125-139)	91 (67-104)	131 (90-178)	9 (8-10)	2	Y	55 (52-60)	H
17	RD2849 (c)	84 (67-96)	135 (129-143)	93 (76-112)	134 (84-195)	8 (7-9)	2	Y	50 (37-57)	H

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

Varieties	Codes	Hisar			Faizabad			Kumher			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	Yield	Rk	G
DWRB201	AVT-SST-7	38.71	2	1	37.02	3	0	36.12	9	0	42.03	5	0	36.59	10	1	23.82	8	1	45.53	4	1	37.12	3	1
DWRB207	AVT-SST-5	36.29	5	1	32.31	7	0	43.63	5	0	42.75	3	0	38.77	3	1	26.38	4	1	33.04	13	0	36.17	5	0
HUB267	AVT-SST-2	28.74	14	0	33.21	6	0	33.56	10	0	35.51	9	0	37.32	9	1	24.95	7	1	43.14	6	1	33.78	9	0
HUB268	AVT-SST-9	37.86	4	1	31.40	9	0	39.58	7	0	38.77	6	0	36.23	12	1	23.67	10	1	30.31	14	0	33.97	8	0
KB1706	AVT-SST-10	26.45	15	0	25.97	12	0	31.50	12	0	42.75	3	0	38.77	3	1	20.29	15	0	41.06	8	0	32.40	12	0
KB1754	AVT-SST-8	21.92	16	0	36.90	4	0	22.94	15	0	36.96	7	0	38.41	5	1	18.90	16	0	48.13	3	1	32.02	13	0
KB1762	AVT-SST-6	36.11	6	1	31.40	9	0	46.83	2	1	36.23	8	0	38.04	7	1	20.67	14	0	48.91	1	1	36.89	4	1
NDB1708	AVT-SST-4	33.15	9	0	24.76	14	0	45.47	3	1	28.80	15	0	34.78	15	0	25.46	5	1	39.79	10	0	33.18	10	0
RD2999	AVT-SST-3	31.46	13	0	31.10	11	0	43.86	4	0	29.35	13	0	32.61	16	0	20.87	13	0	34.01	11	0	31.89	14	0
RD3000	AVT-SST-12	31.70	12	0	17.57	16	0	36.86	8	0	48.55	2	1	37.68	8	1	25.41	6	1	40.62	9	0	34.06	7	0
RD3002	AVT-SST-14	32.43	11	0	31.88	8	0	21.26	16	0	27.72	16	0	36.59	10	1	23.73	9	1	27.17	16	0	28.68	16	0
NDB1173(c)	AVT-SST-11	32.67	10	0	42.15	2	1	32.81	11	0	28.99	14	0	39.13	1	1	22.66	12	0	41.36	7	0	34.25	6	0
NDB1445(c)	AVT-SST-15	34.78	8	1	42.87	1	1	52.38	1	1	35.51	9	0	35.51	13	1	22.89	11	0	45.47	5	1	38.49	1	1
RD2552(c)	AVT-SST-13	35.81	7	1	24.76	14	0	43.54	6	0	51.09	1	1	39.13	2	1	26.39	3	1	48.33	2	1	38.43	2	1
RD2794(c)	AVT-SST-1	37.92	3	1	25.06	13	0	26.05	14	0	34.24	11	0	38.41	5	1	26.95	2	1	33.57	12	0	31.74	15	0
RD2907(c)	AVT-SST-16	39.73	1	1	35.51	5	0	27.82	13	0	32.61	12	0	35.51	13	1	27.11	1	1	28.56	15	0	32.41	11	0
G.M.		33.48			31.49			36.51			36.99			37.09			23.76			39.31			34.09		
S.E.(M)		2.36			1.16			3.02			1.83			1.61			1.56			2.72			0.81		
C.D.		5.62			2.75			7.17			4.35			3.83			3.70			6.46			1.88		
C.V.		14.13			7.36			16.53			9.90			8.70			13.10			13.85					
DOS		11-11-2018			25-11-2018			24-11-2018			16-11-2018			24-11-2018			23-11-2018			22-11-2018					

**AVT-Salinity/alkalinity
Summary of ancillary data**

**ZONE: NWPZ/NEPZ
RABI 2018-19**

Sr. No.	Genotype	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	YR	LB
1	DWRB201	92 (83-104)	132 (118-140)	82 (61-101)	121 (85-157)	8 (7-8)	6	Y	43 (41-48)	H	0	23
2	DWRB207	92 (86-98)	135 (128-144)	83 (64-96)	112 (66-158)	8 (7-9)	6	Y	45 (40-49)	H	0	02
3	HUB267	81 (65-94)	131 (118-141)	90 (70-104)	94 (58-133)	8 (6-9)	6	Y	41 (39-44)	H	0	02
4	HUB268	90 (77-101)	131 (110-145)	99 (88-105)	111 (76-153)	7 (7-8)	6	Y	45 (38-52)	H	0	02
5	KB1706	79 (70-94)	127 (107-136)	84 (65-97)	101 (55-158)	8 (7-9)	6	Y	39 (36-41)	H	0	12
6	KB1754	91 (78-103)	128 (110-142)	93 (64-109)	92 (58-123)	8 (7-9)	6	A	36 (32-39)	HI	0	23
7	KB1762	85 (69-94)	131 (121-140)	92 (70-107)	105 (74-158)	8 (7-9)	6	Y	44 (40-47)	H	0	25
8	NDB1708	90 (82-99)	132 (121-143)	98 (73-109)	102 (63-128)	8 (8-9)	6	Y	41 (38-43)	H	0	02
9	RD2999	82 (67-93)	127 (107-141)	87 (71-96)	97 (70-127)	8 (6-10)	6	Y	41 (37-44)	H	0	35
10	RD3000	78 (65-93)	126 (110-133)	83 (67-91)	100 (57-154)	8 (8-9)	6	Y	45 (38-49)	H	0	02
11	RD3002	81 (71-93)	126 (120-132)	81 (60-93)	101 (68-125)	8 (8-10)	6	Y	47 (43-52)	H	0	45
12	NDB1173 (c)	92 (83-97)	130 (119-142)	92 (66-106)	93 (49-123)	8 (6-10)	6	Y	43 (40-47)	H	20S	23
13	NDB1445 (c)	88 (80-96)	128 (106-143)	90 (74-101)	114 (74-152)	7 (6-8)	6	Y	41 (35-45)	H	0	02
14	RD2552 (c)	91 (84-96)	129 (109-144)	86 (76-95)	112 (64-153)	7 (6-7)	6	Y	42 (32-47)	H	0	23
15	RD2794 (c)	89 (84-97)	131 (120-142)	80 (58-94)	112 (68-144)	8 (7-10)	6	Y	45 (42-51)	H	0	12
16	RD2907 (c)	90 (82-97)	131 (119-140)	91 (69-102)	118 (77-160)	8 (7-9)	6	Y	46 (41-51)	H	0	02

INITIAL VARIETAL TRIAL-FEED BARLEY (IRRIGATED)-NWPZ

- This trial was conducted at six locations.
- The zonal mean across the entries for grain yield was 48.9 q/ha for this trial.
- RD2552 was the best check with 49.9 q/ha and 8th rank for grain yield in this zone .
- Four test entries KB1707, PL906, RD2994 and UPB1080 gave statistically higher grain yields over the best check variety.

INITIAL VARIETAL TRIAL-FEED BARLEY (IRRIGATED)-NEPZ

- This trial was conducted at six locations in this zone.
- The zonal mean across the entries for grain yield was 41.8 q/ha for this trial.
- Among the check varieties RD2552 (49.3 q/ha) was the best check with rank 1
- No test entry was found superior over the best check variety.

INITIAL VARIETAL TRIAL-FEED BARLEY (IRRIGATED)-CZ

- This trial was conducted at four locations in this zone.
- The zonal mean across the entries for grain yield was 51.6 q/ha for this trial.
- BH946 (rank 2) was the best check variety in this zone with 56.4 q/ha grain yield
- No test entry was found to be significantly superior over this check variety.

IVT/AVT- FEED BARLEY (HULLESS) (IRRIGATED)-NWPZ

- This trial was conducted at five locations in this zone. This trial comprised of seven test entries and three check varieties. The variety UPB1079 did not germinate at any of the test location
- The zonal means across the entries for grain yield was 35.2 q/ha for this trial. Analysis of data pooled over locations revealed Karan 16 (rank 1) with grain yield of 37.8 q /ha as the best check. No test entry was superior to this check

IVT/AVT- FEED BARLEY (HULLESS) (IRRIGATED)-NEPZ

- This trial was conducted at four locations in this zone. The zonal mean across the entries for grain yield was 31.9 q/ha and for this trial.
- Analysis of data pooled over locations revealed NDB943 (rank 1) with 36.5 q/ha grain yield as the best check. No test entry was superior to this check

IVT/AVT- FEED BARLEY (HULLESS) (IRRIGATED)-CZ

- This trial was conducted at five locations in this zone. The zonal mean across the entries for grain yield was 43.0 q/ha for this trial.
- Analysis of data pooled over locations revealed NDB943 (rank 3) with grain yield of 45.7 q/ha as the best check. Two test entries namely, DWRB204 (rank 1) and KB1750 (rank 2) and DWRB188 (rank 4) gave significantly superior grain yields over the best check variety.

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

Rabi 2018-19

Entry	Code	Karnal			Hisar			Durgapura			Ludhiana			Pantnagar			Tabiji			Pooled		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
BH1023	IVT-IRFB-E17	60.5	12	0	41.5	11	0	66.7	13	0	33.5	16	0	48.1	2	1	47.5	8	0	49.6	9	0
BH1024	IVT-IRFB-E20	52.5	17	0	44.2	6	0	66.9	11	0	29.5	18	0	32.2	18	0	43.9	11	0	44.9	18	0
DWRB203	IVT-IRFB-E15	65.1	8	0	38.4	17	0	67.1	10	0	48.0	5	0	44.1	3	0	32.2	21	0	49.2	10	0
DWRB205	IVT-IRFB-E10	49.6	19	0	39.9	13	0	55.8	20	0	40.3	11	0	33.1	14	0	61.6	1	1	46.7	16	0
HUB266	IVT-IRFB-E8	56.5	15	0	41.1	12	0	67.4	9	0	45.9	7	0	39.3	8	0	36.6	18	0	47.8	12	0
KB1707	IVT-IRFB-E2	89.8	1	1	48.0	4	1	76.8	3	1	51.3	2	1	39.8	6	0	34.2	19	0	56.6	1	1
KB1713	IVT-IRFB-E5	44.8	20	0	43.7	8	0	62.6	18	0	44.7	9	0	42.0	4	0	44.3	10	0	47.0	14	0
NDB1709	IVT-IRFB-E11	61.4	11	0	33.6	20	0	64.7	16	0	37.6	14	0	39.6	7	0	44.7	9	0	46.9	15	0
NDB1723	IVT-IRFB-E14	57.9	14	0	39.1	15	0	60.6	19	0	36.2	15	0	30.0	20	0	42.3	12	0	44.4	19	0
PL906	IVT-IRFB-E9	75.8	5	0	44.4	5	0	78.3	2	1	49.4	4	1	32.8	16	0	55.2	5	0	55.9	2	1
PL909	IVT-IRFB-E12	74.4	6	0	44.1	7	0	64.7	16	0	39.2	12	0	34.2	13	0	52.7	6	0	51.6	7	0
RD2991	IVT-IRFB-E1	40.7	21	0	39.5	14	0	71.0	5	1	19.9	20	0	36.8	11	0	39.5	13	0	41.2	20	0
RD2992	IVT-IRFB-E4	62.2	10	0	30.3	21	0	53.9	21	0	17.2	21	0	29.5	21	0	39.5	13	0	38.8	21	0
RD2994	IVT-IRFB-E3	78.7	3	0	34.4	19	0	66.4	14	0	52.3	1	1	39.9	5	0	52.7	6	0	54.1	3	0
UPB1077	IVT-IRFB-E6	53.6	16	0	39.0	16	0	70.3	7	0	29.8	17	0	48.5	1	1	38.2	15	0	46.6	17	0
UPB1080	IVT-IRFB-E7	79.8	2	0	43.1	10	0	66.2	15	0	41.9	10	0	37.1	10	0	56.4	3	0	54.1	4	0
BH 946 (C)	IVT-IRFB-E13	69.6	7	0	51.4	3	1	71.0	4	1	25.8	19	0	37.3	9	0	37.0	16	0	48.7	11	0
DWRB137 (C)	IVT-IRFB-E19	62.3	9	0	36.5	18	0	80.0	1	1	45.6	8	0	36.5	12	0	56.8	2	0	52.9	5	0
RD2552 (C)	IVT-IRFB-E16	58.7	13	0	43.2	9	0	70.5	6	0	38.5	13	0	32.2	19	0	56.0	4	0	49.9	8	0
RD2786 (C)	IVT-IRFB-E18	76.7	4	0	53.0	1	1	67.9	8	0	47.2	6	0	33.0	15	0	37.0	16	0	52.5	6	0
RD2899 (C)	IVT-IRFB-E21	50.8	18	0	52.0	2	1	66.9	11	0	50.5	3	1	32.5	17	0	33.8	20	0	47.7	13	0
	G.M.	62.9			41.9			67.4			39.2			37.1			44.9			48.9		
	S.E.(M)	2.3			2.1			3.2			1.5			1.4			1.5			0.851		
	C.D.	5.4			4.9			7.5			3.7			3.4			3.5			2.0		
	C.V.	6.2			8.6			8.1			6.8			6.8			5.7					
	DOS	15.11.18			11.11.18			10.11.18			10.11.18			10.11.18			15.11.18					

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

Rabi 2018-19

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 · Me an &	Two/ Six Row	Grain Colour	1000 g.w Mean & Range	H/N	RUST			SMUT		Hel. Disease		Aphid
											YL	BR	BL	L (%)	C (%)	Spo t (%)	Leaf Blight	
BH1023	IVT-IRFB-E17	86 (68-99)	136 (128-144)	103 (94-111)	102 (79-117)		6		40 (35-44)	H						2	12	
BH1024	IVT-IRFB-E20	83 (65-93)	128 (124-133)	102 (90-121)	122 (96-138)		6		41 (38-43)	H						2	35	
DWRB203	IVT-IRFB-E15	84 (73-91)	133 (121-143)	102 (80-120)	118 (90-179)		6		40 (39-43)	H						2	24	
DWRB205	IVT-IRFB-E10	95 (77-103)	136 (129-142)	115 (98-126)	122 (102-165)		6		40 (35-44)	H	YL						12	
HUB266	IVT-IRFB-E8	94 (77-104)	136 (127-143)	110 (96-130)	123 (99-155)		6		46 (40-51)	H							02	
KB1707	IVT-IRFB-E2	95 (81-104)	135 (121-142)	105 (96-119)	101 (74-127)		6		39 (38-40)	H		40 S					02	
KB1713	IVT-IRFB-E5	92 (76-102)	137 (128-143)	101 (88-121)	108 (96-147)		6		46 (43-48)	H							02	
NDB1709	IVT-IRFB-E11	91 (72-102)	135 (127-144)	112 (96-130)	80 (62-95)		6		41 (38-43)	H				10			02	
NDB1723	IVT-IRFB-E14	89 (73-100)	134 (126-142)	107 (89-130)	89 (75-116)		6		41 (36-47)	H					2		02	
PL906	IVT-IRFB-E9	85 (68-94)	136 (123-142)	98 (82-120)	114 (77-159)		6		45 (43-49)	H							02	
PL909	IVT-IRFB-E12	92 (74-104)	137 (128-143)	100 (83-121)	130 (105-183)		6		48 (46-50)	H							02	

RD2991	IVT-IRFB-E1	81 (63-89)	131 (127-135)	98 (82-120)	104 (82-132)		6		46 (42-51)	H						5	46	
RD2992	IVT-IRFB-E4	83 (65-93)	130 (125-136)	105 (87-121)	91 (67-149)		6		43 (32-49)	H						5	35	
RD2994	IVT-IRFB-E3	81 (64-91)	131 (126-137)	98 (80-121)	107 (93-115)		6		47 (43-52)	H							02	
UPB1077	IVT-IRFB-E6	85 (65-95)	131 (124-136)	106 (92-121)	117 (96-125)		6		37 (35-41)	H				15	3	35		
UPB1080	IVT-IRFB-E7	84 (67-94)	133 (127-140)	96 (84-120)	121 (73-153)		6		37 (34-40)	H							45	
BH 946 (C)	IVT-IRFB-E13	88 (67-98)	135 (127-143)	103 (89-120)	107 (65-129)		6		45 (43-50)	H							02	
DWRB137 (C)	IVT-IRFB-E19	82 (66-92)	130 (125-135)	88 (64-111)	113 (100-122)		6		50 (47-54)	H					1	12		
RD2552 (C)	IVT-IRFB-E16	90 (73-104)	134 (119-143)	99 (83-125)	131 (113-162)		6		42 (40-49)	H							02	
RD2786 (C)	IVT-IRFB-E18	87 (68-102)	133 (124-141)	107 (84-130)	115 (77-135)		6		47 (44-50)	H					5	35		
RD2899 (C)	IVT-IRFB-E21	90 (71-101)	136 (123-143)	99 (89-105)	137 (106-181)		6		46 (43-52)	H							02	

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

Rabi 2018-19

Entry	Code	Varanasi			Faizabad			Kalyani			Kanpur			Pusa			Sabour			Pooled		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
BH1023	IVT-IRFB-E17	34.5	12	0	38.6	16	0	34.8	6	0	40.6	18	0	60.4	4	1	43.6	8	0	42.1	9	0
BH1024	IVT-IRFB-E20	34.6	11	0	32.6	19	0	32.6	10	0	40.9	17	0	39.9	20	0	39.1	15	0	36.6	19	0
DWRB203	IVT-IRFB-E15	36.6	7	0	40.1	14	0	31.2	12	0	46.4	11	0	49.9	15	0	42.8	9	0	41.2	11	0
DWRB205	IVT-IRFB-E10	29.6	16	0	48.3	3	1	29.0	16	0	40.6	18	0	41.1	19	0	38.6	16	0	37.9	17	0
HUB266	IVT-IRFB-E8	48.1	1	1	42.2	9	0	46.0	2	1	51.2	5	0	56.8	9	0	48.8	1	1	48.8	2	1
KB1707	IVT-IRFB-E2	35.8	10	0	40.3	13	0	35.5	5	0	42.0	14	0	50.3	13	0	36.8	18	0	40.1	13	0
KB1713	IVT-IRFB-E5	40.3	3	0	49.1	2	1	34.1	7	0	52.7	4	1	57.2	8	0	42.5	10	0	46.0	4	0
NDB1709	IVT-IRFB-E11	30.6	15	0	43.7	7	0	30.4	13	0	41.8	15	0	45.9	17	0	41.0	11	0	38.9	15	0
NDB1723	IVT-IRFB-E14	27.5	19	0	41.7	11	0	26.8	18	0	49.8	7	0	42.7	18	0	35.7	19	0	37.3	18	0
PL906	IVT-IRFB-E9	44.9	2	1	40.7	12	0	34.1	7	0	56.5	2	1	65.6	2	1	48.7	2	1	48.4	3	1
PL909	IVT-IRFB-E12	34.3	13	0	50.7	1	1	25.4	20	0	58.5	1	1	51.5	12	0	48.5	3	1	44.8	6	0
RD2991	IVT-IRFB-E1	25.7	20	0	46.3	4	0	31.2	11	0	44.0	13	0	56.4	10	0	37.6	17	0	40.2	12	0
RD2992	IVT-IRFB-E4	28.2	18	0	39.0	15	0	30.4	13	0	40.6	18	0	50.3	14	0	28.8	21	0	36.2	21	0
RD2994	IVT-IRFB-E3	33.1	14	0	31.4	21	0	51.4	1	1	53.6	3	1	60.4	4	1	44.3	7	0	45.7	5	0
UPB1077	IVT-IRFB-E6	21.3	21	0	37.7	18	0	26.7	19	0	39.6	21	0	63.6	3	1	46.5	6	1	39.2	14	0
UPB1080	IVT-IRFB-E7	29.3	17	0	46.1	5	0	20.0	21	0	41.8	16	0	53.1	11	0	39.6	13	0	38.3	16	0
BH 946 (C)	IVT-IRFB-E13	36.0	9	0	45.9	6	0	36.2	4	0	46.9	10	0	59.6	6	0	39.2	14	0	44.0	8	0
DWRB137 (C)	IVT-IRFB-E19	38.9	5	0	42.2	9	0	29.7	15	0	49.8	7	0	49.1	16	0	39.8	12	0	41.6	10	0
RD2552 (C)	IVT-IRFB-E16	38.9	6	0	43.6	8	0	34.1	9	0	50.7	6	0	81.3	1	1	47.0	5	1	49.3	1	1
RD2786 (C)	IVT-IRFB-E18	36.1	8	0	32.6	19	0	29.0	16	0	48.8	9	0	39.0	21	0	32.5	20	0	36.3	20	0
RD2899 (C)	IVT-IRFB-E21	39.2	4	0	38.6	17	0	37.7	3	0	45.9	12	0	58.0	7	0	47.2	4	1	44.4	7	0
	G.M.	34.5			41.5			32.7			46.8			53.9			41.4			41.8		
	S.E.(M)	1.7			1.4			2.3			2.7			2.3			1.6			0.835		
	C.D.	4.0			3.4			5.5			6.4			5.6			3.7			1.9		
	C.V.	8.5			5.9			12.2			9.9			7.5			6.5					
	DOS	24.11.2018			14.11.18			15.11.188			22.11.19			24.11.19			25.11.19					

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

Rabi 2018-19

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	Grain Colour	1000 g.w Mean & Range	H/N	RUST			SMUT		Hel. Disease		Aphid
											YL	BR	BL	L (%)	C (%)	Spot (%)	Leaf Blight	
BH1023	IVT-IRFB-E17	77 (70-85)	119 (112-124)	97 (83-106)	104 (78-122)		6		42 (32-55)	H							67	50
BH1024	IVT-IRFB-E20	78 (70-89)	120 (113-127)	89 (78-96)	104 (56-138)		6		42 (38-50)	H				0.01			56	0
DWRB203	IVT-IRFB-E15	76 (71-83)	121 (116-125)	92 (80-101)	110 (73-157)		6		42 (36-48)	H				0.5			46	50-60
DWRB205	IVT-IRFB-E10	84 (75-93)	121 (116-126)	96 (79-109)	92 (69-127)		6		40 (38-43)	H							57	0
HUB266	IVT-IRFB-E8	75 (50-88)	119 (112-124)	108 (98-120)	104 (73-143)		6		45 (41-54)	H							57	15-20
KB1707	IVT-IRFB-E2	84 (79-91)	121 (114-126)	93 (77-106)	106 (68-131)		6		39 (35-43)	H							68	62-70
KB1713	IVT-IRFB-E5	78 (72-85)	120 (112-125)	94 (80-103)	102 (67-142)		6		42 (36-51)	H							68	70-75
NDB1709	IVT-IRFB-E11	84 (75-95)	119 (113-124)	102 (89-111)	95 (54-128)		6		39 (36-45)	H							67	50
NDB1723	IVT-IRFB-E14	77 (71-86)	118 (113-124)	91 (78-100)	104 (70-145)		6		39 (36-43)	H				0.01			67	50
PL906	IVT-IRFB-E9	74 (65-87)	120 (114-127)	91 (87-95)	97 (69-142)		6		44 (41-48)	H			5				67	10-15
PL909	IVT-IRFB-E12	82 (67-87)	121 (114-127)	99 (91-111)	98 (49-147)		6		44 (38-55)	H			2				68	52-60
RD2991	IVT-IRFB-E1	74 (69-80)	117 (108-124)	83 (66-99)	94 (66-119)		6		40 (35-48)	H			5	0.01			67	50
RD2992	IVT-IRFB-E4	70 (64-78)	115 (103-125)	96 (89-102)	96 (71-180)		6		38 (34-43)	H							78	52-60

RD2994	IVT-IRFB-E3	70 (64-79)	116 (111-120)	84 (65-100)	99 (40-148)		6		47 (40-55)	H						47	100
UPB1077	IVT-IRFB-E6	76 (67-86)	121 (114-126)	93 (77-105)	90 (65-111)		6		40 (31-48)	H						68	60-70
UPB1080	IVT-IRFB-E7	78 (71-86)	120 (113-128)	91 (85-98)	97 (74-121)		6		41 (34-46)	H						57	50-60
BH 946 (C)	IVT-IRFB-E13	77 (71-86)	121 (111-130)	91 (80-105)	97 (62-148)		6		41 (36-48)	H						68	72-75
DWRB137 (C)	IVT-IRFB-E19	74 (66-87)	116 (106-126)	72 (63-85)	96 (51-149)		6		46 (39-54)	H				0.01		67	50
RD2552 (C)	IVT-IRFB-E16	79 (70-87)	119 (113-124)	86 (75-102)	121 (59-190)		6		41 (37-48)	H				5.0		68	0
RD2786 (C)	IVT-IRFB-E18	74 (63-85)	119 (111-125)	98 (79-111)	95 (44-153)		6		42 (35-49)	H						67	0
RD2899 (C)	IVT-IRFB-E21	78 (68-89)	120 (114-128)	86 (74-96)	102 (65-136)		6		45 (41-52)	H				5		57	0

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

Rabi 2018-19

Entry	Code	Gwalior			Morena			Udaipur			Vijapur			Pooled		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
BH1023	IVT-IRFB-E17	61.5	14	0	51.7	10	1	51.1	14	0	35.0	16	0	49.8	16	0
BH1024	IVT-IRFB-E20	60.0	16	0	49.2	18	1	41.3	20	0	42.3	12	0	48.2	20	0
DWRB203	IVT-IRFB-E15	63.1	9	0	54.2	6	1	58.4	3	1	48.5	4	0	56.1	3	1
DWRB205	IVT-IRFB-E10	49.0	21	0	50.6	14	1	46.2	18	0	19.8	21	0	41.4	21	0
HUB266	IVT-IRFB-E8	62.9	10	0	51.5	11	1	55.0	8	1	38.6	14	0	52.0	9	0
KB1707	IVT-IRFB-E2	62.7	11	0	56.7	1	1	57.1	4	1	31.6	17	0	52.0	8	0
KB1713	IVT-IRFB-E5	56.1	18	0	49.7	17	1	53.4	11	1	42.7	11	0	50.4	15	0
NDB1709	IVT-IRFB-E11	64.0	5	0	46.5	21	0	53.8	10	1	29.2	18	0	48.4	19	0
NDB1723	IVT-IRFB-E14	62.3	12	0	52.6	7	1	60.5	1	1	28.6	20	0	51.0	12	0
PL906	IVT-IRFB-E9	63.9	6	0	55.1	5	1	57.0	5	1	58.5	1	1	58.6	1	1
PL909	IVT-IRFB-E12	62.0	13	0	46.9	20	0	59.3	2	1	47.4	6	0	53.9	7	0
RD2991	IVT-IRFB-E1	67.1	4	1	50.5	15	1	49.5	15	0	40.4	13	0	51.9	10	0
RD2992	IVT-IRFB-E4	55.3	20	0	52.0	8	1	51.1	13	0	43.6	7	0	50.5	14	0
RD2994	IVT-IRFB-E3	75.8	1	1	50.5	16	1	41.1	21	0	53.3	2	1	55.2	4	1
UPB1077	IVT-IRFB-E6	60.7	15	0	56.5	2	1	56.8	6	1	29.1	19	0	50.8	13	0
UPB1080	IVT-IRFB-E7	55.4	19	0	51.8	9	1	43.3	19	0	43.4	8	0	48.5	18	0
BH 946 (C)	IVT-IRFB-E13	69.9	3	1	56.4	3	1	51.7	12	0	47.7	5	0	56.4	2	1
DWRB137	IVT-IRFB-E19	71.1	2	1	50.7	13	1	46.8	17	0	50.7	3	0	54.8	5	1
RD2552 (C)	IVT-IRFB-E16	57.8	17	0	47.1	19	1	53.9	9	1	36.0	15	0	48.7	17	0
RD2786 (C)	IVT-IRFB-E18	63.1	8	0	56.4	4	1	55.8	7	1	42.8	10	0	54.5	6	0
RD2899 (C)	IVT-IRFB-E21	63.3	7	0	51.2	12	1	47.3	16	0	43.2	9	0	51.3	11	0
	G.M.	62.2			51.8			51.9			40.6			51.6		
	S.E.(M)	4.1			4.0			3.2			2.4			1.751		
	C.D.	9.9			9.6			7.5			5.6			4.1		
	C.V.	11.5			13.5			10.5			10.1					
	DOS	13.11.18			25.11.2018			23.11.2018			13.11.2018					

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

Rabi 2018-19

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. Mea n & Ran ge	Two/ Six Row	Grai n Colo ur	1000 g.w Mean & Range	H/N	RUST			SMUT		Hel. Disease		Aphid
											Y L	BR	BL	L (%)	C (%)	Spo t (%)	Leaf Blight	
BH1023	IVT-IRFB-E17	74 (62-82)	118 (110-123)	95 (81-115)	140 (115-167)		6		57 (40-96)	H								5
BH1024	IVT-IRFB-E20	77 (61-95)	111 (102-119)	87 (79-104)	129 (104-134)		6		55 (40-98)	H				C				5
DWRB203	IVT-IRFB-E15	78 (65-94)	115 (108-122)	94 (82-108)	142 (108-159)		6		57 (39-100)	H								5
DWRB205	IVT-IRFB-E10	81 (75-89)	116 (107-123)	95 (85-101)	152 (98-217)		6		53 (36-96)	H								5
HUB266	IVT-IRFB-E8	82 (69-88)	116 (111-123)	93 (88-98)	137 (94-188)		6		59 (41-98)	H								5
KB1707	IVT-IRFB-E2	80 (75-85)	119 (110-125)	99 (79-115)	139 (115-165)		6		55 (38-100)	H								5
KB1713	IVT-IRFB-E5	78 (65-91)	119 (114-123)	87 (79-100)	158 (100-189)		6		59 (44-98)	H				C				5
NDB1709	IVT-IRFB-E11	77 (69-83)	114 (108-122)	98 (88-102)	142 (102-186)		6		55 (38-92)	H								5
NDB1723	IVT-IRFB-E14	74 (63-80)	115 (108-122)	97 (78-120)	168 (120-250)		6		53 (35-90)	H								5
PL906	IVT-IRFB-E9	75 (62-92)	118 (112-124)	83 (69-100)	156 (100-190)		6		61 (44-98)	H				C				5
PL909	IVT-IRFB-E12	77 (67-83)	119 (115-123)	95 (82-117)	167 (117-237)		6		59 (46-95)	H				C				5
RD2991	IVT-IRFB-E1	73 (58-91)	112 (108-120)	93 (79-112)	145 (112-202)		6		64 (45-98)	H				C				5

RD2992	IVT-IRFB-E4	71 (61-80)	114 (108-120)	92 (82-98)	138 (98-158)		6		60 (44-100)	H								5
RD2994	IVT-IRFB-E3	71 (62-88)	114 (106-120)	89 (74-96)	158 (95-250)		6		60 (42-98)	H								5
UPB1077	IVT-IRFB-E6	77 (62-88)	112 (105-121)	86 (78-95)	142 (95-198)		6		54 (30-100)	H								5
UPB1080	IVT-IRFB-E7	79 (59-92)	115 (108-123)	95 (77-112)	145 (100-200)		6		57 (39-100)	H								5
BH 946 (C)	IVT-IRFB-E13	74 (58-91)	115 (108-122)	84 (77-93)	139 (93-189)		6		56 (40-95)	H								5
DWRB137 (C)	IVT-IRFB-E19	70 (60-79)	112 (105-121)	84 (60-139)	158 (139-203)		6		63 (43-96)	H								5
RD2552 (C)	IVT-IRFB-E16	78 (68-91)	117 (111-123)	95 (74-126)	165 (126-203)		6		59 (40-98)	H					c			5
RD2786 (C)	IVT-IRFB-E18	76 (62-91)	117 (108-123)	87 (79-99)	132 (88-154)		6		60 (44-97)	H								5
RD2899 (C)	IVT-IRFB-E21	74 (66-79)	117 (111-123)	95 (78-104)	148 (104-188)		6		60 (44-100)	H					c			5

**INTIAL VARIETAL TRIAL/ADVANCED VARIETAL TRIAL- FEED BARLEY (HULLESS)
(IRRIGATED)-NWPZ**

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

Rabi 2018-19

Entry	Code	Karnal			Hisar			Durgapura			Ludhiana			Pantnagar			Pooled		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
DWRB188	IVT/AVT-IRFB-HL -E1	35	9	0	29.3	2	1	64.9	1	1	19.3	7	0	33.3	3	0	36.4	4	1
DWRB204	IVT/AVT-IRFB-HL -E3	45.6	2	1	27.5	4	1	62.3	3	1	28.6	2	1	24.5	9	0	37.7	2	1
DWRB206	IVT/AVT-IRFB-HL -E2	36.8	7	0	29.6	1	1	55.8	5	0	28.2	3	1	35.8	2	1	37.2	3	1
KB1750	IVT/AVT-IRFB-HL -E5	38.6	5	0	20.9	9	0	55.4	6	0	16.3	9	0	30.7	5	0	32.4	9	0
KB1757	IVT/AVT-IRFB-HL -E7	35.5	8	0	25.7	6	0	56	4	0	22.2	5	0	37.3	1	1	35.3	5	0
PL891	IVT/AVT-IRFB-HL -E9	38.5	6	0	22.7	7	0	49.5	8	0	29	1	1	26.3	8	0	33.2	7	0
UPB1079	IVT/AVT-IRFB-HL -E6	No Germination																	
K1149 (c)	IVT/AVT-IRFB-HL -E4	48.7	1	1	22.4	8	0	54.5	7	0	21.3	6	0	27.1	7	0	34.8	6	0
Karan 16 (C)	IVT/AVT-IRFB-HL -E10	38.7	4	0	28	3	1	64.7	2	1	26.3	4	0	31.4	4	0	37.8	1	1
NDB943 (c)	IVT/AVT-IRFB-HL -E8	40.6	3	0	26.9	5	1	48.6	9	0	18.6	8	0	27.4	6	0	32.4	8	0
	G.M.	39.8			25.9			56.8			23.3			30.4			35.2		
	S.E.(M)	1.3			1.5			2.5			1.0			1.1			0.698		
	C.D. (5 & 10%)	3.2			3.7			6.0			2.3			2.5			1.6		
	C.V. (%)	6.6			11.7			8.7			8.2			6.9					
	DOS	15.11.18			11.11.18			10.11.18			10.11.18			10.11.18					

**INITIAL VARIETAL TRIAL/ADVANCED VARIETAL TRIAL- FEED BARLEY (HULLESS)
(IRRIGATED)-NWPZ**

Summary of ancillary and disease data

Rabi 2018-19

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 & Ran ge	Two/ Six Row	Grai n Colo ur	1000 g.w Mean & Range	H/N	RUST			SMUT		Hel. Disease		Aphid
											Y L	BR	BL	L (%)	C (%)	Spo t (%)	Leaf Blight	
DWRB188	IVT/AVT-IRFB-HL -E1	88 (70-101)	134 (129-138)	101 (88-109)	96 (84-160)		6		31 (5-40)	N					10	01	23	
DWRB204	IVT/AVT-IRFB-HL -E3	82 (64-94)	130 (123-136)	99 (93-108)	98 (90-107)		6		38 (36-40)	N						01	23	
DWRB206	IVT/AVT-IRFB-HL -E2	94 (73-107)	134 (127-139)	106 (100-111)	112 (97-132)		6		37 (35-40)	N	2 0					02	23	
KB1750	IVT/AVT-IRFB-HL -E5	84 (66-95)	131 (125-137)	95 (88-106)	113 (105-129)		6		37 (35-42)	N	3 0 S				05	01	34	
KB1757	IVT/AVT-IRFB-HL -E7	96 (73-108)	134 (126-141)	104 (86-127)	115 (90-162)		6		37 (36-39)	N						01	23	
PL891	IVT/AVT-IRFB-HL -E9	92 (74-103)	137 (129-144)	106 (103-110)	118 (107-148)		6		50 (48-54)	N					20	0	01	
UPB1079	No Germination																	
K1149 (c)	IVT/AVT-IRFB-HL -E4	80 (71-87)	129 (124-134)	101 (93-121)	105 (101-113)		6		36 (32-38)	N						04	23	
Karan 16 (C)	IVT/AVT-IRFB-HL -E10	82 (60-94)	134 (126-140)	101 (91-107)	114 (108-127)		6		37 (36-41)	N					05	12	23	
NDB943 (c)	IVT/AVT-IRFB-HL -E8	82 (67-92)	128 (124-133)	98 (93-104)	123 (89-216)		6		38 (36-40)	N	3 0 S					0	12	

**INITIAL VARIETAL TRIAL/ADVANCED VARIETAL TRIAL- FEED BARLEY HULLESS)
(IRRIGATED)-NEPZ**

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

Rabi 2018-19

Entry	Code	Varanasi			Faizabad			Kanpur			Sabour			Pooled		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
DWRB188	IVT/AVT-IRFB-HL -E1	33.3	6	0	19.3	9	0	33.7	3	1	29.9	8	0	29.1	8	0
DWRB204	IVT/AVT-IRFB-HL -E3	35.7	4	0	32.0	4	1	34.8	1	1	33.1	5	0	33.9	2	0
DWRB206	IVT/AVT-IRFB-HL -E2	28.9	9	0	23.2	8	0	28.6	6	0	34.0	3	0	28.7	9	0
KB1750	IVT/AVT-IRFB-HL -E5	33.8	5	0	35.3	3	1	25.7	8	0	32.1	6	0	31.7	6	0
KB1757	IVT/AVT-IRFB-HL -E7	30.8	8	0	29.5	7	0	29.7	5	0	26.5	9	0	29.1	7	0
PL891	IVT/AVT-IRFB-HL -E9	33.2	7	0	35.3	2	1	33.5	4	1	30.1	7	0	33.1	3	0
UPB1079	No Germination															
Karan 16 (C)	IVT/AVT-IRFB-HL -E10	38.6	2	1	31.7	5	1	22.1	9	0	37.3	1	1	32.4	4	0
K1149 (c)	IVT/AVT-IRFB-HL -E4	38.6	3	1	30.8	6	1	26.1	7	0	33.6	4	0	32.3	5	0
NDB943 (c)	IVT/AVT-IRFB-HL -E8	41.6	1	1	35.5	1	1	34.4	2	1	34.4	2	0	36.5	1	1
	G.M.	34.9			30.3			29.9			32.3			31.9		
	S.E.(M)	1.5			2.0			1.4			1.0			0.761		
	C.D. (10%)	3.7			4.7			3.5			2.5			1.8		
	C.V. (10%)	8.7			12.9			9.7			6.4					
	DOS	24.11.2018			25.11.18			22.11.18			25.11.18					

**INITIAL VARIETAL TRIAL/ADVANCED VARIETAL TRIAL- FEED BARLEY (HULLESS)
(IRRIGATED)-NEPZ**

Summary of ancillary and disease data

Rabi 2018-19

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	Grai n Colo ur	1000 g.w Mean & Range	H/N	RUST			SMUT		Hel. Disease		Aphid
											Y L	BR	BL	L (%)	C (%)	Spo t (%)	Leaf Blight	
DWRB188	IVT/AVT-IRFB-HL -E1	83 (78-91)	121 (120-123)	96 (87-106)	120 (57-180)		6		40 (35-45)	N					10		13	10
DWRB204	IVT/AVT-IRFB-HL -E3	79 (72-84)	119 (117-123)	87 (71-100)	95 (56-153)		6		41 (36-48)	N							24	5-10
DWRB206	IVT/AVT-IRFB-HL -E2	87 (80-95)	122 (118-128)	99 (88-110)	106 (72-147)		6		38 (35-41)	N				01		02		50-60
KB1750	IVT/AVT-IRFB-HL -E5	84 (75-91)	122 (116-127)	93 (86-104)	89 (45-139)		6		35 (32-38)	N				0.5		13		40-50
KB1757	IVT/AVT-IRFB-HL -E7	85 (81-92)	122 (120-124)	92 (85-97)	91 (62-142)		6		37 (30-47)	N				0.01		13		10-15
PL891	IVT/AVT-IRFB-HL -E9	87 (78-96)	123 (121-126)	95 (92-99)	119 (80-163)		6		45 (41-49)	N						12		100
UPB1079	IVT/AVT-IRFB-HL -E6	No Germination																
Karan 16 (C)	IVT/AVT-IRFB-HL -E10	78 (72-82)	117 (113-120)	95 (84-105)	99 (64-127)		6		37 (34-39)	N							24	50
K1149 (c)	IVT/AVT-IRFB-HL -E4	76 (70-87)	118 (110-126)	89 (85-94)	112 (91-137)		6		36 (32-40)	N			05	05			35	10-15
NDB943 (c)	IVT/AVT-IRFB-HL -E8	75 (72-80)	115 (110-122)	96 (87-103)	104 (79-158)		6		40 (35-45)	N				05		24		100

**INITIAL VARIETAL TRIAL/ADVANCED VARIETAL TRIAL- FEED BARLEY HULLESS)
(IRRIGATED)-CZ**

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

Rabi 2018-19

Entry	Code	Gwalior			Morena			Udaipur			Vijapur			Tikamgarh			Pooled		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
DWRB188	IVT/AVT-IRFB-HL -E1	49.4	6	1	38.5	4	0	45.6	4	1	37.9	2	1	53.2	5	0	44.9	4	0
DWRB204	IVT/AVT-IRFB-HL -E3	52.1	3	1	56.3	1	1	46.0	3	1	38.2	1	1	59.0	1	1	50.3	1	1
DWRB206	IVT/AVT-IRFB-HL -E2	43.3	8	0	37.7	6	0	39.3	8	0	20.8	9	0	51.1	7	0	38.4	8	0
KB1750	IVT/AVT-IRFB-HL -E5	57.2	2	1	41.7	3	0	51.6	1	1	35.0	3	1	56.0	2	1	48.3	2	1
KB1757	IVT/AVT-IRFB-HL -E7	44.7	7	0	30.7	9	0	46.1	2	1	26.1	6	0	50.5	8	0	39.6	7	0
PL891	IVT/AVT-IRFB-HL -E9	49.7	5	1	31.5	8	0	44.3	5	0	25.4	8	0	49.0	9	0	40.0	6	0
UPB1079	IVT/AVT-IRFB-HL -E6	No germination																	
Karan 16 (C)	IVT/AVT-IRFB-HL -E10	50.9	4	1	38.4	5	0	36.0	9	0	30.2	5	0	54.1	4	0	41.9	5	0
K1149 (c)	IVT/AVT-IRFB-HL -E4	37.8	9	0	32.4	7	0	39.4	7	0	25.8	7	0	52.4	6	0	37.5	9	0
NDB943 (c)	IVT/AVT-IRFB-HL -E8	57.3	1	1	43.3	2	0	41.8	6	0	30.5	4	0	55.7	3	1	45.7	3	0
	G.M.	49.2			38.9			43.4			30.0			53.4			43.0		
	S.E.(M)	3.6			2.9			2.5			1.4			1.9			1.159		
	C.D. (5 & 10%)	8.8			7.1			6.1			3.4			4.5			2.7		
	C.V.	14.8			15.1			11.6			9.3			6.9					
	DOS	13.11.18			24.11.2018			23.11.2018			13.11.19			12.11.18					

**INTIAL VARIETAL TRIAL/ADVANCED VARIETAL TRIAL- FEED BARLEY HULLESS)
(IRRIGATED)-CZ**

Summary of ancillary and disease data

Rabi 2018-19

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	Grain Colour	1000 g.w Mean & Range	H/N	RUST			SMUT		Hel. Disease		Aphid
											Y L	BR	BL	L (%)	C (%)	Spot (%)	Leaf Blight	
DWRB188	IVT/AVT-IRFB-HL -E1	76 (62-86)	112 (107-118)	97 (86-107)	153 (103-228)		6		37 (33-43)	N					C			50
DWRB204	IVT/AVT-IRFB-HL -E3	72 (59-80)	108 (103-114)	86 (66-103)	154 (112-217)		6		37 (32-41)	N								70
DWRB206	IVT/AVT-IRFB-HL -E2	84 (76-88)	111 (108-116)	97 (84-108)	125 (106-166)		6		35 (30-39)	N								80
KB1750	IVT/AVT-IRFB-HL -E5	77 (62-88)	104 (95-117)	90 (82-95)	130 (107-154)		6		34 (31-36)	N								50
KB1757	IVT/AVT-IRFB-HL -E7	84 (70-91)	110 (97-119)	93 (88-97)	137 (121-168)		6		33 (25-41)	N								38
PL891	IVT/AVT-IRFB-HL -E9	81 (63-94)	114 (108-124)	104 (98-111)	169 (139-237)		6		45 (37-51)	N								65
UPB1079	IVT/AVT-IRFB-HL -E6	No germination																
Karan 16 (C)	IVT/AVT-IRFB-HL -E10	74 (57-91)	108 (104-113)	95 (70-116)	134 (112-143)		6		39 (32-46)	N								30
K1149 (c)	IVT/AVT-IRFB-HL -E4	77 (63-91)	111 (103-121)	88 (75-103)	165 (149-186)		6		34 (31-35)	N					C			60
NDB943 (c)	IVT/AVT-IRFB-HL -E8	73 (62-79)	107 (102-113)	95 (86-106)	147 (130-189)		6		39 (35-43)	N								35

ADVANCED VARIETAL TRIAL-DUAL PURPOSE BARLEY (RAINFED TIMELY SOWN)-NHZ

- This trial comprised of one test entry VL 155 evaluated along with four checks (HBL276, BHS380, BHS400, VLB118)
- The trial was conducted at five locations. Data of all the locations were considered for pooled analysis over locations.
- Among the check varieties VLB 118 registered the highest grain yield (25.4 q/ha) with a 2nd overall rank, and for forage yield BHS380 with 1st overall rank gave 39.4 q/ha forage yield.
- The test entry VLB 155 with over 1st rank for grain yield gave significantly higher grain yield (26.9 q/ha) over the best check variety.
- However, for forage yield this entry was not higher yielder over the best check variety.

ADVANCED VARIETAL TRIAL- DUAL PURPOSE BARLEY (IRRIGATED-TIMELY SOWN)-NEPZ

- This trial was conducted at five locations in this zone.
- The zonal means across the entries for grain and forage yields were 27.1 q/ha and 101.9 q/ha, respectively for this trial.
- Analysis of data pooled over locations revealed the check varieties RD2552 (rank 1) and DWRB137 (rank 1) were the highest yielder for grain and forage, respectively. The only test entry UPB1074 ranked 5th both for grain and forage yields.
- No test entry was found superior over the best check variety.

ADVANCED VARIETAL TRIAL-DUAL PURPOSE BARLEY (RF-TS)-NHZ

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

Rabi 2018-19

Entry	Code	Almora			Palampur			Bajaura			Shimla			Majhera			Pooled		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
VLB 155	NHTSZ 1802	22.6	2	1	43.5	1	1	18.9	4	0	28.2	3	0	21.5	3	0	26.9	1	1
BHS 380 (C)	NHTSZ 1804	18.8	4	0	27.2	3	0	21.7	3	0	28.7	2	1	14.5	4	0	22.2	4	0
BHS 400 (C)	NHTSZ 1801	21.2	3	1	23.6	5	0	23.4	1	1	28.1	4	0	24.9	1	1	24.2	3	0
HBL 276 (C)	NHTSZ 1805	18.7	5	0	25.4	4	0	18.0	5	0	21.0	5	0	14.0	5	0	19.4	5	0
VLB 118 (C)	NHTSZ 1803	23.1	1	1	27.8	2	0	22.7	2	1	31.6	1	1	22.0	2	0	25.4	2	0
	G.M.	20.9			29.5			20.9			27.5			19.4			23.6		
	S.E.(M)	0.8			1.5			0.7			1.3			0.8			0.482		
	C.D.	2.0			3.8			1.6			3.4			2.0			1.1		
	C.V.	7.7			10.3			6.2			9.7			8.1					
	DOS	25.10.18			25.10.18			6.11.18			20.10.18			27.10.18					

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

Rabi 2018-19

Entry	Code	Almora			Palampur			Bajaura			Shimla			Majhera			Pooled		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
VLB 155	NHTSZ 1802	79.1	2	0	31.0	3	0	31.8	2	0	30.2	1	1	16.3	1	1	37.7	2	1
BHS 380 (C)	NHTSZ 1804	87.6	1	1	39.4	1	1	27.5	3	0	27.0	3	0	15.4	2	1	39.4	1	1
BHS 400 (C)	NHTSZ 1801	70.3	5	0	34.9	2	1	22.4	4	0	26.6	4	0	14.1	3	1	33.7	4	0
HBL 276 (C)	NHTSZ 1805	73.4	4	0	28.9	4	0	45.3	1	1	22.5	5	0	13.6	5	1	36.8	3	0
VLB 118 (C)	NHTSZ 1803	73.5	3	0	23.8	5	0	20.5	5	0	27.3	2	0	14.0	4	1	31.8	5	0
	G.M.	76.8			31.6			29.5			26.7			14.7			35.9		
	S.E.(M)	2.6			2.0			2.3			0.9			1.1			0.864		
	C.D.	6.7			5.1			5.9			2.3			2.8			2.0		
	CV (%)	6.9			12.9			15.9			6.8			14.9					
	DOS	25.10.18			25.10.18			6.11.18			20.10.18			27.10.18					

ADVANCED VARIETAL TRIAL-DUAL PURPOSE BARLEY (RF-TS)-NHZ

Summary of ancillary and disease data

Rabi 2018-19

Sr. No.	ENTRY	AGRONOMIC CHARACTERS						GRAIN CHARACTERISTICS		
		H. days Mean & Range	M. days Mean & Range	Height Mean & Range (cm)	Tillering per meter Mean & Range	Str. Stn. Mean & Ran	Two/ Six Row	Grai n Colo ur	1000 g.w Mean & Range	H/N
VLB 155	NHTSZ 1802	133 (132-136)	176 (164-182)	82 (40-101)	196 (87-409)	3	2	Y	61 (40-82)	H
BHS 380 (C)	NHTSZ 1804	137 (131-144)	179 (166-186)	72 (32-91)	163 (76-316)	3	6	Y	52 (32-72)	H
BHS 400 (C)	NHTSZ 1801	139 (137-144)	181 (169-186)	76 (31-98)	168 (80-334)	4	6	Y	54 (31-76)	H
HBL 276 (C)	NHTSZ 1805	135 (132-140)	179 (167-182)	78 (33-90)	142 (68-269)	3	6	A	55 (33-78)	H
VLB 118 (C)	NHTSZ 1803	130 (125-135)	177 (165-183)	76 (34-94)	149 (68-274)	4	6	Y	55 (34-76)	H

ADVANCED VARIETAL TRIAL- DUAL PURPOSE BARLEY (IRRIGATED-TIMELY SOWN)-NEPZ
Location wise & Zonal means (Grain Yield in q/ha)

Entry	Code	Varanasi			Faizabad			Kanpur			Sabour			Pusa			Pooled		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
UPB1074	AVT-DP-IR-TS -E5	15.1	5	0	27.3	5	0	28.1	3	1	22.8	5	0	18.5	5	0	22.3	5	0
AZAD(C)	AVT-DP-IR-TS -E3	26.5	2	0	33.0	4	0	29.0	2	1	29.4	3	0	23.3	3	1	28.2	3	0
DWRB137(C)	AVT-DP-IR-TS -E1	29.5	1	1	36.8	2	1	24.8	5	0	28.4	4	0	24.0	2	1	28.7	2	1
RD2035(C)	AVT-DP-IR-TS -E4	20.9	4	0	37.8	1	1	25.9	4	0	29.7	2	1	21.5	4	0	27.2	4	0
RD2552(C)	AVT-DP-IR-TS -E2	24.2	3	0	35.0	3	0	29.7	1	1	31.7	1	1	24.5	1	1	29.0	1	1
	G.M.	23.2			34.0			27.5			28.4			22.4			27.1		
	S.E.(M)	0.7			0.5			0.7			0.8			0.5			0.297		
	C.D. (10%)	1.7			1.1			1.8			2.1			1.4			0.7		
	C.V.	5.9			2.7			5.3			6.0			4.8					
	DOS	20.11.18			13.11.18			21.11.18			25.11.18			20.11.2018					

ADVANCED VARIETAL TRIAL- DUAL PURPOSE BARLEY (IRRIGATED-TIMELY SOWN)-NEPZ
Location wise & Zonal means (Forage Yield in q/ha)

Entry	Code	Varanasi			Faizabad			Kanpur			Sabour			Pusa			Pooled		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
UPB1074	AVT-DP-IR-TS -E5	88.9	5	0	86.2	5	0	82.4	3	0	40.3	5	0	64.0	5	0	88.9	5	0
AZAD(C)	AVT-DP-IR-TS -E3	101.2	2	0	118.1	3	0	82.4	3	0	84.5	2	0	82.9	1	1	101.2	2	0
DWRB137(C)	AVT-DP-IR-TS -E1	122.2	1	1	126.1	2	1	74.3	5	0	56.8	3	0	81.6	2	1	122.2	1	1
RD2035(C)	AVT-DP-IR-TS -E4	98.8	3	0	132.6	1	1	96.0	1	1	51.9	4	0	81.3	3	1	98.8	3	0
RD2552(C)	AVT-DP-IR-TS -E2	98.6	4	0	95.9	4	0	86.1	2	0	95.7	1	1	81.0	4	1	98.6	4	0
	G.M.	101.9			111.8			84.2			65.8			78.2			101.9		
	S.E.(M)	2.9			5.1			1.5			2.4			1.308			2.9		
	C.D. (10%)	7.4			12.8			3.7			6.1			3.1			7.4		
	C.V.	5.8			9.1			3.4			7.4			7.5					
	DOS	20.11.18			13.11.18			21.11.18			25.11.18			20.11.2018					

ADVANCED VARIETAL TRIAL- DUAL PURPOSE BARLEY (IRRIGATED-TIMELY SOWN)-NEPZ
Summary of ancillary and disease data

Rabi – 2018-19

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	Grai n Colo ur	1000 g.w Mean & Range	H/N	RUST			SMUT		Hel. Disease		Aphid
											Y L	BR	BL	L (%)	C (%)	Spo t (%)	Leaf Blight	
UPB1074	NHTSZ 1805	135 (132-140)	179 (167-182)	78 (33-90)	142 (68-269)	3	6	A	55 (33-78)	H								
AZAD (C)	NHTSZ 1803	130 (125-135)	177 (165-183)	76 (34-94)	149 (68-274)	4	6	Y	55 (34-76)	H								
DWRB137(C)	NHTSZ 1801	139 (137-144)	181 (169-186)	76 (31-98)	168 (80-334)	4	6	Y	54 (31-76)	H								
RD2035(C)	NHTSZ 1804	137 (131-144)	179 (166-186)	72 (32-91)	163 (76-316)	3	6	Y	52 (32-72)	H								
RD2552(C)	NHTSZ 1802	133 (132-136)	176 (164-182)	82 (40-101)	196 (87-409)	3	2	Y	61 (40-82)	H								

**Rejected Trial
ADVANCED VARIETAL TRIAL (RAINFED)-NHZ
(Grain Yield in q/ha)**

Rabi 2018-19

Entry	Code	Ranichori*		
		Yield	Rk	G at10%
BHS 352	NHGBZ-1820	23.1	11	0
BHS 472	NHGBZ-1815	21.9	14	0
BHS 474	NHGBZ-1809	21.3	16	0
BHS 475	NHGBZ-1808	20.0	20	0
BHS 477	NHGBZ-1807	25.3	10	1
HBL 845	NHGBZ-1811	20.0	19	0
HBL 848	NHGBZ-1814	15.7	21	0
HBL 851	NHGBZ-1817	22.3	13	0
HBL 858	NHGBZ-1818	20.8	17	0
HBL 863	NHGBZ-1803	30.3	2	1
UPB 1077	NHGBZ-1812	20.1	18	0
UPB 1078	NHGBZ-1813	25.4	9	1
UPB 1082	NHGBZ-1802	30.1	3	1
VLB 161	NHGBZ-1801	37.1	1	1
VLB 162	NHGBZ-1810	26.4	7	1
VLB 163	NHGBZ-1805	26.2	8	1
VLB 164	NHGBZ-1806	22.7	12	0
BHS 400 (C)	NHGBZ-1819	27.7	5	1
BHS 476 (C)	NHGBZ-1821	21.3	15	0
HBL 113 (C)	NHGBZ-1804	27.5	6	1
VLB 118 (C)	NHGBZ-1816	28.5	4	1
	G.M.	24.5		
	S.E.(M)	5.0		
	C.D.	11.8		
	C.V. (%)	35.2		
	DOS		9.11.18	

G at 10 %; *Not included in pooled analysis

AVT-MB-TS

Entry	Bathinda		
	Yield (q/ha)	Rk	G
DWRB160	33.70	8	0
DWRB182	35.09	6	0
DWRB184	35.74	5	0
BH902 (c)	34.97	7	0
DWRB 101 (c)	55.52	1	1
DWRB123 (c)	41.08	3	0
DWRB137 (c)	41.51	2	0
BH902 (c)	38.92	4	0
G.M.	39.57		
S.E.(M)	2.00		
C.D.	4.87		
C.V. (%)	10.12		
DOS	14.11.2018		
Reason	RMT		

IVT-MB-TS

Entry	Bathinda		
	Yield (q/ha)	Rk	G
BH1025	74.46	4	0
DWRB196	47.22	15	0
DWRB197	84.49	2	1
DWRB198	45.68	16	0
DWRB199	60.96	8	0
KB1707	62.89	7	0
KB1743	83.87	3	1
PL907	62.96	6	0
PL908	60.80	9	0
RD3007	67.21	5	0
RD3008	49.54	13	0
RD3009	40.12	17	0
RD3010	59.34	10	0
BH946 (c)	48.38	14	0
DWRB101 (c)	53.70	11	0
DWRB123 (c)	89.89	1	1
RD2849 (c)	50.31	12	0
G.M.	61.28		
S.E.(M)	3.52		
C.D.	8.35		
C.V. (%)	11.49		
DOS	14.11.2018		
Reason	RMT		

International Trials and Nurseries

During *rabi* 2018-19 season Two international trials and two international germplasm nurseries were supplied from ICARDA which included a total of 347 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-IWBR, 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 29^h March, 2019 at Indian Institute of Wheat and Barley Research, Karnal, and a total of 241-germplasm lines were selected. In addition, one set each of EIBGN and NBGSN, was each supplied to 9-different locations.

International trials and nurseries evaluated during crop season 2018-19

Sr. No.	Trial/Nurseries	Genotypes received from ICARDA	Indian National check	Number of Sets	Locations
1.	IBYT-HI-2019	24	BH946	4	Karnal, Durgapura, Hisar, Ludhiana
2.	6 th GSYT-2019	24	K603	4	Karnal, Hisar , Pantnagar, Kanpur
3.	IBON-HI-2019	138	BH946	4	Durgapura,Pantnagar,Ludhiana, Karnal
4.	6 th GSBON-2019	161	Lakhan	4	Karnal, Kanpur, Faizabad, Bajaura

International Barley Yield Trial-High Input-2019 (IBYT-HI-2019)

This trial comprising of 25 entries including one local check variety 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 check variety BH946 ranked 5, 11, 7 and 21 at Karnal, Durgapura, Hisar and Ludhiana. At Karnal and Durgapura all the test entries were at par with the check variety, however, four test entries (15, 17, 22 and 24) at Hisar; and three test entries (7, 12 and 16) at Ludhiana were statistically superior to the check variety BH946 for grain yield. Based on field performance and plant type, 11-entries (1,4,6,9,10,11,13,14,15, 19 and 20) were selected by the barley breeders during the field day.

Grain yield, ranking and grouping of barley genotypes evaluated under IBYT-HI-(2019) at different locations in *rabi* 2018-19 season

IBYT-HI-19	Karnal			Durgapura			Hisar			Ludhiana		
	Yield	RK	G	Yield	RK	G	Yield	RK	G	Yield	RK	G
1	29	23	0	43	13	1	36	11	0	22	15	0
2	33	16	0	47	7	1	29	25	0	19	22	0
3	39	4	1	53	2	1	35	15	0	17	24	0
4	30	21	0	27	25	0	30	23	0	16	25	0
5	33	15	0	53	1	1	35	14	0	23	10	0
6	33	17	0	32	23	0	39	8	0	27	5	0
7	32	18	0	52	3	1	33	20	0	30	2	1
8	30	22	0	37	19	0	29	24	0	21	19	0
9	36	10	1	38	16	0	38	9	0	19	20	0
10	34	14	0	47	6	1	30	22	0	21	18	0
11	43	1	1	33	21	0	42	5	0	29	4	0
12	38	8	1	37	20	0	34	17	0	36	1	1
13	28	25	0	30	24	0	34	16	0	24	8	0
14	39	6	1	38	16	0	33	19	0	18	23	0
15	37	9	1	47	7	1	48	1	1	23	11	0
16	35	11	0	51	4	1	36	12	0	30	3	1
17	29	24	0	46	9	1	47	2	1	21	17	0
18	39	3	1	44	12	1	41	6	0	23	14	0
19	40	2	1	46	9	1	33	18	0	23	12	0
20	34	13	0	38	15	0	33	21	0	23	9	0
21	38	7	1	43	14	1	35	13	0	22	16	0
22	34	12	0	33	22	0	45	4	1	27	7	0
23	31	20	0	49	5	1	37	10	0	23	13	0
24	32	19	0	37	18	0	45	3	1	27	6	0
BH946 ©	39	5	1	46	11	1	41	7	0	19	21	0
Mean	35			42			37			23		
CD (5%)	7.9			14.7			5.6			6.1		
CV (%)	13.4			20.36			8.8			14.9		

Mean and range (in parenthesis) across the locations for ancillary characters of barley genotypes evaluated under IBYT-HI-(2019) in *rabi* 2018-19 season

7th

Genotype (IBYT-HI-19)	Days to Heading (Mean & Range)	Days to Maturity (Mean & Range)	Plant Height (cm) (Mean & Range)
1.	86 (73-92)	135 (125-142)	99 (85-142)
2.	84 (72-94)	135 (127-140)	94 (77-140)
3.	85 (73-94)	136 (129-140)	96 (79-140)
4.	98 (94-108)	140 (129-146)	87 (56-146)
5.	90 (73-97)	137 (121-146)	100 (85-146)
6.	86 (76-97)	138 (129-142)	96 (77-142)
7.	84 (70-92)	133 (120-140)	102 (85-140)
8.	91 (73-105)	139 (126-145)	93 (69-145)
9.	86 (74-95)	136 (129-143)	95 (77-143)
10.	85 (73-95)	135 (127-140)	93 (81-140)
11.	94 (80-105)	142 (131-147)	99 (81-147)
12.	93 (79-100)	140 (131-146)	109 (98-146)
13.	92 (78-98)	141 (131-147)	113 (83-147)
14.	90 (79-95)	137 (124-144)	92 (58-144)
15.	85 (71-92)	135 (121-143)	96 (75-143)
16.	84 (71-94)	135 (125-141)	96 (77-147)
17.	82 (64-92)	133 (123-129)	92 (76-139)
18.	87 (70-94)	137 (125-143)	97 (73-143)
19.	89 (72-97)	139 (127-145)	106 (79-145)
20.	84 (73-91)	133 (124-140)	100 (87-140)
21.	91 (75-98)	138 (125-145)	101 (82-145)
22.	88 (78-94)	136 (129-142)	106 (87-142)
23.	88 (72-95)	138 (125-146)	97 (76-146)
24.	102 (92-108)	142 (131-147)	112 (94-147)
25.	86 (73-108)	137 (127-143)	96 (73-143)

Global Spring Barley Yield Trail-2019 (7th GSBYT-2019)

This trial comprised of twenty-five entries including check variety K603 and was evaluated at four locations (Kanpur, Karnal, Hisar and Pantnagar) under low input production conditions. The check variety K603 was ranked nine, second, first and eleven position at Karnal, Kanpur, Hisar and Pantnagar locations. At three locations (Karnal, Kanpur and Hisar), no test entry was found to be superior over the check variety for grain yield. However, at Pantnagar, two

test entries (8 and 9) were statistically superior over this check variety for grain yield at Pantnagar. Based on field observations on plant and spike characters, 14-genotypes (1,4,5,6,7,10,13,15,17,18,19,20,24 and 25) 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 7th GSBYT-(2019) at different locations in *rabi* 2018-19 season

7 th GSBYT-19-	Karnal			Kanpur			Hisar			Pantnagar		
	Yield	RK	G	Yield	RK	G	Yield	RK	G	Yield	RK	G
1	74	5	1	42	17	0	35	9	0	40	3	0
2	73	8	1	57	4	0	36	7	0	34	8	0
3	61	21	0	70	1	1	34	10	0	31	14	0
4	78	2	1	53	6	0	37	5	0	31	13	0
5	73	7	1	58	3	0	33	13	0	22	24	0
6	77	3	1	43	16	0	30	17	0	36	7	0
7	74	6	1	42	18	0	29	20	0	24	21	0
8	81	1	1	42	19	0	36	6	0	40	2	1
9	70	12	1	34	24	0	41	2	1	43	1	1
10	68	16	1	52	8	0	39	4	0	29	17	0
11	57	25	0	36	22	0	34	12	0	36	6	0
12	67	18	1	46	11	0	35	8	0	37	5	0
13	59	24	0	54	5	0	29	18	0	32	12	0
14	70	11	1	38	20	0	26	23	0	29	16	0
15	68	16	1	44	13	0	33	15	0	32	10	0
16	70	10	1	46	10	0	33	14	0	27	19	0
17	69	14	1	33	25	0	26	22	0	38	4	0
18	67	19	1	44	12	0	34	11	0	30	15	0
19	70	13	1	43	15	0	28	21	0	24	22	0
20	60	22	0	44	14	0	31	16	0	24	23	0
21	67	19	1	37	21	0	20	25	0	20	25	0
22	59	23	0	34	23	0	23	24	0	25	20	0
23	76	4	1	50	9	0	29	18	0	32	9	0
24	68	15	1	53	7	0	39	3	0	28	18	0
check, K603	71	9	1	69	2	1	46	1	1	32	11	0
Mean	69			47			33			31		
CD (5%)	16			5			5			4		
CV (%)	14			6			9			7		

Mean and range (in parenthesis) across the locations for ancillary characters of barley genotypes evaluated under 6th GSBYT-(2019) at different locations

Genotype 6th GSBYT-19	Days to Heading (Mean & Range)	Days to Maturity (Mean & Range)	Plant Height (cm) (Mean & Range)
1.	90 (84-95)	132 (125-138)	82 (65-00)
2.	88 (81-92)	133 (129-137)	85 (54-106)
3.	83 (76-87)	132 (127-135)	87 (71-100)
4.	85 (81-90)	132 (130-135)	89 (64-111)
5.	92 (82-97)	136 (132-140)	84 (71-94)
6.	83 (74-88)	133 (131-135)	82 (62-100)
7.	100 (88-108)	137 (131-141)	69 (54-95)
8.	86 (81-90)	132 (126-135)	84 (72-111)
9.	87 (82-91)	133 (127-137)	81 (46-109)
10.	79 (74-83)	129 (123-134)	86 (73-110)
11.	78 (72-83)	128 (124-133)	89 (63-107)
12.	94 (90-97)	135 (127-141)	100 (57-139)
13.	94 (84-99)	134 (129-138)	80 (62-93)
14.	94 (81-98)	137 (133-139)	97 (72-121)
15.	90 (81-95)	133 (130-138)	96 (74-119)
16.	94 (86-100)	136 (131-139)	97 (66-120)
17.	95 (86-100)	136 (133-139)	94 (69-112)
18.	93 (89-96)	133 (130-137)	86 (57-104)
19.	93 (86-99)	137 (133-140)	88 (62-106)
20.	82 (72-87)	134 (132-137)	89 (58-110)
21.	94 (88-102)	136 (130-139)	89 (64-109)
22.	83 (75-89)	129 (124-133)	97 (72-119)
23.	94 (80-100)	134 (127-139)	88 (66-106)
24.	98 (84-104)	138 (130-141)	90 (65-108)
25.	85 (81-92)	136 (130-139)	92 (81-108)

International Barley Observation Nursery-High Input-2019 (IBON-HI-2019)

The IBON comprising of 138 entries including one local check (BH946), repeated five times, were raised at four locations namely, Durgapura, Pantnagar, Ludhiana and Karnal in rabi 2018-19. 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 30 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 259 g to 1225 g with a mean of 627 g. Only nine test entries gave higher grain yield across the locations over the average yield of the check variety BH946. A total of 37 entries (1,2,6, 11, 13, 27,32,34, 39, 46, 47, 50, 52, 60, 62, 65, 73, 80, 81, 82, 83, 91, 93, 94, 98,103, 104, 108, 109, 110, 111, 112, 123, 126, 128, 134 and 135) 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-(2019) at different locations in *rabi* 2018-19 season

Genotype (IBON-HI-19)	Days to Heading	Days to Maturity	Plant Height (cm)	Yield /plot (1.15m ²)	Genotype (IBON-HI-2019)	Days to Heading	Days to Maturity	Plant Height (cm)	Yield /plot (1.15m ²)
73	75 (67-89)	128 (124-133)	95 (74-121)	788 (274-1200)	102	72 (64-82)	128 (123-136)	91 (72-105)	593 (403-1075)
96	80 (73-90)	128 (125-131)	99 (89-109)	731 (303-1450)	123	88 (79-108)	129 (123-140)	90 (73-116)	585 (305-804)
127	85 (73-98)	131 (123-141)	97 (75-111)	694 (193-1250)	91	76 (66-90)	128 (121-139)	91 (79-119)	583 (399-850)
1	90 (79-106)	134 (130-141)	99 (86-117)	689 (255-1250)	11	79 (69-98)	130 (125-139)	91 (75-100)	582 (240-1018)
24	81 (73-94)	130 (126-133)	98 (83-121)	687 (340-1250)	110	82 (73-95)	129 (122-140)	101 (77-120)	580 (235-1050)
138	98 (93-105)	136 (131-144)	104 (94-118)	668 (470-1000)	131	73 (66-83)	126 (122-132)	95 (69-110)	578 (403-836)
108	86 (81-95)	130 (125-138)	100 (87-115)	654 (500-962)	23	87 (79-94)	129 (127-131)	95 (83-116)	575 (284-928)
86	73 (64-83)	125 (121-132)	103 (90-131)	649 (369-900)	47	83 (73-98)	131 (127-139)	102 (75-129)	563 (284-1000)
121	89 (82-97)	135 (129-144)	107 (87-120)	635 (300-1200)	72	76 (70-84)	128 (123-138)	89 (75-109)	562 (278-900)
BH946	77 (67-92)	130 (126-140)	90 (71-121)	627 (259-1225)	48	80 (78-84)	131 (125-139)	96 (72-121)	561 (254-1100)
107	74 (63-92)	128 (122-138)	71 (12-96)	614 (213-1000)	75	82 (73-97)	132 (128-141)	99 (75-126)	560 (365-826)
69	80 (72-94)	127 (122-133)	92 (78-119)	614 (272-1286)	90	71 (61-81)	127 (121-138)	88 (71-110)	558 (274-704)
78	82 (73-90)	130 (126-133)	98 (78-119)	611 (224-1000)	55	96 (87-108)	136 (131-144)	93 (75-116)	556 (271-922)
83	77 (73-84)	127 (122-137)	90 (70-113)	609 (237-996)	124	100 (95-105)	138 (132-145)	105 (95-115)	552 (382-776)
57	72 (64-80)	128 (124-133)	100 (77-128)	595 (344-1000)	117	77 (66-95)	130 (125-138)	80 (69-90)	552 (390-800)

7th Global Spring Barley Observation Nursery-2019 (6th GSBON-2019)

This nursery consisted of 161 entries including a local check Lakhan repeated five times and was raised at four locations namely, Kanpur, Faizabad, Bajaura 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 30 top entries based on grain yield in the decreasing order of ranking are tabulated and given below. A total of 56 entries (1,2,3,5,6,10,12, 13,1,9,21, 26,28, 29,33, 34,36, 37,41, 42, 44, 48, 50, 53, 62, 64, 66, 67, 68, 74, 76, 77, 83, 86, 96, 103, 105, 106, 109, 112, 116, 121, 122, 128, 131, 132, 138, 140, 142, 144, 145, 148, 149, 156, 157 and 161) were selected by the barley breeders during the field day. Twenty-nine entries registered higher grain yields compared to the check variety Lakhan whose plot (1.5 m²) yields ranged from 97 to 756 g .

Mean and range (in parenthesis) across the locations for ancillary characters of barley genotypes evaluated under 5th GSBON-2019 at different locations

Genotype 6 th GYSBON-19	Days to Heading	Days to Maturity	Plant Height (cm)	Yield /plot (1.15m ²)	Genotype 6 th GYSBON-19	Days to Heading	Days to Maturity	Plant Height (cm)	Yield /plot (1.15m ²)
9	94 (78-137)	140 (110-178)	76 (53-91)	757 (210-1346)	122	99 (86-131)	139 (115-175)	85 (65-110)	498 (210-770)
11	95 (79-136)	140 (110-177)	85 (66-109)	640 (400-813)	92	97 (79-139)	140 (115-181)	91 (65-124)	494 (130-715)
6	93 (76-136)	139 (110-178)	78 (52-100)	640 (500-750)	112	93 (76-138)	140 (107-181)	79 (60-96)	489 (376-580)
5	98 (81-145)	143 (112-184)	76 (62-91)	591 (230-750)	22	99 (85-137)	142 (114-182)	78 (54-103)	489 (250-705)
4	100 (85-140)	139 (113-180)	92 (71-113)	577 (240-900)	3	92 (75-138)	139 (108-179)	85 (61-110)	487 (210-727)
10	93 (77-131)	140 (112-178)	84 (50-110)	553 (240-894)	111	98 (83-134)	140 (123-170)	95 (75-119)	482 (230-650)
7	105 (89-143)	146 (128-183)	81 (61-106)	550 (250-790)	124	100 (84-137)	144 (127-181)	96 (79-120)	482 (220-650)
114	79 (76-83)	125 (112-134)	92 (73-120)	549 (425-630)	94	94 (77-140)	138 (109-181)	85 (54-111)	480 (360-678)
60	96 (77-132)	139 (110-175)	86 (64-110)	541 (350-700)	40	97 (79-138)	142 (118-180)	89 (72-120)	476 (120-694)
115	79 (75-83)	125 (112-134)	87 (69-120)	528 (400-852)	100	100 (86-133)	144 (125-175)	87 (54-130)	475 (130-647)
38	101 (81-145)	145 (128-184)	67 (56-90)	515 (200-778)	18	89 (72-132)	138 (107-179)	86 (70-111)	474 (250-619)
74	94 (79-130)	138 (112-173)	84 (62-106)	502 (478-529)	47	109 (96-146)	145 (128-184)	76 (53-96)	473 (115-797)
2	98 (82-142)	143 (112-184)	87 (64-103)	498 (200-780)	157	93 (79-131)	140 (111-176)	85 (60-116)	471 (250-720)
149	96 (77-140)	141 (113-182)	87 (61-111)	498 (135-890)	88	97 (81-131)	140 (111-174)	86 (68-106)	470 (125-825)
109	94 (76-141)	140 (112-182)	83 (52-110)	498 (230-625)	Lakhan	93 (77-138)	140 (109-180)	95 (80-130)	460 (268-586)

Elite International Barley Germplasm Nursery (EIBGN-2018-19)

EIBGN 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* 2018-19 under respective trials/nurseries. A set of 75 treatments including six checks repeated five times at each location were evaluated in an augmented design at nine locations in NEPZ (Kanpur, Faizabad,), NHZ (Shimla,

Bajaura) and NWPZ (Karnal, Hisar, Durgapura, Ludhiana, Pantnagar). 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 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.

The yields were higher in NWPZ followed by NEPZ and NHZ. The check variety HUB113 was adjudged to be the best check in NWPZ and NEPZ. However, in NHZ BH 946 was found to be the best. No test entry was statistically superior in any of the three zones compared to the respective best check of these zones. Among the test entries, test entries INBON-HI-18-49 and IBON-18-60 were in the NSG 1 giving higher yields. Similarly, the top performing seven entries namely IBON-18-100, IBON-18-46, IBYT-18-8, IBYT-18-16, INBYT-HI-18-11, INBYT-HI-18-13 and 5thGSBYT-18-7 were in the NSG 1 in NEPZ. In case NHZ six entries (IBYT-18-16, IBYT-18-4, IBON-18-59, IBYT-18-12, IBYT-18-9 and IBYT-18-5) were higher yielder and were in NSG 1.

Zonal means for grain yield, ranking and grouping of barley genotypes evaluated under EIBGN-2019 at different locations in *rabi* 2018-19 season

Sr. No.	Genotype	Grain Yield (q/ha)											
		NWPZ	Rk	G	NEPZ	Rk	G	NHZ	Rk	G	Overall	Rk	G
1	IBYT-18-4	38	7	0	30	11	0	31	2	1	35	3	1
2	IBYT-18-5	24	38	0	23	34	0	26	6	1	24	33	0
3	IBYT-18-6	22	41	0	25	26	0	21	13	0	22	41	0
4	IBYT-18-8	27	34	0	34	3	1	24	9	0	28	25	0
5	IBYT-18-9	20	43	0	28	16	0	27	5	1	24	39	0
6	IBYT-18-12	23	39	0	29	12	0	28	4	1	25	31	0
7	IBYT-18-16	26	36	0	33	4	1	31	1	1	29	20	0
8	IBYT-18-18	21	42	0	25	23	0	22	11	0	22	42	0
9	IBYT-18-21	34	18	0	28	17	0	26	7	0	31	10	0
10	INBYT-HI-18-3	29	30	0	24	32	0	12	42	0	24	35	0
11	INBYT-HI-18-9	18	45	0	23	38	0	11	44	0	17	45	0
12	INBYT-HI-18-11	31	25	0	33	5	1	15	35	0	28	24	0
13	INBYT-HI-18-13	35	17	0	33	6	1	14	38	0	30	15	0
14	INBYT-HI-18-18	22	40	0	22	39	0	13	41	0	20	44	0
15	INBYT-HI-18-22	30	28	0	23	35	0	9	45	0	24	34	0
16	5thGSBYT-18-3	33	22	0	20	43	0	14	39	0	26	29	0
17	5thGSBYT-18-4	32	23	0	29	14	0	18	24	0	28	23	0
18	5thGSBYT-18-6	37	10	0	25	25	0	24	8	0	32	7	0
19	5thGSBYT-18-7	50	1	1	32	7	1	20	16	0	39	1	1
20	5thGSBYT-18-15	36	13	0	30	10	0	15	34	0	30	14	0
21	5thGSBYT-18-16	25	37	0	25	27	0	14	37	0	23	40	0
22	5thGSBYT-18-19	35	14	0	28	15	0	20	20	0	30	12	0
23	5thGSBYT-18-21	31	26	0	24	29	0	20	17	0	27	27	0
24	5thGSBYT-18-22	28	32	0	25	24	0	21	14	0	25	30	0
25	IBON-18-46	30	29	0	38	2	1	15	31	0	28	22	0

26	IBON-18-47	20	44	0	28	18	0	17	28	0	21	43	0
27	IBON-18-59	38	9	0	32	7	1	28	3	1	34	4	1
28	IBON-18-60	43	3	1	25	22	0	18	26	0	33	5	1
29	IBON-18-82	27	33	0	23	33	0	14	36	0	24	38	0
30	IBON-18-97	42	4	0	24	30	0	21	15	0	33	6	0
31	IBON-18-100	32	24	0	38	1	1	17	29	0	30	13	0
32	IBON-18-108	36	12	0	29	13	0	15	32	0	30	16	0
33	INBON-HI-18-7	27	35	0	25	28	0	15	33	0	24	37	0
34	INBON-HI-18-11	38	8	0	27	19	0	16	30	0	31	11	0
35	INBON-HI-18-26	29	31	0	23	37	0	12	43	0	24	36	0
36	INBON-HI-18-48	35	15	0	24	31	0	17	27	0	28	21	0
37	INBON-HI-18-49	47	2	1	30	9	0	20	18	0	37	2	1
38	INBON-HI-18-55	35	16	0	23	36	0	13	40	0	27	26	0
39	5thGSBON-18-65	31	27	0	11	45	0	23	10	0	25	32	0
40	5thGSBON-18-79	34	20	0	18	44	0	19	23	0	27	28	0
41	5thGSBON-18-84	40	5	0	20	42	0	20	21	0	31	9	0
42	5thGSBON-18-94	40	6	0	20	41	0	20	19	0	31	8	0
43	5thGSBON-18-104	37	11	0	21	40	0	18	25	0	29	18	0
44	5thGSBON-18-109	34	19	0	26	20	0	19	22	0	29	19	0
45	5thGSBON-18-114	34	21	0	26	21	0	21	12	0	29	17	0
Checks													
1	BH 946	82			50			39			57		
2	BH 960	68			47			43			53		
3	BHS 400	63			41			42			49		
4	DWRB 101	65			39			42			49		
5	HUB 113	88			47			46			61		
6	RD 2715	68			49			35			51		

Mean and range (in parenthesis) across the locations for ancillary characters of barley genotypes evaluated under EIBGN-(2019) at 10-different locations

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-18-4	87 (77-112)	134 (114-150)	86 (68-109)	98 (68-125)	8 (7-10)	62 (44-86)	46 (42-50)	6R
IBYT-18-5	95 (83-114)	138 (122-156)	84 (73-104)	132 (101-183)	8 (5-10)	25 (18-29)	43 (38-46)	2R
IBYT-18-6	91 (81-108)	140 (123-181)	82 (64-104)	104 (76-164)	6 (6-8)	62 (36-74)	35 (34-42)	6R
IBYT-18-8	102 (87-118)	146 (125-182)	90 (68-119)	97 (62-155)	8 (7-11)	65 (44-84)	40 (36-46)	6R
IBYT-18-9	89 (79-109)	139 (120-177)	82 (69-106)	110 (80-148)	7 (5-8)	58 (32-76)	35 (31-41)	6R
IBYT-18-12	96 (80-135)	140 (123-179)	78 (62-89)	111 (78-156)	7 (6-9)	53 (18-75)	35 (32-39)	6R
IBYT-18-16	90 (78-127)	139 (118-175)	88 (73-104)	98 (78-125)	7 (5-9)	61 (44-95)	40 (35-44)	6R
IBYT-18-18	103	143	85	99	8	57	42	6R

	(88-137)	(123-181)	(61-109)	(76-136)	(6-10)	(32-86)	(36-45)	
IBYT-18-21	103 (85-138)	142 (121-180)	79 (61-105)	100 (80-142)	8 (7-9)	64 (48-84)	39 (36-42)	6R
INBYT-HI-18-3	91 (75-124)	137 (108-171)	96 (73-111)	87 (43-144)	8 (7-11)	43 (21-78)	45 (34-50)	2R
INBYT-HI-18-9	94 (77-131)	137 (110-178)	86 (64-113)	73 (28-127)	8 (6-10)	60 (28-84)	38 (32-44)	6R
INBYT-HI-18-11	98 (80-132)	139 (123-179)	84 (70-102)	84 (64-129)	8 (6-10)	68 (36-92)	34 (32-38)	6R
INBYT-HI-18-13	100 (87-137)	143 (125-175)	95 (76-116)	100 (70-133)	8 (6-10)	36 (24-64)	39 (32-45)	2R
INBYT-HI-18-18	94 (78-136)	138 (120-174)	95 (80-117)	78 (13-101)	8 (5-10)	68 (46-96)	36 (32-40)	6R
INBYT-HI-18-22	98 (79-136)	140 (118-174)	81 (68-109)	104 (53-143)	6 (5-8)	53 (26-70)	40 (36-43)	6R
5thGSBYT-18-3	106 (89-134)	144 (123-173)	87 (57-111)	89 (38-115)	8 (7-11)	65 (38-90)	38 (27-44)	6R
5thGSBYT-18-4	107 (88-135)	144 (125-174)	85 (58-108)	89 (49-132)	9 (7-11)	67 (36-84)	39 (36-45)	6R
5thGSBYT-18-6	99 (83-125)	142 (121-171)	93 (71-113)	104 (31-221)	8 (5-11)	53 (27-79)	42 (38-47)	6R
5thGSBYT-18-7	96 (82-129)	140 (119-174)	87 (54-106)	112 (75-164)	8 (7-10)	56 (40-68)	42 (35-49)	6R
5thGSBYT-18-15	102 (85-134)	140 (123-173)	81 (64-98)	124 (48-190)	7 (5-9)	24 (17-30)	39 (32-44)	2R
5thGSBYT-18-16	117 (85-140)	147 (125-177)	86 (55-109)	97 (59-130)	8 (3-10)	25 (21-32)	40 (32-47)	2R
5thGSBYT-18-19	107 (87-139)	144 (122-176)	86 (51-114)	100 (43-185)	7 (5-9)	23 (15-32)	42 (36-52)	2R
5thGSBYT-18-21	106 (88-134)	142 (119-175)	81 (52-102)	127 (76-204)	7 (5-8)	22 (14-27)	41 (35-54)	2R
5thGSBYT-18-22	91 (75-121)	138 (123-167)	88 (59-117)	106 (27-206)	7 (4-10)	23 (15-34)	43 (36-52)	2R
IBON-18-46	104 (86-140)	141 (115-176)	88 (69-111)	88 (50-128)	8 (7-10)	73 (56-92)	36 (31-42)	6R
IBON-18-47	106 (88-129)	142 (120-171)	103 (84-123)	92 (48-140)	9 (7-11)	26 (19-32)	46 (36-51)	2R
IBON-18-59	100 (81-139)	141 (121-176)	98 (73-118)	83 (48-142)	8 (6-10)	71 (55-80)	43 (31-52)	6R
IBON-18-60	97 (80-135)	137 (113-174)	88 (59-116)	97 (53-176)	8 (5-12)	62 (28-80)	39 (36-50)	6R
IBON-18-82	100 (84-136)	140 (124-173)	81 (55-102)	90 (58-145)	7 (7-8)	34 (23-66)	45 (38-50)	2R
IBON-18-97	104 (83-137)	143 (123-174)	89 (64-107)	91 (47-162)	6 (5-8)	52 (40-68)	45 (41-50)	6R
IBON-18-100	108 (85-141)	144 (125-176)	92 (51-108)	87 (64-117)	5 (4-8)	49 (25-66)	41 (32-48)	6R
IBON-18-108	107 (83-140)	143 (123-176)	83 (51-95)	89 (60-153)	7 (5-9)	47 (21-22)	36 (28-42)	6R
INBON-HI-18-7	110 (88-142)	145 (120-179)	89 (58-117)	106 (65-155)	9 (8-11)	33 (22-72)	38 (32-45)	2R
INBON-HI-18-11	108 (88-141)	143 (118-175)	93 (52-108)	101 (58-143)	9 (7-11)	32 (25-54)	41 (36-45)	2R
INBON-HI-18-26	98 (80-135)	140 (119-174)	106 (80-126)	78 (48-122)	8 (5-10)	66 (34-76)	39 (25-45)	6R
INBON-HI-18-48	100 (84-135)	141 (117-175)	100 (89-117)	113 (65-209)	9 (7-10)	38 (21-72)	41 (36-46)	2R
INBON-HI-18-49	104	143	93	119	9	25	37	6R

	(85-139)	(123-179)	(71-117)	(72-172)	(6-11)	(20-30)	(28-46)	
INBON-HI-18-55	103 (82-137)	142 (119-178)	94 (83-113)	92 (75-125)	7 (6-9)	57 (29-74)	38 (33-44)	2R
5thGSBON-18-65	106 (85-139)	143 (125-180)	77 (43-93)	111 (63-192)	7 (6-8)	25 (16-34)	41 (36-49)	2R
5thGSBON-18-79	99 (85-137)	141 (124-179)	82 (952-102)	114 (77-167)	8 (7-10)	24 (19-30)	45 (37-49)	2R
5thGSBON-18-84	98 (83-135)	141 (120-178)	89 (62-106)	115 (80-155)	8 (7-9)	25 (19-28)	49 (42-53)	2R
5thGSBON-18-94	107 (88-136)	142 (118-177)	88 (63-102)	114 (76-187)	7 (6-9)	25 (23-28)	41 (30-48)	2R
5thGSBON-18-104	101 (85-126)	141 (117-174)	95 (80-111)	107 (65-137)	7 (6-8)	25 (22-29)	48 (41-52)	2R
5thGSBON-18-109	102 (85-133)	143 (118-178)	96 (82-118)	103 (68-165)	8 (6-9)	27 (25-28)	49 (33-59)	2R
5thGSBON-18-114	91 (77-122)	136 (108-172)	97 (83-117)	113 (63-205)	8 (6-10)	23 (17-29)	49 (31-58)	2R
BH 946	96 (44-135)	140 (113-178)	84 (60-112)	92 (50-140)	7 (5-10)	56 (36-70)	40 (35-55)	6R
BH 959	95 (77-127)	140 (115-176)	83 (56-110)	95 (40-181)	8 (5-12)	57 (30-72)	40 (28-48)	6R
BHS 400	104 (80-139)	143 (112-181)	90 (65-113)	87 (37-128)	6 (3-9)	54 (34-78)	40 (33-46)	6R
DWRB 101	94 (78-128)	139 (115-175)	79 (57-91)	113 (58-192)	7 (4-9)	26 (21-55)	45 (34-54)	2R
HUB 113	97 (77-129)	140 (107-176)	84 (63-102)	103 (15-202)	7 (5-9)	57 (25-75)	41 (35-48)	6R
RD 2715	93 (77-124)	137 (110-172)	91 (67-117)	85 (38-170)	8 (5-11)	59 (15-78)	42 (28-54)	6R

National Barley Genetic Stock Nursery (NBGSN-2019)

This nursery comprising of a set of 18 promising entries endowed with trait(s) of breeding value, received from different cooperating centres were evaluated at 9-centres (Karnal, Durgapura, Kanpur, Hisar, Faizabad, 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 1.5 m² across the locations are given in the following table.

Table : Mean and range (in parenthesis) across the locations for ancillary characters of barley genotypes evaluated under NBGSN - (2019) at different locations in *rabi* 2018-19 season

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
DWRB180	Resistance to leaf blight	P.STO/3/LBIRAN/UNA80//LIGNEE640/4 BLLU/5.PETUNIA1/6/M 111	94 (68-135)	144 (120-184)	89 (72-99)	92 (60-123)	9 (7.8-11.1)	66 (44-80)	43 (38.2-50)	413 (152-660)	6R
DWRB152	Resistance to yellow rust	DWRB73/SWRB78	93 (71-130)	140 (123-179)	84 (63-110.3)	110 (66-230)	8 (6.7-10.3)	40 (20-80)	53 (38-60)	343 (230-480)	6R
DWRB143	Resistance to yellow rust	DWRB73/DWR83	97 (71-127)	141 (121-176)	82 (60.3-100)	73 (42-120)	8 (5.8-10)	60 (41-72)	42 (32-50)	346 (99-500)	6R
BHS462	Resistance to yellow and brown rust	Ist GBYT-9 (2012-13)	99 (73-132)	141 (117-178)	87 (67.3-107)	113 (75-192)	7 (6-8.2)	53 (28-78)	39 (34.3-42)	402 (53-813)	2R
BHS463	Resistance to yellow	IBON-LRA-M-37 Manal/3/Lignee527/NK1272 /JLB70-63/4/Maknusa	103 (77-133)	139 (121-178)	84 (50-102)	107 (72-177)	6 (3.3-7)	46 (28-62)	38 (34.52-40)	325 (53-542)	6R
DWRB160	High 1000-gw, test wt, long spikes bold grains proportion, overall malting quality	DWRB62/DWRB78	101 (73-136)	138 (117-184)	87 (69-115.6)	87 (62-125)	9 (6.8-11)	25 (14.7-33)	61 (47.7-74.16)	328 (137-482)	6R
DWRB182	Low Beta-glucan, resistance to yellow and brown rusts	DWRUB52/DWR81	94 (72-132)	141 (119-177)	81 (57-107.5)	114 (57-218)	7 (5-8.3)	39 (19-92)	47 (29.8-62.5)	370 (126-508)	6R
DWRB184	High malt friability, resistance to yellow rust	DWRUB52/DWR81	94 (78-131)	142 (120-180)	80 (59-110.5)	125 (42-196)	7 (5.5-9)	27 (20.7-42)	51 (41-60)	366 (105-700)	2R
DWRB188	Resistance to black rust	PENCO/CHEVRON-BAR/3/LEGACY//PENCO /CHEVRON-BAR (Hullless)	95 (78-134)	139 (122-181)	86 (52.7-110.2)	74 (22-125)	7 (5.8-8.2)	49 (18-68)	41 (37-45.64)	359 (43-725)	2R
HBL793	Resistance to black rust	HBL316/Dolma	102 (80-138)	144 (120-185)	93 (72-115.5)	79 (25-129)	8 (5-10)	57 (28-76)	35 (30.44-38.4)	267 (80-695)	6R
PL905	Low Beta-glucan, Malt friability, high water extract. Over all malt quality	VJM 604/PL764	100 (80-128)	145 (124-177)	95 (74-106)	114 (45-187)	8 (6-10)	26 (20-28)	45 (42-50)	402 (180-600)	2R
RD2980	Resistance to yellow rust and CCN	RD-2660 / 13th EMBGSN-4	95 (79-125)	141 (121-176)	81 (57-93)	102 (58-130)	7 (5.3-9)	49 (20.7-86)	48 (41-52)	416 (138-634)	2R
RD2981	Resistance to yellow rust and CCN	RD-2660 / 13th EMBGSN-4	94 (75-121)	142 (120-174)	79 (64-92)	81 (48-118)	7 (5.6-8)	53 (34-72)	47 (38-55)	446 (136-590)	6R
DWRB174	Early heading and short plant height	GIIA 121/CI06248/4/ APM/IB65//11012- 2/3/API/CM67//DS/APRO/5/ ATHS	89 (64-129)	137 (115-162)	63 (46.3-80)	85 (41-125)	6 (4.5-7.8)	44 (11-78)	40 (37.15-43)	224 (100-475)	6R
DWRB173	Hooded and early	YAGAN/CAPUCHONA20	89	136	90	83	9	28	45	197	2R

	heading		(65-127)	(111-159)	(75-103)	(30-142)	(8-10)	(18-52)	(38-50)	(46-422)	
DWRB175	Short plant height	NACKTA/HJA A33//FNCI	93 (67-126)	140 (115-172)	62 (37-93)	68 (24-131)	7 (6-10.5)	30 (16-54)	46 (42-51)	171 (40-384)	6R
DWRB137	Yellow rust resistance, short plant height, high grain yield	DWR28/DWRUB64	92 (70-123)	139 (121-171)	75 (52-95)	92 (44-173)	7 (6-9)	60 (42-78)	47 (39-55)	405 (134-780)	6R
RD2907	Salinity/alkalinity	RD103/Rd2518//RD2592	95 (73-127)	139 (122-176)	88 (61-120.5)	98 (63-143)	7 (5.5-8.5)	58 (44-68.4)	47 (42.1-51.68)	569 (192-1025)	6R

Breeder and Nucleus Seed Production Programme of Barley (Rabi, 2018-19)

The indent and production of breeder and nucleus seed of barley varieties during Rabi 2018-19 has been described as below.

Breeder Seed Indent

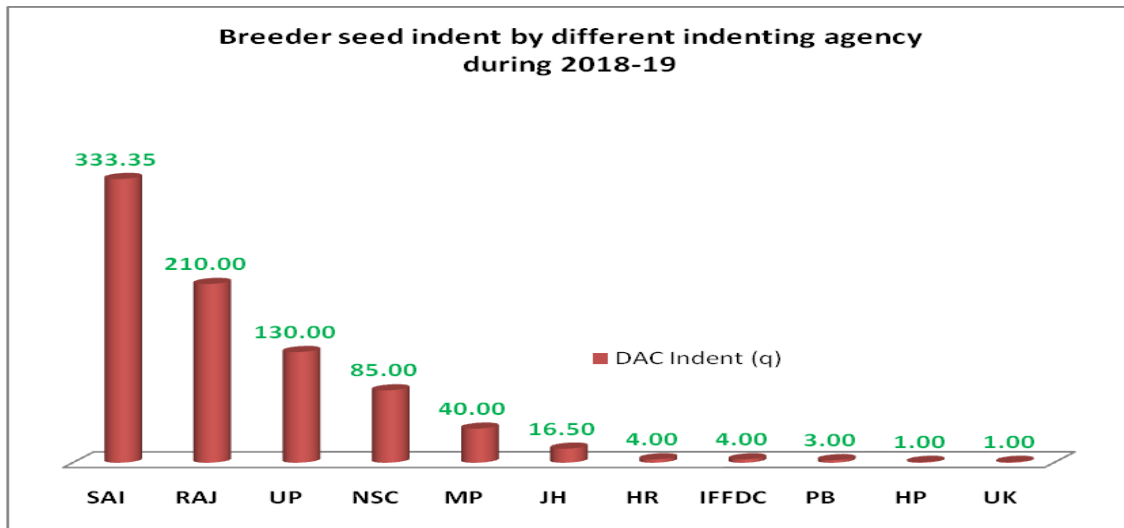
A consolidated quantity of 827.85q breeder seed indent of 29 varieties was received from Deputy Commissioner (Seeds), DAC, Ministry of Agriculture & Farmers Welfare, Govt. of India. The indent included the requirement of eight states (Punjab, Haryana, Himachal Pradesh, Jharkhand, Madhya Pradesh, Rajasthan, Uttar Pradesh and Uttarakhand) and two public sector agencies (IFFDC, National Seeds Corporation) and one private agency (Seed Association of India) for the season Rabi 2019-20. The highest indent was placed by SAI (333.35q) followed by Rajasthan (210.00q), Uttar Pradesh (130.00q) and National Seed Corporation (85.00q). The least demand of breeder seed was made from HP (1.00q) and Uttarakhand (1.00q) both followed by Punjab (3.00q). A total 826.95q breeder seed indent of 28 varieties was allocated among 10 BSP centres except Jyoti due to unavailability of nucleus seed of this very old variety.

Among 29 varieties maximum breeder seed indent was received for the variety RD 2786 (142.00q) followed by RD2794 (97.00), PL426 (83.25q), RD2035 (81.40q) and BH393 (71.20q) Among all 29 varieties, 474.85q (57.45% indent of the total indent was reported for ten varieties' namely RD2786, RD2794, PL426, RD2035 and BH 393. A total of 1421.05q breeder seed of 28 varieties was produced by 10 BSP centres during 2018-19 which is significantly surplus (+594.10q) over the total allocated quantity (826.95) of breeder seed.

Among 10 breeder seed production centres maximum seed production was reported from SKNV, Durgapura (676.60q) followed by CCS HAU Hisar (276.10q), PAU, Ludhiana (135.00q) and IIWBR, Karnal (109.70q) and while the minimum (1.00q) was reported from IARI, RS Karnal. Sufficient breeder seed was produced for all the varieties to fulfill the DAC requirement except RD 2849 (-23.50q) by SKNAU, Durgapura centre.

Nucleus seed and Test stock multiplication of barley

A total of 49.72q nucleus seed of 27 varieties has been produced against 36.25q allocation to the 10 different centres except NB 1445 and Jyoti. A total of 146.70q carry over seed of two barley varieties viz., RD 2899 (65.50q) and RD 2907 (81.20q) was reported by National Seeds Corporation (Ltd), New Delhi and produced at Surathgarh Farm. These two varieties were released and notified for CZ -IR-TS (RD 2899) and NWPZ & NEPZ Salinity condition (RD 2907), respectively vide notification number S.O. 6318(E) dated 26.12.2018



Top ten indented varieties of barley and their production (q) during 2018-19

S.No.	Variety	Year of release	DAC Indent (q)	Production (q)
1	RD 2786	2013	142.00	230
2	RD 2794	2016	97.00	175
3	PL 426	1996	83.25	110
4	RD 2035	1994	81.40	214
5	BH 393	2002	71.20	138.4
6	HUB 113 (Mahamana 113)	2014	60.00	60
7	DWRUB 52	2007	50.90	56.5
8	RD 2052	1991	36.40	50
9	DWRB 137	2018	30.00	52.2
10	RD 2849	2016	30.00	6.5
		Total	682.15	1092.60
Per cent share in DAC Indent			82.5 %	

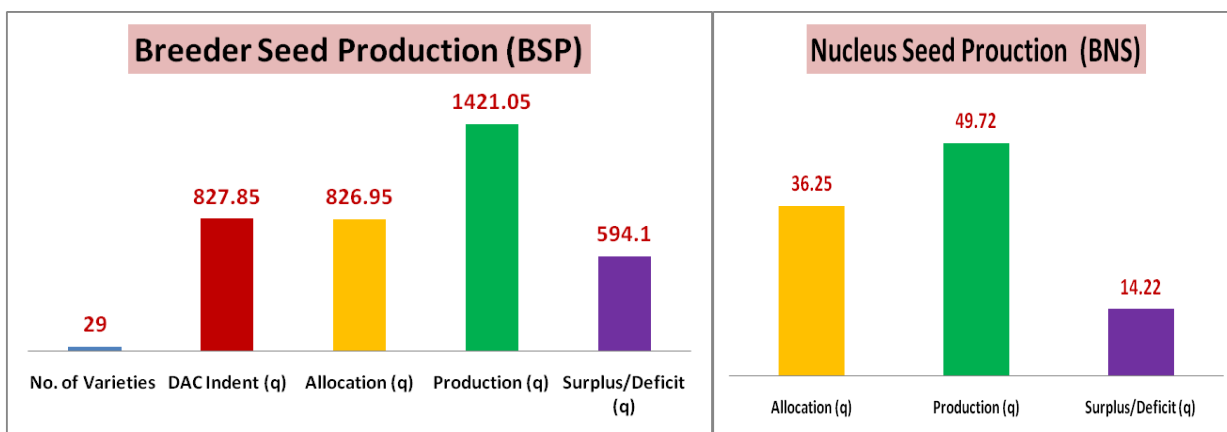


Fig 1. Breeder and Nucleus seed production of 29 barley varieties during 2018-19

Table: Centre wise breeder seed production of Barley during 2018-19

S.No.	BSP Centre	DAC Indent	Allocation	Production	Surplus/Deficit ±
1	SKNAU, Durgapura	387.50	387.50	676.60	+304.10
2	CCS HAU Hisar	132.20	132.20	276.10	+143.90
3	PAU Ludhiana	95.40	95.35	135.00	+39.65
4	IIWBR Karnal	81.90	81.90	109.70	+27.80
5	BHU Varanasi	60.00	60.00	60.00	0.00
6	CSAUAT Kanpur	28.90	28.00	65.45	+37.45
7	JNKVV Jabalpur	20.00	20.00	50.88	+30.88
8	NDUA&T Faizabad	20.00	20.00	42.82	+22.82
9	GBPUAT Pantnagar	1.00	1.00	3.50	+2.50
10	IARI Karnal	1.00	1.00	1.00	0.00

Variety wise breeder and nucleus seed production of barley varieties 2018-19

S.No.	Variety	Year of release	DAC Indent	Centre	Breeder seed (qtls)			Nucleus seed (qtls)		
					Allocation	Production	Surplus/deficit	allocation	Production	Surplus/deficit
1	DWRB 137	2018	30.00	IIWBR Karnal	30.00	52.20	22.20	1.00	5.70	4.70
2	K 1055	2018	10.00	CSAUAT Kanpur	10.00	24.30	14.30	0.50	2.00	1.50
3	RD 2794	2016	97.00	SKNAU, Durgapura	97.00	175.00	78.00	4.00	5.50	1.50
4	RD 2849	2016	30.00	SKNAU, Durgapura	30.00	6.50	-23.50	0.50	0.00	-0.50
5	BH 959	2015	25.00	CCS HAU Hisar	25.00	36.80	11.80	1.00	1.40	0.40
6	BH 946	2014	25.00	CCS HAU Hisar	25.00	73.65	48.65	1.00	1.50	0.50
7	BHS 400 (Pusa Sheetal)	2014	0.50	IARI Karnal	0.50	0.50	0.00	0.50	0.00	-0.50
8	DWRB 92	2014	0.10	IIWBR Karnal	0.10	0.10	0.00	0.25	0.25	0.25
9	HUB 113 (Mahamana 113)	2014	60.00	BHU Varanasi	60.00	60.00	0.00	2.50	2.60	0.10
10	NB 1445	2014	20.00	NDUA&T Faizabad	20.00	42.82	22.82	1.00	0.00	-1.00
11	RD 2786	2013	142.00	SKNAU, Durgapura	142.00	230.00	88.00	5.50	7.00	1.50
12	DWRB 64	2012	0.90	IIWBR Karnal	0.90	0.90	0.00	0.50	0.50	0.50
13	PL 807	2012	5.00	PAU Ludhiana	5.00	5.00	0.00	0.50	0.75	0.25
14	UPB 1008	2011	1.00	GBPUAT Pantnagar	1.00	3.50	2.50	0.50	0.50	0.00
15	BH 380 (Pusa Losar)	2010	0.50	IARI Karnal	0.50	0.50	0.00	0.50	0.80	0.30
16	BH 902	2010	9.50	CCS HAU Hisar	9.50	25.75	16.25	0.50	0.60	0.10
17	Jawahar Barley 1 (JB 110)	2010	15.00	JNKVV Jabalpur	15.00	28.46	13.46	0.50	3.30	2.80
18	DWRUB 52	2007	50.90	IIWBR Karnal	50.90	56.50	5.60	2.00	1.90	-0.10
19	RD 2660	2006	0.70	SKNAU, Durgapura	0.70	1.10	0.40	0.50	0.70	0.20
20	JB 58	2005	5.00	JNKVV Jabalpur	5.00	22.42	17.42	0.50	1.80	1.30
21	BH 393	2002	71.20	CCS HAU Hisar	71.20	138.40	67.20	3.00	3.20	0.20
22	K 508 (Pragati)	1998	9.72	CSAUAT Kanpur	9.72	27.58	17.86	0.50	0.62	0.12
23	K 560 (Haritma)	1998	8.28	CSAUAT Kanpur	8.28	13.57	5.29	0.50	0.50	0.00
24	PL 426	1996	83.25	PAU Ludhiana	83.25	110.00	26.75	3.00	3.00	0.00
25	RD 2035	1994	81.40	SKNAU, Durgapura	81.40	214.00	132.60	3.00	3.50	0.50
26	RD 2052	1991	36.40	SKNAU, Durgapura	36.40	50.00	13.60	1.50	0.50	-1.00

27	PL 172	1987	7.10	PAU Ludhiana	7.10	20.00	12.90	0.50	1.00	0.50
28	BH 75	1985	1.50	CCS HAU Hisar	1.50	1.50	0.00	0.50	0.60	0.10
29	Jyoti	1974	0.90	CSAUAT Kanpur	0.00	0.00	0.00	0	0	0
	Total		827.85		826.95	1421.05	594.10	36.25	49.72	14.22

Molecular Report - AVT Final Year Trials (2018-19)

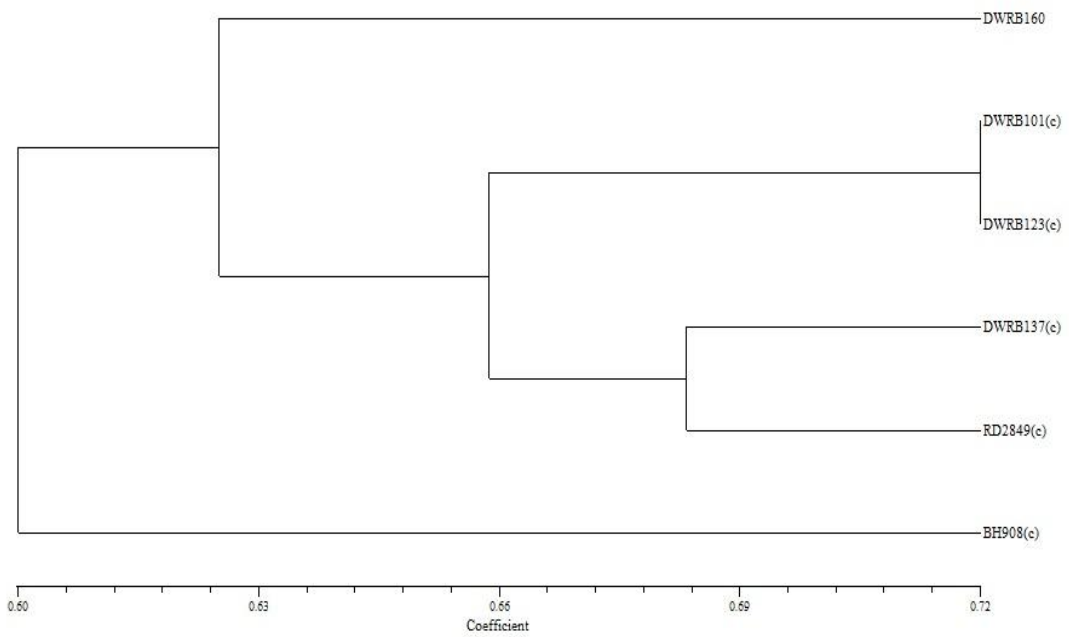
Test entries were characterized at molecular level to analyze genetic variability in final year advanced varietal trials 2018-19. A set of ten genotypes including two test entries (DWRB160 & PL891) and their respective checks (DWRB101, DWRB123, DWRB137, RD2849 & BH902 for DWRB160 and KARAN16, NDB943 & K1149 for PL891) were screened using barley specific molecular markers. Total 46 SSR/STS markers covering seven chromosomes of barley were screened to develop molecular profiles. Molecular weights for microsatellite products, in base pairs, were estimated and the summary statistics including the number of alleles per locus and polymorphism information content (PIC) were determined. Total 80 alleles were scored on PCR based amplification profiles for ten genotypes. The number of alleles ranged from 1 to 3 with an average of 1.76 alleles per locus. The band fragment size varied from 90 bp to 1500 bp with PIC values ranging from 0.0 to 0.75.

Allele molecular weight data of amplified profiles were converted to develop binary format (allele presence = "1" and allele absence = "0") for genetic diversity analysis with NTSYS-PC version 2.1. The similarity matrix developed was used to construct dendrograms using Sequential Agglomerative Hierarchical Nesting (SAHN) based Unweighted Pair Group Method of Arithmetic Means (UPGMA) to infer genetic relationships. For estimating the similarity matrix, null alleles were treated as missing data to reduce the biased genetic or similarity measures. The dendrogram were developed for each of two test entry and their respective check lines. These genotypes grouped within similarity coefficient (GS) value around 0.60 to 0.70 and showed sufficient genetic variability at molecular level. In both dendrogram, final year entries are placed at separate node thus distinguishing from their check lines, respectively.

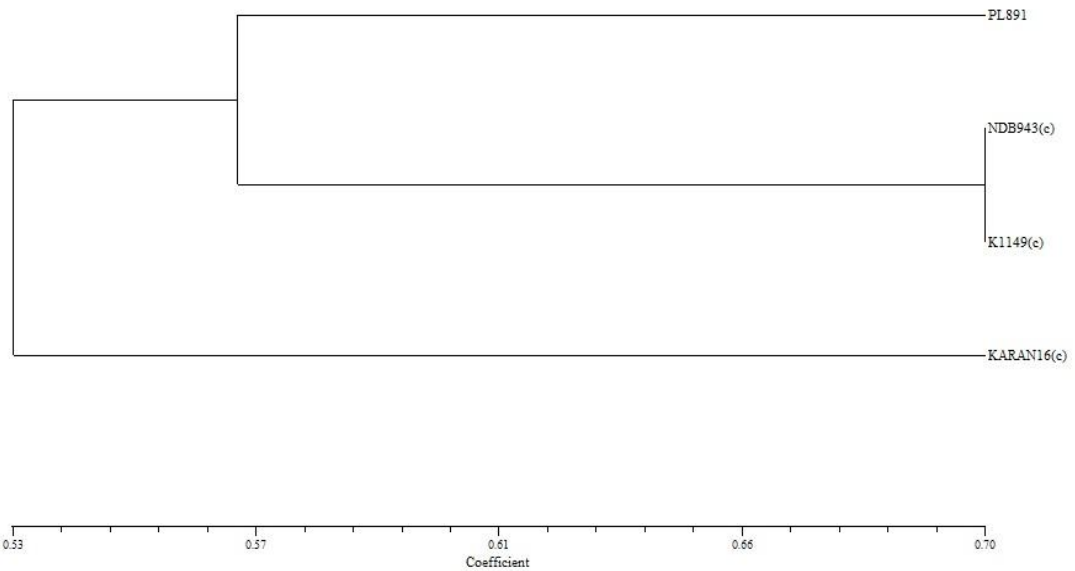
The eventual intend of this effort is to develop molecular markers based amplification profiles for varietal characterization and to assess the level of genetic diversity in Indian barley.

Protocol for developing Molecular profiles of AVT Final Year Trials 2018-19

Development of Molecular profiles: An equal number of fresh, young leaves (ten days old) of five plants from each of AVT were bulked for DNA extraction. Total genomic DNA was isolated using the modified CTAB method (Saghai-Maroo *et al*, 1984). A set of 46 SSR/STS molecular markers covering whole genome of barley was used to develop amplification profiles of genotypes. PCR reaction was conducted in reaction volume of 10 ul containing 1X PCR buffer, 200 mM dNTPs, 0.25 uM of primer, 2Mm mgcl₂, 1 unit Taq polymerase and 50 ng template DNA . PCR amplification was performed using BIORAD S 1000 thermocycler. PCR products were resolved by electrophoresis on 2 % agarose gels (HiMedia) at 4v/cm in 0.5 X TBE buffer. Fragment sizes were approximately calculated by interpolation from the migration distance of marker fragments of 100 or 500 bpDNA ladder (Invitrogen, USA) depending on the amplified fragments size and corroborated with the reported amplified fragment size of respective molecular marker. The occurrence of 'null' alleles was verified by re-amplification using the same primer pair in the same conditions. Gels were stained with ethidium bromide (0.5ug/ml). DNA banding patterns were visualized with UV light and recorded by imaging system (Syngene Synoptics Ltd. USA).



UPGMA based clustering of NWPZ malt barley AVT final year trial (2018-19) entry and its respective checks for SSR/STS markers based amplification profiles



UPGMA based clustering of hulless barley AVT final year trial (2018-19) entry and its respective checks for SSR/STS markers based amplification profiles

Molecular Profiles of Barley AVT Final Year Trials (2018-19)

SN	Marker	Chr	DWRB160	DWRB101 (c)	DWRB123 (c)	DWRB137 (c)	RD2849 (c)	BH902 (c)	PL891	KARAN16 (c)	NDB943 (c)	K1149 (c)
1.	Bmac154	1H	130	130	130	130	130	130	130	130	130	130
2.	Bmac213	1H	180	180	168	168	180	168	180	180	168	168
3.	Bmag382	1H	109	109	109	109	109	109	109	109	109	109
4.	Bmag579	1H	126	126	126	126	126	126	126	126	126	110
5.	MGB402	1H	260	260	260	260	260	260	260,240	260	260,240	260
6.	ScSSR10477	1H	140	150	200	140	150	140	200	150	150	150
7.	HvHVA1	1H	136	136	136	136	136	136	136	136	136	136
8.	Bmac175	2H	180	180	155	180	180	155	180	155	155	180
9.	EBmac640	2H	190	176	190	176	190	190	190	176	176	190
10.	Bmag15	2H	181	181	181	181	181	181	181	181	181	181
11.	EBmac525	2H	125	149	149	149	149	149	149	149	125	125
12.	EBmac623	2H	168	168	154	154	154	168	168	154	154	154
13.	cMWG658	2H	580	580	580	600	580	600	600	600	600	600
14.	Ebmatc39	2H	170	170	170	150	150	150	150	150	150	150
15.	Bmag006	3H	274	274	274	274	274	274	274	274	274	274
16.	Bmag603	3H	122	122	122	122	122	140	122	140	122	122
17.	Bmag877	3H	165	165	153	153	165	165	165	165	165	165
18.	Ebmac541	3H	106	106	106	106	106	106	140	140	106	120
19.	MWG 847	3H	345	345	345	345	345	345	345	345	345	345
20.	Bmag225	3H	185	185	185	185	185	165	185	185	185	185
21.	HvLTPPB	3H	200	216	200	216	216	200	216	200	216	200
22.	Bmag841	3H	125	125	125	125	115	125	115	125	125	115
23.	ABG500	4H	189	189	189	189	189	189	189	189	189	189
24.	HVM40	4H	150	150	160	160	160	150	160	160	150	150
25.	HVM67	4H	136	136	136	136	136	126	136	136	126	126
26.	HvMLOH1A	4H	185	185	175	185	185	175	175	185	175	175
27.	Ksug10	4H	1500	1500	1500	1500	1300	1300	1500	1500	1500	1500
28.	MWG634	4H	800	800	800	800	800	800	800	800	800	800
29.	WG622	4H	161	161	161	161	161	161	161	161	161	161
30.	Bmag353	4H	119	90	90	119,90	90	90	90	119	119	119
31.	Bmag337	5H	145	165	145	165	145	145	145	145	165	165
32.	Bmag751	5H	189	189	189	189	189	189	189	189	189	189
33.	Bmag812	5H	167	157	157	167	167	167	167	157	167	147
34.	GMS61	5H	145	145	135	145	145	145	135	145	145	135
35.	Bmac303	5H	138	119	119	119	138	138	119	138	119	119
36.	ABG458	6H	248	248	248	248	248	248	248	248	248	248
37.	Bmac40	6H	236	210	210	236	236	210	210	236	210	210
38.	Bmac500	6H	110	110	110	190	190	110	110	190	110	110
39.	GBM1215	6H	240	200	200	240	200	240	240,200	240	240	240,200
40.	HVM11	6H	175	175	175	150	175	175	175	150	150	175

41. MWG2029	6H	245	245	245	245	245	245	245	245	245	245	245
42. ABC15864	7H	167	167	167	167	167	167	167	167	167	167	167
43. Bmac64	7H	155	140	140	140	155	155	140	155	155	155	155
44. Bmac162	7H	187	200	200	200	200	200	187	187	200	200	200
45. Bmac167	7H	184	195	195	195	195	195	195	195	184	184	195
46. Bmag110	7H	135	145	135	135	145	145	145	145	135	135	145

Molecular weight of amplified fragments measured in base pairs and calibrated with 100 & 500 bp Ladder

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. A survey was conducted in the areas of Labana, Jajikallan, Badoda, Paota, Kirod-Pathardi of district Jaipur and Damodarpura, Himatpura, Bichhya areas of district Dausa on 25th and 26th February, 2019 to know the status of barley diseases on farmer's field and no rust was observed. Loose smut was noted *in traces* to 2 percent, covered smut *in traces* to 12 percent and stripe diseases *in traces* to 5 percent in fields. Bacterial streak was also noted *in traces* to 2 percent. However 15% incidence of bacterial leaf streak was noted in fields at village Himatpura (Dausa). Farmers fields in Haryana and Punjab were surveyed by the scientist of IIWBR, Karnal. A few isolated fields of barley was observed. No rust was recorded in these areas. Overall barley crop was healthy in all the barley growing areas in India.

Incidence of barley rusts and pathotype distribution during 2018-19

In farmers fields yellow rust of barley was observed in few fields of Jammu & Kashmir, Himachal Pradesh and Uttarakhand only. Five samples of *Puccinia striiformis* f. sp. *hordei* (Yellow rust of barley) were pathotyped from three states. Pathotype 57 was the most predominant and occurred both in Jammu & Kashmir and Himachal Pradesh. Pathotype M was observed in one sample only from Uttarakhand.

Table: Pathotype distribution of *P. striiformis hordei* on barley in India.

State	Sample	Pathotypes	
		0S0 (57)	1S0(M)
Jammu & Kashmir	3	3	-
Himachal Pradesh	1	1	-
Uttarakhand	1	-	1
Total	5	4	1

Observation of any new barley diseases/ insect pests:

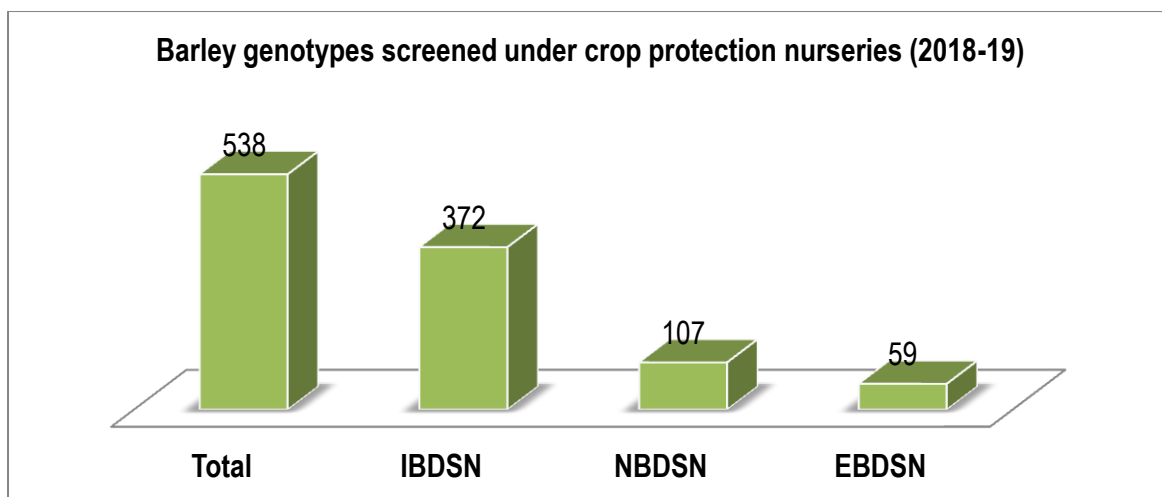
To observe the appearance of any quarantine pests on barley crop the nurseries were observed for any new symptoms during the crop season till the harvest. There was no report from any centre for presence of any of following quarantined pests (disease / insect pest) in their respective areas during the crop season 2018-19.

- 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 2018-19 a total 538 entries were screened under various nurseries (IBDSN, NBDSN and EBDSN) for resistance against various diseases, aphid and CCN at different cooperating centers. There were 372 entries under IBDSN, 107 were for NBDSN and 59 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., Kanpur, Ludhiana and Karnal and for CCN resistance at three locations Ludhiana, Hisar, and Durgapura.

Initial Barley Disease Screening Nursery (IBDSN) 2018-19

During the season 2018-19 a total 372 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, Jammu and Karnal. The yellow rust severity remained very low at Almora so these data are not included. The screening for leaf blight was done at Pantnagar, Varanasi, Kanpur and Faizabad. The disease pressure was low at Kanpur center hence the data are not included.

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 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 372 entries were evaluated, among these, 19 entries were found free from yellow rust (ACI = 0) and 206 entries showed resistant reaction have ACI less than 10. In case of leaf blight screening, 35 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	BBM 797, BBM 800, BBM 811, BBM 814, BBM 816, BBM 820, BD 1792, BD 1793, BD 1802, BH 1815, BH 1817, BK 1802, BK 1813, BK 1821, BKB 1817, BL1550, UPBM 12, UPBM 4 and VB 1826
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Yellow rust, ACI > 0 to 10, Entries – 206	BBM 795, BM 796, BBM 798, BBM 799, BBM 802, BBM 803, BBM 804, BBM 805, BBM 806, BBM 807, BBM 808, BBM 810, BBM 812, BBM 813, BBM 815, BBM 817, BBM 818, BBM 819, BBM 821, BBM 822, BBM 823, BBM 825, BBM 826, BBM 827, BD 1791, BD 1794, BD 1795, BD 1796, BD 1797, BD 1798, BD 1799, BD 1801, BD 1803, BD 1804, BD 1806, BD 1808, BD 1814, BD 1821, BD 1822, BD 1825, BD 1826, BD 1829, BD 1830, BH 1801, BH 1802, BH 1803, BH 1809, BH 1810, BH 1811, BH 1812, BH 1814, BH 1816, BH 1818, BH 1819, BH 1820, BH 1821, BH 1822, BH 1823, BH 1824, BH 1825, BH 1826, BH 1828, BH 1829, BH 1830, BH 1831, BH 1832, BH 1833, BH 1834, BH 1835, BH 1836, BH 1838, BH 1840, BH 1841, BH 1842, BH 1843, BH 1844, BH 1845, BH 1846, BH 1847, BH 1848, BH 1849, BH 1850, BH 1851, BH 1852, BK 1801, BK 1803, BK 1804, BK 1805, BK 1806, BK 1807, BK 1808, BK 1809, BK 1810, BK 1811, BK 1812, BK 1814, BK 1815, BK 1816, BK 1817, BK 1818, BK 1819, BK 1820, BK 1822, BK 1825, BK 1826, BK 1827, BK 1828, BK 1829, BK 1830, BKB 1804, BKB 1806, BKB 1807, BKB 1814, BKB 1822, BKB 1827, BKB 1830, BKB 1840, BKB 1843, BKB 1845, BL1505, BL1506, BL1507, BL1533, BL1535, BL1553, BL1554, BL1560, BL1563, BL1567, BL1568, BL1572, BL1573, BL1582, BL1600, BL1601, BL1604, BL1612, BL1618, BL1644, BL1655, BL1662, BL1663, BL1664, BL1665, BL1667, BL1668, BL1669, BL1671, BL1672, BL1674, HB 1801, HB 1802, HB 1803, HB 1804, HB 1805, HB 1806, HB 1807, HB 1809, HB 1817, HUBL 1818, HUBL 1822, HUBL 1828, HUBL 1830, NDB 1728, NDB 1730, NDB 1734, NDB 1735, NDB 1736, NDB 1738, NDB 1739, NDB 1740, NDB 1741, NDB 1744, NDB 1745, NDB 1747, NDB 1748, NDB 1750, UPBM 10, UPBM 11, UPBM 13, UPBM 16, UPBM 18, UPBM 2, UPBM 6, UPBM 7, UPBM 8, UPBM 9, VB 1803, VB 1804, VB 1805, VB 1808, VB 1811, VB 1814, VB 1815, VB 1818, VB 1819, VB 1820, VB 1821, VB 1822, VB 1824, VB 1825, VB 1827, VB 1828, VB 1829, VB 1830 and VB 1831
Leaf blight, Avg. 14-35 with HS < 57, Entries - 35	BBM 811, BD 1791, BD 1799, BD 1811, BD 1820, BD 1821, BD 1823, BH 1851, BH 1852, BK 1805, BK 1812, BK 1817, BKB 1811, BKB 1817, KB 1833, BKB 1834, BKB 1843, BL1500, BL1517, BL1528, BL1533, BL1600, BL1601, BL1604, BL1646, BL1665, BL1667, HUBL 1829, NDB 1744, NDB 1747, UPBM 12, UPBM 16, UPBM 17, UPBM 3 and VB 1808

Reactions of different entries in Initial Barley Disease Screening Nursery (IBDSN)

S. No.	IBDSN Entries (2018- 19)	Yellow Rust		Leaf Blight	
		A CI	HS	Avg.	HS
1	BD 1791	2.8	10MS	35	46
2	BD 1792	0.0	TR	47	57
3	BD 1793	0.0	0	46	67
4	BD 1794	2.8	10S	47	68
5	BD 1795	7.6	15S	47	57
6	BD 1796	1.2	5MS	57	78
7	BD 1797	0.8	5MS	46	68
8	BD 1798	2.2	10S	36	46
9	BD 1799	0.4	5MR	35	46
10	BD 1800	12.0	20S	46	46
11	BD 1801	2.1	10S	46	47
12	BD 1802	0.0	0	46	56
13	BD 1803	9.8	40S*	46	47
14	BD 1804	4.9	20S	67	99
15	BD 1805	16.1	40S	36	47
16	BD 1806	10.0	20S	46	57

17	BD 1807	11.0	20S	46	56
18	BD 1808	4.0	20S	36	36
19	BD 1809	32.0	60S	45	57
20	BD 1810	44.0	60S	45	46
20A	Infector	76.0	100S	78	79
21	BD 1811	20.0	40S	35	57
22	BD 1812	24.8	40S	46	68
23	BD 1813	44.0	60S	46	56
24	BD 1814	8.2	20MS	36	47
25	BD 1815	13.0	20S	56	78
26	BD 1816	10.4	15MS	56	99
27	BD 1817	23.0	40S	46	56
28	BD 1818	10.2	20S	57	68
29	BD 1819	34.0	60S	46	57
30	BD 1820	11.2	20S	35	46
31	BD 1821	6.6	15S	35	45
32	BD 1822	8.0	20S	36	46
33	BD 1823	44.0	60S	35	36
34	BD 1824	28.4	60S	36	47
35	BD 1825	0.8	5MS	57	57
36	BD 1826	2.2	10S	68	79
37	BD 1827	36.4	80S	57	68
38	BD 1828	32.2	80S	47	58
39	BD 1829	10.0	20S	46	67
40	BD 1830	4.2	10MS	67	99
40A	Infector	76.0	100S	78	89
41	BKB 1801	17.2	40S	46	47
42	BKB 1802	34.4	40S	46	56
43	BKB 1803	60.0	80S	46	46
44	BKB 1804	6.8	10S	46	56
45	BKB 1805	44.0	60S	47	47
46	BKB 1806	1.0	5S	67	99
47	BKB 1807	6.4	20S	46	46
48	BKB 1808	16.1	20S	57	89
49	BKB 1809	60.0	80S	36	47
50	BKB 1810	36.0	60S	46	57
51	BKB 1811	48.0	80S	35	47
52	BKB 1812	18.8	40S	67	99
53	BKB 1813	36.0	80S	46	47
54	BKB 1814	5.0	20S	47	58
55	BKB 1815	12.2	40S*	46	56
56	BKB 1816	18.8	30S	36	47

57	BKB 1817	0.0	0	35	45
58	BKB 1818	40.8	80S	46	46
59	BKB 1819	68.0	80S	78	99
60	BKB 1820	32.8	60S	46	56
60A	Infector	80.0	100S	78	89
61	BKB 1821	45.6	60S	46	57
62	BKB 1822	1.0	5S	57	99
63	BKB 1823	10.2	15S	46	56
64	BKB 1824	18.4	40S	47	68
65	BKB 1825	60.0	80S	46	56
66	BKB 1826	33.8	60S	46	58
67	BKB 1827	3.6	10S	47	47
68	BKB 1828	40.0	60S	67	99
69	BKB 1829	29.0	60S	56	67
70	BKB 1830	1.0	5MS	46	58
71	BKB 1831	36.2	60S	36	46
72	BKB 1832	17.4	40S	46	57
73	BKB 1833	32.0	60S	35	46
74	BKB 1834	52.0	80S	35	46
75	BKB 1835	39.2	60S	46	58
76	BKB 1836	13.3	40S*	58	68
77	BKB 1837	38.4	80S	46	56
78	BKB 1838	21.2	40S	36	45
79	BKB 1839	68.0	80S	78	99
80	BKB 1840	8.0	40S*	78	99
80A	Infector	76.0	100S	78	79
81	BKB 1841	21.2	40S	46	46
82	BKB 1842	22.2	40S	57	99
83	BKB 1843	6.8	30S	35	35
84	BKB 1844	15.2	30S	67	89
85	BKB 1845	1.6	10MS	46	47
86	BKB 1846	21.2	40S	46	56
87	BKB 1847	33.2	60S	46	57
88	BKB 1848	16.8	40S	46	57
89	BKB 1849	84.0	100S	78	99
90	BKB 1850	13.0	30S	67	99
91	UPBM 1	21.4	40MS	36	47
92	UPBM 2	5.8	20MS	46	56
93	UPBM 3	18.0	40S	35	47
94	UPBM 4	0.0	0	46	56
95	UPBM 5	29.4	60S	46	47
96	UPBM 6	7.0	15S	46	47

97	UPBM 7	6.0	20S	46	47
98	UPBM 8	6.0	20S	46	56
99	UPBM 9	0.2	TMS	46	57
100	UPBM 10	8.4	20S	46	47
100A	Infector	80.0	100S	68	89
101	UPBM 11	9.2	20S	46	56
102	UPBM 12	0.0	TR	35	45
103	UPBM 13	2.2	10S	37	46
104	UPBM 14	17.8	30MS	46	47
105	UPBM 15	21.2	40S	46	47
106	UPBM 16	3.4	10MS	35	47
107	UPBM 17	13.8	40S	35	45
108	UPBM 18	0.8	5MS	36	46
109	BH 1801	7.0	20MS	36	47
110	BH 1802	2.5	10MS	46	56
111	BH 1803	0.8	80S	57	68
112	BH 1804	48.0	80S	47	57
113	BH 1805	16.2	80S*	67	79
114	BH 1806	60.0	80S	47	58
115	BH 1807	64.0	80S	36	45
116	BH 1808	62.4	80S	46	47
117	BH 1809	5.4	10S	57	67
118	BH 1810	0.8	5MS	56	78
119	BH 1811	1.0	5S	57	78
120	BH 1812	1.0	5S	57	67
120A	Infector	80.0	100S	78	89
121	BH 1813	11.0	40S*	57	99
122	BH 1814	0.8	5MS	46	46
123	BH 1815	0.0	0	67	99
124	BH 1816	3.2	15S	57	78
125	BH 1817	0.0	TR	46	57
126	BH 1818	3.1	10S	57	68
127	BH 1819	2.0	5S	57	78
128	BH 1820	4.8	15S	56	57
129	BH 1821	4.8	10S	46	56
130	BH 1822	2.8	10MS	46	47
131	BH 1823	6.8	10S	57	67
132	BH 1824	6.2	10S	57	57
133	BH 1825	7.0	20S	57	68
134	BH 1826	5.2	20S	46	47
135	BH 1827	14.2	40S	46	47
136	BH 1828	5.0	20S	46	56

137	BH 1829	2.8	10S	46	57
138	BH 1830	2.6	10MS	67	99
139	BH 1831	1.8	5S	68	89
140	BH 1832	2.0	5S	46	57
140A	Infector	80.0	100S	67	89
141	BH 1833	1.8	5MS	57	68
142	BH 1834	1.2	5S	46	56
143	BH 1835	2.8	10S	47	57
144	BH 1836	9.7	20S	46	57
145	BH 1837	20.8	40S	57	68
146	BH 1838	9.0	20S	57	58
147	BH 1839	11.4	20S	57	68
148	BH 1840	0.8	5MS	56	68
149	BH 1841	1.0	5S	46	56
150	BH 1842	0.1	TMR	56	67
151	BH 1843	4.2	10S	57	58
152	BH 1844	1.0	5MS	57	58
153	BH 1845	5.6	20S	57	68
154	BH 1846	8.0	30S	57	78
155	BH 1847	3.2	5S	46	46
156	BH 1848	8.2	30S	67	89
157	BH 1849	1.2	5S	67	99
158	BH 1850	1.0	5S	57	89
159	BH 1851	2.6	5S	35	56
160	BH 1852	2.0	5S	35	47
160A	Infector	76.0	80S	78	89
161	BBM 795	2.0	10S	67	99
162	BBM 796	2.0	10S	57	89
163	BBM 797	0.0	0	57	89
164	BBM 798	1.0	5S	47	57
165	BBM 799	2.0	5S	47	47
166	BBM 800	0.0	0	46	56
167	BBM 801	12.6	20S	46	57
168	BBM 802	6.0	10S	36	45
169	BBM 803	2.7	5S	46	47
170	BBM 804	2.8	10S	46	48
171	BBM 805	1.8	20MR	47	56
172	BBM 806	1.6	10MS	57	89
173	BBM 807	0.6	5MR	56	89
174	BBM 808	7.8	20S	46	56
175	BBM 809	16.0	40S	46	47
176	BBM 810	9.4	20S	46	57

177	BBM 811	0.0	TR	35	46
178	BBM 812	0.2	TMS	46	48
179	BBM 813	0.4	5MR	47	56
180	BBM 814	0.0	0	57	89
180A	Infector	72.0	80	78	89
181	BBM 815	0.2	TMS	36	45
182	BBM 816	0.0	0	56	99
183	BBM 817	1.2	5S	46	56
184	BBM 818	0.9	5MS	46	57
185	BBM 819	1.8	10MS	46	46
186	BBM 820	0.0	0	46	56
187	BBM 821	0.1	TMR	36	46
188	BBM 822	1.0	5S	46	56
189	BBM 823	3.2	10S	46	46
190	BBM 824	10.6	40S*	46	57
191	BBM 825	1.6	10MS	45	46
192	BBM 826	0.2	TMS	45	56
193	BBM 827	2.0	10MS	45	57
194	BK 1801	6.2	20S	46	46
195	BK 1802	0.0	0	56	99
196	BK 1803	2.8	15MS	46	46
197	BK 1804	4.2	20MS	67	99
198	BK 1805	0.2	TMS	35	45
199	BK 1806	4.3	10S	36	47
200	BK 1807	1.3	5S	46	56
200A	Infector	80.0	100S	78	89
201	BK 1808	3.2	10S	57	89
202	BK 1809	1.0	5S	45	56
203	BK 1810	5.2	20MS	46	56
204	BK 1811	0.2	TMS	46	57
205	BK 1812	1.8	10MS	35	46
206	BK 1813	0.0	0	57	89
207	BK 1814	3.0	10S	46	56
208	BK 1815	0.1	TMR	46	47
209	BK 1816	1.2	5S	57	89
210	BK 1817	3.6	10S	35	46
211	BK 1818	2.6	10MS	45	46
212	BK 1819	0.1	TMR	47	56
213	BK 1820	8.0	20MS	47	57
214	BK 1821	0.0	0	36	47
215	BK 1822	0.8	5MS	45	46
216	BK 1823	28.0	40S	36	46

217	BK 1824	10.4	20S	68	89
218	BK 1825	7.0	10S	68	89
219	BK 1826	10.0	15S	57	89
220	BK 1827	4.8	20MS	46	56
220A	Infector	80.0	100S	78	89
221	BK 1828	5.1	20S	57	99
222	BK 1829	7.0	20S	66	85
223	BK 1830	2.9	10S	56	78
224	HUBL 1801	70.0	100S	57	89
225	HUBL 1802	40.0	60S	57	89
226	HUBL 1803	76.0	100S	67	89
227	HUBL 1804	56.0	80S	57	89
228	HUBL 1805	72.0	80S	56	78
229	HUBL 1806	68.0	80S	67	89
230	HUBL 1807	69.6	100S	57	89
231	HUBL 1808	60.0	100S	56	78
232	HUBL 1809	23.3	40S	57	68
233	HUBL 1810	44.0	80S	57	78
234	HUBL 1811	56.0	80S	57	89
235	HUBL 1812	57.0	80S	57	79
236	HUBL 1813	62.0	100S	57	89
237	HUBL 1814	68.0	100S	67	89
238	HUBL 1815	64.0	80S	67	89
239	HUBL 1816	72.0	100S	57	89
240	HUBL 1817	45.2	80S	56	79
240A	Infector	84.0	100S	68	79
241	HUBL 1818	3.0	10MS	67	99
242	HUBL 1819	53.0	80S	67	99
243	HUBL 1820	48.0	80S	57	79
244	HUBL 1821	44.2	80S	57	89
245	HUBL 1822	3.6	10S	47	68
246	HUBL 1823	50.0	80S	57	79
247	HUBL 1824	48.0	80S	46	68
248	HUBL 1825	61.0	100S	46	47
249	HUBL 1826	15.2	30S	46	56
250	HUBL 1827	26.0	60S	47	57
251	HUBL 1828	4.6	15S	46	56
252	HUBL 1829	15.4	40S	35	47
253	HUBL 1830	1.8	10MS	56	89
254	HB 1801	7.2	20S	57	89
255	HB 1802	1.0	5S	67	89
256	HB 1803	3.2	20MS	67	89

257	HB 1804	2.4	10MS	57	89
258	HB 1805	0.8	5MS	57	89
259	HB 1806	2.0	5MS	56	89
260	HB 1807	1.6	10MS	57	89
260A	Infector	84.0	100S	78	89
261	HB 1808	16.0	60S	36	48
262	HB 1809	8.0	40S*	47	57
263	HB 1810	12.0	60S*	57	58
264	HB 1811	12.0	60S*	57	89
265	HB 1812	14.8	60S*	45	45
266	HB 1813	13.0	60S*	57	79
267	HB 1814	17.2	60S	56	79
268	HB 1815	17.0	60S	47	79
269	HB 1816	12.9	60S*	46	57
270	HB 1817	2.0	10S	46	57
271	NDB 1726	72.0	100S	57	89
272	NDB 1727	21.8	60S	46	48
273	NDB 1728	0.1	TMR	46	46
274	NDB 1729	15.0	40S	36	47
275	NDB 1730	9.2	20S	36	47
276	NDB 1731	13.6	60S*	57	79
277	NDB 1732	40.0	80S	57	79
278	NDB 1733	40.0	80S	57	89
279	NDB 1734	1.6	10MS	56	89
280	NDB 1735	0.4	TS	46	79
280A	Infector	80.0	100S	78	79
281	NDB 1736	4.2	20S	78	99
282	NDB 1737	30.4	40S	57	79
283	NDB 1738	9.8	20S	57	89
284	NDB 1739	2.1	10S	57	89
285	NDB 1740	3.0	10S	57	89
286	NDB 1741	8.0	20S	46	47
287	NDB 1742	11.0	20S	36	47
288	NDB 1743	34.0	60S	46	57
289	NDB 1744	3.0	10S	35	45
290	NDB 1745	4.0	20S	46	57
291	NDB 1746	30.4	60S	56	78
292	NDB 1747	1.8	5S	35	56
293	NDB 1748	1.8	5S	36	46
294	NDB 1749	32.0	80S	36	45
295	NDB 1750	1.6	10MS	36	46
296	VB 1801	34.0	60S	46	57

297	VB 1802	19.2	40S	46	57
298	VB 1803	7.2	20S	56	89
299	VB 1804	9.2	20S	57	99
300	VB 1805	1.6	10MS	56	89
300A	Infector	80.0	100S	78	89
301	VB 1806	18.1	40S	57	99
302	VB 1807	25.2	40S	46	79
303	VB 1808	7.0	15S	35	47
304	VB 1809	12.6	20S	46	79
305	VB 1810	17.0	40S	56	79
306	VB 1811	0.1	TMS	56	89
307	VB 1812	12.0	40MS	57	89
308	VB 1813	20.8	40S	57	89
309	VB 1814	2.8	10S	57	89
310	VB 1815	2.0	5S	67	89
311	VB 1816	11.2	20S	57	78
312	VB 1817	20.8	40S	68	89
313	VB 1818	4.0	10S	57	89
314	VB 1819	0.2	TMS	57	58
315	VB 1820	4.5	20MS	68	89
316	VB 1821	6.2	20MS	46	56
317	VB 1822	2.4	10S	46	48
318	VB 1823	20.0	40S	67	99
319	VB 1824	1.6	10MS	57	99
320	VB 1825	2.8	10S	57	79
320A	Infector	76.0	100S	78	89
321	VB 1826	0.0	0	56	78
322	VB 1827	0.8	5MS	36	48
323	VB 1828	3.0	10S	46	56
324	VB 1829	2.2	10S	46	57
325	VB 1830	5.0	15S	46	45
326	VB 1831	3.0	15S	36	47
327	BL1500	16.0	40S	35	57
328	BL1505	6.8	20S	56	99
329	BL1506	4.4	10S	56	89
330	BL1507	8.0	20S	57	89
331	BL1513	36.0	80S	56	89
332	BL1514	21.6	40S	56	89
333	BL1517	36.4	60S	35	36
334	BL1519	13.4	40S*	56	89
335	BL1520	14.0	20S	56	89
336	BL1522	10.4	40MS	46	79

337	BL1528	20.6	40S	35	45
338	BL1530	17.6	40S	36	48
339	BL1533	6.1	20S	35	47
340	BL1535	0.1	TMR	67	99
340A	Infector	84.0	100S	68	89
341	BL1550	0.0	0	56	99
342	BL1553	5.2	15S	57	89
343	BL1554	3.2	10S	57	99
344	BL1560	3.8	10S	56	99
345	BL1563	0.2	TMS	46	89
346	BL1567	4.1	10S	56	99
347	BL1568	6.8	15S	56	89
348	BL1569	11.0	20S	57	89
349	BL1572	5.4	20S	56	99
350	BL1573	4.4	5S	56	99
351	BL1582	0.8	5MS	67	99
352	BL1600	7.4	20S	35	47
353	BL1601	8.8	20S	35	47
354	BL1604	3.1	10MS	35	47
355	BL1612	8.7	20S	46	89
356	BL1618	6.0	10S	36	48
357	BL1644	5.4	15MS	46	68
358	BL1646	17.8	20S	35	48
359	BL1650	17.0	60S	57	89
360	BL1655	4.6	10S	56	89
360A	Infector	80.0	100S	67	89
361	BL1662	3.2	20MS	56	99
362	BL1663	5.2	20S	56	89
363	BL1664	0.2	TMS	57	89
364	BL1665	1.0	5MS	35	57
365	BL1666	10.8	40S	46	89
366	BL1667	7.2	20S	35	47
367	BL1668	4.2	20S	57	89
368	BL1669	7.4	15S	57	99
369	BL1671	1.6	10MS	56	99
370	BL1672	6.6	20S	46	89
371	BL1673	21.4	40S	46	68
372	BL1674	1.6	10MS	57	78

HS- Highest Score, Avg. - Average, ACI- Average Coefficient of Infection

National Barley Disease Screening Nursery (NBDSN, 2018-19)

During the crop season, a total 107 entries from IVT yield trials including checks were screened against stripe rust, leaf 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, Jammu and Karnal. The yellow rust severity remained very low at Almora so these data are not included in final calculation of ACI. Leaf rust screening was done at Ludhiana and Jammu. 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 107 entries evaluated during 2018-19, 16 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, 32 entries were found moderately resistant against leaf blight with an average score (double digit) 14-35 and HS < 57.

Yellow rust, ACI = 0, Entries – 16	DWRB 182, DWRB 184, DWRB 197, HBL 845, HBL 848, HBL 851, HBL 858, HBL 863, PL 908, PL 911, RD 3005, RD 3007, UPB 1078, BHS 380 (c), DWRB 123 (c) and RD 2899 (c)
Yellow rust, ACI > 0 to 10, Entries – 65	BH 1023, BH 1025, BHS 472, BHS 474, BHS 475, BHS 477, DWRB 160, DWRB 188, DWRB 196, DWRB 198, DWRB 199, DWRB 200, DWRB 201, DWRB 202, DWRB 203, DWRB 204, DWRB 205, DWRB 206, DWRB 207, HUB 265, HUB 266, KB 1706, KB 1713, KB 1750, KB 1757, NDB 1712, PL 891, PL 906, PL 907, PL 909, PL 910, RD 2969, RD 2991, RD 2992, RD 2994, RD 2999, RD 3000, RD 3002, RD 3003, RD 3004, RD 3008, RD 3009, RD 3010, UPB 1074, UPB 1077, UPB 1079, UPB 1080, UPB 1082, VLB 155, VLB 162, VLB 163, VLB 164, BH 902 (c), BHS 352 (c), DWRB 101 (c), DWRB 137 (c), HBL 113 (c), HBL 276 (c), HUB 113 (c), RD 2552 (c), RD 2786 (c), RD 2794 (c), RD 2849 (c), RD 2907 (c) and VLB 118 (c)
Leaf blight, Avg. 14-35 with HS < 57, Entries - 32	BH 1024, BHS 472, BHS 475, BHS 476, DWRB 182, DWRB 184, DWRB 202, DWRB 203, DWRB 204, DWRB 205, DWRB 206, HBL 851, HBL 858, HUB 266, HUB 267, HUB 268, KB 1706, KB 1750, KB 1757, NDB 1712, PL 891, RD 3007, RD 3008, RD 3009, RD 3010, VLB 161, VLB 163, BHS 352 (c), BHS 380 (c), K 603 (c), RD 2899 (c) and VLB 118 (c)

Reactions of different entries in National Barley Disease Screening Nursery (NBDSN)

S. No.	NBDSN Entries	Yellow Rust		Leaf rust	Leaf Blight		CCN	Aphid	
		ACI	HS	HS	Avg.	HS	HS	Avg.	HS
1	BH 1023	1.67	10S	0	45	56	S	5.0	5
2	BH 1024	10.1	40S	0	35	46	S	5.0	5
3	BH 1025	0.07	TMR	0	46	69	HS	4.3	5
4	BHS 472	0.67	5MS	10S	35	47	S	4.3	5
5	BHS 474	0.9	5S	0	46	78	HS	4.7	5
6	BHS 475	3.33	20S	0	35	36	S	5.0	5

7	BHS 476	11.67	40MS	0	35	47	HS	4.3	5
8	BHS 477	7.33	20S	0	36	56	HS	5.0	5
9	DWRB 160	3.83	10S	40S	47	78	S	5.0	5
10	DWRB 182	0	0	20S	35	36	S	4.0	5
11	DWRB 184	0	0	0	35	46	S	4.3	5
12	DWRB 188	8.6	20S	0	46	56	S	5.0	5
13	DWRB 196	3.67	20S	0	57	89	S	5.0	5
14	DWRB 197	0	0	0	46	68	HS	5.0	5
15	DWRB 198	1.13	5S	0	36	67	HS	4.7	5
16	DWRB 199	0.67	5MS	40S	36	56	HS	5.0	5
17	DWRB 200	4.2	15S	0	56	57	S	4.3	5
18	DWRB 201	1.7	10S	0	46	47	S	5.0	5
19	DWRB 202	1.67	10S	0	35	56	S	4.3	5
20	DWRB 203	8.33	20S	0	35	57	HS	5.0	5
21	DWRB 204	6.47	20S	0	35	46	S	4.7	5
22	DWRB 205	6.5	20S	0	34	56	S	5.0	5
23	DWRB 206	5.67	10S	0	35	56	S	5.0	5
24	DWRB 207	3	10S	0	46	56	S	4.7	5
25	HBL 845	0	0	0	46	79	S	4.3	5
26	HBL 848	0	0	0	56	99	HS	4.7	5
27	HBL 851	0	0	0	35	47	S	4.7	5
28	HBL 858	0	0	0	35	56	S	4.0	5
29	HBL 863	0	0	0	57	99	HS	4.7	5
30	HUB 265	6.97	20MS	0	46	56	S	5.0	5
31	HUB 266	2.5	10S	0	35	46	HS	5.0	5
32	HUB 267	45	60S	60S	25	36	HS	5.0	5
33	HUB 268	39.17	60S	60S	24	26	HS	5.0	5
34	KB 1706	4.33	10S	0	35	46	S	5.0	5
35	KB 1707	12.37	40S	40S	36	68	HS	4.7	5
36	KB 1713	8.5	20S	10S	46	57	S	4.7	5
37	KB 1743	41.67	80S	5S	46	56	HS	4.7	5
38	KB 1750	1.08	5S	5S	35	47	S	5.0	5
39	KB 1754	12.33	30MS	0	45	57	HS	5.0	5
40	KB 1757	1.33	10MS	0	35	57	S	5.0	5
41	KB 1762	11.7	60S*	0	57	78	HS	4.7	5
42	NDB 1708	35.33	60S	10S	36	68	HS	5.0	5
43	NDB 1709	30.33	60S	60S	45	46	S	5.0	5
44	NDB 1712	1.5	5S	40S	35	46	HS	4.7	5
45	NDB 1713	37	80S	60S	67	99	S	4.3	5
46	NDB 1723	38.33	60S	0	47	78	S	4.7	5
47	PL 891	1.7	5S	0	35	45	S	4.7	5
48	PL 906	2.2	10MS	5S	46	67	S	4.3	5

49	PL 907	3.83	10S	60S	56	99	S	4.7	5
50	PL 908	0	0	0	46	68	HS	4.7	5
51	PL 909	0.83	5S	0	46	67	S	3.7	4
52	PL 910	3.33	15S	0	46	57	S	4.7	5
53	PL 911	0	0	5S	46	57	S	4.0	5
54	RD 2969	3.33	20S	40S	46	89	S	4.7	5
55	RD 2991	4.03	20S	0	68	99	HS	5.0	5
56	RD 2992	3.33	10S	0	68	89	S	4.3	5
57	RD 2994	0.87	5S	0	57	67	S	4.0	5
58	RD 2999	0.33	5MR	0	78	99	S	4.3	5
59	RD 3000	1.33	5MS	0	67	99	S	5.0	5
60	RD 3002	0.03	TR	10S	57	99	S	4.3	5
61	RD 3003	1.53	5S	5S	78	99	S	5.0	5
62	RD 3004	1.33	10MS	0	57	79	S	5.0	5
63	RD 3005	0	0	0	57	68	S	4.0	5
64	RD 3007	0	0	40S	25	36	HS	4.7	5
65	RD 3008	1.33	10MS	0	25	35	S	5.0	5
66	RD 3009	3.17	10S	0	24	35	S	5.0	5
67	RD 3010	0.87	5S	40S	35	35	S	5.0	5
68	UPB 1074	10	60S*	0	45	68	S	5.0	5
69	UPB 1077	9.2	40S*	0	46	78	HS	4.7	5
70	UPB 1078	0	0	0	46	57	S	5.0	5
71	UPB 1079	10	40S*	0	36	57	S	5.0	5
72	UPB 1080	2.63	10S	0	46	78	S	5.0	5
73	UPB 1082	8.33	20S	0	36	47	HS	5.0	5
74	VLB 155	7.5	30S	0	46	99	S	5.0	5
75	VLB 161	10.67	40S	40S	35	46	S	5.0	5
76	VLB 162	7.67	40MS	0	45	89	HS	5.0	5
77	VLB 163	3.17	15S	0	35	56	HS	5.0	5
78	VLB 164	2.13	10MS	0	35	76	HS	5.0	5
79	AZAD (c)	70	80S	40S	46	46	S	5.0	5
80	BH 902 (c)	9.5	15S	20S	57	78	S	4.3	5
81	BH 946 (c)	13.6	60S*	5S	46	78	S	4.7	5
82	BHS 352 (c)	3.83	10S	0	35	38	S	4.3	5
83	BHS 380 (c)	0	0	0	35	46	S	5.0	5
84	BHS 400 (c)	16.5	60S	0	56	99	S	5.0	5
85	DWRB 101 (c)	0.83	5S	20S	46	67	HS	4.7	5
86	DWRB 123 (c)	0	0	20S	46	57	HS	4.3	5
87	DWRB 137 (c)	1.5	5S	40S	57	68	S	5.0	5
88	HBL 113 (c)	4.17	15S	0	56	99	HS	5.0	5
89	HBL 276 (c)	1.67	10S	5S	35	58	S	4.7	5
90	HUB 113 (c)	9.67	40S*	40S	58	79	HS	4.7	5

91	K 1055 (c)	53.33	80S	20S	47	89	S	5.0	5
92	K 1149 (c)	48.33	80S	40S	46	47	S	5.0	5
93	K 508 (c)	30	40S	60S	57	89	HS	4.3	5
94	K 603 (c)	66.67	80S	0	35	56	S	5.0	5
95	Karan 16 (c)	46.67	60S	10S	46	46	S	5.0	5
96	Lakhan (c)	70	80S	0	46	78	S	5.0	5
97	NDB 1173 (c)	19.33	60S	10S	57	79	S	5.0	5
98	NDB 1445 (c)	50	60S	0	57	79	S	5.0	5
99	NDB 943 (c)	66.67	100S	60S	36	57	S	5.0	5
100	RD 2035 (c)	61.67	80S	40S	57	67	S	5.0	5
101	RD 2552 (c)	6	20S	20S	67	89	HS	4.7	5
102	RD 2786 (c)	2.33	10S	0	57	79	MR	4.7	5
103	RD 2794 (c)	6.67	40S*	0	47	79	S	4.7	5
104	RD 2849 (c)	1.67	10S	20S	46	68	HS	5.0	5
105	RD 2899 (c)	0	0	0	35	46	S	5.0	5
106	RD 2907 (c)	3	10S	0	46	69	S	4.7	5
107	VLB 118 (c)	3.3	10S	0	35	56	HS	5.0	5
108	Infector	83.33	100S	60S	89	89	HS	5.0	5

* Out of 125 entries, few check varieties and entries were found place in many trials and only one check is retained in NBDSN thus resulting 107 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, (c) - Released Checks, ND- Not Determined, NG – Not germinated.

Elite Barley Disease Screening Nursery (EBDSN, 2018-19)

The nursery was constituted with entries showed resistance to different disease in previous years in NBDSN and EBDSN. During the crop season 2018-19, total 59 entries were screened in EBDSN. The screening of stripe rust was done at Durgapura, Ludhiana, Hisar, Almora, Bajaura, Jammu and Karnal. The yellow rust severity remained very low at Almora so these data are not included in final calculation of ACI. Leaf rust screening was done at Ludhiana and Jammu. The leaf blight screening was done at 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.

Confirmed sources of resistance:

Out of 59 entries screened in EBDSN, the following entries were confirmed for resistance against the particular disease under AICW&BIP. A total 10 entries are found free from yellow rust, whereas 46 shown resistant reaction. Out of 59 entries screened for leaf blight, 11 entries also showed moderate level of resistance against leaf blight with an average score (double digit) 14-35 and HS < 57.

Yellow rust, ACI = 0 Entries – 10	BH 1011, BH 1018, BK 1719, DWRB 137, HBL 822, PL 900, RD 2973, RD 2976, UPB 1070 and VLB 130
Yellow rust, ACI > 0 to 10, Entries – 46	BH 1014, BH 1017, BH 1019, BH 946, BK 1601, BK 1622, BK 1704, BK 1714, BK 1716, BK 1723, BK 1725, DWRB 127, DWRB 143, DWRB 152, DWRB 178, DWRB 180, DWRB 186, HBL 113, HBL 276, HBL 812, HBL 814, HUB 113, KB 1633, KB 1634, PL 751, PL 890, PL 902, RD 2552, RD

	2786, RD 2794, RD 2899, RD 2907, RD 2948, RD 2967, RD 2971, RD 2972, RD 2975, RD 2977, RD 2978, RD 2980, RD 2981, RD 2982, RD 2983, UPB 1071, VLB 153 and VLB 159
Leaf blight, Avg. 13-35 with HS < 57, Entries - 11	BH 1011, BH 1018, BK 1719, BK 1723, DWRB 178, KB 1633, PL 890, PL 900, PL 902, UPB 1071 and VLB 130

Reactions of different entries in Elite Barley Disease Screening Nursery (EBDSN)

S. No.	EBDSN Entries (2018- 19)	Yellow Rust		Leaf rust	Leaf Blight		CCN
		ACI	HS	HS	Avg.	HS	HS
1	RD 2552	1.7	5S	0	46	68	S
2	RD 2786	1.3	10MS	0	57	68	S
3	RD 2794	1.7	10S	0	46	56	S
4	RD 2899	1.7	10S	0	45	56	S
5	RD 2907	1.3	10MS	0	45	57	S
6	RD 2948	3.4	20S	0	46	68	S
7	RD 2967	1.7	10S	10S	57	78	S
8	RD 2971	4.0	20S	20S	57	78	S
9	RD 2972	1.7	10S	0	68	89	S
10	RD 2973	0.0	0	0	89	89	S
11	RD 2975	1.9	10S	5MS	68	89	S
12	RD 2976	0.0	TR	10S	58	78	HS
13	RD 2977	0.8	5S	0	56	68	S
14	RD 2978	0.7	10MR	0	58	68	S
15	RD 2980	0.3	5MR	0	56	78	S
16	RD 2981	0.3	5MR	10MS	57	78	S
17	RD 2982	0.2	TMS	10S	57	78	S
18	RD 2983	0.7	5MS	0	46	57	HS
19	BK 1704	3.3	20S	10S	56	68	HS
20	BK 1714	0.2	TMS	10MS	57	78	S
20A	Infector	80.0	100S	60S	68	78	-
21	DWRB 186	6.7	40S*	10MS	46	56	S
22	BK 1601	7.5	40S*	5MS	46	46	HS
23	BK 1622	2.2	10MS	5MS	46	68	S
24	DWRB 152	1.3	10MS	0	56	57	HS
25	DWRB 137	0.0	0	TMR	46	57	S
26	DWRB 143	1.7	10S	10MS	46	46	HS
27	DWRB 127	1.7	10S	0	37	48	S
28	BK 1716	1.7	10S	20MS	35	58	HS
29	BK 1719	0.0	0	10MS	24	35	HS
30	BK 1723	2.2	5S	5S	34	45	S
31	BK 1725	0.8	5S	0	36	46	S
32	DWRB 178	3.4	20S	20S	35	47	HS
33	DWRB 180	5.7	20S	40S	36	46	S

34	HBL 113	0.1	TMS	10S	46	56	S
35	HBL 276	6.7	40S*	20S	46	57	HS
36	HBL 812	3.4	20S	5MS	46	47	HS
37	HBL 814	3.4	20S	10S	46	68	HS
38	HBL 822	0.0	0	40S	47	57	S
39	BH 1011	0.0	0	0	35	45	S
40	BH 1013	12.0	20S	0	46	56	S
40A	Infector	80.0	100S	60S	67	78	-
41	BH 1014	0.7	5MS	5S	36	47	S
42	BH 1017	0.7	5MS	5MS	56	68	S
43	BH 1018	0.0	0	20S	34	45	HS
44	BH 1019	2.0	10MS	0	46	56	S
45	BH 946	1.4	10MS	0	46	46	S
46	PL 751	5.5	20S	0	46	56	S
47	PL 890	0.7	5MS	10S	35	45	S
48	PL 900	0.0	0	TMS	35	46	S
49	PL 902	0.7	5MS	0	35	56	HS
50	KB 1633	0.1	TMR	0	35	45	S
51	KB 1634	0.9	5S	10S	46	56	S
52	HUB 113	0.8	5S	20S	46	46	S
53	NDB 1698	10.8	40S	0	37	47	S
54	VLB 130	0.0	0	0	35	46	HS
55	VLB 153	2.3	10MS	5MS	46	56	S
56	VLB 159	1.2	5S	10S	46	46	S
57	UPB 1070	0.0	0	0	36	45	S
58	UPB 1071	5.0	20S	0	35	35	S
59	UPB 1076	20.4	40S	0	67	99	S
60A	Infector	80.0	100S	60S	78	99	-

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

Table: Center wise reactions of different entries of barley in National Barley Disease Screening Nursery (NBDSN), 2018-19

S. No.	NBDSN Entries (2018-19)	Yellow Rust						Leaf rust		Leaf Blight				CCN			Aphid		
		Jammu	Bajaura	Durgapura	Ludhiana	Karnal	Hisar	Ludhiana	Jammu	Pantnagar	Faizabad	Varanasi	Dharwad	Durgapura	Hisar	Ludhiana	Kanpur	Ludhiana	Karnal
1	BH 1023	0	0	0	0	0	10S	0	0	56	24	35	56	S	R	S	5	5	5
2	BH 1024	0	0	TMR	20S	TR	40S	0	0	45	24	25	46	S	S	S	5	5	5
3	BH 1025	0	0	TMR	0	0	0	0	0	13	36	69	67	S	HS	S	3	5	5
4	BHS 472	5MS	0	0	0	0	0	10S	0	47	24	46	12	S	S	S	5	4	4
5	BHS 474	5S	0	0	0	TMR	0	0	5S	45	36	78	24	S	HS	S	5	5	4
6	BHS 475	20S	0	0	0	0	0	0	10MS	35	24	36	24	S	S	S	5	5	5
7	BHS 476	20MS	10 S	5MR	10S	40MS	0	0	0	46	25	47	12	S	HS	S	5	4	4
8	BHS 477	5MS	20 S	10S	0	0	10S	0	20S	56	35	39	12	S	HS	S	5	5	5
9	DWRB 160	5MS	10 S	10MR	0	0	5S	40S	TMS	37	78	26	56	S	S	S	5	5	5
10	DWRB 182	0	0	0	0	0	0	20S	0	25	36	24	34	S	S	MR	5	4	3
11	DWRB 184	0	0	0	0	0	0	0	0	13	46	26	46	S	HS	S	5	5	3
12	DWRB 188	20MS	15 S	TMR	0	TR	20S	0	0	46	36	36	56	S	S	S	5	5	5
13	DWRB 196	0	20 S	5MR	0	0	0	0	10MS	24	46	89	67	HS	HS	S	5	5	5
14	DWRB 197	0	0	0	0	0	0	0	0	23	46	68	56	HS	HS	MR	5	5	5
15	DWRB 198	5R	0	TMS	5S	0	0	0	0	25	36	26	67	S	HS	S	5	5	4
16	DWRB 199	5MS	0	0	0	0	0	40S	40S	25	35	28	56	HS	HS	S	5	5	5
17	DWRB 200	10S	15 S	0	0	TR	0	0	0	45	57	57	56	S	S	S	5	4	4
18	DWRB 201	0	0	0	0	TR	10S	0	5R	36	46	47	46	MR	R	S	5	5	5
19	DWRB 202	0	0	0	0	0	10S	0	0	47	24	56	24	S	R	S	5	4	4
20	DWRB 203	10S	0	0	10S	20S	10S	0	5S	57	24	35	24	S	HS	S	5	5	5
21	DWRB 204	10MS	0	0	10S	TMS	20S	0	5S	45	24	24	46	S	MR	S	4	5	5

22	DWRB 205	10MS	20 S	0	TS	10S	0	0	0	56	24	24	12	S	S	S	5	5	5
23	DWRB 206	5S	10 S	0	5S	5MS	10S	0	5MS	56	24	35	24	S	MR	S	5	5	5
24	DWRB 207	10MS	0	0	0	0	10S	0	0	24	36	47	56	MR	R	S	4	5	5
25	HBL 845	0	0	0	0	0	0	0	0	56	35	79	12	S	HS	S	5	5	3
26	HBL 848	0	0	0	0	0	0	0	0	45	36	99	24	S	HS	S	5	5	4
27	HBL 851	0	0	0	0	0	0	0	0	47	45	46	12	S	S	S	5	5	4
28	HBL 858	0	0	0	0	0	0	0	0	56	36	35	12	S	MR	S	5	4	3
29	HBL 863	0	0	0	0	0	0	0	TMS	56	35	99	46	S	HS	S	5	5	4
30	HUB 265	0	10 S	TMS	10S	20MS	5S	0	10S	56	36	24	46	S	R	S	5	5	5
31	HUB 266	0	0	5S	10S	0	0	0	0	46	34	24	24	S	HS	S	5	5	5
32	HUB 267	60S	30 S	40S	40S	40S	60S	60S	20S	24	36	26	24	S	HS	S	5	5	5
33	HUB 268	60S	15 S	20S	20S	60S	60S	60S	10MS	12	24	26	24	HS	S	S	5	5	5
34	KB 1706	0	10 S	5MR	10S	5MS	0	0	TMS	35	46	24	46	S	S	S	5	5	5
35	KB 1707	5MS	20 S	0	10S	TR	40S	40S	0	68	24	26	34	HS	HS	S	4	5	5
36	KB 1713	0	15 S	0	0	20MS	20S	10S	TR	57	35	35	56	S	S	S	4	5	5
37	KB 1743	20S	80 S	10S	60S	40S	40S	5S	20S	56	36	36	34	HS	S	S	4	5	5
38	KB 1750	-	0	TMR	5S	0	0	5S	0	47	24	35	34	S	R	S	5	5	5
39	KB 1754	10MS	10 S	5MR	10S	30MS	20S	0	20S	23	57	35	46	S	HS	S	5	5	5
40	KB 1757	10MS	0	0	0	0	0	0	5R	57	24	24	46	S	MR	S	5	5	5
41	KB 1762	60S	0	0	0	TR	10S	0	20S	46	78	36	78	S	HS	S	4	5	5
42	NDB 1708	40S	20 S	40S	20S	40MS	60S	10S	0	24	68	26	24	S	HS	MR	5	5	5
43	NDB 1709	10S	0	20S	60S	40MS	60S	60S	5R	45	35	35	46	R	NG	S	5	5	5
44	NDB 1712	0	0	0	5S	5MS	0	40S	0	46	46	35	24	S	HS	S	5	5	4
45	NDB 1713	0	80 S	40S	40S	40MS	30S	60S	20S	79	35	99	34	S	R	S	5	4	4
46	NDB 1723	20S	40 S	40S	60S	40S	30S	0	0	45	36	27	78	S	MR	S	4	5	5
47	PL 891	0	0	0	5S	TR	5S	0	0	45	24	36	24	MR	S	S	5	5	4
48	PL 906	10MS	0	0	0	TR	5S	5S	0	45	24	36	67	S	S	S	5	4	4

49	PL 907	0	0	10S	5S	10MS	0	60S	0	34	36	99	46	S	S	S	4	5	5
50	PL 908	0	0	0	0	0	0	0	0	45	68	26	34	S	HS	S	4	5	5
51	PL 909	0	0	0	0	0	5S	0	5R	46	36	26	67	S	S	S	3	4	4
52	PL 910	5S	15 S	0	0	0	0	0	0	47	35	57	56	S	R	S	4	5	5
53	PL 911	0	0	0	0	0	0	5S	10S	56	36	57	46	S	NG	S	5	4	3
54	RD 2969	20S	0	0	0	0	0	40S	5S	23	46	25	89	S	S	S	4	5	5
55	RD 2991	5MS	0	0	20S	TR	0	0	0	57	36	69	99	S	HS	S	5	5	5
56	RD 2992	10S	0	0	0	0	10S	0	TMS	67	46	69	89	S	S	S	3	5	5
57	RD 2994	0	0	5S	0	TR	0	0	TR	58	46	35	67	S	MR	S	3	5	4
58	RD 2999	0	0	0	0	5MR	0	0	0	45	58	99	89	MR	R	S	5	4	4
59	RD 3000	5MS	0	0	0	5MS	0	0	0	68	46	99	56	R	R	S	5	5	5
60	RD 3002	0	0	0	0	TR	0	10S	0	35	36	99	67	R	R	S	5	4	4
61	RD 3003	5MS	0	0	0	TR	5S	5S	0	68	68	99	78	S	S	S	5	5	5
62	RD 3004	10MS	0	0	0	0	0	0	TR	79	57	35	67	S	R	S	5	5	5
63	RD 3005	0	0	0	0	0	0	0	TR	58	24	68	67	S	S	S	4	5	3
64	RD 3007	0	0	0	0	0	0	40S	10S	24	36	25	24	S	HS	S	5	5	4
65	RD 3008	10MS	0	0	0	0	0	0	0	25	35	26	24	S	S	S	5	5	5
66	RD 3009	0	0	5S	10S	10MR	0	0	TR	23	35	24	24	S	S	S	5	5	5
67	RD 3010	0	0	0	5S	TR	0	40S	20MS	35	35	35	34	S	S	S	5	5	5
68	UPB 1074	60S	0	0	0	0	0	0	0	68	24	35	34	S	S	S	5	5	5
69	UPB 1077	0	0	5S	40S	TR	10S	0	5MS	78	24	35	46	S	HS	S	4	5	5
70	UPB 1078	0	0	0	0	0	0	0	5MS	57	45	48	12	S	S	S	5	5	5
71	UPB 1079	-	0	40S	0	0	10S	0	TR	57	24	27	24	S	NG	S	5	5	5
72	UPB 1080	0	0	TMS	5S	0	10S	0	5R	46	24	36	78	S	S	S	5	5	5
73	UPB 1082	20S	20 S	5MR	0	10MS	0	0	TMR	47	24	38	34	S	HS	S	5	5	5
74	VLB 155	10MS	30 S	5MR	5S	0	0	0	TMR	46	35	99	12	S	S	S	5	5	5
75	VLB 161	5MS	0	0	0	20S	40S	40S	5MS	46	24	36	34	S	S	S	5	5	5

76	VLB 162	10S	0	5MS	0	40MS	0	0	10MS	46	24	89	12	S	HS	S	5	5	5
77	VLB 163	0	15 S	5MS	0	0	0	0	0	56	24	37	12	S	HS	S	5	5	5
78	VLB 164	10MS	0	TMS	0	5MS	0	0	0	76	24	37	12	HS	S	S	5	5	5
79	AZAD (c)	60S	80 S	80S	60S	80S	60S	40S	40S	45	36	36	46	S	MR	S	5	5	5
80	BH 902 (c)	10MS	15 S	10S	10S	5MS	10S	20S	10MS	36	68	24	78	S	S	S	3	5	5
81	BH 946 (c)	20MS	5 S	TMR	0	TR	60S	5S	10MS	45	36	36	78	S	S	S	4	5	5
82	BHS 352 (c)	0	0	5S	10S	10MS	0	0	0	35	36	38	12	MR	MR	S	5	4	4
83	BHS 380 (c)	0	0	0	0	0	0	0	10S	46	45	35	24	S	R	S	5	5	5
84	BHS 400 (c)	60S	15 S	5MS	10S	10S	0	0	TMS	57	24	99	24	S	S	S	5	5	5
85	DWRB 101 (c)	0	0	0	5S	0	0	20S	5S	35	35	35	67	S	HS	S	4	5	5
86	DWRB 123 (c)	0	0	0	0	0	0	20S	20S	57	35	24	46	S	HS	S	3	5	5
87	DWRB 137 (c)	5MS	0	0	5S	0	0	40S	TMR	46	35	68	67	S	MR	S	5	5	5
88	HBL 113 (c)	10S	15 S	0	0	0	0	0	20S	45	36	99	24	S	HS	S	5	5	5
89	HBL 276 (c)	0	0	0	0	10S	0	5S	10MR	58	36	35	12	S	S	S	5	4	5
90	HUB 113 (c)	10MS	0	0	0	40S	10S	40S	0	68	36	27	79	S	HS	S	4	5	5
91	K 1055 (c)	40S	40 S	80S	60S	60S	40S	20S	0	25	46	26	89	S	S	S	5	5	5
92	K 1149 (c)	10S	80 S	20S	80S	40S	60S	40S	5MS	46	47	26	46	S	S	S	5	5	5
93	K 508 (c)	40S	0	20S	40S	40S	40S	60S	20S	57	36	26	89	S	HS	S	3	5	5
94	K 603 (c)	60S	80 S	60S	60S	80S	60S	0	10S	56	24	35	34	S	S	S	5	5	5
95	Karan 16 (c)	20S	60 S	60S	60S	40S	40S	10S	0	46	46	35	46	S	S	S	5	5	5
96	Lakhan (c)	60S	80 S	80S	60S	80S	60S	0	20S	78	24	24	46	S	S	S	5	5	5
97	NDB 1173 (c)	60S	20 S	0	20S	20MS	0	10S	10MS	25	36	79	67	S	S	S	5	5	5
98	NDB 1445 (c)	60S	40 S	40S	40S	60S	60S	0	20S	45	46	79	56	S	S	S	5	5	5
99	NDB 943 (c)	40S	100 S	40S	60S	80S	80S	60S	0	57	36	26	34	S	NG	S	5	5	5
100	RD 2035 (c)	60S	80 S	80S	60S	60S	30S	40S	10MS	56	46	48	67	S	R	S	5	5	5
101	RD 2552 (c)	10MS	0	0	0	10MS	20S	20S	5MS	34	46	89	78	HS	S	S	4	5	5
102	RD 2786 (c)	5MS	0	0	10S	0	0	0	0	79	46	35	56	MR	MR	MR	5	4	5

103	RD 2794 (c)	0	0	0	0	0	40S	0	5MS	36	36	79	NS	S	S	S	4	5	5
104	RD 2849 (c)	0	0	0	0	10S	0	20S	10S	24	36	68	46	S	HS	S	5	5	5
105	RD 2899 (c)	0	0	0	0	0	0	0	5S	46	24	35	46	S	NG	S	5	5	5
106	RD 2907 (c)	10MS	0	0	0	0	10S	0	TR	35	35	69	NS	S	S	S	4	5	5
107	VLB 118 (c)	5S	10 S	TMS	0	5MS	0	0	10MS	56	35	46	12	S	HS	S	5	5	5
108	Infector	60S	100 S	100S	60S	80S	100S	60S	60S	89	78	89	78	-	-	-	5	5	5

* Out of 125 entries, few check varieties were found place in many trials and only one check is retained in NBDSN thus resulting 107 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, (c) - Released Checks, ND- Not Determined, NG – Not germinated.

Table: Center wise reactions of different entries of barley in Elite Barley Disease Screening Nursery (EBDSN), 2018-19

S. No.	EBDSN Entries	Yellow Rust						Leaf rust		Leaf Blight			CCN		
		Jammu	Bajaura	Durgapura	Ludhiana	Karnal	Hisar	Ludhiana	Jammu	Pantnagar	Faizabad	Varanasi	Durgapura	Hisar	Ludhiana
1	RD 2552	0	0	0	5S	5MS	TS	0	0	45	36	68	S	NG	S
2	RD 2786	0	0	0	0	10MS	0	0	0	68	68	35	S	R	S
3	RD 2794	10S	0	0	0	TR	0	0	0	56	46	26	S	S	S
4	RD 2899	10S	0	0	0	0	0	0	0	56	46	24	S	MR	S
5	RD 2907	0	0	0	0	10MS	0	0	0	45	57	24	S	S	S
6	RD 2948	20S	0	0	0	TMR	0	0	0	46	68	25	S	R	S
7	RD 2967	10S	0	0	0	TMR	0	5MS	10S	56	78	36	S	MR	S
8	RD 2971	20S	0	0	0	5MS	0	0	20S	45	78	47	S	NG	S
9	RD 2972	10S	0	0	0	TR	0	0	0	68	89	47	S	R	MR
10	RD 2973	0	0	0	0	0	0	0	0	89	89	79	S	NG	S
11	RD 2975	TMS	0	0	0	TMR	10S	0	5MS	68	89	47	S	R	S
12	RD 2976	0	0	0	0	TR	0	0	10S	57	78	48	S	HS	S
13	RD 2977	5S	0	0	0	0	0	0	0	45	68	46	S	R	S
14	RD 2978	10MR	0	0	0	TR	0	0	0	68	58	47	S	R	S
15	RD 2980	0	0	0	0	5MR	0	0	0	45	78	35	S	NG	S
16	RD 2981	0	0	0	0	5MR	0	0	10MS	45	78	37	S	R	S
17	RD 2982	TMS	0	0	0	TR	0	0	10S	47	78	36	S	MR	S
18	RD 2983	0	0	0	0	5MS	0	0	0	35	57	46	S	HS	S
19	BK 1704	20S	0	0	0	0	0	0	10S	45	68	46	S	HS	S
20	BK 1714	TMS	0	0	0	TR	0	0	10MS	46	78	38	S	S	S
20A	Infectior	60S	80 S	100S	60S	80S	100S	60S	60S	57	78	68	-	-	-
21	DWRB 186	40S	0	0	0	0	0	0	10MS	56	46	36	MR	R	S

22	BK 1601	40S	0	0	5S	0	0	0	5MS	45	46	36	S	HS	S
23	BK 1622	10MS	0	0	0	0	5S	0	5MS	46	68	24	MR	S	S
24	DWRB 152	10MS	0	0	0	0	0	0	0	56	57	46	S	HS	S
25	DWRB 137	0	0	0	0	0	0	0	TMR	57	36	35	S	R	S
26	DWRB 143	0	0	0	0	0	10S	0	10MS	45	46	46	S	HS	S
27	DWRB 127	0	0	0	0	0	10S	0	0	48	36	26	S	NG	S
28	BK 1716	10S	0	0	0	0	0	10S	20MS	58	24	24	S	HS	MR
29	BK 1719	0	0	0	0	0	0	0	10MS	35	24	24	S	HS	S
30	BK 1723	5MS	0	0	5S	5MS	0	0	5S	45	24	24	S	S	S
31	BK 1725	0	0	5S	0	0	0	0	NG	46	36	36	S	NG	S
32	DWRB 178	20S	0	0	0	TR	0	0	20S	45	24	47	S	HS	S
33	DWRB 180	20S	0	5MS	10S	0	0	0	40S	46	35	36	S	S	S
34	HBL 113	0	0	TMS	0	0	0	0	10S	56	46	36	S	S	S
35	HBL 276	40S	0	0	0	0	0	0	20S	57	35	36	S	HS	S
36	HBL 812	20S	0	0	0	TMR	0	0	5MS	46	46	47	S	HS	MR
37	HBL 814	20S	0	0	0	TMR	0	0	10S	45	68	36	S	HS	S
38	HBL 822	0	0	0	0	0	0	0	40S	57	46	47	S	NG	S
39	BH 1011	0	0	0	0	0	0	0	0	45	35	24	S	S	S
40	BH 1013	20S	15 S	20MS	5S	20MS	0	0	0	56	46	25	S	NG	S
40A	Infector	60S	80 S	100S	60S	80S	100S	60S	60S	67	78	57	-	-	-
41	BH 1014	5MS	0	0	0	TR	0	5S	0	47	36	24	S	S	S
42	BH 1017	0	0	0	5MS	0	0	0	5MS	56	35	68	S	S	S
43	BH 1018	0	0	0	0	0	0	0	20S	45	24	24	S	HS	S
44	BH 1019	10MS	0	0	0	5MS	0	0	0	56	36	47	S	S	S
45	BH 946	10MS	0	TMR	0	TR	0	0	0	45	46	46	S	S	S
46	PL 751	20S	0	0	5S	10MS	0	0	0	56	36	35	S	R	S
47	PL 890	5MS	0	0	0	0	0	10S	0	45	35	35	S	S	S

48	PL 900	0	0	0	0	0	0	0	TMS	46	36	24	S	R	S
49	PL 902	5MS	0	0	0	0	0	0	0	56	36	24	S	HS	S
50	KB 1633	0	0	0	0	TMR	0	0	0	45	35	35	S	NG	S
51	KB 1634	0	0	0	5S	TR	0	0	10S	56	46	35	S	NG	S
52	HUB 113	0	0	0	5S	0	0	0	20S	46	36	46	S	S	S
53	NDB 1698	40S	20 S	0	5S	0	0	0	0	47	36	37	S	S	S
54	VLB 130	0	0	0	0	0	0	0	0	45	24	46	HS	NG	S
55	VLB 153	0	0	TMS	5S	10MS	0	0	5MS	56	35	36	S	S	S
56	VLB 159	5MR	0	0	5S	0	0	0	10S	46	36	46	S	NG	S
57	UPB 1070	0	0	0	0	0	0	0	0	45	36	36	S	NG	S
58	UPB 1071	-	NG	0	0	0	20S	0	0	35	NG	NG	S	NG	S
59	UPB 1076	-	40 S	10S	0	40MS	20S	0	0	NS	24	99	S	NG	S
60A	Infector	60S	80 S	100S	60S	80S	100S	60S	60S	56	78	99	-	-	-

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

Evaluation for seedling rust resistance against three rusts of barley

A total of 166 lines of NBDSN and EBDSN were screened against 17 pathotype of *P. graminis tritici* (Black/Stem rust of barley), *P. hordei* (Leaf/brown rust of barley) and *P. striiformis hordei* (Stripe/yellow rust of barley) under controlled conditions of temperature and light. None of the barley lines possessed resistance to all the rusts. Rust resistance of NBDSN & EBDSN of barley during 2018-19.

Rust resistance in NBDSN lines

Out of 107 entries, 50 entries conferred resistance to one or more rusts of barley in NBDSN. Three lines (BH1024, KB1762, RD3008) were resistant to brown and black rusts. BHS474, HBL845, HBL863, RD2786(C), RD 2991 and RD 3003 possessed resistance to brown & yellow rusts whereas DWRB182, HBL812 to black & yellow rusts of barley. Yellow rust resistance was observed in 25 entries whereas brown rust resistance in 14 entries.

Table: Seedling rust resistance in NBDSN lines during 2018-19

Resistant to	Number of entries	Detail of entries
Brown & Black	3	BH1024, KB1762, RD3008
Brown & Yellow	6	BHS474, HBL845, HBL863, RD2786 (C),RD2991, RD3003
Black & Yellow	2	DWRB 182, HBL812
Yellow	25	BH1023, BHS472, DWRB200, DWRB201, DWRB207, HUB266, KB1707, KB1713, PL906, PL908, PL909, PL911, RD2969, RD2992, RD2999, RD3000, RD3002, RD3004, RD3005, DWRB137(C), HUB113 (C), RD2552(c), RD2794, RD2899, RD2907
Brown	14	BHS475, BHS477, DWRB184, DWRB188, DWRB197, DWRB202, DWRB204, DWRB206, HBL848, HBL851, KB1706, KB1757, UPB1082, HBL113(C)
Total	50	

Rust resistance in EBDSN lines

Thirty seven entries out of 59 EBDSN entries were resistant to one or more rusts of barley. HBL814 was resistant to black & yellow rusts whereas RD2786, RD2972, RD2973, RD2875, RD2976 were resistant to brown & yellow rusts. In addition 23 barley lines conferred resistance to yellow whereas 8 lines to brown rust.

Table: Seedling rust resistance in EBDSN lines

Resistant to	Number of entries	Detail of entries
Black & Yellow	1	HBL814
Brown & Yellow	5	RD2786, RD2972, RD2973, RD2975, RD2976
Yellow	23	BK1622, BK1714, DWRB186, DWRB127, DWRB137, DWRB 143, DWRB152, HUB113, KB1634, PL900, PL902, RD2552, RD2794, RD2899, RD2907, RD2967, RD2971, RD2977, RD2978, RD2980, RD2981, RD2982, RD2983
Brown	8	BH1013, BK1719, BK1723, VLB153, BK1725, DWRB178, DWRB180, HBL113
Total	37	

Table: Seedling response of NBDSN lines to the pathotypes of three rust pathogens of barley during 2018-19

S. No.	NBDSN Entries	Pathotypes																
		Brown rust					Black rust					Yellow rust						
		H1	H2	H3	H4	H5	11	21A-2	40A	117-6	295	57	M	24	G	6S0	Q	7S0
1	BH 1023	S	S	MS	S	MS	R	R	R	S	MS	R	R	R	R	R	R	R
2	BH 1024	R	R	R	R	R	R	R	R	R	R	S	S	R	R	MS	R	S
3	BH 1025	S	S	R	S	S	R	R	R	R	MS	MR	S	R	R	R	R	S
4	BHS 472	S	S	S	S	S	MS	R	R	MS	R	R	MR	R	R	R	R	R
5	BHS 474	R	R	R	R	R	S	MR	R	MR	R	R	R	R	R	R	R	R
6	BHS 475	R	R	R	R	R	MS	R	R	R	R	MS	R	S	R	R	R	R
7	BHS 476	R	S	MS	R	S	MR	R	S	R	S	R	S	MS	S	R	S	S
8	BHS 477	R	R	R	R	R	R	R	MR	R	R	S	S	S	S	R	S	R
9	DWRB 160	S	MS	S	MS	R	S	R	R	MS	S	MS	MS	R	R	R	MS	R
10	DWRB 182	R	MS	MS	S	MS	R	R	R	R	R	R	R	R	R	R	R	R
11	DWRB 184	R	R	R	R	R	R	R	R	MS	S	R	MR	R	R	R	S	R
12	DWRB 188	R	R	R	R	R	R	R	MR	R	R	R	MR	MX	R	R	R	MS
13	DWRB 196	S	S	R	S	R	MS	R	R	R	MS	S	MS	R	R	R	MS	S
14	DWRB 197	R	R	R	R	R	S	R	R	R	R	S	S	S	S	R	S	MX
15	DWRB 198	S	MS	R	MS	R	R	R	R	R	MR	S	S	MS	R	MR	R	S
16	DWRB 199	S	S	R	S	R	S	R	R	R	MR	S	S	MS	R	R	MS	S
17	DWRB 200	MS	S	MS	MS	R	R	MR	R	R	S	R	R	R	R	R	R	R
18	DWRB 201	S	S	R	S	S	R	R	R	R	MS	R	R	R	R	R	R	R
19	DWRB 202	R	R	R	R	R	R	R	R	R	S	MS	S	MS	R	MS	S	MS
20	DWRB 203	R	MS	R	R	R	R	R	R	MR	R	S	S	MR	MS	S	S	S
21	DWRB 204	R	R	R	R	R	S	R	R	S	R	MX	MS	R	R	R	R	R
22	DWRB 205	S	S	R	R	R	S	R	R	S	S	S	S	MR	MS	S	R	R
23	DWRB 206	R	R	R	R	R	MS	R	R	S	R	R	S	R	S	R	R	S
24	DWRB 207	S	S	MS	S	S	S	S	S	S	S	R	R	R	R	R	R	R
25	HBL 845	R	R	R	R	R	R	R	R	MS	R	R	R	R	R	R	R	R
26	HBL 848	R	R	R	R	R	R	R	R	R	S	MR	MX	R	R	MS	R	MS
27	HBL 851	R	R	R	R	R	R	R	R	R	MS	R	R	R	R	R	S	MS
28	HBL 858	S	S	S	S	S	MS	S	R	R	R	R	S	R	R	R	R	S
29	HBL 863	R	R	R	R	R	MS	S	R	R	S	R	R	R	R	R	R	R
30	HUB 265	S	R	S	R	MR	MS	R	MR	S	S	S	S	S	S	S	S	S
31	HUB 266	S	S	R	S	MS	MS	MR	MR	S	S	R	R	R	R	R	R	R
32	HUB 267	S	S	S	S	S	R	R	MR	S	MS	S	S	R	MS	S	MX	S
33	HUB 268	S	S	R	R	R	S	S	MS	S	MR	S	S	S	MS	S	S	S

34	KB 1706	R	R	R	R	R	R	R	MR	S	S	S	MS	MS	MS	R	S	MR
35	KB 1707	S	S	S	S	S	S	MS	MR	R	S	R	R	R	R	R	R	R
36	KB 1713	S	S	R	MS	MS	S	MR	S	S	S	R	R	R	R	R	R	R
37	KB 1743	S	S	S	S	S	S	S	MR	S	S	S	S	S	S	S	S	S
38	KB 1750	S	MS	R	R	R	R	MR	R	MR	S	MS	MS	MR	MS	R	MX	MS
39	KB 1754	S	S	R	R	R	MS	S	MS	S	S	S	S	R	MS	S	S	S
40	KB 1757	R	R	R	R	R	R	R	MR	MR	R	MS	MS	MR	MR	R	R	MX
41	KB 1762	R	R	R	R	R	S	S	R	S	S	R	R	R	R	R	R	R
42	NDB 1708	R	S	R	S	R	S	R	MR	S	S	S	S	R	R	R	R	MR
43	NDB 1709	S	S	S	S	S	MR	R	MS	MR	S	S	R	R	R	R	R	S
44	NDB 1712	S	R	S	MS	R	MR	R	R	MR	R	R	S	S	S	S	S	MR
45	NDB 1713	S	S	S	MS	S	R	R	R	MS	S	S	S	MS	MS	R	S	MS
46	NDB 1723	MR	S	S	S	S	S	R	MS	R	S	S	S	S	R	S	MX	S
47	PL 891	R	S	R	S	R	R	MR	R	R	S	MS	R	R	R	R	R	R
48	PL 906	S	S	S	S	MR	S	S	MS	S	S	R	R	R	R	R	R	R
49	PL 907	S	S	R	S	R	R	S	MS	S	S	S	S	S	S	S	S	S
50	PL 908	R	MS	R	R	R	MS	R	R	S	S	R	R	R	R	R	R	R
51	PL 909	S	S	S	S	MR	S	R	S	S	S	R	R	R	R	R	R	R
52	PL 910	S	S	S	MS	MR	MS	R	R	R	R	MR	S	R	R	MS	R	R
53	PL 911	S	S	S	MS	MS	S	S	S	S	S	R	R	R	R	R	R	R
54	RD 2969	S	S	S	S	MS	MR	R	R	S	MS	R	R	R	R	R	R	R
55	RD 2991	R	R	R	R	R	R	R	S	MS	S	R	R	R	R	R	R	R
56	RD 2992	S	R	R	MS	R	S	S	S	S	S	R	R	R	R	R	R	R
57	RD 2994	S	S	R	MS	R	MS	S	MS	S	S	R	R	R	R	MR	R	R
58	RD 2999	MS	MS	R	R	R	R	R	R	MS	S	R	R	R	R	R	R	R
59	RD 3000	S	S	R	MS	R	S	S	R	R	S	R	R	R	R	R	R	R
60	RD 3002	MS	S	R	R	R	R	R	R	MS	S	R	R	R	R	R	R	R
61	RD 3003	R	R	R	R	R	S	S	MR	S	S	R	R	R	R	R	R	R
62	RD 3004	S	S	S	MS	R	MS	S	R	MS	S	R	R	R	R	R	R	R
63	RD 3005	S	S	S	MS	MS	S	R	R	R	S	R	R	R	R	R	R	R
64	RD 3007	S	S	R	S	S	MS	R	R	S	S	S	S	R	MS	MS	S	S
65	RD 3008	R	R	R	R	R	R	R	R	R	R	MS	MS	R	R	R	S	R
66	RD 3009	R	R	R	MR	R	MR	R	MR	R	S	S	S	R	R	MS	S	R
67	RD 3010	S	MS	R	S	MR	MS	R	R	R	R	S	MS	R	MS	R	S	R
68	UPB 1074	S	S	S	S	MS	R	MS	R	S	MR	S	S	S	R	R	S	S
69	UPB 1077	S	S	S	S	R	R	R	MR	MR	S	MS	S	MR	S	R	S	S
70	UPB 1078	S	R	R	R	R	R	R	R	MS	R	MR	MR	R	R	R	R	MX
71	UPB 1079	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG

72	UPB 1080	R	R	NG	R	R	S	S	R	S	S	S	S	MS	S	R	S	S
73	UPB 1082	R	R	R	R	R	S	R	R	MS	R	NG	S	MR	S	R	S	R
74	VLB 155	R	S	R	R	R	S	R	R	R	S	S	MS	R	S	R	R	MR
75	VLB 161	S	S	S	MS	S	R	R	R	R	R	MS	NG	MR	MS	R	MR	R
76	VLB 162	MS	R	R	R	R	MR	R	S	R	R	S	S	R	S	MS	S	R
77	VLB 163	S	S	S	MS	R	R	MR	R	R	R	S	S	MS	MS	R	R	R
78	VLB 164	S	R	R	R	R	MS	R	R	S	R	S	R	R	S	R	S	MS
79	AZAD (c)	S	S	S	S	S	R	S	R	R	MS	S	S	S	R	S	R	S
80	BH 902 (c)	S	S	S	S	S	S	R	MR	MS	S	S	S	R	R	R	R	R
81	BH 946 (c)	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	MS	S
82	BHS 352 (c)	S	S	S	S	S	S	R	R	R	R	MS	S	R	R	MS	MS	MS
83	BHS 380 (c)	R	R	R	R	R	S	S	R	R	S	R	R	MS	S	R	S	S
84	BHS 400 (c)	R	S	R	R	R	S	R	MR	S	S	MS	MS	R	S	S	MS	S
85	DWRB 101 (c)	S	S	S	S	MS	MS	R	R	R	S	S	MS	R	R	R	MS	S
86	DWRB 123 (c)	MS	S	S	S	S	S	R	MR	R	R	S	MS	R	R	R	S	R
87	DWRB 137 (c)	S	S	S	S	MS	S	S	S	S	S	R	R	R	R	R	R	R
88	HBL 113 (c)	R	R	R	R	R	S	MS	R	R	R	MR	S	MR	R	R	R	R
89	HBL 276 ©	S	S	S	S	S	MS	R	R	R	R	R	MS	R	R	R	MS	S
90	HUB 113 (c)	S	S	S	S	MS	MS	S	R	S	S	R	R	R	R	R	R	R
91	K 1055 (c)	S	S	MS	S	MS	S	MS	MS	S	MS	S	S	S	S	S	S	S
92	K 1149 (c)	S	S	S	MS	MS	R	R	R	R	R	S	S	R	S	R	S	R
93	K 508 (c)	S	S	S	S	MS	S	S	MS	S	S	S	S	S	S	S	S	S
94	K 603 (c)	S	R	S	S	S	MS	S	R	S	S	S	S	S	S	S	S	S
95	Karan 16 (c)	S	S	S	S	R	S	R	MR	S	MR	S	S	S	S	R	S	S
96	Lakhan (c)	S	S	S	S	MS	R	S	R	S	S	S	S	S	S	S	S	S
97	NDB 1173 (c)	S	S	MS	S	S	R	S	R	S	S	S	S	R	R	S	R	S
98	NDB 1445 (c)	S	S	R	R	R	S	S	R	MS	R	S	R	R	S	S	S	S
99	NDB 943 (c)	S	S	S	S	MS	S	S	R	S	S	R	S	S	S	S	S	S
100	RD 2035 (c)	S	S	S	S	S	S	S	MR	S	S	S	S	S	S	S	R	S
101	RD 2552 (c)	S	S	S	S	S	S	S	MS	S	S	R	R	R	R	R	R	R
102	RD 2786 (c)	R	R	R	R	R	R	R	MS	S	MS	R	R	R	R	R	R	R
103	RD 2794 (c)	S	S	R	S	MS	R	R	R	S	R	R	R	R	R	R	R	R
104	RD 2849 (c)	S	S	S	S	S	S	MS	MS	R	MS	S	S	MS	S	R	S	R
105	RD 2899 (c)	MS	S	R	MS	R	S	S	MS	MR	S	R	R	R	R	R	R	R
106	RD 2907 (c)	S	S	R	S	R	S	R	R	S	S	R	R	R	R	R	R	R
107	VLB 118 (c)	R	S	R	R	R	S	MS	S	S	S	MS	MS	MR	S	S	S	S

Table: Seedling response of EBDSN lines to the pathotypes of three rust pathogens of barley during 2018-19

S. No	NBDSN Entries	Pathotypes																
		Brown rust					Black rust					Yellow rust						
		H1	H2	H3	H4	H5	11	21A-2	40A	117-6	295	57	M	24	G	6S0	Q	7S0
1	RD 2552	S	MS	MS	R	R	S	S	R	S	S	R	R	R	R	R	R	R
2	RD 2786	R	R	R	R	R	MR	MS	MR	R	R	R	R	R	R	R	R	R
3	RD 2794	S	S	R	MS	MS	R	R	S	R	S	R	R	R	R	R	R	R
4	RD 2899	S	S	MS	MR	R	S	MS	S	S	S	R	R	R	R	R	R	R
5	RD 2907	S	S	S	R	R	S	S	MS	MS	S	R	R	R	R	R	R	R
6	RD 2948	MS	S	R	MR	R	R	S	S	MR	S	R	R	R	R	R	R	S
7	RD 2967	S	S	S	MS	S	S	MS	S	S	S	R	R	R	R	R	R	R
8	RD 2971	S	S	S	MS	R	MS	S	MS	R	S	R	R	R	R	R	R	R
9	RD 2972	R	R	R	R	R	S	R	S	MS	S	R	R	R	R	R	R	R
10	RD 2973	R	R	R	R	R	R	MS	S	MS	S	R	R	R	R	R	R	R
11	RD 2975	R	R	R	R	R	S	S	R	R	S	R	R	R	R	R	R	R
12	RD 2976	R	R	R	R	R	MR	R	S	S	S	R	R	R	R	R	R	R
13	RD 2977	S	MS	S	MS	R	R	MR	S	MS	S	R	R	R	R	R	R	R
14	RD 2978	S	S	R	MS	R	R	MR	R	S	R	R	R	R	R	R	R	R
15	RD 2980	S	S	S	S	R	S	R	R	MR	S	R	R	R	R	R	R	R
16	RD 2981	MS	R	R	MS	R	S	MS	R	S	S	R	R	R	R	R	R	R
17	RD 2982	R	R	R	R	R	R	R	S	S	S	R	R	R	R	R	R	R
18	RD 2983	R	S	S	MR	R	MR	R	S	S	S	R	R	R	R	R	R	R
19	BK 1704	R	S	R	R	R	R	R	R	MS	R	S	S	R	R	MX	S	S
20	BK 1714	MS	S	R	S	R	R	R	R	MS	S	R	R	R	R	R	R	R
21	DWRB 186	S	S	MS	S	MR	R	MR	R	S	S	R	R	R	R	R	R	R
22	BK 1601	MR	MS	R	MS	R	R	MS	S	MR	S	MR	MR	S	MS	R	R	R
23	BK 1622	MS	S	R	S	R	MR	MR	S	S	S	R	R	R	R	R	R	R
24	DWRB 152	MS	S	R	MR	R	MR	R	MR	MR	MR	R	R	R	R	R	R	R
25	DWRB 137	S	S	R	S	R	MS	R	MR	S	S	R	R	R	R	R	R	R
26	DWRB 143	MS	MS	R	MR	R	MR	R	MS	R	R	R	R	R	R	R	R	R
27	DWRB 127	R	R	R	R	R	R	R	MR	R	R	R	R	R	R	R	R	R
28	BK 1716	S	S	R	MR	MR	R	R	S	R	R	MS	MS	R	MS	R	R	R
29	BK 1719	R	R	R	R	R	R	R	S	R	S	MS	MR	R	S	R	MS	R
30	BK 1723	R	R	R	R	R	R	R	S	S	S	S	S	S	S	R	S	S
31	BK 1725	R	R	R	R	R	MS	R	MS	S	R	S	MS	S	S	MX	MS	R
32	DWRB 178	R	R	R	R	R	R	R	S	S	S	MS	R	MS	S	R	MS	R
33	DWRB 180	R	R	R	R	R	R	R	R	MR	R	S	S	R	R	MS	MS	S

34	HBL 113	R	R	R	R	R	MR	NG	R	S	MR	R	MX	R	R	R	NG	R
35	HBL 276	MS	S	S	S	S	R	NG	R	R	S	S	R	MS	R	MX	NG	R
36	HBL 812	MS	R	R	R	R	R	MR	R	R	S	R	R	R	R	R	NG	R
37	HBL 814	R	S	R	R	R	R	R	R	R	R	R	R	R	R	R	NG	R
38	HBL 822	MS	MS	NG	R	R	R	R	R	MS	S	R	NG	MS	R	NG	R	R
39	BH 1011	S	S	S	MS	MR	R	R	R	R	MS	MS	S	R	MS	R	MS	R
40	BH 1013	R	R	R	R	R	S	S	R	R	S	S	S	S	S	S	S	S
41	BH 1014	S	S	MS	MS	MS	R	R	R	MR	MS	R	S	R	S	R	MS	R
42	BH 1017	S	MS	MS	R	R	MS	S	MS	S	S	R	R	R	R	R	R	R
43	BH 1018	S	S	MS	MS	MS	R	R	R	MR	R	MS	S	MR	S	R	S	R
44	BH 1019	S	S	MS	S	R	S	R	R	MS	S	R	R	R	R	R	R	R
45	BH 946	S	S	MS	S	S	R	R	R	MS	S	R	S	S	S	MX	R	R
46	PL 751	MS	S	R	MS	S	S	R	R	R	R	S	S	S	S	S	S	S
47	PL 890	S	S	S	MS	MS	R	R	R	R	R	S	S	R	R	R	R	R
48	PL 900	S	MS	MS	MS	MR	R	MR	R	MR	S	R	R	R	R	R	R	R
49	PL 902	S	MS	R	MR	R	S	S	MR	S	S	R	R	R	R	R	R	R
50	KB 1633	R	R	MS	R	R	MR	R	MR	S	S	MS	R	MR	MS	R	R	R
51	KB 1634	S	S	R	MS	R	MS	R	R	S	S	R	R	R	R	R	R	R
52	HUB 113	S	S	MS	MR	MS	MS	S	R	S	S	R	R	R	R	R	R	R
53	NDB 1698	S	S	MS	R	MR	S	R	S	MS	S	R	R	R	R	S	S	MX
54	VLB 130	R	R	R	R	R	R	R	R	MR	R	R	MS	R	R	R	R	R
55	VLB 153	R	R	R	R	R	R	R	MR	S	S	R	S	R	R	S	S	S
56	VLB 159	NG	NG	NG	NG	NG	NG	R	R	NG	NG	NG	NG	NG	NG	NG	NG	NG
57	UPB 1070	NG	NG	NG	NG	NG	MS	MR	R	R	NG	NG	NG	NG	NG	NG	NG	NG
58	UPB 1071	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG
59	UPB 1076	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	MS	NG

EXPERIMENT - CHEMICAL CONTROL OF BARLEY FOLIAR BLIGHT

The experiment was conducted in RBD with three replications at Kanpur and Faizabad. Leaf blight susceptible variety was planted in 2 x 2 m plots at row to row distance of 25 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. All the treatment found significantly superior over control.

Chemical control of leaf blight experiment at Kanpur

Variety: RD2503

Replications : 3

Date of sowing: 03.12.2018

Plot size: 2 x 2 m

Date of Inoculum spray: 10th, 19th Jan. 4th Feb. 2019

Date of appearance of blight: 28.01.19

Date of fungicide application: 04.02.19 & 24.02.19

Date of harvest: 16.04.19

S. No.	Treatment	Blight severity (double digit system)			1000 grain weight	Grain yield (q/ha)	Yield increase over check (q/ha)
		I 12.02.19	II 23.02.19	III 06.03.19			
1.	Seed treatment with Vitavax @2g/Kg seed	56	56	47	36.0	34.8	10.12
2.	Seed treatment with Raxil @ 2g/Kg	46	46	36	37.0	33.8	6.96
3.	ST with Vitavax 2g/Kg + Tilt spray @0.1%	36	24	24	36.8	36.2	14.55
4.	ST with Vitavax 2g/Kg + Folicur spray @0.1%	35	35	24	36.8	36.6	15.80
5.	ST with Raxil @ 2g/Kg + Tilt spray @0.1%	46	46	35	36.0	36.0	13.90
6.	ST with Raxil @ 2g/Kg + Folicur spray @0.1%	47	47	36	35.6	34.4	8.86
7.	Tilt spray @0.1% only	47	46	46	33.9	33.7	6.64
8.	Folicur spray @0.1%	57	46	45	34.6	33.9	7.27
9.	Control without seed treatment	67	78	79	34.0	31.6	-

Table: Chemical control of barley leaf blight experiment at Faizabad

S. No.	Treatment	Blight severity (double digit system)			1000 grain weight	Grain yield (q/ha)	Yield increase over check (q/ha)
		I 12-03-19	II 19-03-19	III 27-03-19			
10.	Seed treatment with Vitavax @2g/Kg seed	13	25	47	33.32	46.75	4.46
11.	Seed treatment with Raxil @ 2g/Kg	11	25	46	33.30	46.75	4.46
12.	ST with Vitavax 2g/Kg + Tilt spray @0.1%	11	24	24	39.20	54.75	22.34
13.	ST with Vitavax 2g/Kg + Folicur spray @0.1%	12	24	25	37.38	50.50	12.84
14.	ST with Raxil @ 2g/Kg + Tilt spray @0.1%	01	24	47	36.68	50.25	12.29

15.	ST with Raxil @ 2g/Kg + Folicur spray @0.1%	02	24	36	36.28	48.75	8.93
16.	Tilt spray @0.1% only	12	25	35	35.18	48.50	8.37
17.	Folicur spray @0.1%	12	35	45	34.30	47.75	6.70
18.	Control without seed treatment	13	57	89	32.86	44.75	0.00

ENTOMOLOGY

During the cropping season of 2018-19, following experiments were allotted for entomology discipline. These are listed as below:-

Experiment number	Title	Centres
1	Screening of NBDSN barley entries 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

*Trials allotted to Durgapura centre were not conducted

Experiment 1: Screening of NBDSN barley entries (2018-19) against foliar aphids

A total of one hundred and twenty five barley NBDSN entries were screened against aphids at three locations as per the planned programme of work during 2018-19. Out of 125 entries, few check varieties and entries were found and therefore, only one check is retained in NBDSN, thus resulting 107 entries under NBDSN. 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.

This year, entries were found in category grades of 3 to 5. At Karnal centre, five entries viz., DWRB182, DWRB184, PL911, RD3005 and HBL 845 were found to be moderately resistant (grade 3). At Ludhiana, seven entries; BH1025, PL909, RD2992, RD2994, BH 902 (c), DWRB 123 (c) and K 508 (c) were found moderately resistant (grade 3). None of the entry was found to be in moderately resistant (grade 3) category at Kanpur 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 four locations Ludhiana, Vijapur, Kanpur and Karnal during 2018-19 season with eight treatments.

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.

Location: Ludhiana

The studies were conducted under irrigated conditions at Plant Breeding Research Farm, PAU, Ludhiana. The wheat variety PL 807 was sown on 12th Nov.2018 in the plots of 6 rows of 6m long in a replicated trial. There were eight 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, quinalphos (1.83 aphids/tiller) recorded minimum aphids/tiller and was at par with acetamiprid (1.88 aphids/tiller) and thiamethoxam (1.96 aphids/tiller) and significantly better than all other treatments and untreated control (12.80 aphids/tiller). Similar results were recorded 2, 7 and 15 days after.

Grain yield (q/ha) obtained was maximum (54.00) from acetamiprid treated plots followed by quinalphos (53.60) treated plots. However, all the foliar insecticidal treatments recorded higher grain yield than untreated check (50.88) (Table 2).

Location: Vijapur

An experiment on eco-friendly management of foliar aphids on barley was conducted at Wheat Research Station, Vijapur under irrigated condition. The barley variety RD 2052 was sown on 27-11-2018. Aphid populations did not differ statistically among all treatments during 24hrs 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 revealed that the minimum aphid population was noticed in imidacloprid 200 SL @ 20 ml a.i./ha as compared to untreated check. On 7th day after spray, minimum no. of aphid population was recorded in imidacloprid 200 SL @ 20 ml a.i./ha and it was at par with all the treatments except *Lecanicillium lecanii* @ 3g/lit. Observation taken after 15th day after spray has found that the significantly lowest aphid population was reported in treatment of imidacloprid 200 SL @ 20 g a.i./ha and it was at par with the treatments of quinalphos 25% EC @100 g a.i./ha and acetamiprid 20 SP @ 20 g a.i./ha as compared to untreated control. Thus, all the insecticidal as well as bio-pesticide treatments had significantly lower aphid populations than untreated check. The grain yield (q/ha) showed significant differences among all the treatments. Thus, the significantly maximum grain yield was recorded in treatment of imidacloprid 200 SL @ 20 g a.i./ha which was at par with treatments of quinalphos 25% EC @100 g a.i./ha and acetamiprid 20 SP @ 20 g a.i./ha (Table 3).

Table 2: Management of foliar aphid (*Rhopalosiphum maidis*) through biopesticides & chemicals (2018-19). (Location: Ludhiana)

S. No.	Treatments	Dose ml or g / ha	Aphid population per earhead					Grain Yield (q/ha)
			Before spray	After spray				
			1 day	1 day	2 days	7 days	15 days	
1	Actara (thiamethoxam 25 WG)	50 g	12.20	1.96 (1.72)	1.91 (1.70)	1.56 (1.59)	1.70 (1.64)	53.55
2	Quinalphos 25EC (Ekalux)	375 ml	12.43	1.83 (1.67)	1.83 (1.68)	1.75 (1.65)	1.51 (1.58)	53.60
3	Acetamiprid 20SP (Pride)	100 gm	12.66	1.88 (1.69)	1.71 (1.64)	1.43 (1.55)	1.43 (1.55)	54.00
4	Azadirachtin 1500 ppm	3.0 ml/l	12.20	9.50 (3.24)	9.15 (3.18)	9.48 (3.23)	9.29 (3.20)	51.91
5	Verticillium lecanii (2 x 108 c.f.u)	3.0 g/l	11.93	10.39 (3.37)	9.83 (3.29)	10.39 (3.37)	10.23 (3.35)	51.20
6	Beauveria bassiana (2 x 108c.f.u)	5.0 g/l	12.36	9.64 (3.26)	9.84 (3.29)	10.11 (3.33)	10.13 (3.33)	51.42
7	Metarhizium anisopliae	3.0 g/l	11.66	10.09 (3.32)	9.91 (3.30)	9.96 (3.31)	10.08 (3.32)	51.33
8	Control	-	11.70	12.80 (3.71)	13.09 (3.75)	12.91 (3.72)	12.19 (3.63)	50.88
CD (p=0.05)			NS	(0.15)	(0.13)	(0.11)	(0.10)	1.71

Figures within parentheses are transformed means

Date of sowing : 12.11.2018
 Date of insecticidal application : 06.03.2019
 Date of harvest : 27.04.2019

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

Table 3 Management of foliar aphid (*Rhopalosiphum maidis*) through biopesticides & chemicals (2018-19) ((Location: Vijapur)

Sr. No.	Treatment	Doses g.a.i./ha	Aphid population per shoot					Grain yield (q/ha)	Yield increase over check (q/ha)
			Before spray (1 day)	After spray (days)					
				1st	2nd	7th	15th		
1.	Imidacloprid 200 SL	20 ml	16.67	11.33	9.00a*	7.47a	6.13a	20.00a	6.59
2.	Quinalphos 25 % EC	100 ml	18.00	12.00	10.00ab	7.67a	6.87ab	19.20ab	5.79
3.	Acetamiprid 20 SP	20 ml	17.13	12.47	10.13ab	9.47ab	6.93ab	18.84ab	5.43
4.	Azadirachtin 1500 ppm	3 ml/ L	15.87	13.20	11.20ab	9.40ab	7.73ab	17.10abc	3.69
5.	Lecanicillium lecanii (2 X 10 ⁸ cfu /gm ²)	3 g/L	16.20	11.87	12.53b	11.40b	8.60b	15.51bc	2.10
6.	Beauveria bassiana (2 X 10 ⁸ cfu /gm ²)	5 g/L	16.73	11.73	12.40ab	10.67ab	8.67b	13.84c	0.43
7.	Metarhizium anisopliae	3 g/L	16.00	12.33	12.67b	10.80ab	8.20b	15.94bc	2.53
8.	Untreated Check	-	16.73	18.40	19.40c	12.73c	24.60c	13.41c	-
	S. Em + C.D. at 5%) C.V. %		1.69 NS 17.56	1.56 NS 20.96	1.15 3.49 16.39	1.11 3.37 17.17	0.64 1.95 11.46	1.23 3.73 12.74	

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

Date of sowing : 27/11/2018

Date of insecticide application : 01/01/2019

Date of harvesting : 01 /04/2019

Design : R.B.D

Replications : Three

Spacing : 23 cm between row

No. of rows / plot : 6

Plot size : Gross: 6.0m x 1.38m

Net : 5.0m x 0.92m

Variety : RD 2052

Condition : Irrigated

Location: Kanpur

The experiment was conducted under irrigated condition at research farm Nawabganj C.S.A. Univ., Kanpur. The barley variety K 551 was sown on 11.12.2018 in plot of 23 rows of 3m length. There were total of 8 treatments including untreated check and each was replicated thrice. For recording the observation, five shoots were randomly selected in each plot and observation were recorded 24 hr before spray and thereafter at 1,2,7 and 15 days interval on these plants.

The number of aphids recorded 24 hr. before spray did not differ significantly but after one day of application of insecticides, it was observed that flubendamide 480 SC and imidacloprid 17.8% spray after one day recorded 5.60 and 6.77 aphids population and were at par acetamiprid 20 SP and chlorantranilpride 6.86 and 7.13 aphids in insecticidal treatments. The aphid population per shoot lowers than untreated control (16.56). Similarly 2days, 7days and 15 days after spray against all these insecticide were at par with each other and better than untreated checks.

Grain yield q/ha was maximum (50.38q/ha and 50.10q/ha) from fludendamide 480SC and imidacloprid 17.8% respectively, followed by acepamiprid 20 SP and chlorantranilpride 18.5% SC (49.21q/h and 48.10q/ha). However, all the insecticidal treatment recorded significantly higher than untreated check (Table 4).

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(1.66 aphids/shoot) number of aphids/shoot followed by Chlorantranilpride 18.5 SC (Coragen) @ 20 g a.i./ha (1.83 aphids/shoot) and imidacloprid 200 SL (Confidor 17.8) @ 20 g a.i./ha (4.92 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 (18.45 aphids/shoot after 15th day of spraying).

The highest grain yield of 47.86 q/ha was recorded in imidacloprid 200 SL (Confidor 17.8) @ 20 g a.i./ha treatment followed by acetamiprid 20 SP @ 20g a.i./ha (46.50 q/ha). All the insecticidal treatment recorded significantly higher than untreated check (38.52 q/ha) (Table 5).

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

During the 2018-19, survey was conducted to determine the incidence of insect-pests and their natural enemies on barley crop. At Vijapur, the termite damage in barley fields remained low to moderate throughout the crop season. Besides, in barley fields the aphid population was moderate to high. Among natural enemies, predators like coccinellid beetles, chrysoperla and syrphid fly were frequently noticed preying on barley aphids. At Ludhiana and Karnal locations, aphid infestation was observed to be moderate to high on 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 4 Management of foliar aphid (*Rhopalosiphum maidis*) through biopesticides & chemicals (2018-19) (Location: Kanpur)

S.No.	Treatments	Actual dose ml/g/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	15 days		
1.	Imidacloprid (17.8% SL)	100ml	10.40	6.77 (15.00)	5.40 (13.44)	5.06 (12.91)	2.80 (9.63)	50.10	7.61
2.	Flubendamide (Fame) 480 SC)	250ml	9.50	5.60 (13.66)	3.73 (11.05)	5.13 (13.00)	2.20 (8.53)	50.38	7.89
3.	Acetamiprid 20SP	100g	10.20	6.86 (15.18)	5.66 (13.76)	6.66 (14.89)	5.73 (13.81)	49.21	6.72
4.	Chlorantaniliprid 18.5 SC	100ml	10.26	7.13 (15.48)	6.06 (14.24)	7.00 (15.34)	12.13 (20.36)	48.10	5.61
5.	Azadirachtian 1500ppm	3ml/lit.	9.33	10.93 (19.30)	14.33 (22.64)	26.33 (31.73)	30.13 (33.27)	44.98	2.49
6.	Beauveria bassiana (2 x 10 ⁸ c.f.u)	5.0g/lit.	11.20	9.00 (17.42)	11.40 (19.73)	14.2 (22.01)	25.4 (30.26)	45.99	3.50
7.	Metarhizium anisopliae (2 x 10 ⁸ c.f.u)	3.0g/lit.	9.80	8.93 (17.38)	10.73 (19.11)	15.73 (22.83)	12.2 (20.44)	47.88	5.39
8.	Control	-	10.26	16.53 (23.99)	23.53 (29.00)	87.53 (69.66)	61.60 (51.71)	42.49	-
S.Em +		-	NS	0.496	0.618	1.581	0.924	0.362	-
CD 5%		-	NS	1.520	1.892	3.424	3.193	1.08	-

Date of sowing : 11.12.2018
Date of insecticidal application: 04.02.2019
Date of harvest : 28.04.2019
Design : R.B.D.

Plot size : 3 m x 5m = 15 Sq m
Variety : K551
No. of rows/plot : 23
Replication : Three

Table 5. Management of foliar aphid (*Rhopalosiphum maidis*) through biopesticides & chemicals (2018-19). (Location-Karnal)

S. No.	Treatments	Dose ml or g / ha	Doses (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	100 ml	20	45.25	4.92 (2.42)	4.37 (2.31)	1.69 (1.64)	1.02 (1.42)	45.23
2	Quinalphos 25 % EC	400 ml	100	47.16	5.95 (2.63)	7.66 (2.94)	1.48 (1.57)	0.94 (1.39)	47.86
3	Acetamiprid 20SP	100 gm	20	48.35	1.66 (1.62)	1.97 (1.72)	0.95 (1.39)	1.22 (1.48)	46.50
4	Chlorantranilipride 18.5 SC	100 ml	20	46.25	1.83 (1.68)	1.70 (1.63)	0.96 (1.40)	1.19 (1.48)	43.00
5	Azadirachtin 1500 ppm	3.0 (ml/l)	-	43.25	7.94 (2.98)	7.50 (2.91)	5.70 (2.58)	5.03 (2.45)	43.70
6	Beauveria bassiana (2 x 10 ⁸ c.f.u)	5 g/l	-	44.62	13.40 (3.79)	12.18 (3.62)	6.56 (2.74)	7.83 (2.97)	45.31
7	Metarhizium anisopliae	3 g/l	-	41.25	13.68 (3.82)	12.40 (3.60)	5.95 (2.63)	7.66 (2.94)	43.90
8	Control	-	-	45.12	31.98 (8.74)	31.36 (5.68)	23.10 (4.90)	18.45 (4.40)	38.52
CD (p=0.05)				NS	(0.18)	(0.15)	(0.17)	(0.18)	2.22

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

Date of sowing : 12-11-2018 Plot size : Six row of six meter
length at 25 cm spacing
Date of insecticide application : 26-02-2019 Variety : DWRUB64
Date of harvest : 18-04-2019 Replication : Three

CO-OPERATORS

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

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	Durgapura	Dr. A. S. Baloda

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

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.

The details of the coordinated and special trials (proposed and conducted) are reported in Table 1. Total 48 trials were proposed, conducted and reported at different locations.

Table 1 Details of barley coordinated and special trials during 2018-19

Trial Name	Number of trials				
	Proposed locations	Not conducted/Failed	Data Received	Trial/data Rejected	Data Reported
Coordinated Trials					
IR-TS-MB- LON	5	-	5	-	5
IR-TS- Hulless- LON	5	-	5	-	5
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
Weed management (NEPZ, NWPZ, NHZ ,CZ)	11	-	11	-	11
Pusa Hydrogel and herbal hydrogel (NWPZ)	3	-	3	-	3
Nutrient Management System (NHZ)	2	-	2	-	2
Nutrient Management System (NHZ)	5	-	5	-	5
Total	48	-	48	-	48

Response of new malt barley genotypes to different N levels under irrigated timely sown conditions (NWPZ)-AVT malt

The grain yield of test entry DWRB 160 (51.20 q ha⁻¹) was statistically at par with the newly released malt barley varieties although BH 946 a six row variety registered significantly highest grain yield (54.46 q ha⁻¹). Significantly highest grain yield (54.46 q ha⁻¹) was recorded when nitrogen was applied @ 120 kg ha⁻¹.

Table 2 NWPZ POOLED 2018-19 AVT Malt N x Varieties

Varieties	N (Kg ha ⁻¹)							
	60		90		120		Mean	
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
Yield, kg/ha								
BH 946	49.71	1	56.30	1	57.37	1	54.46	1
DWRB 160	47.06	2	51.90	4	54.65	2	51.20	2
DWRB101	44.63	4	52.32	3	52.94	5	49.96	4
DWRB 123	46.90	3	52.34	2	54.26	3	51.16	3

RD 2849	42.76	5	51.54	5	53.77	4	49.36	5
MEAN	46.21		52.88		54.60		51.23	
CD (0.05)	N(A) 1.36		Varieties (B) 1.45		B within A NS		A within B NS	
Earhead/ m²								
BH 946	348	4	374	5	394	4	372	4
DWRB 160	342	5	380	4	388	5	370	5
DWRB101	360	3	396	3	408	3	388	3
DWRB 123	382	1	406	1	419	1	402	1
RD 2849	366	2	405	2	413	2	395	2
MEAN	360		392		404		385	
CD (0.05)	N (A) 10		Varieties (B) 9		B within A NS		A within B NS	
Grains/Earhead								
BH 946	34.31	1	36.86	1	35.86	1	35.68	1
DWRB 160	31.17	2	30.43	2	32.12	2	31.24	2
DWRB101	25.29	4	26.61	3	26.83	5	26.24	3
DWRB 123	25.62	3	25.92	5	26.89	4	26.14	4
RD 2849	23.94	5	25.96	4	26.94	3	25.62	5
MEAN	28.07		29.16		29.73		28.98	
CD (0.05)	N (A) 0.79		Varieties (B) 1.42		B within A NS		A within B NS	
1000 Grain Weight, g								
BH 946	41.37	5	41.89	5	42.39	5	41.88	5
DWRB 160	52.21	1	54.44	1	54.43	1	53.69	1
DWRB101	44.29	4	45.74	3	45.93	3	45.32	3
DWRB 123	45.66	2	48.44	2	48.03	2	47.38	2
RD 2849	45.07	3	45.61	4	44.64	4	45.11	4
MEAN	45.72		47.22		47.08		46.67	
CD (0.05)	N (A) 0.95		Varieties (B) 1.67		B within A NS		A within B NS	

Centres: Agra, Durgapura, Ludhiana, Hisar, Karnal

Response of new hull less genotypes to different N levels under irrigated timely sown conditions (NWPZ)-AVT-Hulless

The test entry PL 891 recorded significantly highest grain yield (41.97 q ha⁻¹) as compared to the other varieties. Significantly highest grain yield was recorded when nitrogen was applied @ 75 kg ha⁻¹.

Table 3 **NWPZ** **POOLED** **2018-19**
AVT Hull less N x Varieties

Varieties	N (Kg ha ⁻¹)						Mean	
	45		60		75		Yld.	Rk.
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.		
Yield, kg/ha								
NDB943	36.23	3	40.27	3	41.76	3	39.42	3
PL891	39.08	1	42.96	1	43.86	1	41.97	1
K1149	34.11	4	37.26	4	38.59	4	36.65	4
Karan16	37.24	2	40.89	2	41.80	2	39.98	2
MEAN	36.66		40.35		41.50		39.50	
CD (0.05)	N(A) 1.12		Varieties (B) 1.04		B within A NS		A within B NS	
Earhead/ m²								
NDB943	329	4	357	3	367	4	351	4
PL891	349	1	373	1	381	2	368	1

K1149	340	2	356	4	369	3	355	3
Karan16	339	3	368	2	387	1	365	2
MEAN	340		364		376		360	
CD (0.05)	N (A) 11		Varieties (B) 9		B within A NS		A within B NS	
Grains/Earhead								
NDB943	35.49	1	36.34	1	36.36	1	36.06	1
PL891	29.25	4	30.16	4	31.27	4	30.23	4
K1149	31.40	3	33.10	3	33.18	3	32.56	3
Karan16	34.57	2	35.45	2	35.13	2	35.05	2
MEAN	32.68		33.76		33.98		33.47	
CD (0.05)	N (A) NS		Varieties (B) 0.95		B within A NS		A within B NS	
1000 Grain Weight, g								
NDB943	37.47	2	38.03	2	39.43	2	38.31	2
PL891	43.40	1	44.26	1	43.60	1	43.76	1
K1149	36.96	3	36.42	4	37.16	3	36.85	3
Karan16	35.77	4	36.48	3	36.86	4	36.37	4
MEAN	38.40		38.80		39.26		38.82	
CD (0.05)	N (A) NS		Varieties (B) 0.85		B within A NS		A within B NS	

Centres: Agra, Durgapura, Ludhiana, Hisar, Karnal

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 must. So, seven special trials were conducted in different zones. The results from these trials are presented below.

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

In NWPZ, BH 946 recorded significantly highest grain yield (57.77 q ha⁻¹) as compared to all the other varieties. Maximum grain yield (55.80 q ha⁻¹) was realised in zero till sowing with rice residue retention which was significantly higher than other methods of sowing.

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

Varieties	NWPZ		POOLED		2018-19			
	SPL-1 Tillage Varieties							
	Tillage Practices							
	CT		ZT		ZT+Residue@6 tha ⁻¹		Mean	
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
Yield, q/ha								
BH902	53.12	3	53.28	3	54.71	3	53.71	3
BH946	57.07	1	56.92	1	59.33	1	57.77	1
RD2552	52.45	5	53.18	4	54.47	4	53.37	4
DWRB101	55.04	2	55.14	2	56.13	2	55.44	2
DWRUB52	52.58	4	52.57	5	54.34	5	53.16	5
MEAN	54.05		54.22		55.80		54.69	
CD (0.05)	Tillage(A) 0.96		Varieties (B) 1.14		B within A NS		A within B NS	

Earhead/ m²								
BH902	327	5	326	5	337	5	330	5
BH946	340	4	337	4	346	4	341	4
RD2552	355	3	357	3	366	3	359	3
DWRB101	390	1	390	2	398	1	393	1
DWRUB52	387	2	390	1	396	2	391	2
MEAN	360		360		368		363	
CD (0.05)	Tillage (A) 7		Varieties (B) 9		B within A NS		A within B NS	
Grains/Earhead								
BH902	42.79	1	41.68	2	41.61	2	42.03	2
BH946	42.00	2	42.68	1	42.46	1	42.38	1
RD2552	40.80	3	39.10	3	40.09	3	40.00	3
DWRB101	32.57	4	31.59	4	31.46	4	31.87	4
DWRUB52	31.35	5	30.42	5	30.80	5	30.86	5
MEAN	37.90		37.09		37.29		37.43	
CD (0.05)	Tillage (A) NS		Varieties (B) 1.46		B within A NS		A within B NS	
1000 Grain Weight, g								
BH902	42.59	4	44.05	3	44.92	3	43.85	3
BH946	44.16	3	42.99	4	44.25	4	43.80	4
RD2552	40.52	5	42.08	5	41.52	5	41.37	5
DWRB101	45.27	1	49.06	1	48.16	2	47.49	1
DWRUB52	45.22	2	46.89	2	48.67	1	46.93	2
MEAN	43.55		45.01		45.50		44.69	
CD (0.05)	Tillage (A) 1.15		Varieties (B) 2.07		B within A NS		A within B NS	

Centres: Agra, Durgapura, Ludhiana, Hisar, Karnal

In NHZ, maximum grain yield (32.24 q ha⁻¹) was recorded under zero till sowing with rice residue retention which was at par to conventional tillage sowing. BHS 400 registered significantly highest grain yield (40.86 q ha⁻¹) compared to all other varieties.

Table 4(a) **NHZ** **POOLED** **2018-19**
SPL-1 Tillagex 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	31.51	2	36.09	2	37.75	2	35.12	2
BHS 400	36.18	1	43.58	1	42.81	1	40.86	1
HBL 113	29.52	3	33.31	3	34.78	3	32.54	3
BHS 352	19.48	5	23.83	4	23.78	4	22.36	4
HBL 276	19.85	4	23.02	5	22.10	5	21.66	5
MEAN	27.31		31.97		32.24		30.51	
CD (0.05)	Tillage (A) 2.16		Varieties (B) 1.83		B within A NS		A within B NS	
Earhead/ m²								
VLB118	311	3	342	3	333	3	329	3
BHS 400	321	2	353	2	351	2	342	2
HBL 113	356	1	378	1	397	1	377	1
BHS 352	271	4	287	4	296	4	285	4
HBL 276	253	5	277	5	287	5	272	5
MEAN	302		327		333		321	
CD (0.05)	Tillage (A) 16		Varieties (B) 14		B within A NS		A within B NS	

Grains/Earhead								
VLB118	22.45	2	24.12	2	25.38	2	23.98	2
BHS 400	26.48	1	29.44	1	28.90	1	28.27	1
HBL 113	20.88	4	22.04	4	22.36	3	21.76	3
BHS 352	18.91	5	21.84	5	21.82	4	20.86	5
HBL 276	20.91	3	22.66	3	21.39	5	21.65	4
MEAN	21.93		24.02		23.97		23.31	
CD (0.05)	Tillage (A) 0.84		Varieties (B) 1.25		B within A NS		A within B NS	
1000 Grain Weight, g								
VLB118	40.91	1	42.48	1	41.39	1	41.59	1
BHS 400	40.48	2	41.92	2	40.92	2	41.11	2
HBL 113	36.43	3	37.01	5	37.95	3	37.13	3
BHS 352	34.93	5	37.40	3	34.17	5	35.50	5
HBL 276	35.94	4	37.37	4	36.50	4	36.60	4
MEAN	37.74		39.24		38.19		38.39	
CD (0.05)	Tillage (A) 0.96		Varieties (B) 1.58		B within A NS		A within B NS	

Centres: Bajaura and Malan

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

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 highest grain yield (42.20 q ha⁻¹) as compared to other varieties.

Table 5 NHZ Poole 2018-19
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SPL-2 Varieties x Seed rate										
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	35.50	3	38.42	3	29.99	3	23.89	3	31.95	3
100	40.28	2	43.87	2	33.32	2	25.99	2	35.86	2
125	41.66	1	44.31	1	35.32	1	26.38	1	36.92	1
MEAN	39.15		42.20		32.87		25.42		34.91	
CD (0.05)	Varieties(A) 2.34		Seed rate(B) 1.41		B within A NS		A within B NS			
Earhead/ m ²										
75	273	3	307	3	357	3	237	3	293	3
100	319	2	358	2	392	2	272	2	335	2
125	337	1	376	1	430	1	290	1	358	1
MEAN	310		347		393		266		329	
CD (0.05)	Varieties(A) 22		Seed rate(B) 14		B within A NS		A within B NS			
Grains/Earhead										
75	29.77	2	30.83	2	21.44	3	24.94	3	26.74	3
100	29.99	1	31.03	1	21.95	2	25.10	2	27.02	1
125	29.67	3	29.79	3	22.48	1	25.81	1	26.93	2
MEAN	29.81		30.55		21.96		25.28		26.90	
CD (0.05)	Varieties(A) 2.60		Seed rate(B) NS		B within A NS		A within B NS			
1000 Grain Weight, g										
75	41.23	1	40.96	3	37.65	1	36.91	1	39.19	1
100	40.49	3	41.15	1	36.81	2	36.69	2	38.78	2
125	40.92	2	41.06	2	36.42	3	35.71	3	38.53	3
MEAN	40.88		41.06		36.96		36.44		38.83	

CD (0.05)	Varieties(A)	Seed rate(B)	B within A	A within B
	0.86	NS	NS	NS

Centres: Bajaura and Malan

Table 5(i) NHZ Pooled Three years
SPL-2 Varieties x Seed rate

Seed rate (Kg ha ⁻¹)	Varieties				Yield q/ha				Mean	
	VLB118		BHS 400		HBL 113		BHS 352			
	Yield	Rk	Yield	Rk	Yield	Rk	Yield	Rk	Yield	Rk
75	33.24	3	37.30	2	33.17	2	26.89	2	32.65	3
100	38.57	1	42.16	1	30.90	3	26.95	1	34.64	1
125	37.76	2	35.42	3	33.97	1	25.21	3	33.09	2
MEAN	36.52		38.29		32.68		26.35		33.46	
CD (0.05)	Varieties(A)	Seed rate(B)	B within A	A within B						
	7.0	NS	NS	NS						

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

In NWPZ, All the additives except mulch @ 6 t/ha 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 served the purpose to realize at par yield using all other additives. Grain yield reduced significantly due to delay in sowing. Similar results were observed in NEPZ, also.

Table 6	NWPZ				POOLED		2018-19	
SPL 3 DOSx Additives								
Treatments	Sowing Time				Mean			
	Timely		Late		Yld.	Rk	Yld.	Rk
	Yld.	Rk	Yld.	Rk.				
Yield, q/ha								
Recommended dose of Fertilizer	55.26	6	41.61	6	48.44	6		
T1 + FYM @5 t/ha	57.75	1	43.45	5	50.60	4		
T1+Mulch@ 6 t/ha	55.58	5	43.50	4	49.54	5		
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	57.09	4	45.04	3	51.07	3		
T4+ spray of ZnSo4 @ 0.5 %	57.36	3	46.12	1	51.74	2		
T4 + Two spray of Kcl @ 0.5 %	57.73	2	46.08	2	51.91	1		
MEAN	56.80		44.30		50.55			
CD (0.05)	Sowing Time (A)		Additives (B)		B within A		A within B	
	0.99		0.97		1.38		1.52	
Earhead/ m ²								
Recommended dose of Fertilizer	346	6	303	6	324	6		
T1 + FYM @5 t/ha	355	4	312	4	333	4		
T1+Mulch@ 6 t/ha	350	5	311	5	330	5		
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	360	2	317	3	338	2		
T4+ spray of ZnSo4 @ 0.5 %	358	3	319	2	338	3		
T4 + Two spray of Kcl @ 0.5 %	363	1	320	1	341	1		
MEAN	355		314		334			
CD(0.05)	Sowing Time (A)		Additives (B)		B within A		A within B	
	6		8		NS		NS	
Grains/Earhead								
Recommended dose of Fertilizer	41.96	1	36.45	4	39.20	1		
T1 + FYM @5 t/ha	40.82	5	36.42	5	38.62	5		
T1+Mulch@ 6 t/ha	40.69	6	36.30	6	38.50	6		
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	40.94	3	36.46	3	38.70	4		
T4+ spray of ZnSo4 @ 0.5 %	41.11	2	36.76	2	38.93	2		
T4 + Two spray of Kcl @ 0.5 %	40.86	4	36.90	1	38.88	3		

MEAN	41.06		36.55		38.81			
CD(0.05)	Sowing Time (A)		Additives (B)		B within A		A within B	
	0.98		NS		NS		NS	
1000 Grain Weight, g								
Recommended dose of Fertilizer	42.81	6	40.43	6	41.62	6		
T1 + FYM @5 t/ha	44.43	3	41.41	5	42.92	4		
T1+Mulch@ 6 t/ha	43.92	5	41.45	4	42.68	5		
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	44.12	4	41.91	3	43.02	3		
T4+ spray of ZnSo4 @ 0.5 %	44.98	2	42.75	1	43.86	2		
T4 + Two spray of Kcl @ 0.5 %	45.15	1	42.67	2	43.91	1		
MEAN	44.23		41.77		43.00			
CD(0.05)	Sowing Time (A)		Additives (B)		B within A		A	
within B	0.67		1.21		NS		NS	

Centres: Durgapura, Ludhiana, Hisar, Karnal and Agra

Table 6 (i)	NWPZ				POOLED	Three years		
SPL 3 DOSx Additives								
	Sowing Time				Mean			
	Timely		Late					
Treatments	Yld.	Rk.	Yld.	Rk.	Yld.	Rk		
Yield, q/ha								
Recommended dose of Fertilizer	52.39	6	41.30	6	46.84	6		
T1 + FYM @5 t/ha	53.93	3	42.31	4	48.12	4		
T1+Mulch@ 6 t/ha	53.09	5	41.94	5	47.51	5		
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	53.93	2	43.52	3	48.73	2		
T4+ spray of ZnSo4 @ 0.5 %	53.26	4	44.06	1	48.66	3		
T4 + Two spray of Kcl @ 0.5 %	54.20	1	43.91	2	49.06	1		
MEAN	53.47		42.84		48.15			
CD (0.05)	Sowing Time (A)		Additives (B)		B within A		A within B	
	3.38		1.17		NS		NS	

Table 6(a)	NEPZ				POOLED	2018-19		
SPL 3 DOSx Additives								
	Sowing Time				Mean			
	Timely		Late					
Treatments	Yld.	Rk	Yld.	Rk.	Yld.	Rk		
Yield, q/ha								
Recommended dose of Fertilizer	40.16	6	34.18	5	37.17	6		
T1 + FYM @5 t/ha	42.06	4	37.24	3	39.65	4		
T1+Mulch@ 6 t/ha	40.51	5	33.99	6	37.25	5		
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	42.58	3	37.83	2	40.20	2		
T4+ spray of ZnSo4 @ 0.5 %	43.77	2	36.37	4	40.07	3		
T4 + Two spray of Kcl @ 0.5 %	44.90	1	39.32	1	42.11	1		
MEAN	42.33		36.49		39.41			
CD (0.05)	Sowing Time (A)		Additives (B)		B within A		A within B	
	2.60		1.87		NS		NS	
Earhead/ m²								
Recommended dose of Fertilizer	336	6	333	6	335	6		
T1 + FYM @5 t/ha	353	3	352	5	353	5		
T1+Mulch@ 6 t/ha	352	4	354	4	353	4		
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	350	5	358	3	354	3		
T4+ spray of ZnSo4 @ 0.5 %	366	1	363	1	365	1		
T4 + Two spray of Kcl @ 0.5 %	359	2	361	2	360	2		
MEAN	353		353		353			
CD(0.05)	Sowing Time (A)		Additives (B)		B within A		A within B	
	NS		8		NS		NS	

Grains/Earhead							
Recommended dose of Fertilizer	34.67	5	29.93	5	32.30	5	
T1 + FYM @5 t/ha	34.19	6	30.80	3	32.49	4	
T1+Mulch@ 6 t/ha	35.46	3	27.49	6	31.47	6	
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	35.43	4	32.03	2	33.73	2	
T4+ spray of ZnSo4 @ 0.5 %	36.66	1	30.77	4	33.71	3	
T4 + Two spray of Kcl @ 0.5 %	36.42	2	32.76	1	34.59	1	
MEAN	35.47		30.63		33.05		
CD(0.05)	Sowing Time (A)		Additives (B)		B within A		A within B
	2.63		NS		NS		NS
1000 Grain Weight, g							
Recommended dose of Fertilizer	40.71	6	40.66	5	40.69	6	
T1 + FYM @5 t/ha	42.42	1	39.83	6	41.12	5	
T1+Mulch@ 6 t/ha	41.76	5	41.27	3	41.52	3	
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	41.82	4	40.76	4	41.29	4	
T4+ spray of ZnSo4 @ 0.5 %	42.12	3	41.75	1	41.93	2	
T4 + Two spray of Kcl @ 0.5 %	42.36	2	41.66	2	42.01	1	
MEAN	41.86		40.99		41.43		
CD(0.05)	Sowing Time (A)		Additives (B)		B within A		A within B
	NS		NS		NS		NS

Centres: Kanpur, Varanasi and Faizabad

Table 6(a)	NEPZ				POOLED	Three years	
SPL 3 DOSx Additives							
Treatments	Sowing Time				Mean		
	Timely		Late				
	Yld.	Rk	Yld.	Rk.	Yld.	Rk	
Yield, q/ha							
Recommended dose of Fertilizer	37.10	6	31.26	6	34.18	6	
T1 + FYM @5 t/ha	39.51	4	33.86	4	36.68	4	
T1+Mulch@ 6 t/ha	37.94	5	32.05	5	34.99	5	
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	40.54	3	34.60	3	37.57	3	
T4+ spray of ZnSo4 @ 0.5 %	42.14	2	34.88	2	38.51	2	
T4 + Two spray of Kcl @ 0.5 %	42.56	1	35.72	1	39.14	1	
MEAN	39.96		33.73		36.85		
CD (0.05)	Sowing Time (A)		Additives (B)		B within A		A within B
	2.72		0.93		NS		NS

SPL- 4 Weed management in Barley (NWPZ, NEPZ, CZ & NHZ):

Grain yield in Halauxifen methyl + Florasulam + Carfentrazone + Surfactant, Metsulfuron + Carfentrazone + Surfactant and 2,4-D E + Carfentrazone treatments was significantly superior to other herbicide treatments and weedy check condition. Significantly highest grain yield was recorded in weed free condition. The grain yield reduction due to weeds in weedy check was 25.8 % as compared to weed free conditions in NWPZ. Almost similar results were observed in NEPZ also. All the herbicide treatments controlled the broad leaf weeds very effectively in CZ, which resulted in grain yield statistically at par to weed free condition. 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, Metsulfuron methyl 20 WG + surfactant, Metsulfuron + Carfentrazone +Surfactant, 2,4-D E + Carfentrazone and weed free condition.

SPL- 4 Weed management in Barley (NWPZ, NEPZ, CZ & NHZ)**Table 7** **NWPZ Pooled 2018-19**
SPL 4– Weed management

Treatments	Yield, q/ha	Earhead /m ²	Grains/ Earhead	1000 GW, g
Halauxifen-methyl Ester+ Florasulam 40.85% WG + Polyglycol 26-2 N	53.12	358	39.50	41.63
Metsulfuron methyl 20 WG + surfactant	50.97	337	40.00	41.39
Carfentrazone 40DF	52.13	342	39.62	42.06
2,4-D Na (80 WP)	48.73	336	39.45	40.94
2,4-D E 38 EC	50.49	347	38.52	41.31
Metsulfuron + Carfentrazone +Surfactant	54.96	363	39.86	43.36
2,4-D Na + Carfentrazone	53.12	347	40.00	42.60
2,4-D E + Carfentrazone	54.25	359	39.65	42.15
Halauxifen methyl+Florasulam+Carfentrazone+ Surfactant	54.28	360	40.13	42.70
Weedy check	42.56	311	37.39	39.74
Weed free	57.37	370	40.62	44.04
MEAN	52.0	348	39.52	41.99
CD (0.05)	1.65	12	1.13	0.88

Centres: Durgapura, Agra, Hisar, Ludhiana and Karnal**Table 7 (a)** **NEPZ Pooled 2018-19**
SPL 4– Weed management

Treatments	Yield, q/ha	Earhead /m ²	Grains/ Earhead	1000 GW,g
Halauxifen-methyl Ester+ Florasulam 40.85% WG + Polyglycol 26-2 N	42.30	389	35.47	41.02
Metsulfuron methyl 20 WG + surfactant	40.27	392	35.38	41.81
Carfentrazone 40DF	39.36	385	33.07	41.43
2,4-D Na (80 WP)	39.07	381	34.51	41.16
2,4-D E 38 EC	37.70	383	33.62	40.09
Metsulfuron + Carfentrazone +Surfactant	41.81	395	35.40	42.15
2,4-D Na + Carfentrazone	42.16	391	35.89	42.09
2,4-D E + Carfentrazone	41.14	384	36.69	42.35
Halauxifen methyl+Florasulam+Carfentrazone+ Surfactant	43.16	395	33.96	41.21
Weedy check	34.06	378	34.62	39.30
Weed free	45.90	403	36.99	42.84
MEAN	40.63	389	35.06	41.40
CD (0.05)	1.13	10	1.49	1.12

Centres: Kanpur, Varanasi, Faizabad**Table 7 (b)** **NHZ 2018-19**
SPL 4– Weed management

Treatments	Yield, q/ha	Earhead /m ²	Grains/ Earhead	1000 GW, g
Halauxifen-methyl Ester+ Florasulam 40.85% WG + Polyglycol 26-2 N	43.68	391	30.65	37.58
Metsulfuron methyl 20 WG + surfactant	43.84	378	30.73	38.17
Carfentrazone 40DF	41.05	361	30.13	37.91
2,4-D Na (80 WP)	40.18	377	29.43	37.45
2,4-D E 38 EC	40.18	372	29.69	37.77
Metsulfuron + Carfentrazone +Surfactant	44.03	359	32.12	38.59
2,4-D Na + Carfentrazone	41.59	369	32.09	38.29
2,4-D E + Carfentrazone	42.83	393	30.51	38.43
Halauxifen methyl+Florasulam+Carfentrazone+ Surfactant	45.17	400	31.28	38.20
Weedy check	34.65	340	28.34	36.59
Weed free	45.13	381	32.98	37.96
MEAN	42.03	375	30.72	37.90
CD (0.05)	3.21	35	3.42	1.91

Centres: Malan, Bajaura**Table 7 (c)** **CZ 2018-19**

SPL 4– Weed management

Treatments	Yield, q/ha	Earhead /m ²	Grains/ Earhead	1000 GW, g
Halauxifen-methyl Ester+ Florasulam 40.85% WG + Polyglycol 26-2 N	43.25	416	34.00	45.67
Metsulfuron methyl 20 WG + surfactant	39.81	394	32.67	44.32
Carfentrazone 40DF	39.61	385	31.33	44.03
2,4-D Na (80 WP)	39.91	393	30.00	44.03
2,4-D E 38 EC	41.35	413	31.33	44.50
Metsulfuron + Carfentrazone +Surfactant	42.88	413	32.00	44.57
2,4-D Na + Carfentrazone	42.16	412	32.33	44.25
2,4-D E + Carfentrazone	42.91	418	32.33	44.62
Halauxifen methyl+Florasulam+Carfentrazone+ Surfactant	43.21	417	33.67	45.20
Weedy check	29.04	331	28.00	41.98
Weed free	43.86	430	36.33	46.37
MEAN	40.73	402	32.18	44.50
CD (0.05)	4.63	24	2.05	0.89

Centres: Udaipur

SPL-5 Evaluation of Pusa Hydrogel and herbal hydrogel (NWPZ)

Application of Pusa Hydrogel @ 2.5 kg ha⁻¹ and New Hydrogel @ 2.5 kg ha⁻¹ resulted in significantly higher grain yield as compared to control conditions in NWPZ. Highest grain yield (54.62 q ha⁻¹) was recorded with three irrigations which was significantly highest than other irrigation levels

Table 8 NORTH WESTERN PLAINS ZONE Pooled 2018-19
SPL-5 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	33.83	3	41.35	3	48.41	3	51.89	3	43.87	3
Pusa Hydrogel@ 2.5 kg ha ⁻¹	37.61	2	45.46	2	52.40	1	55.92	2	47.85	2
New Hydrogel @ 2.5 kg ha ⁻¹	37.79	1	47.26	1	52.07	2	56.05	1	48.29	1
MEAN	36.41		44.69		50.96		54.62		46.67	
CD (0.05)	Irrigation levels(A)		Hydrogel(B)		B within A		A within B			
	1.91		1.05		NS		NS			
Earhead/ m ²										
Control	237	3	267	3	303	3	324	3	283	3
Pusa Hydrogel@ 2.5 kg ha ⁻¹	249	2	285	1	326	1	342	2	301	2
New Hydrogel @ 2.5 kg ha ⁻¹	250	1	285	2	324	2	343	1	301	1
MEAN	245		279		318		337		295	
CD (0.05)	Irrigation levels(A)		Hydrogel(B)		B within A		A within B			
	11		6		NS		NS			
Grains/Earhead										
Control	39.99	3	41.95	3	43.27	3	44.96	2	42.54	3
Pusa Hydrogel@ 2.5 kg ha ⁻¹	42.26	2	44.53	2	47.27	1	45.47	1	44.88	1
New Hydrogel @ 2.5 kg ha ⁻¹	42.73	1	45.45	1	45.42	2	44.62	3	44.55	2
MEAN	41.66		43.98		45.32		45.01		43.99	
CD (0.05)	Irrigation levels(A)		Hydrogel(B)		B within A		A within B			
	2.07		1.56		NS		NS			
1000 grains wt. (g)										
Control	37.94	3	40.97	3	42.84	3	43.24	3	41.25	3
Pusa Hydrogel@ 2.5 kg ha ⁻¹	39.96	2	42.71	2	44.37	1	45.72	1	43.19	1
New Hydrogel @ 2.5 kg ha ⁻¹	40.11	1	42.72	1	44.28	2	45.49	2	43.15	2
MEAN	39.34		42.13		43.83		44.82		42.53	
CD (0.05)	Irrigation levels (A)		Hydrogel(B)		B within A		A within B			
	1.25		1.03		NS		NS			

Centres: Durgapura, Hisar and Agra

SPL-6 Performance of promising barley varieties under different Nutrient Management System (NHZ)

Application of NPK @ 60:30:40 kg ha⁻¹ resulted in significantly highest grain yield as compared to application of FYM alone @ 10 t ha⁻¹ or in combination with NPK @ 30:40:30 kg ha⁻¹. BHS 400 recorded highest grain yield (37.33 q ha⁻¹) as compared to all other varieties.

Table 9 NHZ POOLED 2018-19
SPL-6 Nutrient Management x Varieties

Varieties	Nutrient Management				Mean			
	FYM 10t/ha Yld.	Rk.	FYM 10t/ha + NPK: 30:40:30 Yld.	Rk.	NPK: 60:40:30 Yld.	Rk.		
Yield, q/ha								
BHS 400	31.34	1	38.73	1	41.92	1	37.33	1
BHS 352	23.63	5	28.86	5	32.41	5	28.30	5
HBL 113	30.81	2	35.37	2	38.78	2	34.99	2
HBL 713	26.35	4	31.01	4	35.28	4	30.88	4
VLB 118	27.17	3	32.77	3	36.42	3	32.12	3
MEAN	27.86		33.35		36.96		32.72	
CD (0.05)	Nutrient Management (A) 2.16		Varieties (B) 1.83		B within A NS		A within B NS	
Earhead/ m²								
BHS 400	281	2	313	2	382	2	325	2
BHS 352	273	4	270	5	290	5	278	5
HBL 113	352	1	371	1	389	1	370	1
HBL 713	277	3	299	4	313	4	296	4
VLB 118	271	5	300	3	330	3	300	3
MEAN	291		310		341		314	
CD (0.05)	Nutrient Management (A) 15		Varieties (B) 12		B within A 21		A within B 24	
Grains/Earhead								
BHS 400	26.68	1	27.77	2	26.10	4	26.85	1
BHS 352	22.06	5	28.19	1	27.76	2	26.00	4
HBL 113	23.79	4	25.58	5	26.21	3	25.19	5
HBL 713	25.39	2	25.93	4	28.46	1	26.59	2
VLB 118	25.39	2	26.95	3	25.95	5	26.09	3
MEAN	24.66		26.88		26.89		26.15	
CD (0.05)	Nutrient Management (A) 1.90		Varieties (B) NS		B within A NS		A within B NS	
1000 Grain Weight, g								
BHS 400	42.43	1	43.03	1	42.47	2	42.65	1
BHS 352	41.17	3	40.21	4	40.97	3	40.78	3
HBL 113	39.58	4	39.45	5	39.16	5	39.40	5
HBL 713	39.28	5	40.38	3	39.41	4	39.69	4
VLB 118	42.00	2	42.39	2	43.18	1	42.52	2
MEAN	40.89		41.09		41.04		41.01	
CD (0.05)	Nutrient Management (A) NS		Varieties (B) 0.88		B within A NS		A within B NS	

Centres: Bajaura and Malan

SPL 7: Effect of different nutrient management system on malting quality of different barley varieties (NWPZ & CZ)

Application of recommended doses of fertilizer resulted in significantly highest grain yield (48.0 qha⁻¹) as compared to application of FYM alone @ 15 t ha⁻¹ or combination of FYM @ 10 t ha⁻¹ and half of the recommended doses of fertilizer in NWPZ. DWRB 123 recorded highest grain yield (46.95q ha⁻¹) as compared to all other varieties except RD 2849. Application of FYM @ 10 t ha⁻¹ and half of the recommended doses of fertilizer resulted in significantly highest grain yield (42.66 q ha⁻¹) in CZ as compared to application of

FYM alone @ 15 t ha⁻¹ or recommended doses of fertilizer. DWRB 92 recorded highest grain yield (42.41 q ha⁻¹) as compared to all other varieties except DWRB 123.

Table 10 **NWPZ POOLED 2018-19**
SPL-7 Nutrient Management x Varieties

Varieties	Nutrient Management							
	R DF Yld.	Rk.	FYM 10t/ha + half of the RDF Yld.	Rk.	FYM 15t/ha Yld.	Rk.	Yld.	Mean Rk.
Yield, q/ha								
DWRB101	47.32	3	47.18	2	41.24	4	45.24	3
DWRB123	49.10	2	47.56	1	44.19	1	46.95	1
RD2849	50.09	1	46.21	3	42.39	2	46.23	2
DWRB92	45.49	4	46.15	4	41.28	3	44.31	4
MEAN	48.00		46.78		42.27		45.68	
CD (0.05)	Nutrient Management (A) 1.38		Varieties (B) 1.38		B within A NS		A within B NS	
Earhead/ m²								
DWRB101	365	3	366	3	351	1	361	3
DWRB123	378	1	377	1	347	2	367	1
RD2849	378	2	372	2	344	3	365	2
DWRB92	360	4	357	4	338	4	352	4
MEAN	370		368		345		361	
CD (0.05)	Nutrient Management (A) 9		Varieties (B) 9		B within A NS		A within B NS	
Grains/Earhead								
DWRB101	30.27	3	29.47	2	26.80	4	28.85	4
DWRB123	30.05	4	29.02	3	29.13	2	29.40	2
RD2849	30.66	2	28.87	4	28.16	3	29.23	3
DWRB92	35.62	1	36.14	1	34.99	1	35.58	1
MEAN	31.65		30.87		29.77		30.76	
CD (0.05)	Nutrient Management (A) 0.86		Varieties (B) 1.10		B within A NS		A within B NS	
1000 Grain Weight, g								
DWRB101	44.64	4	45.32	3	44.86	3	44.94	3
DWRB123	48.51	1	47.97	1	47.11	1	47.86	1
RD2849	47.03	2	45.95	2	46.64	2	46.54	2
DWRB92	45.01	3	44.50	4	42.96	4	44.16	4
MEAN	46.30		45.93		45.39		45.88	
CD (0.05)	Nutrient Management (A) NS		Varieties (B) 1.62		B within A NS		A within B NS	

Centres: Durgapura, Agra, Hisar, Ludhiana

Table 11 **Karnal 2018-19**
SPL-7 Nutrient Management x Varieties

Varieties	Nutrient Management							
	R DF Yld.	Rk.	FYM 10t/ha + half of the RDF Yld.	Rk.	FYM 15t/ha Yld.	Rk.	Yld.	Mean Rk.
Yield, q/ha								
DWRB101	45.29	2	42.58	1	21.36	2	36.41	1
DWRB123	45.62	1	41.72	2	21.51	1	36.28	2
RD2849	43.51	3	41.27	3	21.19	3	35.32	3
MEAN	44.81		41.86		21.35		36.01	
CD (0.05)	Nutrient Management (A) 0.91		Varieties (B) NS		B within A NS		A within B NS	
Earhead/ m²								
DWRB101	330	2	311	1	265	2	302	2
DWRB123	330	1	308	3	269	1	302	1

RD2849	316	3	309	2	264	3	296	3
MEAN	325		309		266		300	
CD (0.05)	Nutrient Management (A) 16		Varieties (B) NS		B within A NS		A within B NS	
Grains/Earhead								
DWRB101	29.25	1	30.45	1	18.02	2	25.91	1
DWRB123	26.49	3	27.08	3	18.55	1	24.04	3
RD2849	29.23	2	29.15	2	17.87	3	25.42	2
MEAN	28.32		28.89		18.15		25.12	
CD (0.05)	Nutrient Management (A) 1.94		Varieties (B) 1.22		B within A NS		A within B NS	
1000 Grain Weight, g								
DWRB101	46.96	3	45.06	3	44.81	2	45.61	3
DWRB123	52.31	1	50.08	1	43.04	3	48.48	1
RD2849	47.15	2	45.97	2	45.03	1	46.05	2
MEAN	48.81		47.04		44.30		46.71	
CD (0.05)	Nutrient Management (A) 0.93		Varieties (B) 1.33		B within A 2.30		A within B 2.02	

**Table 12 CZ POOLED 2018-19
SPL-7 Nutrient Management x Varieties**

Varieties	Nutrient Management							
	R DF Yld.	Rk.	FYM 10t/ha + half of the RDF Yld.	Rk.	FYM 15t/ha Yld.	Rk.	Mean Rk.	
Yield, q/ha								
DWRB101	34.85	4	40.39	4	34.17	4	36.47	4
DWRB123	40.29	2	43.01	2	39.27	2	40.86	2
RD2849	36.21	3	42.70	3	36.35	3	38.42	3
DWRB92	42.36	1	44.54	1	40.32	1	42.41	1
MEAN	38.43		42.66		37.53		39.54	
CD (0.05)	Nutrient Management (A) 3.72		Varieties (B) 3.92		B within A NS		A within B NS	
Earhead/ m²								
DWRB101	457	2	353	3	377	1	395	1
DWRB123	420	4	242	4	258	3	307	4
RD2849	470	1	423	2	281	2	391	2
DWRB92	438	3	501	1	221	4	387	3
MEAN	446		380		284		370	
CD (0.05)	Nutrient Management (A) 18		Varieties (B) 44		B within A 76		A within B 68	
Grains/Earhead								
DWRB101	21.33	4	24.00	4	24.00	4	23.11	4
DWRB123	30.00	1	32.00	1	31.00	1	31.00	1
RD2849	26.67	3	31.33	2	28.67	2	28.89	2
DWRB92	28.00	2	29.33	3	28.67	2	28.67	3
MEAN	26.50		29.17		28.08		27.92	
CD (0.05)	Nutrient Management (A) 1.85		Varieties (B) 2.06		B within A NS		A within B 3.40	
1000 Grain Weight, g								
DWRB101	40.25	4	43.93	1	39.80	4	41.32	4
DWRB123	40.60	3	43.28	2	43.21	1	42.36	1
RD2849	43.46	1	38.87	4	42.28	3	41.54	3
DWRB92	42.26	2	41.15	3	42.93	2	42.12	2
MEAN	41.64		41.81		42.06		41.84	
CD (0.05)	Nutrient Management (A) NS		Varieties (B) NS		B within A 1.61		A within B 1.62	

Centre: Udaipur

Annexure I

Centre wise Yield Tables

Table 2.1

Durgapura

2018-19

AVT Malt N x Varieties

Varieties	N (Kg ha ⁻¹)						Mean	
	60		90		120		Yld.	Rk.
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
Yield, kg/ha								
BH 946	47.36	1	55.89	1	57.98	1	53.74	1
DWRB 160	45.73	2	54.62	2	56.69	2	52.35	2
DWRB101	39.98	5	49.99	4	52.53	4	47.50	5
DWRB 123	44.28	3	50.11	3	51.74	5	48.71	4
RD 2849	43.40	4	49.89	5	53.00	3	48.76	3
MEAN	44.15		52.10		54.39		50.21	
F. Test S.E.m C.D. C.V.(%)								
N application	(A)	**	0.86	3.357944	6.60			
Varieties	(B)	**	1.02	2.987969	6.12			
B within A		N.S.	1.77	5.175314				
A within B			1.80	5.259328				

Table 2.2

Ludhiana

2018-19

AVT Malt N x Varieties

Varieties	N (Kg ha ⁻¹)						Mean	
	60		90		120		Yld.	Rk.
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
Yield, kg/ha								
BH 946	38.64	2	47.35	1	46.79	2	44.26	1
DWRB 160	39.81	1	40.34	5	46.67	3	42.27	3
DWRB101	38.55	3	44.57	2	42.59	5	41.90	4
DWRB 123	38.09	4	43.33	4	47.10	1	42.84	2
RD 2849	32.10	5	44.20	3	46.05	4	40.78	5
MEAN	37.44		43.96		45.84		42.41	
F. Test S.E.m C.D. C.V.(%)								
N application	(A)	**	0.71	2.795373	6.50			
Varieties	(B)	N.S.	1.20	3.501418	8.49			
B within A		N.S.	2.08	6.064635				
A within B			1.99	5.808924				

Table 2.3

Hisar

2018-19

AVT Malt N x Varieties

Varieties	N (Kg ha ⁻¹)						Mean	
	60		90		120		Yld.	Rk.
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
Yield, kg/ha								
BH 946	65.81	1	65.94	1	66.47	1	66.07	1
DWRB 160	56.48	3	60.78	5	60.91	5	59.39	5
DWRB101	58.60	2	63.96	2	64.75	3	62.43	2
DWRB 123	55.16	4	62.90	3	65.28	2	61.11	3
RD 2849	54.89	5	62.57	4	63.23	4	60.23	4

MEAN		58.19		63.23		64.13		61.85
		F. Test		S.E.m		C.D.		C.V.(%)
N application	(A)	*		0.76		3.003073		4.79
Varieties	(B)	**		1.10		3.209696		5.33
B within A		N.S.		1.90		5.559356		
A within B				1.87		5.450752		

Table 2.4 Agra
AVT Malt N x Varieties **2018-19**

Varieties	N (Kg ha ⁻¹)						Mean	
	60		90		120		Yld.	Rk.
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, kg/ha							
BH 946	49.86	1	57.18	1	60.58	1	55.88	1
DWRB 160	49.77	2	56.40	2	56.99	2	54.39	2
DWRB101	41.93	5	52.53	4	54.65	3	49.71	4
DWRB 123	46.26	3	53.57	3	54.16	4	51.33	3
RD 2849	43.50	4	48.40	5	53.25	5	48.38	5
MEAN	46.26		53.62		55.93		51.94	
		F. Test		S.E.m		C.D.		C.V.(%)
N application	(A)	*		1.36		5.323135		10.11
Varieties	(B)	**		1.27		3.712587		7.35
B within A		N.S.		2.20		6.43039		
A within B				2.39		6.981718		

Table 2.5 Karnal
AVT Malt N x Varieties **2018-19**

Varieties	N (Kg ha ⁻¹)						Mean	
	60		90		120		Yld.	Rk.
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, kg/ha							
BH 946	46.89	2	55.14	1	55.04	1	52.35	1
DWRB 160	43.48	4	47.34	5	51.96	4	47.59	5
DWRB101	44.10	3	50.56	4	50.17	5	48.28	4
DWRB 123	50.70	1	51.79	3	53.00	3	51.83	2
RD 2849	39.93	5	52.63	2	53.32	2	48.63	3
MEAN	45.02		51.49		52.70		49.74	
		F. Test		S.E.m		C.D.		C.V.(%)
N application	(A)	*		1.28		5.006467		9.93
Varieties	(B)	*		1.18		3.45835		7.15
B within A		N.S.		2.05		5.990037		
A within B				2.24		6.523849		

Table 3.1 Durgapura
AVT Hull less N x Varieties **2018-19**

Varieties	N (Kg ha ⁻¹)						Mean	
	45		60		75		Yld.	Rk.
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, kg/ha							
NDB943	38.20	2	46.00	2	47.03	2	43.74	2
PL891	42.63	1	47.57	1	49.80	1	46.67	1

K1149	35.80	4	41.47	4	43.03	4	40.10	4
Karan16	36.80	3	43.27	3	44.47	3	41.51	3
MEAN	38.36		44.58		46.08		43.01	
		F. Test	S.E.m	C.D.	C.V.(%)			
N application	(A)	*	1.361	5.344	10.965			
Varieties	(B)	*	1.285	3.817	8.962			
B within A		N.S.	2.225	6.612				
A within B			2.359	7.011				

Table 3.2 Ludhiana **2018-19**
AVT Hull less N x Varieties

Varieties	N (Kg ha ⁻¹)						Mean	
	45		60		75		Yld.	Rk.
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, kg/ha							
NDB943	29.30	3	31.91	3	34.41	2	31.88	3
PL891	31.30	2	34.91	1	33.33	3	33.18	2
K1149	25.40	4	25.59	4	27.78	4	26.26	4
Karan16	33.52	1	34.85	2	34.88	1	34.41	1
MEAN	29.88		31.81		32.60		31.43	
		F. Test	S.E.m	C.D.	C.V.(%)			
N application	(A)	N.S.	0.74	2.91	8.18			
Varieties	(B)	**	0.84	2.49	8.00			
B within A		N.S.	1.45	4.31				
A within B			1.46	4.34				

Table 3.3 Hisar **2018-19**
AVT Hull less N x Varieties

Varieties	N (Kg ha ⁻¹)						Mean	
	45		60		75		Yld.	Rk.
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, kg/ha							
NDB943	36.02	3	38.10	3	39.13	3	37.75	3
PL891	37.53	2	42.03	2	43.32	1	40.96	2
K1149	34.63	4	36.08	4	36.23	4	35.65	4
Karan16	39.60	1	42.91	1	43.06	2	41.86	1
MEAN	36.94		39.78		40.44		39.05	
		F. Test	S.E.m	C.D.	C.V.(%)			
N application	(A)	*	0.70	2.74	6.19			
Varieties	(B)	**	0.55	1.62	4.19			
B within A		N.S.	0.95	2.81				
A within B			1.08	3.20				

Table 3.4 Agra **2018-19**
AVT Hull less N x Varieties

Varieties	N (Kg ha ⁻¹)						Mean	
	45		60		75		Yld.	Rk.
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, kg/ha							
NDB943	38.73	3	44.56	3	47.18	3	43.49	3
PL891	45.49	1	50.90	1	53.74	1	50.04	1
K1149	41.21	2	47.45	2	49.44	2	46.03	2

Karan16		38.03	4	42.97	4	44.47	4	41.82	4
MEAN		40.86		46.47		48.71		45.35	
		F. Test	S.E.m	C.D.		C.V.(%)			
N application	(A)	**	0.71	2.79		5.44			
Varieties	(B)	**	0.68	2.03		4.52			
B within A		N.S.	1.18	3.52					
A within B			1.25	3.71					

Table 3.5 Karnal **2018-19**
AVT Hull less N x Varieties

Varieties	N (Kg ha ⁻¹)						Mean	
	45		60		75		Yld.	Rk.
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, kg/ha							
NDB943	38.89	1	40.78	1	41.06	2	40.24	2
PL891	38.47	2	39.38	3	39.09	3	38.98	3
K1149	33.50	4	35.73	4	36.46	4	35.23	4
Karan16	38.25	3	40.46	2	42.14	1	40.28	1
MEAN	37.28		39.09		39.69		38.68	
		F. Test	S.E.m	C.D.		C.V.(%)		
N application	(A)	*	0.45	1.76		4.01		
Varieties	(B)	**	0.55	1.64		4.28		
B within A		N.S.	0.96	2.84				
A within B			0.94	2.80				

Table 4.1 NWPZ Durgapura **2018-19**
SPL-1 Tillage x 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							
BH902	54.80	4	53.28	3	57.80	3	55.29	3
BH946	55.41	2	54.25	2	58.80	2	56.15	2
RD2552	56.74	1	56.71	1	61.67	1	58.38	1
DWRB101	54.89	3	50.67	4	54.73	5	53.43	5
DWRUB52	54.14	5	50.58	5	56.12	4	53.61	4
MEAN	55.20		53.10		57.82		55.37	
		F. Test	S.E.m	C.D.		C.V.(%)		
Tillage	(A)	*	0.67	2.62		4.67		
Varieties	(B)	**	0.90	2.61		4.85		
B within A		N.S.	1.55	4.53				
A within B			1.54	4.49				

Table 4.2 NWPZ Ludhiana **2018-19**
SPL-1 Tillage x 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							
BH902	59.14	5	59.76	5	60.79	3	59.90	5
BH946	60.64	2	60.28	4	63.65	1	61.52	2
RD2552	60.95	1	62.15	1	61.84	2	61.65	1
DWRB101	60.08	4	61.19	2	60.08	4	60.45	3
DWRUB52	60.20	3	60.87	3	59.40	5	60.16	4

MEAN		60.20		60.85		61.15		60.74
		F. Test	S.E.m	C.D.	C.V.(%)			
Tillage	(A)	N.S.	1.32	5.19	8.43			
Varieties	(B)	N.S.	1.40	4.10	6.93			
B within A		N.S.	2.43	7.09				
A within B			2.54	7.43				

**Table 4.3 NWPZ Karnal 2018-19
SPL-1 Tillage x 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							
BH902	60.03	2	60.13	3	62.63	3	60.93	2
BH946	61.41	1	61.97	1	64.01	1	62.46	1
RD2552	51.90	4	53.70	4	55.81	4	53.80	4
DWRB101	59.36	3	60.61	2	62.82	2	60.93	3
DWRUB52	49.22	5	50.30	5	53.70	5	51.07	5
MEAN	56.38		57.34		59.79		57.84	
		F. Test	S.E.m	C.D.	C.V.(%)			
Tillage	(A)	**	0.33	1.31	2.24			
Varieties	(B)	**	0.82	2.39	4.25			
B within A		N.S.	1.42	4.14				
A within B			1.31	3.83				

**Table 4.4 Hisar 2018-19
SPL-1 Tillage x 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							
BH902	48.33	5	48.12	5	47.24	4	47.89	5
BH946	63.50	1	62.23	1	61.82	1	62.52	1
RD2552	49.75	4	48.18	4	47.12	5	48.35	4
DWRB101	59.98	2	59.69	2	58.83	2	59.50	2
DWRUB52	58.68	3	58.15	3	57.56	3	58.13	3
MEAN	56.05		55.27		54.51		55.28	
		F. Test	S.E.m	C.D.	C.V.(%)			
Tillage	(A)	N.S.	0.51	2.00	3.56			
Varieties	(B)	**	0.76	2.21	4.11			
B within A		N.S.	1.31	3.82				
A within B			1.28	3.73				

**Table 4.5 Agra 2018-19
SPL-1 Tillage x 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							
BH902	43.29	2	55.13	1	45.12	3	47.85	1
BH946	44.39	1	45.86	2	48.40	1	46.22	2
RD2552	42.93	3	45.17	3	45.90	2	44.67	3
DWRB101	40.87	4	43.56	4	44.20	5	42.88	4
DWRUB52	40.65	5	42.93	5	44.91	4	42.83	5
MEAN	42.43		46.53		45.71		44.89	

		F. Test	S.E.m	C.D.	C.V.(%)
Tillage	(A)	**	0.26	1.03	2.30
Varieties	(B)	**	0.36	1.05	2.45
B within A		N.S.	0.63	1.82	
A within B			0.62	1.80	

Table 4.6 **NHZ Bajaura 2018-19**
SPL-1 Tillage x Varieties

Varieties	Tillage Practices						Mean	
	ZT ZT+Residue@6 tha ⁻¹		CT		Yld.	Rk.	Yld.	Rk.
	Yld.	Rk.	Yld.	Rk.				
Yield, Q/ha								
VLB 118	45.45	3	49.04	3	52.86	2	49.12	2
BHS 400	48.17	1	50.81	1	54.28	1	51.09	1
HBL 112	45.58	2	49.50	2	50.89	3	48.66	3
BHS 352	27.81	4	31.57	4	33.51	4	30.96	4
HBL 276	25.26	5	27.75	5	28.36	5	27.12	5
MEAN	38.45		41.73		43.98		41.39	

		F. Test	S.E.m	C.D.	C.V.(%)
Tillage	(A)	*	0.71	2.79	6.64
Varieties	(B)	**	0.84	2.46	6.10
B within A		N.S.	1.46	4.26	
A within B			1.49	4.34	

Table 4.7 **NHZ Malan 2018-19**
SPL-1 Tillage x Varieties

Varieties	Tillage Practices						Mean	
	ZT ZT+Residue@6 tha ⁻¹		CT		Yld.	Rk.	Yld.	Rk.
	Yld.	Rk.	Yld.	Rk.				
Yield, Q/ha								
VLB 118	17.57	2	23.14	2	22.64	2	21.11	2
BHS 400	24.19	1	36.35	1	31.33	1	30.62	1
HBL 112	13.46	4	17.12	4	18.67	3	16.42	3
BHS 352	11.15	5	16.09	5	14.05	5	13.76	5
HBL 276	14.45	3	18.30	3	15.84	4	16.20	4
MEAN	16.16		22.20		20.51		19.62	

		F. Test	S.E.m	C.D.	C.V.(%)
Tillage	(A)	*	1.12	4.39	22.09
Varieties	(B)	**	0.98	2.85	14.92
B within A		N.S.	1.69	4.93	
A within B			1.88	5.49	

Table 5.1 **NHZ 2018-19**
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 kg / ha	23.08	3	30.53	3	16.42	3	16.71	1	21.68	3
100 kg / ha	26.07	2	37.08	1	19.51	2	16.38	2	24.76	2
125 kg / ha	27.10	1	35.03	2	21.79	1	16.17	3	25.02	1
MEAN	25.42		34.22		19.24		16.42		23.82	

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

Varieties	(A)	**	1.01	3.50	12.73
Seed Rate	(B)	**	0.59	1.78	8.64
B within A		N.S.	1.19	3.56	
A within B			1.40	4.20	

Table 5.2 **NHZ** **2018-19**
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 kg / ha	47.91	3	46.30	3	43.55	3	31.06	3	42.21	3
100 kg / ha	54.48	2	50.66	2	47.13	2	35.59	2	46.96	2
125 kg / ha	56.23	1	53.59	1	48.84	1	36.59	1	48.81	1
MEAN	52.87		50.18		46.51		34.41		45.99	
			F. Test		S.E.m		C.D.		C.V.(%)	
Varieties	(A)		**		1.14		3.93		7.41	
Seed Rate	(B)		**		0.78		2.33		5.85	
B within A			N.S.		1.55		4.65			
A within B					1.70		5.10			

Table 6.1 **NWPZ** **Durgapura 2018-19**
SPL 3 DOSx Additives

Treatments	Sowing Time					
	Timely			Late		
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha					
Recommended dose of Fertilizer	52.49	6	44.53	6	48.51	6
T1 + FYM @5 t/ha	55.26	4	46.04	4	50.65	4
T1+Mulch@ 6 t/ha	55.11	5	45.59	5	50.35	5
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	56.35	1	48.55	3	52.45	3
T4+ spray of ZnSo4 @ 0.5 %	55.40	3	49.88	2	52.64	2
T4 + Two spray of Kcl @ 0.5 %	55.58	2	52.11	1	53.85	1
MEAN	55.03		47.78		51.41	
	F. Test	S.E.m	C.D.	C.V.(%)		
DOS	(A)	*	0.64	2.89	5.31	
INM	(B)	*	1.10	3.26	5.23	
B within A		N.S.	1.55	4.61		
A within B			1.56	5.03		

Table 6.2 **NWPZ** **Ludhiana** **2018-19**
SPL 3 DOSx Additives

Treatments	Sowing Time					
	Timely			Late		
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha					
Recommended dose of Fertilizer	49.07	4	22.02	6	35.54	6
T1 + FYM @5 t/ha	48.65	5	22.79	5	35.72	5
T1+Mulch@ 6 t/ha	48.58	6	24.51	1	36.54	4
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	49.41	3	24.08	2	36.75	3
T4+ spray of ZnSo4 @ 0.5 %	49.89	2	23.96	4	36.92	2
T4 + Two spray of Kcl @ 0.5 %	51.42	1	24.02	3	37.72	1
MEAN	49.50		23.56		36.53	
	F. Test	S.E.m	C.D.	C.V.(%)		
DOS	(A)	**	0.39	1.77	4.58	
INM	(B)	N.S.	0.65	1.95	4.39	
B within A		N.S.	0.93	2.75		
A within B			0.93	3.03		

Table 6.3

NWPZ
SPL 3 DOSx Additives

Hisar 2018-19

Treatments	Sowing Time				Mean	
	Timely		Late		Yld.	Rk.
	Yld.	Rk.	Yld.	Rk.		
	Yield, q/ha					
Recommended dose of Fertilizer	62.82	2	49.87	6	56.34	5
T1 + FYM @5 t/ha	67.88	1	54.07	3	60.97	1
T1+Mulch@ 6 t/ha	59.27	6	53.33	5	56.30	6
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	61.73	3	55.72	2	58.73	3
T4+ spray of ZnSo4 @ 0.5 %	61.25	4	56.67	1	58.96	2
T4 + Two spray of Kcl @ 0.5 %	61.11	5	53.77	4	57.44	4
MEAN	62.34		53.90		58.12	
	F. Test	S.E.m	C.D.	C.V.(%)		
DOS (A)	*	0.99	4.45	7.22		
INM (B)	*	1.05	3.12	4.43		
B within A	*	1.49	4.42			
A within B		1.68	5.88			

Table 6.4

NWPZ
SPL 3 DOSx Additives

Agra 2018-19

Treatments	Sowing Time				Mean	
	Timely		Late		Yld.	Rk.
	Yld.	Rk.	Yld.	Rk.		
	Yield, q/ha					
Recommended dose of Fertilizer	47.65	6	41.63	6	44.64	6
T1 + FYM @5 t/ha	52.06	4	44.00	4	48.03	4
T1+Mulch@ 6 t/ha	50.02	5	42.94	5	46.48	5
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	52.65	2	44.79	3	48.72	3
T4+ spray of ZnSo4 @ 0.5 %	54.26	1	47.40	1	50.83	1
T4 + Two spray of Kcl @ 0.5 %	52.62	3	45.89	2	49.25	2
MEAN	51.54		44.44		47.99	
	F. Test	S.E.m	C.D.	C.V.(%)		
DOS (A)	**	0.15	0.70	1.37		
INM (B)	**	0.36	1.06	1.82		
B within A	N.S.	0.50	1.50			
A within B		0.49	1.52			

Table 6.5

NWPZ
SPL 3 DOSx Additives

Karnal 2018-19

Treatments	Sowing Time				Mean	
	Timely		Late		Yld.	Rk.
	Yld.	Rk.	Yld.	Rk.		
	Yield, q/ha					
Recommended dose of Fertilizer	64.28	6	50.02	6	57.15	6
T1 + FYM @5 t/ha	64.92	4	50.38	5	57.65	5
T1+Mulch@ 6 t/ha	64.91	5	51.12	4	58.02	4
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	65.32	3	52.06	3	58.69	3
T4+ spray of ZnSo4 @ 0.5 %	66.02	2	52.68	2	59.35	2
T4 + Two spray of Kcl @ 0.5 %	67.94	1	54.60	1	61.27	1
MEAN	65.56		51.81		58.69	
	F. Test	S.E.m	C.D.	C.V.(%)		
DOS (A)	**	0.13	0.59	0.94		
INM (B)	**	0.38	1.13	1.58		
B within A	N.S.	0.54	1.59			
A within B		0.51	1.56			

Table 7.1	NORTH WESTERN PLAIN ZONE			Yield,q/ha	2018-19
SPL-4 Weed management					
Treatments	Durgapura	Ludhiana	Hisar	Agra	Karnal
Halauxifen-methyl Ester+ Florasulam 40.85% WG +Polyglycol 26-2 N	56.50	53.28	55.64	40.33	59.84
Metsulfuron methyl 20 WG + surfactant	50.25	50.03	54.87	44.83	54.86
Carfentrazone 40DF	52.34	54.38	53.36	45.00	55.55
2,4-D Na (80 WP)	42.96	49.73	52.10	44.00	54.86
2,4-D E 38 EC	49.08	50.40	52.89	43.63	56.44
Metsulfuron + Carfentrazone +Surfactant	52.13	56.94	56.73	47.33	61.69
2,4-D Na + Carfentrazone	55.46	53.26	56.02	45.47	55.39
2,4-D E + Carfentrazone	57.50	53.94	56.39	44.62	58.82
Halauxifen methyl + Florasulam+ Carfentrazone+Surfactant	58.21	49.83	57.85	46.67	58.86
Weedy check	39.09	46.37	44.37	35.84	47.15
Weed free	60.67	56.97	58.02	48.75	62.45
G.M.	52.20	52.28	54.39	44.22	56.90
S.E.(M)	1.93	1.40	1.44	0.76	0.63
C.D.	4.72	3.40	3.50	1.84	1.55
C.V.	6.42	4.62	4.57	2.96	1.93

Table 7.2	NORTH EASTERN PLAIN ZONE		Yield, q/ha	2018-19
SPL-4 Weed management				
Treatments	Kanpur	Varanasi	Faizabad	
Halauxifen-methyl Ester+ Florasulam 40.85% WG +Polyglycol 26-2 N	53.34	29.58	43.97	
Metsulfuron methyl 20 WG + surfactant	47.80	29.16	43.84	
Carfentrazone 40DF	46.30	30.12	41.65	
2,4-D Na (80 WP)	49.30	27.57	40.35	
2,4-D E 38 EC	48.35	26.49	38.25	
Metsulfuron + Carfentrazone +Surfactant	50.39	30.97	44.06	
2,4-D Na + Carfentrazone	51.14	32.23	43.10	
2,4-D E + Carfentrazone	50.34	30.91	42.17	
Halauxifen methyl + Florasulam+ Carfentrazone+Surfactant	52.12	34.92	42.42	
Weedy check	42.78	23.69	35.71	
Weed free	54.64	36.22	46.85	
G.M.	49.68	30.17	42.04	
S.E.(M)	0.85	0.37	0.78	
C.D.	2.07	0.90	1.90	
C.V.	2.95	2.13	3.21	

Table 7.3	NORTH HILL ZONE	Yield,q/ha	2018-19
SPL-4 Weed management			
Treatments	Bajaura	Malan	
Halauxifen-methyl Ester+ Florasulam 40.85% WG +Polyglycol 26-2 N	51.30	36.06	
Metsulfuron methyl 20 WG + surfactant	53.97	33.70	
Carfentrazone 40DF	50.00	32.10	
2,4-D Na (80 WP)	49.20	31.15	
2,4-D E 38 EC	50.07	30.28	
Metsulfuron + Carfentrazone +Surfactant	54.03	34.03	
2,4-D Na + Carfentrazone	50.27	32.90	
2,4-D E + Carfentrazone	52.33	33.33	
Halauxifen methyl + Florasulam+ Carfentrazone+Surfactant	52.43	37.90	
Weedy check	46.27	23.04	
Weed free	54.33	35.92	
G.M.	51.29	32.77	
S.E.(M)	1.51	1.69	
C.D.	3.69	4.13	
C.V.	5.11	8.95	

Table 7.4	CENTRAL ZONE	Yield,q/ha	2018-19
SPL-4 Weed management			
Treatments		Udaipur	
Halauxifen-methyl Ester+ Florasulam 40.85% WG +Polyglycol 26-2 N		43.25	
Metsulfuron methyl 20 WG + surfactant		39.81	
Carfentrazone 40DF		39.61	
2,4-D Na (80 WP)		39.91	
2,4-D E 38 EC		41.35	
Metsulfuron + Carfentrazone +Surfactant		42.88	
2,4-D Na + Carfentrazone		42.16	
2,4-D E + Carfentrazone		42.91	
Halauxifen methyl + Florasulam+ Carfentrazone+Surfactant		43.21	
Weedy check		29.04	
Weed free		43.86	
G.M.		40.73	
S.E.(M)		1.90	
C.D.		4.63	
C.V.		8.07	

Table 8.1 **NWPZ** **Durgapura 2018-19**
SPL-5 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	14.10	3	22.53	3	33.07	3	40.77	3	27.62	3
Pusa Hydrogel@ 2.5 kg ha ⁻¹	20.03	1	29.10	1	38.83	1	45.80	1	33.44	1
New Hydrogel @ 2.5 kg ha ⁻¹	18.40	2	27.93	2	37.33	2	43.63	2	31.83	2
MEAN	17.51		26.52		36.41		43.40		30.96	
	F. Test		S.E.m		C.D.		C.V.(%)			
Irrigation (A)	**		0.86		2.98		8.35			
Hydrogel (B)	**		0.64		1.93		7.18			
B within A	N.S.		1.28		3.85					
A within B			1.36		4.07					

Table 8.2 **NWPZ** **Hisar 2018-19**
SPL-5 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	48.12	3	55.89	3	62.51	2	62.56	3	57.27	3
Pusa Hydrogel@ 2.5 kg ha ⁻¹	49.23	2	57.39	2	63.57	1	63.48	2	58.42	2
New Hydrogel @ 2.5 kg ha ⁻¹	49.27	1	61.64	1	61.64	3	63.67	1	59.06	1
MEAN	48.87		58.31		62.58		63.24		58.25	
	F. Test		S.E.m		C.D.		C.V.(%)			
Irrigation (A)	**		1.32		4.58		6.82			
Hydrogel (B)	N.S.		0.85		2.54		5.03			
B within A	N.S.		1.69		5.08					
A within B			1.91		5.74					

Table 8.3

NWPZ Agra 2018-19
SPL-5 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	39.27	3	45.63	3	49.66	3	52.34	3	46.73	3
Pusa Hydrogel@ 2.5 kg ha ⁻¹	43.58	2	49.88	2	54.79	2	58.49	2	51.69	2
New Hydrogel @ 2.5 kg ha ⁻¹	45.70	1	52.20	1	57.25	1	60.83	1	54.00	1
MEAN	42.85		49.24		53.9		57.22		50.80	
	F. Test		S.E.m		C.D.		C.V.(%)			
Irrigation (A)	**		1.11		3.83		6.53			
Hydrogel (B)	**		0.30		0.89		2.02			
B within A	N.S.		0.59		1.78					
A within B			1.21		3.62					

Table 9.1

NHZ Bajaura 2018-19
SPL-6 NutrientXvarieties

Varieties	Nutrient Management							
	FYM 10t/ha		FYM 10t/ha + NPK: 30:40:30		NPK: 60:40:30		Mean	
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, Q/ha							
BHS 400	35.88	1	46.63	1	48.80	1	43.77	1
BHS 352	23.71	5	30.14	5	33.61	5	29.15	5
HBL 113	34.68	2	41.26	2	45.00	2	40.31	2
HBL 713	29.03	4	35.09	4	41.02	4	35.05	4
VLB 118	32.27	3	40.37	3	45.00	2	39.21	3
MEAN	31.11		38.70		42.69		37.50	
	F. Test		S.E.m		C.D.		C.V.(%)	
Nutrient Management (A)	**		1.30		5.11		13.44	
Varieties (B)	**		1.36		3.96		10.84	
B within A	N.S.		2.35		6.85			
A within B			2.47		7.21			

Table 9.2

NHZ Malan 2018-19
SPL-6 NutrientXvarieties

Varieties	Nutrient Management							
	FYM 10t/ha		FYM 10t/ha + NPK: 30:40:30		NPK: 60:40:30		Mean	
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, Q/ha							
BHS 400	26.80	2	30.84	1	35.04	1	30.89	1
BHS 352	23.55	4	27.58	3	31.20	3	27.45	3
HBL 113	26.94	1	29.49	2	32.57	2	29.67	2
HBL 713	23.67	3	26.93	4	29.53	4	26.71	4
VLB 118	22.08	5	25.18	5	27.84	5	25.03	5
MEAN	24.61		28.00		31.24		27.95	
	F. Test		S.E.m		C.D.		C.V.(%)	
Nutrient Management (A)	**		0.18		0.71		2.49	
Varieties (B)	**		0.52		1.53		5.62	
B within A	N.S.		0.91		2.65			
A within B			0.83		2.43			

Table 10.1 **NWPZ Durgapura 2018-19**
SPL-7 Nutrient Management x Varieties

Varieties	Nutrient Management						Mean	
	R DF	FYM 10t/ha + half of the RDF		FYM 15t/ha		Yld.	Rk.	
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
Yield, q/ha								
DWRB101	48.20	3	52.80	1	47.43	2	49.48	2
DWRB123	50.33	1	52.07	2	47.90	1	50.10	1
RD2849	48.50	2	50.97	3	46.13	3	48.53	3
DWRB92	46.80	4	49.73	4	44.87	4	47.13	4
MEAN	48.46		51.39		46.58		48.81	
		F. Test	S.E.m	C.D.	C.V.(%)			
Nutrient Management	(A)	*	0.89	3.48	6.30			
Varieties	(B)	N.S.	1.33	3.96	8.20			
B within A		N.S.	2.31	6.86				
A within B			2.19	6.50				

Table 10.2 **NWPZ Ludhiana 2018-19**
SPL-7 Nutrient Management x Varieties

Varieties	Nutrient Management						Mean	
	R DF	FYM 10t/ha + half of the RDF		FYM 15t/ha		Yld.	Rk.	
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
Yield, q/ha								
DWRB101	36.71	2	32.83	3	23.95	4	31.17	4
DWRB123	35.91	3	32.85	2	29.83	1	32.86	2
RD2849	47.81	1	31.56	4	27.90	2	35.76	1
DWRB92	34.74	4	34.42	1	25.41	3	31.52	3
MEAN	38.79		32.92		26.77		32.83	
		F. Test	S.E.m	C.D.	C.V.(%)			
Nutrient Management	(A)	**	1.08	4.25	11.43			
Varieties	(B)	**	0.69	2.05	6.30			
B within A		**	1.19	3.55				
A within B			1.50	4.45				

Table 10.3 **NWPZ Hisar 2018-19**
SPL-7 Nutrient Management x Varieties

Varieties	Nutrient Management						Mean	
	R DF	FYM 10t/ha + half of the RDF		FYM 15t/ha		Yld.	Rk.	
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
Yield, q/ha								
DWRB101	59.94	2	61.70	1	58.66	1	60.10	1
DWRB123	60.08	1	61.32	2	57.32	2	59.57	2
RD2849	55.32	3	56.69	4	54.83	4	55.61	4
DWRB92	54.41	4	58.73	3	57.08	3	56.74	3
MEAN	57.44		59.61		56.97		58.01	
		F. Test	S.E.m	C.D.	C.V.(%)			
Nutrient Management	(A)	N.S.	0.71	2.80	4.25			
Varieties	(B)	**	0.81	2.42	4.21			
B within A		N.S.	1.41	4.19				

Table 10.4 **NWPZ** **Agra** **2018-19**
SPL-7 Nutrient Management x Varieties

Varieties	Nutrient Management								
	R DF	FYM 10t/ha + half of the RDF				FYM 15t/ha		Mean	
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	
Yield, q/ha									
DWRB101	44.41	4	41.39	4	34.90	4	40.23	4	
DWRB123	50.08	1	44.02	2	41.71	1	45.27	1	
RD2849	48.73	2	45.60	1	40.68	2	45.00	2	
DWRB92	45.99	3	41.73	3	37.78	3	41.83	3	
MEAN	47.30		43.19		38.77		43.09		
F. Test S.E.m C.D. C.V.(%)									
Nutrient Management	(A)	**	0.97	3.81	7.81				
Varieties	(B)	**	0.95	2.84	6.65				
B within A		N.S.	1.65	4.91					
A within B			1.73	5.14					

Table 10.5 **NWPZ** **Karnal** **2018-19**
SPL-7 Nutrient Management x Varieties

Varieties	Nutrient Management								
	R DF	FYM 10t/ha + half of the RDF				FYM 15t/ha		Mean	
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	
Yield, q/ha									
DWRB101	45.29	2	42.58	1	21.36	2	36.41	1	
DWRB123	45.62	1	41.72	2	21.51	1	36.28	2	
RD2849	43.51	3	41.27	3	21.19	3	35.32	3	
MEAN	44.81		41.86		21.35		36.01		
F. Test S.E.m C.D. C.V.(%)									
Nutrient Management	(A)	**	0.23	0.92	1.95				
Varieties	(B)	N.S.	0.37	1.14	3.09				
B within A		N.S.	0.64	1.98					
A within B			0.57	1.77					

Table 10.6 **CZ** **Udaipur** **2018-19**
SPL-7 Nutrient Management x Varieties

Varieties	Nutrient Management								
	R DF	FYM 10t/ha + half of the RDF				FYM 15t/ha		Mean	
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	
Yield, q/ha									
DWRB101	34.85	4	40.39	4	34.17	4	36.47	4	
DWRB123	40.29	2	43.01	2	39.27	2	40.86	2	
RD2849	36.21	3	42.70	3	36.35	3	38.42	3	
DWRB92	42.36	1	44.54	1	40.32	1	42.41	1	
MEAN	38.43		42.66		37.53		39.54		
F. Test S.E.m C.D. C.V.(%)									
Nutrient Management	(A)	*	0.95	3.72	8.30				
Varieties	(B)	*	1.32	3.92	10.01				
B within A		N.S.	2.29	6.79					

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	85.00	72	84.6		55	-	60.67	38.75	-
SILT, (%)	-	53.4	6.35	18.5	7.20		32	-	20.09	26.78	-
CLAY, (%)	-	18.4	6.80	9.5	8.10		14	-	18.09	34.47	-
BULK DENSITY, Mg m ⁻³	1.52	1.54	1.45	1.4	1.45		-	-	1.63	1.46	-
FIELD CAPACITY,(%)	31	-	10.38				-	-	18.50		-
PERMANENT WILTING POINT,(%)	14	-	3.10				-	-	9.50		-
ORGANIC CARBON, (%)	0.6	0.61	0.23	0.35	0.47	0.32	0.40	-	0.35	0.55	-
AVAILABLE N, Kg ha ⁻¹	454	356	175	135		-	-	-	187.40	287.52	-
AVAILABLE P ₂ O ₅ ,kg ha ⁻¹	44	23.5	28.60	17.4	28.55	16.4	18	-	29.80	23.67	-
AVAILABLE K ₂ O,kg ha ⁻¹	226	168	251	275	252.2	225	180	-	311.00	365.15	-
PH (1:2)	5.3	6.4	8.1	7.8	-	8.1	7.5	-	8.40	7.87	-
EC(1:2)	-	5.5	0.24	0.22	-	0.26	0.15	-	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,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.)								40 (01-07 Oct.)							
41 (08-14 Oct.)								41 (08-14 Oct.)							
42 (15-21 Oct.)								42 (15-21 Oct.)							
43 (22-28 Oct)								43 (22-28 Oct)							
44 (29-04 Nov.)	21.8	6.2	91	58	35.4			44 (29-04 Nov.)							
45 (05-11 Nov.)	21.9	2.1	89	37	0			45 (05-11 Nov.)	25.5	8.6	74.3	75.3	5.0		
46 (12-18 Nov.)	18.4	2.6	90	51	29.9			46 (12-18 Nov.)	23.8	8.7	75.3	76.0	12.2		
47 (19-25 Nov.)	22.3	1.4	93	36	0			47 (19-25 Nov.)	22.1	9.1	74.0	77.9	Nil		
48 (26-02 Dec.)	21.1	1.5	90	41	0			48 (26-02 Dec.)	21.7	8.7	70.4	81.6	Nil		
49 (03-09 Dec.)	20.0	-0.7	90	32	0			49 (03-09 Dec.)	21.4	7.4	71.7	81.1	Nil		
50 (10-16 Dec.)	15.3	1.3	92	45	3.6			50 (10-16 Dec.)	21.4	6.7	69.7	77.7	8.4		
51 (17-23 Dec)	19.9	-3.5	92	26	0			51 (17-23 Dec)	21.9	7.5	61.3	57.4	Nil		
52 (24-31 Dec)	17.2	-3.2	92	27	0			52 (24-31 Dec)	22.1	7.6	53.9	50.0	Nil		
1 (01-07 Jan)	14.0	0.9	90	50	12.2			1 (01-07 Jan)	22.3	7.5	68.7	68.7	15.5		
2 (8-14 Jan)	14.4	0.4	92	49	19.4			2 (8-14 Jan)	22.8	7.1	67.7	73.9	4.1		
3 (15-21 Jan)	16.4	1.8	90	42	0.0			3 (15-21 Jan)	22.1	5.8	69.1	75.3	Nil		
4 (22-28 Jan)	11.1	0.4	93	59	48.8			4 (22-28 Jan)	22.6	6.1	69.4	75.7	60.0		
5 (29-04 Feb.)	14.0	0.9	93	49	21.8			5 (29-04 Feb.)	25.3	5.5	69.7	79.0	24.3		
6 (05-11 Feb.)	15.4	2.6	92	46	49.6			6 (05-11 Feb.)	21.9	7.3	72.3	68.3	70.2		
7 (12-18 Feb.)	16.5	4.9	89	65	31.2			7 (12-18 Feb.)	24.0	6.1	73.7	68.3	36.4		
8 (19-25 Feb.)	15.1	4.2	92	59	80.0			8 (19-25 Feb.)	23.0	6.5	72.3	71.3	41.8		
9 (26-04 Mar.)	14.2	3.8	88	53	19.6			9 (26-04 Mar.)	23.8	6.5	73.1	67.7	20.9		
10 (05-11 Mar.)	20.1	4.0	91	38	12.6			10 (05-11 Mar.)	25.9	6.6	71.1	66.6	10.1		
11 (12-18 Mar.)	17.9	4.4	89	45	23.6			11 (12-18 Mar.)	24.5	7.9	70.6	67.1	7.3		
12 (19-25 Mar.)	21.8	6.6	87	45	18.8			12 (19-25 Mar.)	25.3	7.8	73.1	68.6	Nil		
13 (26-01 Apr.)	25.9	7.8	91	30	9.6			13 (26-01 Apr.)	27.7	10.8	72.3	67.4	Nil		
14 (02-08 Apr.)	29.5	9.0	93	40	3.4			14 (02-08 Apr.)	29.0	12.3	72.9	65.6	6.1		
15 (09-15 Apr.)	25.9	9.3	92	39	9.8			15 (09-15 Apr.)	29.4	13.1	75.0	68.6	16.0		
16 (16-22 Apr.)	24.21	10.5	90	63	18.0			16 (16-22 Apr.)	27.9	12.0	75.6	69.9	20.0		
17 (23-29 April)	30.76	11.8	92	42	10.2			17 (23-29 April)	33.5	15.3	77.0	65.7	3.2		
18(30-06 May)	28.9	10.5	92	44	5.6			18(30-06 May)	32.1	17.0	73.3	65.1	Nil		
19 (8-14 May, 19)	29.6	10.1	90	40	7.4			19 (8-14 May, 19)	32.8	15.4	76.7	69.4	Nil		
20 (15-21 May, 19)	28.2	12.6	88	37	14.8			20 (15-21 May, 19)	33.3	14.5	78.3	73.9	19.0		
21 (22-28 May, 19)								21 (22-28 May, 19)	32.8	15.7	78.1	70.7	14.4		

Agra Latitude 27°02' N Longitude 77° 09' E Height above MSL 163.4 m							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	Julian weeks	Temperature,C		RH %		Rainfall	Pan Evap.	Sun Shine
	Max.	Min.	Max.	Min.	mm	mm			Max.	Min.	Max.	Min.	mm	mm	hrs/day
40 (01-07 Oct.)	36.7	22.3	84.90	58.7	5.0	4.50		40 (01-07 Oct.)	34.37	17.16	74.00	41.86	0.00	3.99	8.24
41 (08-14 Oct.)	35.6	20.0	85.10	57.6		3.30		41 (08-14 Oct.)	34.24	17.16	66.43	40.14	0.00	4.03	7.01
42 (15-21 Oct.)	33.3	20.0	83.00	45.80		3.00		42 (15-21 Oct.)	33.96	15.06	64.86	23.00	0.00	4.21	8.77
43 (22-28 Oct)	33.9	16.2	89.00	49.90		4.40		43 (22-28 Oct)	33.46	13.74	64.14	19.57	0.00	4.76	8.31
44 (29-04 Nov.)	32.8	16.3	90.85	47.14		2.42		44 (29-04 Nov.)	32.03	12.57	67.43	27.29	0.00	4.29	8.80
45 (05-11 Nov.)	29.9	11.9	87.57	49.14		2.14		45 (05-11 Nov.)	30.64	9.77	57.43	20.71	0.00	4.03	8.66
46 (12-18 Nov.)	28.6	15.0	86.40	49.00		2.30		46 (12-18 Nov.)	31.13	11.29	69.86	23.86	0.00	3.94	8.31
47 (19-25 Nov.)	27.3	12.8	81.71	54.30		1.90		47 (19-25 Nov.)	30.91	11.00	69.71	26.43	0.00	3.30	8.34
48 (26-02 Dec.)	22.0	10.5	89.10	57.90		1.30		48 (26-02 Dec.)	27.57	8.34	77.00	27.86	0.00	2.30	7.06
49 (03-09 Dec.)	21.5	8.3	100.00	51.60		1.40		49 (03-09 Dec.)	26.04	7.86	80.86	33.57	0.00	2.50	6.50
50 (10-16 Dec.)	21.9	7.9	100.00	66.60		1.00		50 (10-16 Dec.)	23.89	6.96	77.29	30.00	0.00	2.96	7.46
51 (17-23 Dec)	21.1	4.6	96.40	58.10		1.10		51 (17-23 Dec)	24.03	4.07	77.29	26.29	0.00	2.61	7.40
52 (24-31 Dec)	23.1	2.8	96.60	68.30		1.30		52 (24-31 Dec)	23.78	4.06	78.75	23.13	0.00	2.74	8.54
1 (01-07 Jan)	20.2	6.6	86.70	61.90		1.00		1 (01-07 Jan)	25.71	5.79	75.71	22.29	0.00	3.17	7.80
2 (8-14 Jan)	20.3	5.9	86.60	55.10		1.10		2 (8-14 Jan)	23.43	4.94	83.43	29.14	0.00	2.64	7.51
3 (15-21 Jan)	22.1	5.4	91.60	61.90		1.40		3 (15-21 Jan)	26.86	5.64	78.71	20.43	0.00	3.09	8.59
4 (22-28 Jan)	23.8	7.2	91.60	68.60	15.0	1.70		4 (22-28 Jan)	21.57	5.57	80.14	32.71	0.00	3.71	7.33
5 (29-04 Feb.)	25.5	7.9	90.40	69.20		1.40		5 (29-04 Feb.)	22.73	4.90	73.14	28.71	0.00	3.07	7.84
6 (05-11 Feb.)	25.6	10.2	89.40	64.40	3.5	1.40		6 (05-11 Feb.)	23.64	5.44	72.43	31.29	0.00	4.19	6.77
7 (12-18 Feb.)	26.7	10.2	87.40	68.00		1.70		7 (12-18 Feb.)	26.64	8.19	66.57	30.86	0.00	4.16	8.19
8 (19-25 Feb.)	28.7	12.2	88.60	78.00	1.8	2.10		8 (19-25 Feb.)	28.24	11.26	71.86	25.71	0.00	4.90	6.90
9 (26-04 Mar.)	33.0	9.5	82.40	63.60	1.7	1.40		9 (26-04 Mar.)	26.57	9.61	70.14	26.00	1.00	4.96	7.79
10 (05-11 Mar.)	26.7	10.3	83.30	47.90		3.10		10 (05-11 Mar.)	28.10	10.44	68.57	23.57	0.00	6.09	8.86
11 (12-18 Mar.)	28.7	13.4	82.00	49.40		3.00		11 (12-18 Mar.)	28.46	10.79	55.71	22.43	0.00	5.49	7.21
12 (19-25 Mar.)	33.0	16.2	88.70	49.30	0.5	4.30		12 (19-25 Mar.)	32.73	13.07	51.00	19.57	0.00	6.97	8.46
13 (26-01 Apr.)	35.6	17.2	87.70	39.70		4.40		13 (26-01 Apr.)	36.79	15.54	44.57	14.43	0.00	7.16	7.59
14 (02-08 Apr.)	39.6	20.2	86.20	31.40		9.40		14 (02-08 Apr.)	38.96	17.97	35.29	11.57	0.00	8.84	7.81
15 (09-15 Apr.)	40.1	23.9	92.00	33.40		6.30		15 (09-15 Apr.)	39.36	20.11	36.14	13.14	0.00	11.44	8.90
16 (16-22 Apr.)	33.9	20.4	88.60	53.30	22.0	4.60		16 (16-22 Apr.)	33.73	17.74	52.57	32.43	6.00	7.30	8.06
17 (23-29 April)	42.1	24.7	89.70	23.30		7.40		17 (23-29 April)	39.75	22.60	29.00	11.00	0.00	9.15	9.45
18(30-06 May)								18(30-06 May)							

Kanpur 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.					
40 (01-07 Oct.)								40 (01-07 Oct.)	34.4	21.6	87.6	55.4	0.0	46.1	9.3
41 (08-14 Oct.)								41 (08-14 Oct.)	32.4	21.0	88.6	56.6	0.0	39.7	8.3
42 (15-21 Oct.)								42 (15-21 Oct.)	33.8	17.6	83.0	48.1	0.0	38.2	8.4
43 (22-28 Oct)								43 (22-28 Oct)	32.0	15.4	86.0	55.6	0.0	35.6	8.5
44 (29-04 Nov.)	32.1	15.15	81.5	39	-	3	9	44 (29-04 Nov.)	31.9	15.5	89.6	49.9	0.0	40.1	8.7
45 (05-11 Nov.)	28.3	12.7	82.4	44	-	2.8	6.5	45 (05-11 Nov.)	28.6	12.7	92.3	44.6	0.0	51.9	7.4
46 (12-18 Nov.)	29.5	10.6	84	34.2	-	2.6	8.1	46 (12-18 Nov.)	28.6	13.1	92.7	50.6	0.0	50.7	7.2
47 (19-25 Nov.)	28.4	11.5	84.5	34.1	-	2.5	8.6	47 (19-25 Nov.)	27.9	9.6	92.6	42.6	0.0	22.8	7.1
48 (26-02 Dec.)	26.6	10.5	90.1	44.4	8	2.4	5.3	48 (26-02 Dec.)	26.8	11.1	92.4	49.0	0.0	21.0	6.8
49 (03-09 Dec.)	24.8	8.7	89.1	38.4	-	2.4	6.8	49 (03-09 Dec.)	25.1	8.5	92.9	49.3	0.0	19.8	6.3
50 (10-16 Dec.)	22.9	8.3	78.8	47.1	-	2.1	4.4	50 (10-16 Dec.)	24.2	7.6	92.9	45.3	0.0	21.1	6.2
51 (17-23 Dec)	22.3	5.2	87	34.7	-	1.9	7.3	51 (17-23 Dec)	23.1	5.0	94.3	48.4	0.0	20.4	6.8
52 (24-31 Dec)	21	4.5	87.3	34.2	-	1.6	8.3	52 (24-31 Dec)	21.0	3.6	94.0	46.4	0.0	18.1	7.3
1 (01-07 Jan)	22.9	6.6	87.8	46.8	-	1.2	3.3	1 (01-07 Jan)	22.3	5.4	93.3	51.3	0.0	18.7	5.6
2 (8-14 Jan)	21.4	7.2	86.3	43.7	-	1	4.9	2 (8-14 Jan)	22.0	5.8	93.3	50.9	0.0	21.8	6.1
3 (15-21 Jan)	23.1	6	83	40.2	-	1	8	3 (15-21 Jan)	22.7	5.1	93.6	41.9	0.0	23.2	6.9
4 (22-28 Jan)	19.5	10.6	85.1	53.7	13.5	1.1	3.1	4 (22-28 Jan)	20.6	10.6	92.6	59.9	41.0	26.8	4.2
5 (29-04 Feb.)	22.5	8.6	88.3	57	-	1.2	8.6	5 (29-04 Feb.)	21.9	7.1	95.0	54.9	0.0	24.4	7.5
6 (05-11 Feb.)	21.7	10.3	91.2	57.2	10.5	1.2	5.1	6 (05-11 Feb.)	22.4	8.9	93.1	57.1	9.0	24.4	4.4
7 (12-18 Feb.)	23.5	10.2	89.2	57.8	1.7	1.4	5.4	7 (12-18 Feb.)	21.8	9.1	92.6	60.7	2.0	23.0	3.7
8 (19-25 Feb.)	25.9	13.1	85.5	50.5	-	1.3	5.5	8 (19-25 Feb.)	25.6	11.3	86.3	52.1	2.5	31.8	6.9
9 (26-04 Mar.)	22.1	10.6	86.5	57	9.1	1.6	4.9	9 (26-04 Mar.)	22.9	10.1	92.7	52.7	0.0	28.8	6.8
10 (05-11 Mar.)	27.5	12	78	40	-	1.8	9.6	10 (05-11 Mar.)	26.9	11.9	87.1	46.7	0.0	33.2	9.2
11 (12-18 Mar.)	29.7	13.2	80.1	37	-	2.6	7.9	11 (12-18 Mar.)	30.0	12.7	87.1	35.7	0.0	36.2	5.2
12 (19-25 Mar.)	32.2	15.6	70.5	38.8	-	2.2	10.1	12 (19-25 Mar.)	32.3	12.8	86.1	35.0	0.0	38.6	9.5
13 (26-01 Apr.)	30.9	17.2	77.2	41.2	0.4	2.7	9.9	13 (26-01 Apr.)	34.1	17.4	84.6	39.7	5.0	40.5	8.9
14 (02-08 Apr.)	36.7	16.7	69.2	34.7	-	3.2	10.2	14 (02-08 Apr.)	34.6	18.9	80.3	42.4	2.0	44.4	8.5
15 (09-15 Apr.)	36.7	20.6	74.2	41.1	-	3.4	7.8	15 (09-15 Apr.)	36.7	21.3	74.7	38.6	0.0	50.5	9.4
16 (16-22 Apr.)								16 (16-22 Apr.)	34.7	19.2	83.6	49.7	0.0	42.4	8.0
17 (23-29 April)								17 (23-29 April)	40.5	23.3	75.9	30.3	0.0	50.2	9.6
18(30-06 May)								18(30-06 May)	40.0	24.5	78.7	30.6	0.0	50.8	10.0
								19 (8-14 May, 19)	42.4	24.9	65.9	25.3	0.0	56.8	8.7
								20 (15-21 May, 19)	39.6	24.3	60.1	31.6	0.0	56.2	9.4

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.)	34.4	20.0	90	40	0.0	4.2	7.9	40 (01-07 Oct.)	36.8	21.5	60	22	0.0	4.9	
41 (08-14 Oct.)	32.5	15.2	86	43	0.0	3.7	6.8	41 (08-14 Oct.)	36.2	18.8	48	16	0.0	5.8	
42 (15-21 Oct.)	33.4	16.5	72	30	0.0	3.7	7.1	42 (15-21 Oct.)	35.5	18.9	44	15	0.0	4.5	
43 (22-28 Oct.)	31.4	14.4	84	36	0.0	2.9	7.1	43 (22-28 Oct.)	33.7	18.7	38	17	0.0	4.6	
44 (29-04 Nov.)	31.0	15.4	92	44	0.0	2.4	2.1	44 (29-04 Nov.)	33.1	16.7	49	22	0.0	3.7	
45 (05-11 Nov.)	27.4	10.1	90	41	0.0	2.1	3.3	45 (05-11 Nov.)	30.2	11.4	64	13	0.0	3.4	
46 (12-18 Nov.)	27.5	12.7	91	53	0.0	1.9	3.5	46 (12-18 Nov.)	30.7	14.0	65	23	0.0	3.6	
47 (19-25 Nov.)	27.4	10.9	87	44	0.0	2.3	5.8	47 (19-25 Nov.)	30.5	13.1	61	14	0.0	3.1	
48 (26-02 Dec.)	27.2	9.4	93	46	0.0	1.7	5.5	48 (26-02 Dec.)	27.4	12.4	75	28	0.0	2.6	
49 (03-09 Dec.)	24.9	7.5	96	45	0.0	1.2	5.1	49 (03-09 Dec.)	25.7	9.5	87	19	0.0	1.9	
50 (10-16 Dec.)	21.0	7.7	91	57	0.0	1.4	3.6	50 (10-16 Dec.)	24.5	8.0	88	24	9.6	1.4	
51 (17-23 Dec.)	20.7	2.0	93	50	0.0	1.2	6.3	51 (17-23 Dec.)	24.7	7.9	84	26	0.0	1.4	
52 (24-31 Dec.)	19.8	1.9	94	49	0.0	0.9	4.4	52 (24-31 Dec.)	22.5	5.8	81	18	0.0	1.9	
1 (01-07 Jan.)	18.9	5.7	95	66	0.0	0.9	3.3	1 (01-07 Jan.)	23.1	8.4	76	30	0.0	1.9	
2 (8-14 Jan.)	19.3	5.6	93	60	0.0	0.9	4.4	2 (8-14 Jan.)	22.0	8.4	67	28	0.0	2.2	
3 (15-21 Jan.)	20.4	4.9	90	55	0.0	1.0	5.0	3 (15-21 Jan.)	24.2	7.2	69	24	0.0	3.2	
4 (22-28 Jan.)	18.2	4.8	99	63	6.5	1.1	4.6	4 (22-28 Jan.)	19.8	7.2	83	44	7.0	1.8	
5 (29-04 Feb.)	17.1	5.3	96	65	0.0	1.1	3.9	5 (29-04 Feb.)	20.7	7.0	73	29	0.0	2.4	
6 (05-11 Feb.)	21.0	6.9	92	56	0.0	1.6	5.7	6 (05-11 Feb.)	22.4	8.7	54	30	0.0	3.1	
7 (12-18 Feb.)	20.0	9.7	94	66	0.0	1.2	3.1	7 (12-18 Feb.)	24.1	12.3	70	31	0.0	3.6	
8 (19-25 Feb.)	22.2	9.0	89	50	0.0	2.1	5.6	8 (19-25 Feb.)	26.5	14.1	70	34	0.0	4.2	
9 (26-04 Mar.)	20.9	8.0	93	53	14.8	1.9	5.8	9 (26-04 Mar.)	23.5	11.8	65	32	0.0	4.0	
10 (05-11 Mar.)	24.2	8.5	88	38	0.0	2.7	8.2	10 (05-11 Mar.)	27.7	14.7	59	19	0.0	4.9	
11 (12-18 Mar.)	24.9	9.1	91	48	0.0	2.6	6.1	11 (12-18 Mar.)	27.6	15.3	59	30	0.0	4.8	
12 (19-25 Mar.)	28.9	11.8	80	42	0.0	4.0	7.2	12 (19-25 Mar.)	32.3	17.2	55	24	0.0	6.7	
13 (26-01 Apr.)	32.6	13.5	81	28	0.0	3.7	7.3	13 (26-01 Apr.)	36.1	19	45	12	0.0	7.1	
14 (02-08 Apr.)	36.0	16.0	74	28	0.0	5.4	8.0	14 (02-08 Apr.)	37.8	22.1	31	14	0.0	9.3	
15 (09-15 Apr.)	36.9	20.0	69	27	0.0	6.4	7.0	15 (09-15 Apr.)	38.4	25.1	34	18	0.0	9.8	
16 (16-22 Apr.)	32.9	17.2	81	37	8.2	5.8	7.2	16 (16-22 Apr.)	33.1	20.3	56	30	13.8	6.7	
17 (23-29 April)	40.7	20.6	56	18	0.0	8.3	8.5	17 (23-29 April)	40.7	26.8	27	14	0.0	9.8	
18(30-06 May)	41.2	23.0	33	16	0.0	8.3	9.4	18(30-06 May)							

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	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.)	29.1	15.6	89.7	46.7	0.0	5.4	2.1	40 (01-07 Oct.)	32.5	20.5	93.0	47.0	0.0	23.4	1.8
41 (08-14 Oct.)	26.9	11.5	90.3	38.6	0.0	4.6	2.3	41 (08-14 Oct.)	30.8	18.6	85.0	40.0	0.0	26.2	3.7
42 (15-21 Oct.)	26.5	12.8	90.9	41.4	0.0	4.7	1.8	42 (15-21 Oct.)	31.7	16	88.0	33.0	0.0	22.2	1.9
43 (22-28 Oct)	27.0	10.8	88.4	39.9	0.0	7.3	2.1	43 (22-28 Oct)	26.2	14.2	90.0	35.0	0.0	18.4	1.2
44 (29-04 Nov.)	26.1	11.6	90.9	46.4	0.0	5.9	1.4	44 (29-04 Nov.)	29.6	16.2	89.0	44.0	2.6	15	2.9
45 (05-11 Nov.)	23.6	7.4	98.4	44.9	0.0	6.2	1.5	45 (05-11 Nov.)	27.1	11	90.0	33.0	0.0	14.3	1.7
46 (12-18 Nov.)	20.6	7.7	96.9	56.9	14.8	4.7	1.5	46 (12-18 Nov.)	26.4	11.5	91.0	36.0	0.0	13.9	2.8
47 (19-25 Nov.)	20.1	4.2	99.1	53.0	0.0	7.9	1.3	47 (19-25 Nov.)	27.2	9.4	88.0	31.0	0.0	17.2	2.5
48 (26-02 Dec.)	18.4	3.2	100.0	48.0	0.0	6.7	1.1	48 (26-02 Dec.)	25.7	10.1	93.0	34.0	0.0	14.5	1.7
49 (03-09 Dec.)	18.8	5.6	98.6	58.1	0.0	4.5	1.0	49 (03-09 Dec.)	22.6	7.7	95.0	43.0	0.0	8.7	1
50 (10-16 Dec.)	19.8	6.1	98.7	53.3	0.0	5.7	1.3	50 (10-16 Dec.)	20.3	7.4	93.0	50.0	0.0	9	2.6
51 (17-23 Dec)	20.2	5.7	96.6	53.4	0.0	5.4	1.3	51 (17-23 Dec)	20.3	3.6	93.0	39.0	0.0	9.5	1.4
52 (24-31 Dec)	16.7	8.2	100.0	61.1	28.4	5.5	1.9	52 (24-31 Dec)	18.4	2.8	95.0	42.0	0.0	8.9	1.9
1 (01-07 Jan)	17.3	6.9	95.6	72.4	0.0	4.3	1.6	1 (01-07 Jan)	18.2	6.7	92	53	2.0	8.2	2.0
2 (8-14 Jan)	19.4	8.1	98.0	64.9	5.4	5.0	0.5	2 (8-14 Jan)	19.8	6.0	91	45	2.0	9.0	2.9
3 (15-21 Jan)	20.4	9.6	97.4	66.0	2.4	4.3	1.4	3 (15-21 Jan)	19.3	6.2	91	48	46.4	10.9	2.8
4 (22-28 Jan)	21.8	10.8	94.0	61.7	2.8	6.0	2.1	4 (22-28 Jan)	17.2	5.9	94	53	15.6	10.4	2.7
5 (29-04 Feb.)	21.6	8.5	99.1	65.3	15.6	7.0	2.0	5 (29-04 Feb.)	19.1	6.3	93	52	0.0	8.4	2.3
6 (05-11 Feb.)	23.2	8.8	94.3	52.4	0.0	7.9	2.3	6 (05-11 Feb.)	19.4	8.4	92	58	68.4	11.6	4.2
7 (12-18 Feb.)	23.7	9.9	92.1	58.7	2.0	5.8	2.6	7 (12-18 Feb.)	19.9	10.6	91	62	16.4	9.8	3.2
8 (19-25 Feb.)	27.7	12.6	89.7	49.3	0.0	8.2	4.5	8 (19-25 Feb.)	21.1	10.3	91	58	5.4	14.4	4.0
9 (26-04 Mar.)	30.0	13.7	90.4	46.3	0.0	7.7	4.1	9 (26-04 Mar.)	20.0	9.6	89	55	11.4	14.4	3.5
10 (05-11 Mar.)	33.9	16.8	85.1	40.3	0.0	8.3	5.6	10 (05-11 Mar.)	22.7	10.0	87	50	1.4	16.2	3.1
11 (12-18 Mar.)	35.4	18.4	78.6	28.7	0.0	8.4	7.2	11 (12-18 Mar.)	24.6	10.7	90	45	0.0	15.4	2.7
12 (19-25 Mar.)	33.0	18.6	74.7	36.4	1.0	8.0	6.1	12 (19-25 Mar.)	26.9	12.9	87	42	0.0	23.8	3.7
13 (26-01 Apr.)	39.2	21.2	63.3	22.7	6.8	9.1	7.9	13 (26-01 Apr.)	31.1	14.7	88	38	0.0	26.0	2.6
14 (02-08 Apr.)	29.1	15.6	89.7	46.7	0.0	5.4	2.1	14 (02-08 Apr.)	34.3	18.3	83	33	0.0	31.2	2.6
15 (09-15 Apr.)	26.9	11.5	90.3	38.6	0.0	4.6	2.3	15 (09-15 Apr.)	35.0	19.9	70	31	6.6	41.5	5.0
16 (16-22 Apr.)	26.5	12.8	90.9	41.4	0.0	4.7	1.8	16 (16-22 Apr.)	31.3	18.1	77	37	31.2	30.6	3.8
17 (23-29 April)	27.0	10.8	88.4	39.9	0.0	7.3	2.1	17 (23-29 April)	39.3	21.9	58	19	3.8	52.8	4.4
18(30-06 May)								18(30-06 May)	37.7	21.3	42	15	4.5	53.6	4.7

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MALTING QUALITY EVALUATION

The Barley Improvement Unit took up the malting quality 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. The grain samples (500gm) were received from six locations (Hisar, Karnal, Ludhiana, Bathinda, Durgapura and Pantnagar). This year a total of 150 samples were received. There were 13 test entries in IVT (TS) which were analyzed with four checks, in case of AVT (TS), three entries (DWRB 160, DWRB182 and DWRB 184) with five checks were analyzed.

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

State	Location	Trial	No. of Samples
Timely Sown			
Haryana	Hisar	AVT/IVT	25
	Karnal	AVT/IVT	28
Punjab	Ludhiana	AVT/IVT	25
	Bathinda	AVT/ IVT	25
Rajasthan	Durgapura	AVT/IVT	25
Uttarakhand	Pantnagar	AVT/IVT	25
Total			150

The grain samples were analyzed for different malting quality traits (table 2).

Table 2. Malting quality traits analyzed

Grain Quality	Malt Quality
<ul style="list-style-type: none"> - 1000 Grain Weight (g) - Test Weight (kg/hl) - Germinative Energy (at 72 hrs) (%) - Husk Content (%) - Protein Content (%) - Beta glucan (%) - Kernel Plumpness (%) - Proportion of bold grain (on 2.5 mm sieve) - Proportion of thin grain (through 2.2 mm sieve) 	<ul style="list-style-type: none"> - Malt Yield (%) - Malt Friability (%) - Hot Water extract % (F.g.d.b.) - Diastatic Power (^oL) - Wort Filtration rate (ml/hr) - Kolbach Index - Wort Colour (on EBC scale) - Wort pH - Saccharification rate

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 genotype. This year only samples from Karnal, Hisar and Bhatinda could be micro-malted due to break down of micro-malting machine. 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. Grain beta glucan content was done in samples of three locations in case of AVT entries and for two locations in IVT entries. Wort beta glucan was done for two locations in AVT and one location in IVT. 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. The diastatic power was done by the modified method being followed by industry and hence results should be inferred under this light. Hot water extract and other malt quality values should be interpreted in the light that only 100 g sample was micro-malted for each genotype and each location. This gives a relative picture in comparison to checks only and therefore industrial values for bulk processing, may differ.

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, c & d) and Table 5 (a & b) respectively, for timely and late sown trials. The location wise data for each physical and biochemical grain/malt quality parameter are given in annexure 2a and 2b. The mean values were taken for identifying promising lines based on minimum standards determined by the 'NCGMBD' for malt barley in the country.

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 6a and 6b). Thus based on the ten important traits (a maximum possible score of 30), entries were identified as promising. The salient points of this year's results are as below:

- In overall malting quality (comparable or better than checks) based upon ten grain and malt traits, DWRB 182, DWRB 160, BH1025, RD 3008 were found promising.
- Beta glucan content needs to be brought down in new malt varieties and in this regard DWRB 182, KB 1707 and KB 1743 seems to be promising.
- Malt friability was relatively better in DWRB 182, DWRB 184, RD 3008 and BH 1025 as compared to checks.

Table 3. Promising entries* for individual malting quality trait

Traits	Promising entries
Bold Grains (%)	DWRB 160, PL 907, DWRB 199, BH 1025, DWRB 196
Thousand grain weight	DWRB 160, DWRB 196, BH 1025, PL 907, DWRB 199, DWRB 198
Husk Content	RD 3008
Grain Beta glucan	DWRB 182, KB 1743, KB 1707
Malt Friability	DWRB 182, DWRB 184, RD 3008, BH 1025
Hot water extract	RD 3010, DWRB 184

Filtration Rate	PL 907, RD 3009, DWRB 199, RD 3008, RD 3007, DWRB 196
Diastatic Power	DWRB 198, KB 1743, RD 3008, DWRB 199
Kolbach Index	PL 908, DWRB 196, DWRB 197, RD 3008, BH 1025
FAN Content	RD 3009, DWRB 197, RD 3008, RD 3010, RD 3007
Wort beta glucan	DWRB 182, PL 908, KB1743, DWRB197, RD 3008, BH1025, RD 3009
Over all MQ	DWRB 182, DWRB 160, BH1025, RD3008

**Superior or at par to best check*

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

S. No.	Genotype	Test wt (kg/ha)	Bold (%)#	Thin (%)	1000GW (g)	GER (%)	Protein (%)	Husk (%)	Beta glu (%)
1	DWRB160	66 (62-68)	96 (91-99)	0.5 (0.2-1.4)	65 (53-75)	98 (92-100)	9.9 (8.8-11.6)	10.5 (8.7-13.8)	7.7 (7.4-7.9)
2	DWRB182	64 (59-68)	90 (87-94)	1.6 (0.7-2.5)	46 (40-54)	97 (95-99)	10.1 (7.4-12.6)	9.9 (7.4-12.2)	4.8 (4.7-4.8)
3	DWRB184	65 (59-70)	93 (86-97)	1.6 (0.2-5.4)	51 (47-55)	99 (96-100)	10.1 (8.0-13.4)	11.2 (9.2-12.8)	6.2 (6.0-6.5)
4	BH902 (c)*	61 (59-65)	87 (78-94)	3.3 (1.1-6.4)	46 (45-48)	99 (96-100)	9.8 (8.2-11.1)	10.7 (8.1-12.9)	6.0 (5.8-6.3)
5	DWRB 101 (c)	67 (61-71)	92 (87-96)	1.0 (0.2-2.3)	48 (44-50)	98 (94-99)	10.6 (8.9-12.7)	7.7 (6.8-8.2)	5.9 (5.7-6.3)
6	DWRB123 (c)	67 (62-72)	94 (90-98)	0.7 (0.4-1.9)	52 (48-57)	99 (98-100)	10.2 (8.4-11.2)	9.0 (6.3-11.4)	6.4 (6.0-6.7)
7	DWRB137 (c)*	63 (61-66)	91 (87-96)	1.6 (0.8-2.4)	47 (44-50)	98 (95-100)	9.6 (7.5-11.4)	10.4 (8.2-12.8)	6.0 (5.7-6.5)
8	RD2849 (c)	68 (61-72)	94 (91-97)	0.8 (0.2-1.5)	50 (48-54)	98 (96-100)	9.9 (8.8-10.9)	10.4 (8.8-13.7)	5.7 (5.0-6.7)

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

S. No.	Genotype	Frib (%)#	FR (ml/hr)	HWE (%fgdb)	DP (⁰ L)	KI (%)	FAN (ppm)	Wort BG (ppm)
1	DWRB160	50 (45-56)	208 (155-300)	78 (74-81)	75 (75-75)	41 (39-44)	153 (136-171)	1084 (1037-1130)
2	DWRB182	67 (65-69)	251 (208-290)	78 (77-80)	72 (65-81)	39 (37-41)	163 (150-172)	693 (665-722)
3	DWRB184	61 (55-66)	177 (165-190)	79 (77-84)	71 (69-75)	40 (39-41)	165 (133-186)	1081 (1029-1134)
4	BH902 (c)*	55 (42-64)	223 (170-265)	74 (72-75)	76 (70-82)	41 (39-42)	156 (134-188)	1192 (1047-1336)
5	DWRB 101 (c)	60 (59-61)	210 (180-240)	79 (76-82)	70 (69-70)	40 (39-41)	181 (172-191)	1116 (1071-1161)
6	DWRB123 (c)	44 (37-51)	245 (215-300)	77 (72-81)	69 (65-76)	38 (37-40)	144 (138-147)	1339 (1337-1340)
7	DWRB137 (c)*	38 (28-54)	255 (180-300)	71 (70-72)	69 (66-71)	38 (37-40)	148 (136-166)	1341 (1337-1345)
8	RD2849 (c)	59 (49-64)	177 (170-225)	76 (74-79)	74 (70-76)	41 (40-42)	171 (141-199)	1035 (889-1181)

* = six- row barleys # = range in brackets

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

S.No.	Genotype	Test wt (kg/hl)	Bold (%)#	Thin (%)	1000GW (g)	GER (%)	Protein (%)	Husk (%)	Beta glu (%)
1	BH1025	65 (63-69)	96 (93-97)	0.6 (0.3-0.9)	57 (51-61)	99 (94-100)	10.6 (9.9-12.1)	10.5 (8.3-11.8)	5.5 (4.6-6.4)
2	DWRB196	65 (63-67)	96 (84-99)	0.4 (0.1-1.5)	65 (48-76)	99 (96-100)	10.0 (7.9-12.1)	10.3 (7.9-12.4)	7.4 (7.1-7.8)
3	DWRB197	67 (64-70)	94 (91-96)	0.7 (0.1-1.4)	49 (45-55)	99 (96-100)	10.5 (9.1-11.9)	10.6 (9.5-11.4)	6.7 (6.6-6.9)
4	DWRB198	64 (61-70)	94 (91-98)	0.8 (0.4-1.8)	55 (41-67)	99 (97-100)	10.8 (9.7-12.6)	10.9 (9.3-12.4)	6.5 (6.4-6.6)
5	DWRB199	64 (61-69)	96 (88-99)	0.3 (0.1-0.7)	55 (47-63)	99 (98-100)	10.1 (8.7-11.7)	11.0 (8.9-12.9)	5.7 (5.3-6.1)
6	KB1707*	60 (57-63)	79 (63-92)	3.5 (1.4-7.7)	43 (38-50)	98 (96-99)	9.5 (7.9-11.3)	12.3 (9.6-15.5)	4.9 (4.8-4.9)
7	KB1743*	62 (56-67)	86 (67-94)	2.9 (0.6-10.3)	44 (39-50)	99 (96-100)	10.8 (9.4-12.4)	11.4 (9.4-14.4)	4.6 (4.1-5.0)
8	PL907	64 (60-68)	97 (92-99)	0.3 (0.1-0.7)	57 (49-63)	100 (99-100)	11.3 (8.8-12.9)	8.8 (7.1-11.2)	6.0 (5.8-6.1)
9	PL908*	61 (57-66)	93 (91-95)	1.6 (0.6-3.5)	47 (43-51)	99 (99-100)	10.1 (8.1-12.0)	11.0 (8.9-13.5)	5.7 (5.0-6.4)
10	RD3007	65 (63-69)	93 (88-98)	0.8 (0.2-1.6)	52 (47-61)	97 (93-100)	9.9 (8.8-11.3)	10.9 (8.3-13.8)	7.5 (6.9-8.2)
11	RD3008	67 (63-70)	81 (67-89)	2.3 (1.2-4.9)	48 (43-54)	99 (97-100)	10.7 (9.2-12.2)	8.5 (6.4-10.5)	6.3 (5.7-6.9)
12	RD3009	65 (62-70)	90 (84-98)	1.3 (0.3-2.5)	52 (47-60)	100 (98-100)	11.8 (9.9-13.4)	9.9 (7.7-11.6)	5.5 (5.5-5.6)
13	RD3010	68 (65-72)	89 (80-94)	1.3 (0.7-2.3)	47 (42-53)	98 (94-100)	10.4 (8.7-12.4)	10.1 (8.2-13.6)	5.9 (5.6-6.2)
14	BH946 (c)*	61 (55-65)	91 (85-96)	1.3 (0.7-2.2)	44 (37-50)	99 (95-100)	9.0 (7.8-10.5)	12.1 (8.2-15.6)	5.4 (5.1-5.8)
15	DWRB101 (c)	69 (65-74)	95 (90-97)	0.6 (0.2-1.2)	51 (47-55)	98 (89-100)	10.4 (8.2-11.9)	8.6 (6.9-11.0)	5.7 (5.4-6.0)
16	DWRB123 (c)	68 (65-72)	96 (94-98)	0.7 (0.3-1.1)	55 (50-60)	99 (96-100)	10.3 (8.6-11.8)	8.7 (7.1-11.1)	6.1 (6.0-6.2)
17	RD2849 (c)	69 (66-72)	93 (85-97)	0.7 (0.3-2.0)	50 (45-55)	99 (96-100)	9.8 (7.7-10.9)	9.7 (7.8-12.8)	5.5 (5.2-5.8)

* = six- row barleys

= range in brackets

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

S.No.	Genotype	Frib (%)#	FR (ml/hr)	HWE (%fgdb)	DP (°L)	KI (%)	FAN (ppm)	Wort BG (ppm)
1	BH1025	63 (58-68)	163 (150-190)	78 (77-79)	74 (70-76)	41 (39-43)	171 (163-181)	613
2	DWRB196	49 (40-57)	195 (125-300)	77 (75-78)	69 (66-70)	42 (40-43)	164 (144-200)	1274
3	DWRB197	56 (50-63)	157 (110-195)	77 (73-81)	74 (69-82)	41 (41-42)	204 (199-212)	571
4	DWRB198	53 (50-57)	165 (160-175)	78 (74-82)	66 (62-70)	40 (39-41)	177 (168-192)	1140
5	DWRB199	50 (42-56)	202 (150-250)	76 (75-76)	72 (69-76)	40 (39-41)	164 (150-188)	1290
6	KB1707*	53 (49-58)	175 (125-265)	74 (71-76)	77 (69-81)	39 (38-40)	147 (140-156)	804
7	KB1743*	54 (44-61)	178 (135-220)	76 (73-79)	79 (76-82)	40 (39-41)	172 (166-176)	409
8	PL907	54 (46-60)	247 (190-325)	78 (77-80)	74 (69-83)	39 (38-39)	174 (159-183)	1007
9	PL908*	56 (41-69)	183 (125-235)	79 (75-83)	75 (75-76)	43 (40-45)	180 (148-204)	384
10	RD3007	56 (50-62)	200 (130-270)	78 (76-80)	75 (70-82)	41 (38-44)	185 (171-203)	714
11	RD3008	64 (59-69)	202 (180-225)	79 (76-84)	76 (70-81)	41 (40-44)	202 (167-225)	609
12	RD3009	55 (51-57)	212 (175-240)	77 (73-81)	69 (66-70)	40 (38-42)	205 (196-216)	631
13	RD3010	58 (54-63)	187 (175-200)	80 (79-80)	74 (69-82)	38 (37-39)	193 (164-220)	865
14	BH946 (c)*	55 (52-58)	190 (165-205)	75 (72-76)	69 (66-70)	41 (39-43)	161 (154-166)	648
15	DWRB101 (c)	58 (54-63)	173 (160-200)	80 (77-85)	69 (65-76)	38 (36-40)	180 (175-188)	928
16	DWRB123 (c)	49 (43-56)	175 (150-200)	77 (74-81)	67 (65-70)	38 (34-40)	155 (145-164)	1296
17	RD2849 (c)	62 (56-66)	188 (170-220)	78 (76-81)	73 (69-81)	39 (37-41)	166 (150-178)	961

*= six- row barley # = range

Table 5 a. Weighted performances of AVT 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	0	2	2	1	3	20
2	DWRB182	2	2	3	3	0	2	2	3	1	2	20
3	DWRB184	2	3	2	3	0	1	2	1	1	3	18
4	BH902 (c)*	1	3	2	3	0	0	1	2	1	3	16
5	DWRB 101 (c)	3	2	3	3	0	1	2	2	1	3	20
6	DWRB123 (c)	3	3	3	3	0	0	1	2	1	2	18
7	DWRB137 (c)*	1	3	3	3	0	0	0	3	1	2	16
8	RD2849 (c)	3	3	3	3	0	0	1	1	1	3	18

Table 5 b. 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	BH1025	2	3	3	3	0	1	2	1	1	3	19
2	DWRB196	2	3	3	3	0	0	1	1	1	3	17
3	DWRB197	3	3	2	3	0	0	1	1	1	3	17
4	DWRB198	2	3	2	3	0	0	2	1	1	3	17
5	DWRB199	2	3	2	3	0	0	1	2	1	3	17
6	KB1707*	1	2	1	3	0	0	1	1	1	2	12
7	KB1743*	1	3	2	3	0	0	2	1	1	3	16
8	PL907	2	3	3	2	0	0	2	2	1	2	17
9	PL908*	1	3	2	3	0	0	3	1	1	3	17
10	RD3007	2	3	2	3	0	0	2	1	1	3	17
11	RD3008	3	1	3	3	0	1	2	2	1	3	19
12	RD3009	2	2	3	2	0	0	1	2	1	3	16
13	RD3010	3	2	3	3	0	0	2	1	1	2	17
14	BH946 (c)*	1	2	1	3	0	0	1	1	1	3	13
15	DWRB101 (c)	3	3	3	3	0	0	2	1	1	2	18
16	DWRB123 (c)	3	3	3	3	0	0	1	1	1	2	17
17	RD2849 (c)	3	3	3	3	0	1	2	1	1	2	19

*= six- row barleys

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 (⁰L), 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	Uniform plump	Uniform plump
	on 2.5 mm	>90%	>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	4-5 %	4-5 %
	S/T/Ratio	40-44%	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 a: AVT-TS-MALT BARLEY

GRAIN PARAMETERS

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

S.No	Genotype	Karnal	Hisar	Bathinda	Ludhiana	Durgapura	Pantnagar	Mean
1	DWRB160	67	66	53	61	75	70	65
2	DWRB182	45	45	48	40	54	44	46
3	DWRB184	55	53	47	48	49	54	51
4	BH902 (c)*	48	46	45	46	45	46	46
5	DWRB 101 (c)	50	50	44	48	45	48	48
6	DWRB123 (c)	53	53	48	49	57	54	52
7	DWRB137 (c)*	49	45	44	44	49	50	47
8	RD2849 (c)	51	52	48	48	54	50	50
	Mean	52	51	47	48	54	52	

*= 6 row barley

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

S.No	Genotype	Karnal	Hisar	Bathinda	Ludhiana	Durgapura	Pantnagar	Mean
1	DWRB160	68	65	62	65	68	66	66
2	DWRB182	67	64	59	66	68	63	64
3	DWRB184	69	66	59	62	70	64	65
4	BH902 (c)*	65	60	61	60	62	59	61
5	DWRB 101 (c)	71	67	61	68	69	68	67
6	DWRB123 (c)	70	67	62	67	72	67	67
7	DWRB137 (c)*	64	64	62	64	66	61	63
8	RD2849 (c)	71	67	61	69	72	68	68
	Mean	68	65	61	65	68	64	

*= 6 row barley

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

S.No	Genotype	Karnal	Hisar	Bathinda	Ludhiana	Durgapura	Pantnagar	Mean
1	DWRB160	98	97	91	96	99	98	96
2	DWRB182	89	87	89	89	94	94	90
3	DWRB184	92	93	92	96	86	97	93
4	BH902 (c)*	92	78	83	92	81	94	87
5	DWRB 101 (c)	92	93	87	92	94	96	92
6	DWRB123 (c)	94	90	91	96	98	98	94
7	DWRB137 (c)*	93	90	87	87	96	95	91
8	RD2849 (c)	92	91	94	94	97	95	94
	Mean	93	90	89	93	93	96	

*= 6 row barley

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

S.No	Genotype	Karnal	Hisar	Bathinda	Ludhiana	Durgapura	Pantnagar	Mean
1	DWRB160	0.4	0.2	1.4	0.8	0.2	0.2	0.5
2	DWRB182	2.2	1.8	2.5	1.3	1.3	0.7	1.6
3	DWRB184	0.6	0.2	2.6	0.4	5.4	0.4	1.6
4	BH902 (c)*	1.4	6.4	3.2	1.4	6.2	1.1	3.3
5	DWRB 101 (c)	0.6	0.6	2.3	1.1	1.0	0.2	1.0
6	DWRB123 (c)	0.5	0.5	1.9	0.8	0.4	0.4	0.7
7	DWRB137 (c)*	0.8	1.6	2.0	2.2	2.4	0.8	1.6
8	RD2849 (c)	0.8	0.7	1.5	1.0	0.2	0.5	0.8
	Mean	0.9	1.5	2.2	1.1	2.1	0.5	

*= 6 row barley

Table 2.5 a : Germinative energy (% 72hrs) of AVT (TS-MB) entries from different locations

S.No	Genotype	Karnal	Hisar	Bathinda	Ludhiana	Durgapura	Pantnagar	Mean
1	DWRB160	100	92	98	97	100	100	98
2	DWRB182	95	98	97	96	99	99	97
3	DWRB184	98	98	96	100	99	100	99
4	BH902 (c)*	100	96	99	99	98	100	99
5	DWRB 101 (c)	98	99	99	94	99	99	98
6	DWRB123 (c)	100	100	98	98	100	100	99
7	DWRB137 (c)*	96	97	99	95	100	100	98
8	RD2849 (c)	100	97	98	96	99	99	98
	Mean	98	97	98	97	99	100	

* = 6 row barley

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

S.No	Genotype	Karnal	Hisar	Bathinda	Ludhiana	Durgapura	Pantnagar	Mean
1	DWRB160	9.8	8.8	11.6	9.2	10.9	9.0	9.9
2	DWRB182	10.2	10.8	11.7	8.1	12.6	7.4	10.1
3	DWRB184	10.3	9.1	10	9.7	13.4	8.0	10.1
4	BH902 (c)*	8.5	10	10.8	9.9	11.1	8.2	9.8
5	DWRB 101 (c)	10.3	11.5	10.4	9.8	12.7	8.9	10.6
6	DWRB123 (c)	11.2	10.2	11.1	9.3	11.0	8.4	10.2
7	DWRB137 (c)*	9.6	9.9	11.4	9.3	9.7	7.5	9.6
8	RD2849 (c)	10.4	10.2	9.6	9.5	10.9	8.8	9.9
	Mean	10.0	10.1	10.8	9.4	11.5	8.3	

* = 6 row barley # Predicted values through NIR

Table 2.7 a : Husk content (%) of AVT (TS-MB) entries from different locations

S.No	Genotype	Karnal	Hisar	Bathinda	Ludhiana	Durgapura	Pantnagar	Mean
1	DWRB160	10.0	9.7	11.9	13.8	8.7	9.1	10.5
2	DWRB182	9.3	8.0	7.4	10.9	11.3	12.2	9.9
3	DWRB184	9.7	12.1	9.2	11.2	12.8	12.3	11.2
4	BH902 (c)*	11.2	10.1	8.1	12.9	9.8	12.1	10.7
5	DWRB 101 (c)	7.9	8.1	7.8	7.4	6.8	8.2	7.7
6	DWRB123 (c)	8.0	9.5	9.5	11.4	6.3	9.2	9.0
7	DWRB137 (c)*	12.8	9.1	8.2	11.1	9.8	11.5	10.4
8	RD2849 (c)	9.4	10.2	8.8	9.7	13.7	10.6	10.4
	Mean	9.8	9.6	8.9	11.1	9.9	10.6	

* = 6 row barley

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

S.No	Genotype	Karnal	Ludhiana	Hisar	Average
1	DWRB160	7.6	7.4	7.9	7.7
2	DWRB182	4.8	4.7	4.7	4.8
3	DWRB184	6.5	6.0	6.0	6.2
4	BH902 (c)*	5.8	6.3	6.0	6.0
5	DWRB 101 (c)	5.8	6.3	5.7	5.9
6	DWRB123 (c)	6.4	6.7	6.0	6.4
7	DWRB137 (c)*	5.8	6.5	5.7	6.0
8	RD2849 (c)	5.4	6.7	5.0	5.7
	Mean	6.0	6.4	5.9	

* = 6 row barley

MALT PARAMETERS

Table 2.9 a : Malt friability (%) of AVT (TS-MB) entries from different locations

S.No	Genotype	Karnal	Hisar	Bathinda	Mean
1	DWRB160	56	45	51	50
2	DWRB182	69	67	65	67
3	DWRB184	55	66	62	61
4	BH902 (c)*	58	42	64	55
5	DWRB 101 (c)	61	59	60	60
6	DWRB123 (c)	37	44	51	44
7	DWRB137 (c)*	28	32	54	38
8	RD2849 (c)	49	64	64	59
	Mean	52	52	59	

*= 6 row barley

Table 2.10 a : Hot water extract (% fgdb) of AVT (TS-MB) entries from different locations

S.No	Genotype	Karnal	Hisar	Bathinda	Mean
1	DWRB160	78	81	74	78
2	DWRB182	77	80	77	78
3	DWRB184	77	84	77	79
4	BH902 (c)*	75	75	72	74
5	DWRB 101 (c)	79	82	76	79
6	DWRB123 (c)	77	81	72	77
7	DWRB137 (c)*	72	72	70	71
8	RD2849 (c)	74	79	75	76
	Mean	76	79	74	

*= 6 row barley

Table 2.11 a : Wort filtration rate (ml/hr) of AVT (TS-MB) entries from different locations

S.No	Genotype	Karnal	Hisar	Bathinda	Mean
1	DWRB160	170	300	155	208
2	DWRB182	255	290	208	251
3	DWRB184	165	190	175	177
4	BH902 (c)*	265	170	235	223
5	DWRB 101 (c)	180	240	210	210
6	DWRB123 (c)	300	220	215	245
7	DWRB137 (c)*	285	300	180	255
8	RD2849 (c)	170	185	225	177
	Mean	224	237	200	

*= 6 row barley

Table 2.12 a : Saccharification rate (minutes) of AVT (TS-MB) entries from different locations

S.No	Genotype	Karnal	Hisar	Bathinda	Mean
1	DWRB160	5.0	10.0	5.0	6.7
2	DWRB182	5.0	5.0	5.0	5.0
3	DWRB184	5.0	5.0	10.0	6.7
4	BH902 (c)*	5.0	5.0	5.0	5.0
5	DWRB 101 (c)	10.0	10.0	5.0	8.3
6	DWRB123 (c)	5.0	5.0	10.0	6.7
7	DWRB137 (c)*	5.0	5.0	10.0	6.7
8	RD2849 (c)	5.0	5.0	5.0	5.0
	Mean	5.6	6.3	6.9	

*= 6 row barley

Table 2.13 a : Wort pH of AVT (TS-MB) entries from different locations

S.No	Genotype	Karnal	Hisar	Bathinda	Mean
1	DWRB160	6.0	6.0	5.9	6.0
2	DWRB182	5.9	6.0	5.9	5.9
3	DWRB184	5.8	5.9	5.9	5.9
4	BH902 (c)*	6.0	6.0	5.9	5.9
5	DWRB 101 (c)	5.9	5.9	5.9	5.9
6	DWRB123 (c)	6.0	6.0	5.9	6.0
7	DWRB137 (c)*	6.0	6.1	5.9	6.0
8	RD2849 (c)	6.0	5.9	5.8	5.9
	Mean	6.0	6.0	5.9	

*= 6 row barley

Table 2.14 a : Wort colour (EBC method) of AVT (TS-MB) entries from different locations

S.No	Genotype	Karnal	Hisar	Bathinda	Mean
1	DWRB160	2.0	2.0	2.0	2.0
2	DWRB182	2.5	2.0	2.0	2.2
3	DWRB184	2.5	2.0	2.0	2.2
4	BH902 (c)*	2.0	2.0	2.0	2.0
5	DWRB 101 (c)	2.0	2.0	2.0	2.0
6	DWRB123 (c)	2.0	2.0	2.0	2.0
7	DWRB137 (c)*	2.0	2.0	2.0	2.0
8	RD2849 (c)	2.0	2.0	2.0	2.0
	Mean	2.1	2.0	2.0	

*= 6 row barley

Table 2.15 a : Diastatic power (⁰L) of AVT (TS-MB) entries from different locations

S.No	Genotype	Karnal	Hisar	Bathinda	Mean
1	DWRB160	75	75	75	75
2	DWRB182	69	65	81	72
3	DWRB184	75	69	69	71
4	BH902 (c)*	82	70	76	76
5	DWRB 101 (c)	70	69	70	70
6	DWRB123 (c)	76	65	66	69
7	DWRB137 (c)*	70	66	71	69
8	RD2849 (c)	75	76	70	74
	Mean	74	69	72	

*= 6 row barley

Table 2.16 a : Kolbach Index (KI) # of AVT (TS-MB) entries from different locations

S.No	Genotype	Karnal	Hisar	Bathinda	Mean
1	DWRB160	39	44	39	41
2	DWRB182	41	40	37	39
3	DWRB184	39	41	40	40
4	BH902 (c)*	42	40	39	41
5	DWRB 101 (c)	41	39	41	40
6	DWRB123 (c)	38	37	40	38
7	DWRB137 (c)*	40	38	37	38
8	RD2849 (c)	42	41	40	41
	Mean	40	40	39	

*= 6 row barley #NIR predicted values

Table 2.17 a : Wort FAN content (ppm) of AVT (TS-MB) entries from different locations

S.No	Genotype	Karnal	Hisar	Bathinda	Mean
1	DWRB160	171	136	151	153
2	DWRB182	172	150	166	163
3	DWRB184	186	133	176	165
4	BH902 (c)*	146	134	188	156
5	DWRB 101 (c)	191	181	172	181
6	DWRB123 (c)	138	146	147	144
7	DWRB137 (c)*	136	142	166	148
8	RD2849 (c)	141	171	199	171
	Mean	160	149	171	

*= 6 row barley

Table 2.18 a : Wort β -glucan (ppm) of AVT (TS-MB) entries at Karnal

S.No	Genotype	Karnal	Hisar	Mean
1	DWRB160	1037	1130	1084
2	DWRB182	665	722	693
3	DWRB184	1029	1134	1081
4	BH902 (c)*	1047	1336	1192
5	DWRB 101 (c)	1071	1161	1116
6	DWRB123 (c)	1337	1340	1339
7	DWRB137 (c)*	1337	1345	1341
8	RD2849 (c)	1181	889	1035
	Mean	1088	1132	

*= 6 row barley

Table 2.19 a : Malt homogeneity (%) of AVT (TS-MB) entries from different locations

S.No	Genotype	Karnal	Hisar	Bathinda	Mean
1	DWRB160	93	83	81	86
2	DWRB182	96	92	91	93
3	DWRB184	92	91	89	91
4	BH902 (c)*	82	68	94	82
5	DWRB 101 (c)	91	95	84	90
6	DWRB123 (c)	70	79	89	79
7	DWRB137 (c)*	45	49	82	59
8	RD2849 (c)	87	93	93	91
	Mean	82	81	88	

*= 6 row barley

Annexure 2 b: 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	Bathinda	Ludhiana	Durgapura	Pantnagar	Average
1	BH1025	61	60	51	54	60	55	57
2	DWRB196	72	69	48	58	76	69	65
3	DWRB197	54	49	46	45	55	48	49
4	DWRB198	59	54	41	50	67	58	55
5	DWRB199	60	53	51	47	63	56	55
6	KB1707*	44	44	50	38	43	41	43
7	KB1743*	47	39	46	42	50	43	44
8	PL907	59	61	49	49	63	57	57
9	PL908*	48	48	47	43	51	45	47
10	RD3007	55	50	50	47	61	52	52
11	RD3008	49	50	45	43	54	46	48
12	RD3009	54	51	50	47	60	51	52
13	RD3010	47	51	44	42	53	45	47
14	BH946 (c)*	43	44	46	37	50	45	44
15	DWRB101 (c)	50	51	51	49	55	47	51
16	DWRB123 (c)	54	55	53	50	60	55	55
17	RD2849 (c)	51	51	45	47	55	49	50
	Mean	53	52	48	46	57	51	

*= 6 row barley

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

S.No.	Genotype	Karnal	Hisar	Bathinda	Ludhiana	Durgapura	Pantnagar	Average
1	BH1025	69	64	64	64	68	63	65
2	DWRB196	67	66	63	63	67	63	65
3	DWRB197	69	67	66	66	70	64	67
4	DWRB198	65	66	61	62	70	62	64
5	DWRB199	65	63	64	61	69	63	64
6	KB1707*	63	59	62	57	61	58	60
7	KB1743*	66	58	67	59	63	56	62
8	PL907	65	64	64	62	68	60	64
9	PL908*	64	61	60	59	66	57	61
10	RD3007	69	65	63	63	69	64	65
11	RD3008	70	66	66	66	69	63	67
12	RD3009	67	65	65	63	70	62	65
13	RD3010	69	67	65	67	72	66	68
14	BH946 (c)*	63	61	62	58	65	55	61
15	DWRB101 (c)	73	67	65	69	74	67	69
16	DWRB123 (c)	70	66	65	66	72	67	68
17	RD2849 (c)	70	69	66	67	72	68	69
	Mean	67	64	64	63	69	62	

*= 6 row barley

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

S.No.	Genotype	Karnal	Hisar	Bathinda	Ludhiana	Durgapura	Pantnagar	Average
1	BH1025	97	95	93	95	96	97	96
2	DWRB196	99	96	84	98	99	98	96
3	DWRB197	96	96	91	93	95	92	94
4	DWRB198	96	92	91	93	98	97	94
5	DWRB199	97	96	88	97	97	99	96
6	KB1707*	86	74	92	78	63	82	79
7	KB1743*	94	67	87	86	92	92	86
8	PL907	99	97	92	96	98	98	97
9	PL908*	95	91	94	91	95	95	93
10	RD3007	94	91	88	93	98	95	93
11	RD3008	83	82	84	67	89	82	81
12	RD3009	94	85	84	88	98	93	90
13	RD3010	90	93	80	86	94	88	89
14	BH946 (c)*	94	92	85	86	96	95	91
15	DWRB101 (c)	97	96	90	95	97	93	95
16	DWRB123 (c)	97	94	95	95	94	98	96
17	RD2849 (c)	95	90	85	94	97	96	93
	Average	94	90	89	90	94	94	

*= 6 row barley

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

S.No.	Genotype	Karnal	Hisar	Bathinda	Ludhiana	Durgapura	Pantnagar	Average
1	BH1025	0.3	0.7	0.9	0.6	0.6	0.5	0.6
2	DWRB196	0.2	0.3	1.5	0.3	0.2	0.1	0.4
3	DWRB197	0.1	0.5	1.1	0.1	1.4	1.0	0.7
4	DWRB198	0.4	0.9	1.8	0.7	0.4	0.6	0.8
5	DWRB199	0.1	0.3	0.7	0.4	0.2	0.2	0.3
6	KB1707*	1.4	5.1	1.6	3.1	7.7	2.4	3.5
7	KB1743*	0.6	10.3	1.4	2.3	1.6	1.3	2.9
8	PL907	0.1	0.3	0.7	0.3	0.1	0.2	0.3
9	PL908*	0.6	3.5	1.2	1.9	1.5	1.0	1.6
10	RD3007	0.2	1.1	1.6	1.0	0.2	0.7	0.8
11	RD3008	1.3	2.2	2.1	4.9	1.2	2.0	2.3
12	RD3009	0.5	2.5	1.0	2.2	0.3	1.1	1.3
13	RD3010	0.7	0.9	2.2	2.3	1.0	1.0	1.3
14	BH946 (c)*	0.7	1.4	1.9	2.2	1.0	0.7	1.3
15	DWRB101 (c)	0.2	0.4	1.2	0.8	0.4	0.7	0.6
16	DWRB123 (c)	0.3	0.6	0.8	0.9	1.1	0.3	0.7
17	RD2849 (c)	0.5	0.5	2.0	0.8	0.4	0.3	0.7
	Average	0.5	1.8	1.4	1.5	1.1	0.8	

*= 6 row barley

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

S.No.	Genotype	Karnal	Hisar	Bathinda	Ludhiana	Durgapura	Pantnagar	Average
1	BH1025	100	100	94	100	99	99	99
2	DWRB196	99	100	96	100	100	100	99
3	DWRB197	98	96	100	98	100	99	99
4	DWRB198	100	98	97	98	100	100	99
5	DWRB199	98	100	99	98	100	100	99
6	KB1707*	99	97	98	99	96	98	98
7	KB1743*	100	99	97	96	100	100	99
8	PL907	100	100	100	99	100	100	100
9	PL908*	100	99	99	100	99	99	99
10	RD3007	100	98	93	98	99	96	97
11	RD3008	100	100	97	99	99	100	99
12	RD3009	100	98	99	100	100	100	100
13	RD3010	98	99	94	95	100	100	98
14	BH946 (c)*	100	99	95	99	100	99	99
15	DWRB101 (c)	100	99	89	100	99	99	98
16	DWRB123 (c)	98	100	98	99	96	100	99
17	RD2849 (c)	99	99	96	99	100	99	99
	Average	99	99	97	99	99	99	

*= 6 row barley

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

S.No.	Genotype	Karnal	Hisar	Bathinda	Ludhiana	Durgapura	Pantnagar	Average
1	BH1025	10.2	10.1	11.6	9.9	12.1	9.9	10.6
2	DWRB196	7.9	10.2	12.1	9.3	11.6	8.6	10.0
3	DWRB197	9.8	11.9	11.6	9.1	11.5	9.2	10.5
4	DWRB198	9.7	11.5	10.7	10.1	12.6	10.3	10.8
5	DWRB199	9	10.6	11.7	10.2	10.4	8.7	10.1
6	KB1707*	8.6	9.8	11.3	7.9	10.7	8.5	9.5
7	KB1743*	9.4	12.4	11.3	10.4	11.4	9.9	10.8
8	PL907	11.2	11.4	12.3	11.2	12.9	8.8	11.3
9	PL908*	8.8	10.4	11.6	9.5	12	8.1	10.1
10	RD3007	8.9	9.3	11	10.1	11.3	8.8	9.9
11	RD3008	9.2	11.5	10.8	10.6	12.2	10.1	10.7
12	RD3009	11.7	12.4	13.4	11.1	12.1	9.9	11.8
13	RD3010	9.2	10.6	12.4	10.3	11.1	8.7	10.4
14	BH946 (c)*	8.3	9.7	10.5	7.8	8.8	8.6	9.0
15	DWRB101 (c)	10.4	10.5	11.3	10	11.9	8.2	10.4
16	DWRB123 (c)	8.6	10.5	11	10.2	11.8	9.4	10.3
17	RD2849 (c)	8.9	10.2	10.2	10.9	10.9	7.7	9.8
	Mean	9.4	10.8	11.5	9.9	11.5	9.0	

*= 6 row barley

Predicted values through NIR

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	BH1025	10.8	11.5	9.8	10.7	8.3	11.8	10.5
2	DWRB196	10.4	12.4	7.9	10.7	9.6	10.9	10.3
3	DWRB197	9.9	9.5	10.7	11.4	10.8	11.2	10.6
4	DWRB198	9.7	12.4	11.0	11.3	9.3	11.6	10.9
5	DWRB199	9.9	11.6	8.9	12.2	10.2	12.9	11.0
6	KB1707*	9.6	12.4	12.6	14.0	9.7	15.5	12.3
7	KB1743*	9.4	10.2	13.0	10.8	10.8	14.4	11.4
8	PL907	7.9	9.7	7.1	9.5	7.2	11.2	8.8
9	PL908*	12.6	9.0	10.9	10.9	8.9	13.5	11.0
10	RD3007	11.1	8.3	10.1	13.8	10.7	11.6	10.9
11	RD3008	7.1	8.4	9.6	10.5	6.4	9.1	8.5
12	RD3009	11.6	8.1	7.7	11.3	9.2	11.2	9.9
13	RD3010	10.1	9.4	8.2	13.6	8.8	10.7	10.1
14	BH946 (c)*	12.2	10.3	12.5	13.7	8.2	15.6	12.1
15	DWRB101 (c)	6.9	8.9	8.7	11.0	7.9	8.0	8.6
16	DWRB123 (c)	7.1	10.1	7.8	11.1	8.2	7.8	8.7
17	RD2849 (c)	12.8	7.8	9.0	10.6	8.6	9.3	9.7
	Mean	9.9	10.0	9.7	11.6	9.0	11.6	

*= 6 row barley

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

S.No.	Genotype	Karnal	Ludhiana	Average
1	BH1025	4.6	6.4	5.5
2	DWRB196	7.1	7.8	7.4
3	DWRB197	6.6	6.9	6.7
4	DWRB198	6.4	6.6	6.5
5	DWRB199	5.3	6.1	5.7
6	KB1707*	4.8	4.9	4.9
7	KB1743*	4.1	5.0	4.6
8	PL907	5.8	6.1	6.0
9	PL908*	5.0	6.4	5.7
10	RD3007	6.9	8.2	7.5
11	RD3008	5.7	6.9	6.3
12	RD3009	5.5	5.6	5.5
13	RD3010	5.6	6.2	5.9
14	BH946 (c)*	5.1	5.8	5.4
15	DWRB101 (c)	5.4	6.0	5.7
16	DWRB123 (c)	6.2	6.0	6.1
17	RD2849 (c)	5.2	5.8	5.5

*six row barley

MALT PARAMETERS

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

S.No.	Genotype	Karnal	Hisar	Bathinda	Average
1	BH1025	64	68	58	63
2	DWRB196	50	40	57	49
3	DWRB197	63	55	50	56
4	DWRB198	57	52	50	53
5	DWRB199	51	42	56	50
6	KB1707*	58	49	51	53
7	KB1743*	61	44	57	54
8	PL907	46	60	56	54
9	PL908*	69	57	41	56
10	RD3007	62	57	50	56
11	RD3008	69	59	65	64
12	RD3009	57	57	51	55
13	RD3010	63	54	57	58
14	BH946 (c)*	58	52	53	55
15	DWRB101 (c)	63	54	57	58
16	DWRB123 (c)	56	43	49	49
17	RD2849 (c)	63	56	66	62
	Mean	60	53	55	

*= 6 row barley

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

S.No.	Genotype	Karnal	Hisar	Bathinda	Average
1	BH1025	94	94	83	90
2	DWRB196	93	70	88	83
3	DWRB197	93	87	74	85
4	DWRB198	93	93	74	87
5	DWRB199	84	70	83	79
6	KB1707*	83	77	80	80
7	KB1743*	89	79	85	84
8	PL907	79	89	83	84
9	PL908*	90	82	65	79
10	RD3007	98	87	78	88
11	RD3008	96	89	92	92
12	RD3009	90	87	83	86
13	RD3010	94	87	89	90
14	BH946 (c)*	87	80	81	82
15	DWRB101 (c)	98	95	85	93
16	DWRB123 (c)	87	77	86	83
17	RD2849 (c)	94	96	95	95
	Mean	91	85	83	

*= 6 row barley

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

S.No.	Genotype	Karnal	Hisar	Bathinda	Average
1	BH1025	79	79	77	78
2	DWRB196	77	78	75	77
3	DWRB197	78	81	73	77
4	DWRB198	78	82	74	78
5	DWRB199	75	76	76	76
6	KB1707*	74	76	71	74
7	KB1743*	76	79	73	76
8	PL907	78	80	77	78
9	PL908*	79	83	75	79
10	RD3007	80	78	76	78
11	RD3008	84	76	77	79
12	RD3009	79	73	81	77
13	RD3010	79	80	80	80
14	BH946 (c)*	76	76	72	75
15	DWRB101 (c)	85	77	78	80
16	DWRB123 (c)	81	74	76	77
17	RD2849 (c)	81	76	77	78
	Mean	79	78	76	

*= 6 row barley

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

S.No.		Karnal	Hisar	Bathinda	Average
1	BH1025	150	150	190	163
2	DWRB196	300	125	160	195
3	DWRB197	195	165	110	157
4	DWRB198	175	160	160	165
5	DWRB199	250	150	205	202
6	KB1707*	265	125	135	175
7	KB1743*	220	135	180	178
8	PL907	325	225	190	247
9	PL908*	235	125	190	183
10	RD3007	200	130	270	200
11	RD3008	200	225	180	202
12	RD3009	240	175	220	212
13	RD3010	185	175	200	187
14	BH946 (c)*	165	200	205	190
15	DWRB101 (c)	160	160	200	173
16	DWRB123 (c)	200	175	150	175
17	RD2849 (c)	175	170	220	188
	Mean	214	163	186	

*= 6 row barley

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

S.No.	Genotype	Karnal	Hisar	Bathinda	Average
1	BH1025	5.0	10.0	10.0	8.3
2	DWRB196	10.0	10.0	5.0	8.3
3	DWRB197	5.0	5.0	5.0	5.0
4	DWRB198	5.0	10.0	5.0	6.7
5	DWRB199	10.0	5.0	5.0	6.7
6	KB1707*	5.0	5.0	5.0	5.0
7	KB1743*	10.0	5.0	5.0	6.7
8	PL907	5.0	10.0	5.0	6.7
9	PL908*	10.0	5.0	5.0	6.7
10	RD3007	5.0	5.0	5.0	5.0
11	RD3008	5.0	5.0	5.0	5.0
12	RD3009	10.0	10.0	5.0	8.3
13	RD3010	5.0	10.0	5.0	6.7
14	BH946 (c)*	10.0	10.0	5.0	8.3
15	DWRB101 (c)	10.0	5.0	5.0	6.7
16	DWRB123 (c)	5.0	5.0	5.0	5.0
17	RD2849 (c)	10.0	5.0	5.0	6.7
	Mean	7.4	7.1	5.3	

*= 6 row barley

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

S.No.	Genotype	Karnal	Hisar	Bathinda	Average
1	BH1025	6.0	6.0	5.9	6.0
2	DWRB196	6.0	6.0	5.9	6.0
3	DWRB197	5.9	6.0	5.9	5.9
4	DWRB198	6.0	6.0	6.0	6.0
5	DWRB199	6.0	6.0	6.0	6.0
6	KB1707*	6.1	6.1	6.0	6.0
7	KB1743*	6.0	6.0	6.0	6.0
8	PL907	6.0	6.0	6.0	6.0
9	PL908*	6.0	6.0	6.0	6.0
10	RD3007	5.5	5.9	5.9	5.8
11	RD3008	6.0	5.9	5.8	5.9
12	RD3009	4.9	5.9	5.9	5.6
13	RD3010	4.9	6.0	5.9	5.6
14	BH946 (c)*	6.0	5.9	5.9	5.9
15	DWRB101 (c)	5.8	5.9	6.0	5.9
16	DWRB123 (c)	5.2	6.0	6.0	5.7
17	RD2849 (c)	6.1	5.9	6.0	6.0
	Mean	5.8	6.0	5.9	

*= 6 row barley

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

S.No.	Genotype	Karnal	Hisar	Bathinda	Average
1	BH1025	2.0	2.5	2.0	2.2
2	DWRB196	2.0	2.0	2.0	2.0
3	DWRB197	2.0	2.0	2.0	2.0
4	DWRB198	2.0	2.0	2.0	2.0
5	DWRB199	2.0	2.0	2.0	2.0
6	KB1707*	2.0	2.0	2.0	2.0
7	KB1743*	2.0	2.0	2.0	2.0
8	PL907	2.5	2.0	2.0	2.2
9	PL908*	2.5	2.0	2.0	2.2
10	RD3007	2.0	2.0	2.0	2.0
11	RD3008	2.5	2.5	2.0	2.3
12	RD3009	2.0	2.0	2.0	2.0
13	RD3010	2.5	2.0	2.0	2.2
14	BH946 (c)*	2.0	2.0	2.0	2.0
15	DWRB101 (c)	2.0	2.5	2.0	2.2
16	DWRB123 (c)	2.0	2.0	2.5	2.2
17	RD2849 (c)	2.0	2.0	2.0	2.0
	Mean	2.1	2.1	2.0	

*= 6 row barley

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

S.No.	Genotype	Karnal	Hisar	Bathinda	Average
1	BH1025	76	75	70	74
2	DWRB196	70	70	66	69
3	DWRB197	82	69	69	74
4	DWRB198	62	66	70	66
5	DWRB199	69	69	76	72
6	KB1707*	69	81	81	77
7	KB1743*	81	76	82	79
8	PL907	83	70	69	74
9	PL908*	75	76	75	75
10	RD3007	82	70	71	75
11	RD3008	76	81	70	76
12	RD3009	70	70	66	69
13	RD3010	69	69	82	74
14	BH946 (c)*	69	66	70	69
15	DWRB101 (c)	66	76	65	69
16	DWRB123 (c)	66	65	70	67
17	RD2849 (c)	69	69	81	73
	Mean	73	72	73	

*= 6 row barley

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

S.No.	Genotype	Karnal	Hisar	Bathinda	Average
1	BH1025	43	40	39	41
2	DWRB196	43	42	40	42
3	DWRB197	41	41	42	41
4	DWRB198	41	39	39	40
5	DWRB199	39	41	41	40
6	KB1707*	40	39	38	39
7	KB1743*	41	39	40	40
8	PL907	38	39	38	39
9	PL908*	45	45	40	43
10	RD3007	44	41	38	41
11	RD3008	44	40	40	41
12	RD3009	38	42	40	40
13	RD3010	39	39	37	38
14	BH946 (c)*	43	40	39	41
15	DWRB101 (c)	40	36	39	38
16	DWRB123 (c)	40	39	34	38
17	RD2849 (c)	39	41	37	39
	Mean	41	40	39	

*= 6 row barley

Table 2.18 b : FAN content (ppm) in wort of IVT (TS-MB) entries from different locations

S.No.	Genotype	Karnal	Hisar	Bathinda	Average
1	BH1025	163	169	181	171
2	DWRB196	149	144	200	164
3	DWRB197	200	212	199	204
4	DWRB198	171	192	168	177
5	DWRB199	150	153	188	164
6	KB1707*	144	140	156	147
7	KB1743*	176	166	173	172
8	PL907	159	183	181	174
9	PL908*	204	188	148	180
10	RD3007	180	203	171	185
11	RD3008	167	225	214	202
12	RD3009	196	216	201	205
13	RD3010	164	194	220	193
14	BH946 (c)*	154	162	166	161
15	DWRB101 (c)	188	177	175	180
16	DWRB123 (c)	145	156	164	155
17	RD2849 (c)	150	171	178	166
	Mean	168	180	181	

*= 6 row barley

Table 2.18 b : Wort beta glucan content (ppm) of IVT (TS-MB) entries from different locations

S.No.	Genotype	Karnal
1	BH1025	613
2	DWRB196	1274
3	DWRB197	571
4	DWRB198	1140
5	DWRB199	1290
6	KB1707*	804
7	KB1743*	409
8	PL907	1007
9	PL908*	384
10	RD3007	714
11	RD3008	609
12	RD3009	631
13	RD3010	865
14	BH946 (c)*	648
15	DWRB101 (c)	928
16	DWRB123 (c)	1296
17	RD2849 (c)	961
	Mean	832

*= 6 row barley

FEED BARLEY QUALITY EVALUATION

The feed grain samples from various trials grown at different locations were analysed for 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 No. of Samples
IVT (HL)	NWPZ/NEPZ/CZ	Vijapur, Durgapura, Ludhiana, Faizabad, Varansi, Pantnagar, Karnal, Gwalior, Kanpur, Udaipur, Bhagalpur	110
IVT FB (IR)	NWPZ/NEPZ/CZ	Udaipur, Durgapura, Ludhiana, Kanpur, Faizabad, Varansi, Bhagalpur, Pantnagar, Karnal, Gwalior, Hisar, Vijapur,	252
AVT-IR-FB	NEPZ	Kanpur, Faizabad, Varansi, Bhagalpur	24
AVT-SST	NWPZ/NEPZ	Kanpur, Faizabad, Hisar	48
AVT-IR-DP	NEPZ	Kanpur, Faizabad, Varansi, Bhagalpur	20
IVT-RF	NEPZ	Kanpur, Saini Farm (Kanpur), Faizabad, Bhagalpur	64
IVT-RF	NHZ	Bajaura, Shimla, Malan, Almora	84
AVT- DP	NHZ	Shimla, Almora, Bajaura	15
		TOTAL	617

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	IVT/AVT (HL)	NWPZ/NEPZ/CZ	K1149 (c)	PL 891	PL 891	PL 891
2	IVT FB (IR)	NWPZ/NEPZ/CZ	DWRB 203, BH 1023	DWRB137 (c)	DWRB137 (c)	BH 946 (c)
3	AVT (IR)	NEPZ	DWRB 137 ©	DWRB 137 ©	DWRB 137 ©	DWRB 137 ©
4	AVT (SAL/ALK)	NWPZ/NEPZ	KB 1754, HUB 268, HUB 267, RD 3002, KB 1706, RD 3000	DWRB 207, RD 3002, RD 3000, DWRB 201, RD 2999	RD 3002, RD 3000, DWRB 207, KB 1762, HUB 268, DWRB 201	RD 3002, RD 3000, DWRB 207, HUB 268, NDB 1708, DWRB 201
5	AVT-IR-DP	NEPZ	DWRB 137 ©	DWRB 137 ©	DWRB 137 ©	DWB 137 ©
6	IVT-RF	NEPZ	PL910, DWRB203, DWRB202, DWRB200, PL911	PL910 RD3004 NDB1712	RD3004, DWRB202, NDB1712, DWRB200, KB1743, PL911, PL910, KB1762, DWRB203, HUB265	NDB1712 RD3004 DWRB202 KB1743 HUB265 PL910 DWRB200 DWRB203 PL911 RD3005 KB1762
7	IVT-RF	NHZ	HBL 858	BHS 477 VLB 162 HBL 848	UPB 1077	UPB 1077 VLB 164 BHS 477 HBL 851
8	AVT- DP	NHZ	HBL 276 ©	VLB 155	VLB 118 ©	VLB 118 ©

Annexure -1

IVT/AVT- Hulless Barley- NWPZ/NEPZ/CZ

Table 1: Thousand grain weight (g) of different entries

S. No.	Genotype	Karnal	Durgapura	Ludhiana	Pantnagar	Mean	Varansi	Faizabad	Kanpur	Bhagalpur	Mean	Vijapur	Gwalior	Udaipur	Mean	O Mean
1	DWRB188	40.4	56.9	36.5	40.2	43.5	37.1	34.9	36.4	36.2	36.1	30.3	37.0	34.8	34.0	37.9
3	DWRB204	36.1	38.6	52.1	38.9	41.4	35.0	33.1	36.4	40.9	36.4	33.9	35.3	30.1	33.1	37.0
2	DWRB206	32.9	38.8	33.1	39.3	36.0	33.4	28.6	NA	34.3	32.1	31.3	35.5	26.9	31.2	33.1
5	KB1750	33.9	40.2	30.3	37.7	35.6	34.4	32.4	31.3	35.5	33.4	31.8	34.3	29.2	31.8	33.6
7	KB1757	34.2	38.7	31.7	34.5	34.8	29.8	31.8	32.3	34.6	32.1	30.3	24.4	26.0	26.9	31.3
9	PL891	50.0	52.2	42.5	49.4	48.5	40.4	33.6	33.8	46.8	38.7	44.4	46.8	37.5	42.9	43.4
6	UPB1079	33.6	NA	29.0	47.5	36.7	NA	31.3	NA	NA	31.3	37.4	NA	NA	37.4	35.1
4	K1149 (c)	37.5	41.9	45.6	33.7	39.7	34.2	34.4	33.4	33.6	33.9	30.8	34.6	30.3	31.9	35.2
10	Karan16 (c)	36.6	39.8	46.9	37.4	40.2	33.8	34.7	NA	32.9	33.8	40.4	29.3	29.1	33.0	35.6
8	NDB943 (c)	38.5	43.6	49.4	37.7	42.3	37.6	31.8	45.8	36.8	38.0	39.1	36.7	30.5	35.5	38.6
	Average	37.4	43.4	39.7	39.6		35.1	32.7	35.6	36.8		35.0	34.9	30.5		

Table 2: Test weight (kg/ha) of different entries

S. No.	Genotype	Karnal	Durgapura	Ludhiana	Pantnagar	Mean	Varansi	Faizabad	Kanpur	Bhagalpur	Mean	Vijapur	Gwalior	Udaipur	Mean	O Mean
1	DWRB188	75.1	80.1	71.7	67.3	73.5	71.9	70.8	75.1	49.6	66.9	NA	60.4	79.4	69.9	70.1
3	DWRB204	58.4	81.4	68.1	62.7	67.6	57.0	63.1	62.2	51.8	58.5	72.1	51.4	73.7	65.8	64.0
2	DWRB206	59.1	78.5	67.3	61.5	66.6	65.5	55.6	NA	45.5	55.5	62.6	49.2	73.9	61.9	61.3
5	KB1750	65.7	78.3	71.8	59.8	68.9	68.3	63.6	61.6	43.5	59.3	70.9	55.4	78.1	68.1	65.4
7	KB1757	71.7	79.2	70.1	63.7	71.2	64.5	69.5	69.9	48.5	63.1	71.1	51.2	74.6	65.6	66.6
9	PL891	69.8	76.9	73.4	67.6	71.9	66.8	68.2	69.7	56.1	65.2	67.1	64.4	72.1	67.9	68.3
6	UPB1079	70.4	NA	69.2	71.6	70.4	NA	63.1	NA	NA	63.1	76.9	NA	NA	76.9	70.1
4	K1149 (c)	75.8	81.4	73.6	74.8	76.4	75.4	74.2	78.4	46.8	68.7	75.1	67.9	73.4	72.1	72.4
10	Karan16 (c)	67.2	75.5	70.6	65.4	69.7	68.0	67.3	NA	52.8	62.7	67.1	56.8	76.2	66.7	66.4
8	NDB943 (c)	75.4	80.6	73.5	66.4	74.0	74.3	67.4	68.9	50.4	65.2	75.6	59.5	78.6	71.2	70.1
	Average	68.9	79.1	70.9	66.1		68.0	66.3	69.4	49.4		71.0	57.3	75.5		

Table 3: Bold grains (%) of different entries

S. No.	Genotype	Karnal	Durgapura	Ludhiana	Pantnagar	Mean	Varansi	Faizabad	Kanpur	Bhagalpur	Mean	Vijapur	Gwalior	Udaipur	Mean	O Mean
1	DWRB188	65.7	49.2	48.1	58.7	55.4	28.9	20.5	33.8	54.3	34.3	NA	55.6	23.6	39.6	43.1
3	DWRB204	76.5	73.6	50.8	69.5	67.6	58.1	30.5	55.3	80.7	56.1	65.8	70.5	26.3	54.2	59.3
2	DWRB206	53.8	47.0	37.6	68.0	51.6	35.2	34.9	NA	50.6	40.2	27.1	63.5	10.6	33.7	41.8
5	KB1750	60.1	70.5	30.5	60.1	55.3	34.4	36.9	43.1	54.1	42.1	20.7	52.3	7.9	27.0	41.5
7	KB1757	37.3	49.7	30.2	55.5	43.2	17.6	19.3	35.3	51.2	30.9	17.0	41.1	10.6	22.9	32.3
9	PL891	85.1	91.5	59.3	84.0	80.0	45.3	33.1	37.0	70.4	46.4	62.3	71.2	38.3	57.3	61.2
6	UPB1079	30.2	NA	29.5	72.6	44.1	NA	34.6	NA	NA	34.6	52.6	NA	NA	52.6	43.8
4	K1149 (c)	53.6	63.4	28.6	43.8	47.3	32.3	27.8	25.2	46.6	33.0	16.0	38.3	8.2	20.8	33.7
10	Karan16 (c)	45.8	50.3	32.6	52.7	45.3	37.6	35.3	NA	40.0	37.6	48.4	45.3	18.6	37.5	40.1
8	NDB943 (c)	55.3	54.8	35.2	65.4	52.7	39.1	35.4	60.2	66.9	50.4	54.8	63.2	23.2	47.1	50.0
	Average	56.3	61.1	38.2	63.0			30.8	41.4	57.2		40.5	55.7	18.6		

Table 4: Thin grains (%) of different entries

S. No.	Genotype	Karnal	Durgapura	Ludhiana	Pantnagar	Mean	Varansi	Faizabad	Kanpur	Bhagalpur	Mean	Vijapur	Gwalior	Udaipur	Mean	O Mean
1	DWRB188	7.9	13.5	12.6	7.9	10.5	21.0	28.9	19.7	11.1	20.1	NA	10.8	27.6	19.2	16.6
3	DWRB204	3.8	3.8	11.4	6.2	6.3	6.7	23.9	10.8	3.3	11.2	5.6	6.8	22.2	11.5	9.7
2	DWRB206	10.0	4.8	14.4	4.0	8.3	18.7	25.3	NA	10.8	18.3	34.6	6.6	55.4	32.2	19.6
5	KB1750	6.9	6.3	20.6	10.2	11.0	16.5	21.1	14.4	38.4	22.6	26.4	10.8	40.4	25.9	19.8
7	KB1757	17.9	10.9	22.9	10.3	15.5	43.4	34.1	18.3	13.8	27.4	42.0	22.8	48.9	37.9	26.9
9	PL891	1.7	0.7	6.8	1.0	2.5	13.9	21.1	16.1	3.6	13.7	9.0	3.8	19.4	10.7	9.0
6	UPB1079	30.0	NA	36.7	4.5	23.7	NA	30.8	NA	NA	30.8	9.5	NA	NA	9.5	21.3
4	K1149 (c)	5.9	2.7	24.6	11.8	11.3	14.7	15.7	21.8	13.1	16.3	35.4	13.8	48.8	32.7	20.1
10	Karan16 (c)	18.6	12.7	28.0	14.1	18.4	19.7	18.8	NA	22.4	20.3	19.6	23.1	44.1	28.9	22.5
8	NDB943 (c)	4.1	4.3	20.0	4.7	8.3	9.1	20.0	6.5	6.6	10.6	9.0	7.5	31.6	16.0	11.6
	Average	10.7	6.6	19.8	7.5		18.2	24.0	15.4	13.7		21.2	11.8	37.6		

Table 5 : Crude protein content (% dry weight) of different entries

S. No.	Genotype	Karnal	Durgapura	Ludhiana	Pantnagar	Mean	Varansi	Faizabad	Kanpur	Bhagalpur	Mean	Vijapur	Gwalior	Udaipur	Mean	O Mean
1	DWRB188	13.6	10.4	11.2	10.3	11.4	13.4	11.6	12.3	13.9	12.8	NA	12.6	13.8	13.2	12.5
3	DWRB204	10	9.2	9.4	8.7	9.3	9.3	12.4	10.7	14.3	11.7	15.0	10.8	15.3	13.7	11.6
2	DWRB206	11	12.8	10	9.5	10.8	11.2	11.3	NA	13.8	12.1	18.1	11.6	17.4	15.7	12.9
5	KB1750	11	11.2	10.9	9.8	10.7	10.7	11.3	13.0	14.8	12.5	17.1	12.3	15.2	14.9	12.7
7	KB1757	12.4	11.3	11.7	10.2	11.4	11.8	11.3	11.5	14.5	12.3	19.1	11.7	19.0	16.6	13.4
9	PL891	10.1	12	10.1	8.9	10.3	11.6	9.9	11.8	13.3	11.7	16.7	10.8	15.6	14.4	12.1
6	UPB1079	12.8	NA	13.4	9.8	12.0	NA	10.6	NA	NA	10.6	16.9	NA	NA	16.9	13.2
4	K1149 (c)	10.8	12.9	10.7	11.7	11.5	11.4	9.1	11.3	13.0	11.2	17.4	11.2	16.9	15.2	12.6
10	Karan16 (c)	10.8	11.1	9.2	9.4	10.1	10.8	10.4	NA	12.8	11.3	16.2	11.6	15.7	14.5	12.0
8	NDB943 (c)	12.3	10.9	10.5	10.7	11.1	12.3	11.9	10.8	11.5	11.6	16.7	11	17.1	14.9	12.6
	Average	11.5	11.3	10.7	9.9		11.4	11.0	11.6	13.5		17.0	11.5	16.2		

IVT-Feed Barley (Irrigated) - NWPZ/NEPZ/CZ

Table 1: Thousand grain weight (g) of different entries

S. No	Genotype	Hisar	Durga pura	Ludhiana	Karnal	Pantnagar	Mean	Varansi	Kanpur	Faizabad	Bhagalpur	Mean	Udaipur	Vijapur	Gwalior	Mean	O Mean
1	BH1023	41.9	35.1	35.4	41.7	43.1	39.4	39.7	34.9	35.7	43.7	38.5	36.9	42.8	40.4	40.1	39.3
2	BH1024	42.6	47.1	39.9	51.9	41.0	44.5	38.3	36.7	41.9	43.3	40.1	38.3	42.7	42.0	41.0	41.9
3	DWRB203	39.4	43.2	35.6	41.4	40.5	40.0	44.3	38.0	43.1	42.9	42.1	32.1	39.7	55.6	42.5	41.5
4	DWRB205	38.5	41.9	38.6	39.1	43.6	40.3	39.2	40.8	38.4	37.5	39.0	29.2	NA	53.7	41.5	40.3
5	HUB266	44.2	51.7	35.5	41.2	48.8	44.3	52.3	46.3	42.8	46.5	47.0	NA	40.3	41.6	41.0	44.1
6	KB1707	40.4	39.3	36.1	41.8	40.3	39.6	36.9	38.8	36.6	38.7	37.8	NA	34.3	40.3	37.3	38.2
7	KB1713	44.5	50.2	44.0	47.5	45.7	46.4	55.7	40.0	42.4	45.1	45.8	37.5	39.8	44.3	40.5	44.2
8	NDB1709	42.3	44.9	36.8	38.9	40.2	40.6	33.4	40.7	40.9	39.3	38.6	32.7	39.0	38.3	36.7	38.6
9	NDB1723	41.4	47.0	36.8	38.0	42.0	41.1	48.0	40.9	39.0	38.8	41.7	32.8	40.8	40.4	38.0	40.2
10	PL906	43.8	46.1	40.8	46.1	45.8	44.5	42.8	40.2	45.0	49.5	44.4	42.9	51.1	45.2	46.4	45.1
11	PL909	48.1	52.8	42.1	44.2	47.7	47.0	41.5	45.4	43.1	47.2	44.3	36.0	43.2	39.9	39.7	43.7
12	RD2991	48.5	51.6	40.7	41.7	42.1	44.9	47.6	45.2	42.7	38.0	43.4	NA	48.9	38.3	43.6	44.0
13	RD2992	47.2	51.1	37.3	44.5	41.1	44.2	39.1	43.2	38.5	38.2	39.7	42.8	40.9	44.3	42.7	42.2
14	RD2994	47.9	53.3	46.6	49.1	50.3	49.4	45.4	39.9	42.9	52.5	45.2	NA	49.3	48.6	49.0	47.9
15	UPB1077	35.8	44.6	35.6	32.3	34.5	36.6	31.1	36.2	36.7	39.4	35.9	40.6	34.8	36.3	37.2	36.5
16	UPB1080	40.0	41.9	35.0	37.5	57.0	42.3	36.1	36.2	39.2	44.5	39.0	29.8	40.1	36.9	35.6	39.0
17	BH 946 (c)	43.3	46.8	37.6	43.4	44.6	43.1	49.0	39.8	40.2	43.0	43.0	40.7	44.8	39.7	41.7	42.6
18	DWRB137 (c)	49.7	55.4	41.7	46.6	51.0	48.9	45.9	42.7	45.8	52.0	46.6	42.0	53.9	49.2	48.4	48.0
19	RD2552 (c)	42.5	48.1	39.2	38.4	43.2	42.3	53.1	40.0	38.0	40.1	42.8	36.9	39.4	39.3	38.6	41.2
20	RD2786 (c)	46.4	51.9	43.4	46.3	46.4	46.9	55.8	48.2	42.5	40.3	46.7	40.7	NA	39.0	39.9	44.5
21	RD2899 (c)	45.2	51.3	44.0	48.8	45.4	46.9	41.0	41.9	37.4	45.8	41.5	40.5	41.5	43.4	41.8	43.4
	Average	43.5	47.4	39.2	42.9	44.5		43.6	40.8	40.6	43.2		37.2	42.5	42.7		

Table 2: Test weight (kg/hl) of different entries

S. No	Genotype	Hisar	Durga pura	Ludhiana	Karnal	Pantnagar	Mean	Varansi	Kanpur	Faizabad	Bhagalpur	Mean	Udaipur	Vijapur	Gwalior	Mean	O Mean
1	BH1023	62.9	64.4	62.4	63.0	61.3	62.8	86.9	60.4	59.0	54.5	65.2	74.5	61.3	57.3	64.4	64.1
2	BH1024	64.2	67.3	64.8	60.4	61.3	63.6	63.5	60.9	63.8	57.6	61.5	73.8	60.4	59.5	64.6	63.2
3	DWRB203	65.2	72.1	65.4	67.3	61.3	66.2	59.5	65.5	65.7	57.6	62.1	72.4	60.4	61.9	64.9	64.4
4	DWRB205	61.6	70.1	63.4	60.8	59.4	63.1	53.6	59.5	56.3	46.7	54.0	66.4	NA	50.1	58.3	58.5
5	HUB266	66.6	78.8	66.0	63.2	63.2	67.6	62.6	60.9	64.4	60.0	62.0	NA	60.1	61.2	60.6	63.4
6	KB1707	58.5	59.1	60.9	60.9	56.1	59.1	52.3	58.4	57.9	51.2	54.9	NA	48.5	54.9	51.7	55.2
7	KB1713	60.7	65.7	61.4	64.1	59.1	62.2	64.6	61.1	60.1	52.5	59.6	72.7	58.6	55.4	62.3	61.3
8	NDB1709	62.6	67.3	65.2	63.7	59.8	63.7	57.8	62.5	62.8	53.8	59.2	71.9	60.0	60.6	64.2	62.4
9	NDB1723	59.8	66.2	58.7	61.1	56.6	60.5	55.4	60.4	60.3	51.8	56.9	70.9	55.3	56.3	60.8	59.4
10	PL906	59.8	66.0	62.0	63.1	58.3	61.9	58.9	61.1	60.2	56.8	59.2	74.9	64.4	58.1	65.8	62.3
11	PL909	62.1	67.1	62.3	62.2	59.4	62.6	57.3	60.8	61.2	54.0	58.3	75.7	58.6	54.4	62.9	61.3
12	RD2991	63.9	66.3	64.7	63.8	58.6	63.4	55.8	61.1	61.9	49.6	57.1	NA	61.3	55.1	58.2	59.6
13	RD2992	61.2	66.4	66.3	61.3	57.4	62.5	53.1	59.5	54.9	47.8	53.8	74.8	57.9	54.4	62.4	59.6
14	RD2994	62.1	67.2	67.2	63.1	58.7	63.7	63.0	60.3	58.8	54.1	59.0	NA	63.2	56.1	59.7	60.8
15	UPB1077	61.2	68.0	63.3	58.1	59.1	61.9	83.4	59.3	60.3	54.8	64.5	73.3	52.6	55.5	60.5	62.3
16	UPB1080	63.9	67.9	61.9	62.9	62.5	63.8	61.9	63.4	63.5	55.5	61.1	65.7	61.7	56.1	61.1	62.0
17	BH 946 (c)	59.1	69.9	61.9	59.7	57.6	61.6	56.8	59.3	59.9	50.1	56.5	73.9	57.5	52.6	61.3	59.8
18	DWRB137 (c)	63.6	68.3	64.2	63.6	60.8	64.1	62.9	60.1	62.1	55.7	60.2	75.3	66.1	60.3	67.2	63.8
19	RD2552 (c)	61.6	70.0	59.7	60.7	56.6	61.7	55.4	59.8	59.4	50.4	56.2	75.2	57.2	55.1	62.5	60.1
20	RD2786 (c)	61.2	67.1	62.8	65.7	60.0	63.4	60.4	62.1	60.8	54.3	59.4	72.7	NA	57.3	65.0	62.6
21	RD2899 (c)	61.4	67.8	61.0	63.2	55.7	61.8	56.5	60.6	56.1	53.1	56.6	72.1	58.7	56.5	62.4	60.3
	Average	62.1	67.8	63.1	62.5	59.2		61.0	60.8	60.4	53.4		72.7	59.1	56.6		

Table 3: Bold grains (%) of different entries

S. No	Genotype	Hisar	Durga pura	Ludhiana	Karnal	Pantnagar	Mean	Varansi	Kanpur	Faizabad	Bhagalpur	Mean	Udaipur	Vijapur	Gwalior	Mean	O Mean
1	BH1023	76.9	52.4	68.1	79.1	85.4	72.4	46.8	58.6	44.1	80.5	57.5	69.0	55.7	63.1	62.6	64.1
2	BH1024	84.6	81.3	69.2	65.2	75.6	75.2	78.3	66.1	74.9	85.2	76.1	75.5	63.0	70.9	69.8	73.7
3	DWRB203	75.5	88.2	76.6	87.9	87.2	83.1	92.5	68.8	83.1	84.5	82.2	50.6	53.8	68.0	57.5	74.2
4	DWRB205	68.9	69.9	70.8	79.3	90.5	75.9	82.6	65.1	62.3	74.2	71.1	31.9	NA	74.5	53.2	66.7
5	HUB266	91.3	95.2	77.9	74.0	94.3	86.5	80.1	71.9	84.0	93.0	82.3	NA	59.8	81.2	70.5	79.8
6	KB1707	64.6	47.3	68.5	82.3	74.7	67.5	51.7	57.1	54.3	48.8	53.0	NA	32.5	58.8	45.6	55.4
7	KB1713	93.2	94.1	91.1	94.9	92.9	93.2	77.3	83.3	76.5	89.7	81.7	79.1	74.1	85.8	79.7	84.9
8	NDB1709	72.3	70.7	71.4	73.1	91.1	75.7	39.6	53.9	53.7	47.4	48.7	51.6	41.9	55.5	49.7	58.0
9	NDB1723	60.6	75.4	67.1	57.5	65.2	65.2	48.4	56.7	55.5	47.5	52.0	53.3	37.9	55.0	48.7	55.3
10	PL906	85.4	77.1	84.9	88.5	90.6	85.3	80.3	69.8	78.9	93.3	80.6	88.8	86.1	87.4	87.4	84.4
11	PL909	92.5	96.1	89.2	89.9	96.0	92.8	85.4	84.3	78.7	91.2	84.9	84.1	71.8	81.0	79.0	85.6
12	RD2991	90.1	92.2	78.7	80.7	85.7	85.5	61.7	75.4	62.5	60.6	65.1	NA	77.7	63.1	70.4	73.6
13	RD2992	93.4	98.0	81.5	93.8	81.8	89.7	80.1	86.3	84.6	75.7	81.7	90.5	32.3	88.4	70.4	80.6
14	RD2994	89.5	93.3	86.1	92.6	88.6	90.0	89.5	71.9	69.7	94.2	81.3	NA	86.3	87.3	86.8	86.0
15	UPB1077	77.5	92.5	82.3	64.4	80.3	79.4	47.1	70.1	78.2	89.2	71.1	81.9	54.6	72.5	69.7	73.4
16	UPB1080	74.8	74.4	62.0	69.0	72.0	70.5	69.1	55.0	67.5	75.9	66.9	26.5	62.2	48.5	45.7	61.0
17	BH 946 (c)	91.8	94.9	85.4	93.9	93.6	91.9	85.5	80.9	83.9	85.0	83.8	86.4	79.4	80.6	82.1	85.9
18	DWRB137 (c)	93.4	95.6	85.1	90.3	86.2	90.1	93.3	78.8	90.3	95.6	89.5	85.1	93.4	90.3	89.6	89.7
19	RD2552 (c)	82.5	89.7	81.3	76.4	84.0	82.8	70.7	72.0	66.9	73.4	70.7	81.1	53.7	71.7	68.9	74.1
20	RD2786 (c)	91.7	96.7	92.5	92.7	92.2	93.2	90.0	89.0	83.1	76.7	84.7	88.2	NA	71.8	80.0	85.9
21	RD2899 (c)	90.0	95.9	92.3	94.3	94.4	93.4	91.1	82.9	65.1	89.5	82.2	88.4	43.1	85.2	72.2	82.6
	Average	82.9	84.3	79.1	81.9	85.8		73.4	71.3	71.3	78.6		71.3	61.0	73.4		

Table 4: Thin grains (%) of different entries

S. No	Genotype	Hisar	Durga pura	Ludhiana	Karnal	Pantnagar	Mean	Varansi	Kanpur	Faizabad	Bhagalpur	Mean	Udaipur	Vijapur	Gwalior	Mean	O Mean
1	BH1023	4.8	22.7	9.1	5.5	2.7	9.0	5.9	13.2	19.9	3.6	10.7	7.1	15.2	12.8	11.7	10.5
2	BH1024	2.8	4.8	9.3	10.8	4.2	6.4	3.4	9.0	5.2	2.4	5.0	7.7	13.1	6.6	9.1	6.8
3	DWRB203	3.8	3.2	5.2	2.8	2.6	3.5	1.3	7.4	3.1	2.9	3.7	20.5	16.2	9.3	15.4	7.5
4	DWRB205	6.0	2.3	6.7	5.3	1.6	4.4	3.3	7.8	8.2	6.4	6.4	29.7	NA	4.4	17.0	9.3
5	HUB266	1.4	0.5	6.0	9.9	1.6	3.9	2.6	7.4	3.2	1.3	3.6	NA	14.8	4.1	9.4	5.7
6	KB1707	5.5	19.8	6.3	3.0	4.2	7.8	8.6	10.4	10.2	10.8	10.0	NA	32.5	7.4	19.9	12.6
7	KB1713	1.4	1.1	1.5	1.0	1.0	1.2	3.1	5.0	5.0	1.7	3.7	6.4	9.0	4.4	6.6	3.8
8	NDB1709	5.0	2.5	4.3	4.3	0.9	3.4	15.0	7.5	8.4	9.2	10.0	10.0	19.9	9.2	13.0	8.8
9	NDB1723	8.9	3.1	8.7	13.9	7.4	8.4	14.9	12.0	12.0	16.4	13.8	17.5	26.0	11.5	18.3	13.5
10	PL906	3.5	7.6	2.7	2.3	1.5	3.5	4.2	8.2	5.8	0.9	4.8	2.4	2.9	3.4	2.9	3.7
11	PL909	1.3	0.6	2.2	3.6	0.8	1.7	3.1	4.2	4.3	1.9	3.4	3.4	9.9	5.6	6.3	3.8
12	RD2991	2.0	1.5	4.9	4.9	2.5	3.1	8.2	6.2	8.9	8.7	8.0	NA	5.3	10.2	7.8	6.3
13	RD2992	1.0	0.2	4.5	1.1	2.7	1.9	3.8	2.9	2.8	4.4	3.5	2.1	5.5	3.1	3.6	3.0
14	RD2994	1.4	2.0	2.4	1.7	2.6	2.0	1.5	8.8	7.9	0.7	4.7	NA	2.6	3.1	2.8	3.2
15	UPB1077	4.1	1.2	3.4	13.1	28.2	10.0	4.0	6.1	4.5	0.8	3.8	5.5	15.1	7.6	9.4	7.7
16	UPB1080	3.1	5.5	8.2	4.3	4.4	5.1	3.2	8.0	5.1	2.1	4.6	34.6	8.6	11.3	18.1	9.3
17	BH 946 (c)	1.2	0.7	2.3	0.9	0.7	1.2	1.4	2.7	2.3	2.4	2.2	2.1	4.3	3.9	3.4	2.2
18	DWRB137 (c)	0.9	0.4	4.0	1.8	3.7	2.2	1.2	5.2	2.2	0.8	2.3	4.3	1.0	1.8	2.4	2.3
19	RD2552 (c)	3.7	2.2	3.6	7.5	2.8	4.0	8.4	7.6	8.6	5.7	7.6	5.3	16.9	9.4	10.5	7.4
20	RD2786 (c)	1.3	0.6	1.1	1.2	1.5	1.1	1.5	1.9	3.0	4.5	2.7	2.8	NA	7.1	5.0	2.9
21	RD2899 (c)	1.8	0.6	1.5	0.5	1.0	1.1	1.7	5.1	8.7	2.2	4.4	2.8	4.8	3.5	3.7	3.1
	Average	3.1	3.9	4.6	4.7	3.7		4.8	7.0	6.6	4.3		9.6	11.8	6.7		

Table 5 : Crude protein content (% dry weight) of different entries

S. No	Genotype	Hisar	Durga pura	Ludhiana	Karnal	Pantnagar	Mean	Varansi	Kanpur	Faizabad	Bhagalpur	Mean	Udaipur	Vijapur	Gwalior	Mean	O Mean
1	BH1023	7.9	12.2	9.9	8.6	7.2	9.2	10.2	8.4	8.6	9.3	9.1	11.5	13.3	7.9	10.9	9.7
2	BH1024	8.7	10.7	11.3	9.7	8.2	9.7	9.1	9.5	8.3	9.7	9.2	14.4	15	8.7	12.7	10.5
3	DWRB203	10.2	9.9	9.5	9.5	7.9	9.4	8.4	9.9	9.3	8.6	9.1	13.3	14.9	10.2	12.8	10.4
4	DWRB205	10.2	11.1	9.7	11.1	8.8	10.2	9.8	10.6	9.2	10.9	10.1	12.7	NA	10.2	11.5	10.6
5	HUB266	9.3	9.6	10.3	11.6	7.3	9.6	11.1	9.2	8.1	8.8	9.3	NA	16.6	9.3	13.0	10.6
6	KB1707	9.5	12.7	10.3	8.9	7.6	9.8	10.3	10.5	8.2	10.4	9.9	NA	17.2	9.5	13.4	11.0
7	KB1713	8.6	10.2	9.0	9.0	7.8	8.9	9.1	8.5	8.4	9.3	8.8	11.9	14.5	8.6	11.7	9.8
8	NDB1709	10.2	10.1	9.8	9.1	7.3	9.3	11.4	8.6	7.8	9.2	9.3	14.5	17.1	10.2	13.9	10.8
9	NDB1723	8.9	9.1	9.1	9.6	8.9	9.1	9.4	8.5	7.7	10.1	8.9	12.6	16	8.9	12.5	10.2
10	PL906	8.6	10.8	9.1	9.8	7.8	9.2	8.5	8.6	8.1	10.5	8.9	12	12.8	8.6	11.1	9.8
11	PL909	8.8	10.8	10.2	10.2	8.2	9.6	9.5	8.7	7.8	9.4	8.9	11.6	13.7	8.8	11.4	10.0
12	RD2991	10.4	9.4	9.8	10.2	7.7	9.5	9.5	9.2	7.0	9.4	8.8	NA	14.2	10.4	12.3	10.2
13	RD2992	10.4	9.0	8.8	8.9	7.7	9.0	9.7	9.1	7.1	10.6	9.1	11.9	14.1	10.4	12.1	10.1
14	RD2994	8.4	8.9	9.4	9.6	8.2	8.9	9.0	9.2	9.3	10.6	9.5	NA	13.1	8.4	10.8	9.7
15	UPB1077	11.1	9.3	9.4	11.4	7.9	9.8	9.1	9.4	8.1	8.4	8.8	12.7	15.2	11.1	13.0	10.5
16	UPB1080	10.5	10.8	12.0	10.2	8.8	10.5	10.5	10.3	9.1	10.7	10.2	12.9	15.1	10.5	12.8	11.1
17	BH 946 (c)	10.3	9.6	10.3	8.6	8.3	9.4	9.1	9.2	7.6	9.8	8.9	12.3	14.3	10.3	12.3	10.2
18	DWRB137 (c)	9.1	8.4	8.6	9.7	7.7	8.7	9.2	8.8	7.9	9.6	8.9	12.4	13.7	9.1	11.7	9.8
19	RD2552 (c)	8.7	8.8	8.7	8.9	8.2	8.7	8.3	8.6	7.3	9.0	8.3	11.6	14.2	8.7	11.5	9.5
20	RD2786 (c)	10.0	9.3	10.0	9.3	7.5	9.2	9.4	9.1	9.0	10.2	9.4	11.8	NA	10	10.9	9.8
21	RD2899 (c)	9.1	9.4	8.5	8.3	8.5	8.8	7.8	8.9	8.5	9.2	8.6	12.9	14.6	9.1	12.2	9.9
	Average	9.5	10.0	9.7	9.6	8.0		9.4	9.2	8.2	9.7		12.5	14.7	9.5		

AVT-IR-FB-NEPZ

Table 1: Thousand grain weight (g) & test weight (kg/hl)

S. No.	Genotype	Thousand Grain Weight					Test Weight				
		Kanpur	Faizabad	Varansi	Bhagalpur	Mean	Kanpur	Faizabad	Varansi	Bhagalpur	Mean
1	RD2969	42.5	35.9	40.6	35.4	38.6	59.8	57.5	52.6	51.5	55.3
2	DWRB137 (c)	40.0	41.9	49.3	40.6	43.0	59.6	60.2	61.8	53.1	58.7
3	HUB113 (c)	39.2	34.5	39.7	31.2	36.2	59.5	58.4	55.3	48.9	55.5
4	K1055 (c)	39.6	30.6	42.7	27.4	35.1	61.3	55.5	58.7	46.5	55.5
5	K508 (c)	35.2	33.2	36.5	28.1	33.3	61.4	60.5	59.8	51.6	58.3
6	RD 2552 (c)	36.7	31.2	35.5	29.9	33.3	59.3	55.8	53.9	47.9	54.2
	Mean	38.9	34.5	40.7	32.1		60.1	58.0	57.0	49.9	

Table 2: Bold grain (%) & thin grains (%)

S. No.	Genotype	Bold Grains					Thin Grain				
		Kanpur	Faizabad	Varansi	Bhagalpur	Mean	Kanpur	Faizabad	Varansi	Bhagalpur	Mean
1	RD2969	89.2	57.6	80.4	74.6	75.4	2.9	12.3	3.9	8.1	6.8
2	DWRB137 (c)	79.0	79.6	93.8	87.3	84.9	4.7	4.7	0.9	2.9	3.3
3	HUB113 (c)	70.8	53.1	79.2	49.9	63.2	9.5	17.2	5.3	19.6	12.9
4	K1055 (c)	67.4	37.7	65.8	28.8	49.9	7.1	25.3	6.9	31.7	17.8
5	K508 (c)	70.2	51.9	74.5	44.4	60.3	6.1	11.1	4.1	18.7	10.0
6	RD 2552 (c)	75.6	42.7	66.6	41.2	56.5	5.8	24.3	10.8	28.9	17.5
	Mean	75.4	53.8	76.7	54.4		6.0	15.8	5.3	18.3	

Table 3: Crude protein content (% dwt)

S. No.	Genotype	Kanpur	Faizabad	Varansi	Bhagalpur	Mean
1	RD2969	9.3	11.1	10.0	12.5	10.7
2	DWRB137 (c)	8.4	9.4	9.1	11.1	9.5
3	HUB113 (c)	9.0	9.3	9.4	11.5	9.8
4	K1055 (c)	9.1	12.1	8.8	15.7	11.4
5	K508 (c)	9.5	9.1	9.4	12.9	10.2
6	RD 2552 (c)	8.4	9.9	9.2	12.1	9.9
	Mean	9.0	10.2	9.3	12.6	

AVT-SAL/ALK- NEPZ,CZ & NWPZ

Table 1: Thousand grain weight (g)

SR.NO	Genotype	Hisar	Kanpur	Faizabad	Mean
1	DWRB 201	40.6	56.2	38.86	45.2
2	DWRB 207	47.5	53.6	41.26	47.5
3	HUB 267	40.1	41.3	37.14	39.5
4	HUB 268	43.7	38.7	41.86	41.4
5	KB 1706	41.3	56.0	31.2	42.8
6	KB 1754	37.9	54.1	26.54	39.5
7	KB 1762	45.5	39.2	37.54	40.7
8	NDB 1708	43.4	38.7	37.36	39.8
9	RD 2999	41.2	59.9	29.8	43.6
10	RD 3000	48.9	44.6	43.56	45.7
11	RD 3002	51.4	45.4	42.72	46.5
12	NDB 1173 (c)	43.1	38.0	34.76	38.6
13	NDB 1445 (c)	41.1	34.0	36.6	37.2
14	RD 2552 (c)	41.8	37.8	40.84	40.2
15	RD 2794 (c)	44.7	40.6	38.74	41.3
16	RD 2907 (c)	44.9	47.0	38.16	43.3
	Mean	43.6	45.3	37.3	

Table 2: Test weight (kg/hl)

SR.NO	Genotype	Hisar	Kanpur	Faizabad	Mean
1	DWRB 201	59.4	57.5	58.5	58.5
2	DWRB 207	58.1	59.5	59.0	58.9
3	HUB 267	64.0	63.0	59.9	62.3
4	HUB 268	65.4	64.4	65.2	65.0
5	KB 1706	63.4	61.9	60.0	61.7
6	KB 1754	73.5	70.7	66.9	70.4
7	KB 1762	62.7	59.9	56.7	59.8
8	NDB 1708	61.5	59.0	58.8	59.8
9	RD 2999	59.3	58.5	54.6	57.5
10	RD 3000	63.6	61.1	59.3	61.3
11	RD 3002	62.8	61.5	61.2	61.8
12	NDB 1173 (c)	62.4	60.5	58.3	60.4
13	NDB 1445 (c)	60.4	59.2	59.3	59.6
14	RD 2552 (c)	61.3	60.7	61.5	61.2
15	RD 2794 (c)	61.3	62.8	59.9	61.3
16	RD 2907 (c)	59.3	60.0	61.9	60.4
	Mean	62.4	61.3	60.1	

Table 3: Bold grain (%)

SR.NO	Genotype	Hisar	Kanpur	Faizabad	Mean
1	DWRB 201	86.1	81.7	81.6	83.1
2	DWRB 207	94.0	89.6	75.9	86.5
3	HUB 267	81.1	88.2	73.2	80.8
4	HUB 268	90.0	80.7	84.4	85.0
5	KB 1706	75.6	60.6	28.8	55.0
6	KB 1754	45.4	39.9	15.0	33.4
7	KB 1762	92.2	84.5	82.3	86.3
8	NDB 1708	90.5	78.6	64.9	78.0
9	RD 2999	86.1	89.5	64.1	79.9
10	RD 3000	95.1	90.6	86.5	90.8
11	RD 3002	95.8	92.8	88.6	92.4
12	NDB 1173 (c)	66.3	61.3	45.1	57.5
13	NDB 1445 (c)	73.0	55.4	55.2	61.2
14	RD 2552 (c)	86.9	77.2	79.6	81.3
15	RD 2794 (c)	92.8	82.9	64.2	80.0
16	RD 2907 (c)	89.5	92.6	60.3	80.8
	Mean	83.8	77.9	65.6	

Table 4: Thin grains (%)

SR.NO	Genotype	Hisar	Kanpur	Faizabad	Mean
1	DWRB 201	2.2	4.7	2.9	3.3
2	DWRB 207	0.8	2.4	2.8	2.0
3	HUB 267	5.3	2.4	4.7	4.1
4	HUB 268	1.5	3.9	2.1	2.5
5	KB 1706	2.8	6.1	25.9	11.6
6	KB 1754	12.1	20.8	49.7	27.5
7	KB 1762	1.2	3.8	8.0	4.3
8	NDB 1708	1.6	3.5	4.7	3.2
9	RD 2999	2.1	2.1	8.6	4.3
10	RD 3000	0.5	1.6	2.3	1.4
11	RD 3002	0.5	0.6	2.6	1.3
12	NDB 1173 (c)	7.9	10.4	15.5	11.3
13	NDB 1445 (c)	5.2	15.8	11.7	10.9
14	RD 2552 (c)	2.7	5.1	3.7	3.8
15	RD 2794 (c)	1.1	3.6	8.4	4.4
16	RD 2907 (c)	2.9	1.0	11.2	5.0
	Mean	3.1	5.5	10.3	

Table 5: Crude protein content (% dwb)

SR.NO	Genotype	Hisar	Kanpur	Faizabad	Mean
1	DWRB 201	10.1	11.4	7.5	9.7
2	DWRB 207	8.4	10.7	9.5	9.5
3	HUB 267	11.2	10.8	9.0	10.3
4	HUB 268	10.9	11.7	9.8	10.8
5	KB 1706	9.7	11.3	10.3	10.4
6	KB 1754	11.0	11.0	11.9	11.3
7	KB 1762	11.2	11.2	7.7	10.0
8	NDB 1708	10.3	11.0	9.7	10.3
9	RD 2999	9.3	12.0	8.7	10.0
10	RD 3000	11.3	11.3	9.5	10.7
11	RD 3002	10.5	10.6	9.6	10.2
12	NDB 1173 (c)	9.2	11.7	8.6	9.8
13	NDB 1445 (c)	8.1	11.9	8.5	9.5
14	RD 2552 (c)	7.1	10.4	7.9	8.5
15	RD 2794 (c)	8.9	11.6	8.8	9.8
16	RD 2907 (c)	10.8	10.2	8.8	9.9
	Mean	9.9	11.2	9.1	

AVT-DP-NEPZ

Table 1: Thousand grain weight (g) & test weight (kg/hl)

S. No.	Genotype	Thousand Grain Weight					Test Weight				
		Kanpur	Faizabad	Varansi	Bhagalpur	Mean	Kanpur	Faizabad	Varansi	Bhagalpur	Mean
1	UPB 1074	36.9	43.2	29.4	34.8	36.1	58.4	60.3	46.1	47.5	53.1
2	AZAD (c)	39.0	37.0	38.9	40.3	38.8	61.1	59.1	56.8	51.4	57.1
3	DWRB 137 (c)	43.8	38.5	40.3	43.3	41.4	60.6	61.0	60.0	55.3	59.2
4	RD 2035 (c)	37.5	35.6	30.7	33.8	34.4	60.0	61.1	53.2	49.3	55.9
5	RD 2552 (c)	39.2	32.9	28.0	29.4	32.4	58.5	54.6	49.1	44.3	51.6
	Mean	39.3	37.4	33.5	36.3		59.7	59.2	53.1	49.5	

Table 2: Bold grain (%) & thin grains (%)

S. No.	Genotype	Bold Grains					Thin Grain				
		Kanpur	Faizabad	Varansi	Bhagalpur	Mean	Kanpur	Faizabad	Varansi	Bhagalpur	Mean
1	UPB 1074	72.3	79.4	37.8	39.4	57.2	6.8	4.8	18.9	16.2	11.7
2	AZAD (c)	77.0	64.1	47.6	54.9	60.9	6.5	9.0	12.8	9.2	9.4
3	DWRB 137 (c)	59.8	39.0	87.4	91.5	69.4	8.7	13.5	1.8	1.3	6.3
4	RD 2035 (c)	58.0	49.9	33.0	39.5	45.1	11.8	12.3	24.3	19.3	16.9
5	RD 2552 (c)	64.0	48.1	41.5	38.8	48.1	8.0	16.2	22.4	27.6	18.6
	Mean	66.2	56.1	49.4	52.8		8.4	11.2	16.0	14.7	

Table 3: Crude protein content (% dwt)

S. No.	Genotype	Kanpur	Faizabad	Varansi	Bhagalpur	Mean
1	UPB 1074	8.5	9.8	12.1	11.8	10.6
2	AZAD (c)	8.3	7.6	11.3	10.1	9.3
3	DWRB 137 (c)	9.8	8.6	11.5	10.0	10.0
4	RD 2035 (c)	9.3	8.0	10.3	10.7	9.6
5	RD 2552 (c)	8.9	10.8	10.6	11.0	10.3
	Mean	9.0	9.0	11.2	10.7	

IVT-RF-NEPZ

Table 1: Thousand grain weight (g)

SR.NO	Genotype	Bhagalpur	Kanpur	Saini Farm (Kanpur)	Faizabad	Mean
1	DWRB200	45.9	49.8	44.3	36.2	38.2
2	DWRB202	40.7	44.1	48.2	43.5	37.3
3	DWRB203	44.4	39.3	40.1	43.8	35.7
4	HUB265	40.8	46.5	41.0	34.6	32.8
5	KB1743	42.7	48.8	48.2	42.0	36.9
6	KB1754	35.5	36.8	43.9	31.3	30.5
7	KB1762	28.6	49.8	53.6	34.5	34.5
8	NDB1712	46.8	51.7	46.6	47.4	39.3
9	NDB1713	35.1	45.3	51.0	32.4	33.2
10	PL910	50.8	52.6	46.1	44.2	40.3
11	PL911	38.0	43.7	46.6	33.0	34.7
12	RD3003	30.4	47.5	40.2	32.7	32.8
13	RD3004	50.0	50.8	48.3	44.3	40.1
14	RD3005	36.1	42.4	44.0	36.8	33.7
15	K 603 (c)	45.2	47.7	46.9	40.4	39.2
16	Lakhan (c)	42.0	49.1	46.5	34.8	37.3
	Mean	40.8	46.6	46.0	38.2	

Table 2: Test weight (kg/ha)

SR.NO	Genotype	Bhagalpur	Kanpur	Saini Farm (Kanpur)	Faizabad	Mean
1	DWRB200	54.3	61.9	61.7	56.7	49.9
2	DWRB202	55.7	63.4	59.0	64.4	50.5
3	DWRB203	59.8	63.3	64.1	65.4	52.7
4	HUB265	51.8	59.7	59.1	54.6	45.2
5	KB1743	50.7	61.2	71.8	56.2	48.6
6	KB1754	42.8	76.7	54.7	65.6	49.0
7	KB1762	46.1	61.1	60.6	53.7	45.5
8	NDB1712	56.0	64.5	53.0	66.7	48.8
9	NDB1713	52.1	62.0	69.7	59.7	49.1
10	PL910	63.4	68.5	60.6	66.5	53.4
11	PL911	54.2	62.5	59.3	59.4	49.5
12	RD3003	46.1	58.6	62.6	52.2	46.5
13	RD3004	54.2	62.4	59.8	60.9	48.9
14	RD3005	48.8	61.9	60.6	58.7	47.8
15	K 603 (c)	52.3	60.1	59.2	59.0	49.3
16	Lakhan (c)	53.3	58.9	53.8	57.4	47.5
	Mean	52.6	62.9	60.6	59.8	

Table 3: Bold grain (%)

SR.NO	Genotype	Bhagalpur	Kanpur	Saini Farm (Kanpur)	Faizabad	Mean
1	DWRB200	89.3	90.0	76.3	71.6	68.4
2	DWRB202	79.7	91.4	95.6	82.4	71.8
3	DWRB203	88.3	76.3	58.8	81.4	63.2
4	HUB265	83.6	93.3	80.6	57.0	63.1
5	KB1743	83.3	93.9	83.9	69.2	66.7
6	KB1754	58.7	31.4	92.1	25.5	42.5
7	KB1762	42.9	96.3	96.5	74.4	63.2
8	NDB1712	87.7	91.6	82.3	77.3	68.6
9	NDB1713	41.7	76.8	88.4	25.7	46.9
10	PL910	83.7	94.7	89.5	49.7	65.1
11	PL911	75.4	88.8	90.4	60.8	65.5
12	RD3003	54.1	94.1	82.0	64.5	61.6
13	RD3004	90.8	88.9	92.5	83.2	72.5
14	RD3005	54.1	89.7	89.0	61.9	60.7
15	K 603 (c)	75.1	88.9	84.2	48.4	62.5
16	Lakhan (c)	69.1	82.3	88.2	30.1	56.7
	Mean	72.3	85.5	85.6	60.2	

Table 4: Thin grains (%)

SR.NO	Genotype	Bhagalpur	Kanpur	Saini Farm (Kanpur)	Faizabad	Mean
1	DWRB200	2.0	1.5	2.9	7.6	5.8
2	DWRB202	1.8	0.4	0.7	1.8	3.0
3	DWRB203	1.9	4.9	9.2	2.7	5.9
4	HUB265	3.7	1.3	2.9	13.1	4.4
5	KB1743	2.8	1.1	1.3	8.7	3.4
6	KB1754	10.4	18.6	1.0	31.2	13.2
7	KB1762	19.1	0.5	0.9	8.8	7.1
8	NDB1712	2.2	1.3	2.9	4.1	2.9
9	NDB1713	16.2	3.3	1.2	26.6	9.9
10	PL910	2.0	0.8	1.5	11.0	4.7
11	PL911	10.4	1.5	1.5	8.6	6.8
12	RD3003	16.9	0.8	3.1	11.9	9.1
13	RD3004	0.8	2.3	1.2	3.2	2.9
14	RD3005	12.9	2.2	2.0	8.9	7.0
15	K 603 (c)	4.6	1.5	2.1	11.3	7.1
16	Lakhan (c)	5.6	2.5	1.7	17.8	8.3
	Mean	7.1	2.8	2.3	11.1	

Table 5: Crude protein content (% dwb)

SR.NO	Genotype	Bhagalpur	Kanpur	Saini Farm (Kanpur)	Faizabad	Mean
1	DWRB200	8.8	10.3	11.1	8.5	10.7
2	DWRB202	9.5	9.8	9.8	10.2	9.9
3	DWRB203	9.6	9.2	11.0	10.4	10.2
4	HUB265	9.2	10.2	9.2	11.0	8.1
5	KB1743	9.7	11.6	11.5	9.9	9.1
6	KB1754	10.3	10.6	9.9	10.5	9.3
7	KB1762	8.7	9.5	10.0	8.6	8.6
8	NDB1712	10.0	12.6	10.3	11.3	9.6
9	NDB1713	9.9	9.2	13.0	10.2	8.9
10	PL910	10.3	10.7	9.5	12.0	10.1
11	PL911	8.2	9.3	10.1	8.5	9.6
12	RD3003	10.5	10.6	9.9	9.4	10.7
13	RD3004	9.4	10.3	11.1	9.4	9.4
14	RD3005	9.3	9.5	12.0	9.8	9.9
15	K 603 (c)	9.2	9.5	10.7	9.3	10.9
16	Lakhan (c)	8.5	9.6	11.5	8.7	10.5
	Mean	9.4	10.2	10.7	9.9	

AVT-RF- NHZ**Table 1: Thousand grain weight (g)**

SR.NO	Genotype	Bajaura	Almora	Malan	Shimla	Mean
1	BHS 472	6.9	9.6	10.2	7.4	9.8
2	BHS 474	8.5	12.8	10.5	7.7	9.7
3	BHS 475	7.7	9.6	9.7	8.2	8.6
4	BHS 476	7.9	10.6	9.6	7.2	11.3
5	BHS 477	9.3	10.9	11.6	8.1	9.4
6	HBL 845	8.0	12.1	11.6	8.7	10.3
7	HBL 848	9.2	10.5	11.1	8.1	10.6
8	HBL 851	8.8	10.4	11.7	8.2	11.2
9	HBL 858	8.8	14.8	12.1	9.2	12.6
10	HBL 863	7.6	10.3	9.6	8.0	7.7
11	UPB 1077	8.5	8.7	10.7	7.3	9.4
12	UPB 1078	8.8	10.6	10.4	8.2	10.2
13	UPB 1082	8.9	10.4	9.2	8.5	7.8
14	VLB 161	10.1	11.8	14.4	9.9	9.4
15	VLB 162	7.8	9.0	9.8	7.6	8.8
16	VLB 163	8.8	9.7	13.0	8.1	8.9
17	VLB 164	7.8	10.2	11.6	7.3	8.6
18	BHS 352 (c)	8.8	12.0	9.9	9.0	11.9
19	BHS 400 (c)	7.9	9.5	9.6	8.5	10.9
20	HBL 113 (c)	8.0	8.3	10.2	7.9	7.7
21	VLB 118 (c)	8.4	9.4	10.0	7.3	10.2
	Mean	8.4	10.5	10.8	8.1	

Table 2: Test weight (kg/hl)

SR.NO	Genotype	Bajaura	Almora	Malan	Shimla	Mean
1	BHS 472	58.5	56.1	58.2	65.2	50.6
2	BHS 474	59.8	55.8	60.8	59.8	49.0
3	BHS 475	62.4	64.3	61.1	65.9	52.3
4	BHS 476	58.5	54.5	59.2	62.5	51.1
5	BHS 477	61.4	59.3	62.4	62.5	50.5
6	HBL 845	66.8	60.7	66.0	68.8	54.6
7	HBL 848	63.4	60.5	63.7	66.9	53.7
8	HBL 851	60.1	60.8	59.4	62.8	52.0
9	HBL 858	75.2	71.1	74.4	78.1	63.4
10	HBL 863	63.2	61.7	63.5	68.0	51.9
11	UPB 1077	64.2	59.2	60.4	65.8	52.3
12	UPB 1078	60.7	58.3	59.3	61.1	50.5
13	UPB 1082	62.9	61.8	58.5	66.8	50.4
14	VLB 161	73.5	73.1	73.1	78.8	59.9
15	VLB 162	64.3	63.5	66.1	69.1	54.6
16	VLB 163	61.6	60.3	59.8	66.6	50.7
17	VLB 164	60.2	61.9	59.2	64.5	50.4
18	BHS 352 (c)	71.6	73.1	70.2	77.7	62.5
19	BHS 400 (c)	58.7	58.7	60.5	61.7	51.7
20	HBL 113 (c)	67.2	64.2	65.9	70.2	54.3
21	VLB 118 (c)	56.1	57.0	57.2	58.2	48.9
	Mean	63.3	61.7	62.8	66.7	

Table 3: Bold grain (%)

SR.NO	Genotype	Bajaura	Almora	Malan	Shimla	Mean
1	BHS 472	65.9	34.2	34.4	47.3	39.4
2	BHS 474	82.1	29.1	52.6	66.0	47.7
3	BHS 475	59.5	52.1	26.0	58.2	40.7
4	BHS 476	61.3	27.7	38.2	50.8	39.8
5	BHS 477	95.4	49.5	85.6	88.9	65.3
6	HBL 845	89.9	45.4	71.0	80.7	59.6
7	HBL 848	84.4	41.4	77.9	83.2	60.1
8	HBL 851	88.1	73.1	82.5	69.8	66.1
9	HBL 858	12.0	5.7	3.1	30.2	13.8
10	HBL 863	79.0	56.6	45.7	63.8	49.6
11	UPB 1077	90.8	82.5	80.3	87.0	70.5
12	UPB 1078	62.4	49.6	49.7	41.6	43.2
13	UPB 1082	79.1	62.0	53.4	63.9	52.1
14	VLB 161	11.1	4.4	46.8	11.2	14.9
15	VLB 162	90.6	64.3	60.2	65.1	58.0
16	VLB 163	63.8	62.5	47.8	33.9	42.6
17	VLB 164	78.4	65.6	69.0	67.5	57.3
18	BHS 352 (c)	8.9	7.1	16.0	20.5	14.5
19	BHS 400 (c)	64.3	54.6	48.6	67.7	50.8
20	HBL 113 (c)	77.3	44.5	57.3	72.9	51.2
21	VLB 118 (c)	87.2	84.4	81.5	67.5	67.3
	Mean	68.2	47.4	53.7	58.9	

Table 4: Thin grains (%)

SR.NO	Genotype	Bajaura	Almora	Malan	Shimla	Mean
1	BHS 472	5.3	30.1	28.8	12.6	18.4
2	BHS 474	1.2	36.7	9.3	5.3	12.3
3	BHS 475	18.6	20.0	32.1	24.7	20.7
4	BHS 476	8.7	38.8	27.4	17.0	22.6
5	BHS 477	1.2	17.5	2.5	1.9	6.0
6	HBL 845	0.9	21.4	5.7	2.6	8.3
7	HBL 848	1.6	17.3	4.9	2.8	8.1
8	HBL 851	1.8	7.6	1.0	4.8	6.4
9	HBL 858	31.5	66.3	69.9	37.6	44.7
10	HBL 863	10.8	27.0	26.8	26.5	18.8
11	UPB 1077	0.9	3.2	2.1	1.5	3.9
12	UPB 1078	10.9	23.4	19.0	30.6	19.4
13	UPB 1082	2.6	12.8	10.5	6.8	6.9
14	VLB 161	17.8	48.2	42.7	18.6	25.7
15	VLB 162	1.2	12.2	8.9	6.4	7.7
16	VLB 163	6.0	12.5	14.2	17.9	11.1
17	VLB 164	2.7	8.4	6.0	6.3	5.9
18	BHS 352 (c)	43.7	63.7	39.4	46.4	42.6
19	BHS 400 (c)	6.5	14.1	15.3	7.0	12.4
20	HBL 113 (c)	2.4	13.7	9.2	3.7	6.6
21	VLB 118 (c)	2.0	2.8	2.4	9.3	6.5
	Mean	8.5	23.7	18.0	13.8	

Table 5: Crude protein content (% dwb)

SR.NO	Genotype	Bajaura	Almora	Malan	Shimla	Mean
1	BHS 472	41.6	30.0	29.4	34.2	30.0
2	BHS 474	44.4	29.0	37.3	39.2	31.8
3	BHS 475	39.6	30.4	29.3	33.1	28.1
4	BHS 476	41.2	27.7	35.1	35.3	32.1
5	BHS 477	48.0	37.1	45.8	45.5	36.7
6	HBL 845	45.8	32.1	42.4	39.9	34.2
7	HBL 848	44.6	34.6	41.4	42.5	35.4
8	HBL 851	39.1	35.6	37.5	34.5	32.8
9	HBL 858	38.9	23.4	24.0	26.6	26.2
10	HBL 863	34.3	25.6	28.8	27.6	23.8
11	UPB 1077	40.1	35.5	37.2	37.9	32.5
12	UPB 1078	42.1	28.2	31.8	29.1	28.9
13	UPB 1082	38.1	43.1	32.2	34.6	30.0
14	VLB 161	36.5	30.3	31.9	32.0	26.3
15	VLB 162	43.9	47.3	39.0	38.4	35.7
16	VLB 163	40.2	32.2	37.1	35.9	30.1
17	VLB 164	38.0	33.7	35.3	35.4	29.7
18	BHS 352 (c)	35.4	28.5	30.8	28.8	28.7
19	BHS 400 (c)	41.9	35.3	36.8	39.6	34.5
20	HBL 113 (c)	38.6	30.8	34.4	34.7	28.5
21	VLB 118 (c)	38.9	38.8	41.6	37.8	34.6
	Mean	40.5	32.8	35.2	35.4	

AVT-DP-NHZ

Table 1: Thousand grain weight (g) & test weight (kg/hl)

S. No.	Genotype	Thousand grain weight (g)				Test weight (kg/hl)			
		Shimla	Almora	Bajaura	Mean	Shimla	Almora	Bajaura	Mean
1	VLB 155	36.9	28.3	40.0	26.8	66.9	53.3	64.0	46.6
2	BHS 380 (c)	30.5	28.8	35.2	24.6	62.5	55.5	62.4	46.1
3	BHS 400 (c)	32.1	28.0	41.5	25.7	56.5	47.6	58.3	40.8
4	HBL 276 (c)	25.9	24.2	35.4	22.6	74.2	68.7	75.1	55.7
5	VLB 118 (c)	32.1	30.7	40.3	26.5	54.9	47.9	57.7	40.9
	Mean	31.5	28.0	38.5		63.0	54.6	63.5	

Table 2: Bold grain (%) & thin grains (%)

S. No.	Genotype	Bold grains (%)				Thin grains (%)			
		Shimla	Almora	Bajaura	Mean	Shimla	Almora	Bajaura	Mean
1	VLB 155	30.7	24.1	65.8	30.6	13.9	33.6	4.9	13.6
2	BHS 380 (c)	29.1	39.4	74.2	36.7	22.7	24.8	3.4	13.7
3	BHS 400 (c)	34.6	29.7	63.9	32.3	29.6	37.2	6.0	18.4
4	HBL 276 (c)	8.6	3.2	17.3	8.5	61.6	68.9	32.0	41.9
5	VLB 118 (c)	40.2	49.9	91.9	46.3	21.2	17.4	0.7	10.6
	Mean	28.6	29.3	62.6		29.8	36.4	9.4	

Table 3: Crude protein content (% dwt)

S. No.	Genotype	Protein content (%dwt)			
		Shimla	Almora	Bajaura	Mean
1	VLB 155	11.7	12.5	9.4	8.9
2	BHS 380 (c)	11.6	12.1	8.7	9.1
3	BHS 400 (c)	11.5	11.4	8.2	8.0
4	HBL 276 (c)	11.5	13.4	9.8	9.9
5	VLB 118 (c)	10.9	10.8	7.9	8.2
	Mean	11.4	12.0	8.8	

BARLEY QUALITY SCREENING NURSERY

The genotypes were screened for higher protein content coupled with higher thousand grain weight & bold grain percentage. The results were not confirmatory as samples from Pantnagar, especially checks were insufficient to draw any valid conclusion. However, the genotype DWRB 194 seems promising. The trial needs to be repeated for confirmation.

Table 1: Crude protein content (% dwt)

S. No.	Genotype	Protein Content (% dwt)			
		Durgapura	Ludhiana	Pantnagar	Mean
1	DWRB 193	15.5	12.4	8.7	12.2
2	DWRB 194	16.1	12.2	11.8	13.4
3	DWRB 195	14.6	13.0	9.1	12.2
4	KB 1636	12.4	9.8	10.8	11.0
5	BK 1127 ©	16.1	14.0	NA	15.1
6	DWRB 91 ©	12.2	10.1	NA	11.2
7	DWRB 92 ©	14.2	10.6	NA	12.4
8	BH 902 9 ©	10.5	9.8	NA	10.2
9	DWRUB 64 (c)	12.1	9.1	NA	10.6
	Mean	13.7	11.2	10.1	

Table 2: Bold grain (%) & thin grains (%)

S. No.	Genotype	Bold grain (%)				Thin grain (%)			
		Durgapura	Ludhiana	Pantnagar	Mean	Durgapura	Ludhiana	Pantnagar	Mean
1	DWRB 193	97.5	94.6	93.1	95.1	0.6	1.9	0.5	1.0
2	DWRB 194	93.7	93.2	98.1	95.0	2.2	1.4	0.0	1.2
3	DWRB 195	46.3	90.6	96.5	77.8	20.1	1.9	0.5	7.5
4	KB 1636	83.1	86.9	NA	85.0	3.2	1.7	NA	2.5
5	BK 1127 ©	93.1	95.9	NA	94.5	1.7	1.1	NA	1.4
6	DWRB 91 ©	78.3	94.7	NA	86.5	6.5	1.6	NA	4.0
7	DWRB 92 ©	96.6	95.4	NA	96.0	0.8	0.6	NA	0.7
8	BH 902 9 ©	77.0	90.8	NA	83.9	8.3	1.5	NA	4.9
9	DWRUB 64 (c)	91.9	91.5	NA	91.7	1.9	2.0	NA	2.0
	Mean	84.2	92.6	95.9		5.0	1.5	0.4	

Table 3: Thousand grain weight (g) & test weight (kg/hl)

S. No.	Genotype	Thousand grain weight (g)				Test weight (kg/hl)			
		Durgapura	Ludhiana	Pantnagar	Mean	Durgapura	Ludhiana	Pantnagar	Mean
1	DWRB 193	65.0	55.2	49.4	56.5	70.7	57.7	59.0	62.4
2	DWRB 194	66.9	60.3	67.3	64.8	64.4	59.0	60.3	61.2
3	DWRB 195	29.9	35.2	48.0	37.7	59.1	58.0	62.8	60.0
4	KB 1636	42.1	40.8	58.7	47.2	70.7	63.7	NA	67.2
5	BK 1127 ©	69.4	65.5	54.0	63.0	68.8	62.2	NA	65.5
6	DWRB 91 ©	57.4	59.8	NA	58.6	66.5	61.8	NA	64.2
7	DWRB 92 ©	59.0	52.4	NA	55.7	68.2	58.5	NA	63.4
8	BH 902 9 ©	43.9	47.6	NA	45.7	62.7	57.7	NA	60.2
9	DWRUB 64 (c)	50.9	44.1	NA	47.5	67.3	60.5	NA	63.9
	Mean	53.8	51.2	55.5		66.5	59.9	60.7	

**Barley Improvement (AICW&BIP)
Monitoring Report of NWPZ (2018-19)**

Duration: March 05-08, 2019

Locations Visited: Ludhiana, Bathinda, Hisar, Bawal, Durgapura, Kumher (Bharatpur), Bichpuri (Agra) and Mathura

Team: Dr AS Kharub, Principal Scientist & PI, Barley Improvement, ICAR-IIWBR, Karnal
Dr. Dinesh Kumar, Principal Scientist, ICAR-IIWBR, Karnal
Dr Vishnu Kumar, Scientist, ICAR-IIWBR, Karnal
Dr PS, Shekhawat, Plant Pathologist, RARI, Durgapura

The above barley monitoring team visited different locations of the north western plains zone (NWPZ) during March 05-08, 2019. This team monitored different coordinated yield, disease, agronomy and quality experiments and the observations recorded are briefed hereunder trial wise-

AVT-MB-TS-NWPZ: This trial was monitored at Ludhiana, Bathinda, Hisar, Bawal, Durgapura and Mathura centres. The trial was conducted as per recommended layout at all the locations. The trial of Bathinda centre was rejected due to the patchy trial block and uneven genotypic growth within and between the entries coupled with delayed heading in AVT malt barley trial. The trial at Mathura centre was also rejected due to the stray animal grazing losses in many entries. The entry AVT-MB-TS-NWPZ-04 showed off type plants and needs purification. The covered smut in traces was observed in the entries AVT-MB-TS-NWPZ-01, 05, 06, 07 and 08, whereas yellow rust reaction of 20S was recorded in the entry AVT-MB-TS-08 at Ludhiana and Hisar.

AVT-SST (Sal/Alk): This trial was monitored at CCSHAU Hisar, IIWBR Hisar and Kumher centres. The trial was conducted as per recommended layout at all the locations. The entries AVT-SST-01, 05, 10, 13 and 16 were found with few off type plants for plant height, spike type, plant maturity variations and needs purification, whereas, the entries AVT-SST- 02, 08, 11 and 15 were observed as mixture/segregation. The covered smut infection in traces was observed in the entries AVT-SST-01, 04, 05, 08, 09, 13 and 15 The entries AVT-SST-12 and AVT-SST-14 were found similar based on ancillary characters.

IVT-MB-TS-NWPZ: This trial was monitored at Ludhiana, Bathinda, Hisar, Bawal, Durgapura and Mathura centres. The trial was conducted as per recommended layout at all the locations. The trial of Bathinda centre was rejected due to the patchy trial block and uneven genotypic growth within and between the entries coupled with delayed heading in IVT malt barley trial. The trial of Mathura centre was also rejected due to the stray animal grazing losses in many entries. The entries IVT-MB-TS-NWPZ-01, 02, 06, 11, 12 and 13 were observed with off type plants and needs purification. The entries IVT-MB-TS-NWPZ-09, 15 and 16 were observed as mixture/segregation. The covered smut in traces was observed in the entries IVT-MB-TS-NWPZ-01, 05, 06, 08 and 12. The six rowed entry IVT-MB-TS-NWPZ-06 showed lodging at Bawal (30%) and Hisar (70%) locations, respectively.

IVT-IR-FB: This trial was monitored at Ludhiana, Hisar and Durgapura centres. The trial was conducted as per recommended layout at all the locations. The entries IVT-IR-FB-NWPZ-03, 06 and 09 were observed with off type plants and needs purification. The entries IVT-IR-FB-NWPZ-10, 11 and 18 were observed as mixture/segregation. The covered smut in traces was observed in the entries IVT-IR-FB-NWPZ-10, 13, 16, 19, 20 and 21. The stripe rust incidences were observed in the entries viz., IVT-IR-FB-NWPZ-01 & 11 (10S) and IVT-IR-FB-NWPZ-14 (40S) at Ludhiana and Durgapura centres. The spot blotch was recorded on double digit score in the entries viz., IVT-IR-FB-NWPZ-01 (45), IVT-IR-FB-NWPZ-04 (57) and IVT-IR-FB-NWPZ-18 (12) at Ludhiana. The six rowed entries

namely IVT-IR-FB-NWPZ-01, 12 & 17 were found susceptible for plant lodging at Ludhiana and Durgapura centres.

IVT/AVT-Hulless: This trial was monitored at Ludhiana, Hisar and Durgapura centres. The trial was conducted as per recommended layout at all the locations. The entries IVT/AVT-Hulless-02, 04, 05 and 09 were observed with off type plants and needs purification. The entries IVT/AVT-Hulless-08 and 10 were observed as mixture/segregation. The covered smut in traces was observed in the entries IVT/AVT-Hulless-01, 02 and 08. The stripe rust reactions were recorded in the entries viz., IVT/AVT-Hulless-02 (5S) and IVT/AVT-Hulless-04 (20S) at Ludhiana. Very poor plant stand (<10%) was observed in the entry IVT/AVT-Hulless-06 at all three locations.

Agronomy experiments: The agronomy experiments were observed at Ludhiana, Hisar, Durgapura and Agra locations. All the allotted experiments were conducted at all the locations. The entry tags in final year agronomy trials of malt and hulless entries were corrected at Agra, Hisar and Durgapura locations. At Agra centre, it was suggested to conduct nitrogen level trials in optimum fertility blocks to get better treatment expressions. In hydrogel experiments the treatment effects were nearly similar at all the locations.

Quality and pathology experiments: The quality nursery was monitored at Ludhiana and Durgapura locations and was found as per lay out plan. The plant pathological experiments were observed at Ludhiana, Hisar and Durgapura centres and were found in good condition.

Table: The entries observed with segregation/mixtures and needs purification

Trial	Needs purification	Segregation /mixture
AVT-MB-TS	AVT-MB-TS-04	-
IVT-MB-TS	IVT-MB-TS-01, 02, 06, 11, 12 & 13	IVT-MB-TS-09, 15 & 16
IVT-IR-FB	IVT-IR-FB-03, 06 & 09	IVT-IR-FB-10, 11 & 18
AVT-SST	AVT-SST-01, 05, 10, 13 & 16	AVT-SST-02, 08, 11 & 15
IVT/AVT-Hulless	IVT/AVT-Hulless-02, 04, 05 and 09	IVT/AVT-Hulless-08 & 10

Sd/-
(Vishnu Kumar)
ICAR-IIWBR, Karnal

Sd/-
(PS Shekhawat)
RARI, Durgapura

Sd/-
(Dinesh Kumar)
ICAR-IIWBR, Karnal

Sd/-
(AS Kharub)
ICAR-IIWBR, Karnal

Barley Network (AICW&BIP)
Monitoring Report of North Eastern Plain Zone

Duration: 21-24 February, 2019

Locations visited: Dalipnagar, Kanpur, Faizabad, Varansi and Saini

Team Members

- Dr. Jogendra Singh, Principal Scientist (Plant Breeding) & Scientist Incharge, Seed and Research Unit, ICAR-IIWBR, Hisar
- Dr. P.K. Gupta, Barley Breeder, CSAUA&T, Kanpur (UP)
- Dr. R.K Singh, Professor, Deptt of Agronomy, BHU, Varansi (UP).
- Dr. S.P. Singh, Assist. Professor, Deptt of Plant Pathology, NDU&T, Faizabad (UP).

The team constituted by the Director, IIWBR, Karnal for monitoring of Barley trials in North Eastern Plain Zone, assembled at CSAUA&T, Kanpur (UP) on 21st February, 2019 and visited the different locations as per schedule.

(i) BREEDING TRIALS:

A. Location wise observations:

Dalipnagar

One allotted barley breeding trial (AVT-SAL/ALK) was conducted at the Centre. The experiment was found in good condition. There was no incidence of rusts and leaf spot observed in any entry. However, minor incidence of loose and covered smut was observed in few entries.

Kanpur

Five barley breeding trials were conducted at Kanpur centre. All trials were found in good condition. No rusts were seen in the trials while loose smut and covered smut were observed in few barley entries. International (6th GSBYT and 6th GSBON) and national (EIBGN and NBGSN) barley nurseries were also conducted systematically at this centre.

Kumarganj, Ayodhya

Six breeding trials were conducted at Kumarganj, Ayodhya centre. All barley trials were in good condition. No rust was observed in breeding trials. However, loose and covered smuts were observed in few entries. In addition, EIBGN, NBGSN and 6th GSBON were also planted as per technical programme and found in good conditions.

Varansi

At Varansi centre, five barley breeding trials were conducted as per technical programme and found in good conditions. No rusts were seen in the trials while loose and covered smuts were observed in few barley entries. Leaf blight and stripe disease were recorded in one entry of the IVT-RF trial. Barley nurseries viz; EIBGN and NBGSN were also planted at the centre.

Saini

One breeding trial namely, IVT-RF was conducted at the centre and found in good condition. No diseases were observed in the trial.

B. Disease / pest incidence:

There was no incidence of the rusts in any trial. However, incidence of leaf blight was observed from 36 (IVT-IR-FB-1) to 68 (IVT-IR-FB-16) at Kanpur location. Minor incidences of loose and covered smuts were observed in few entries.

C. Trials rejected: Nil

D: Entries observed as segregating/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-FB-6
AVT-IR-Dual	-	-
AVT-SST	AVT-SST-11	AVT-SST-10
IVT-RF	IVT-RF-4	IVT-RF-1, IVT-RF-8
IVT-IR-FB	IVT-IR-FB-10, IVT-IR-FB-11, IVT-IR-FB-14	-
IVT/AVT-FB (HUSKLESS)	IVT/AVT-FB-9 and IVT/AVT-FB-10	-

Note: In IVT/AVT-IR-FB-Hulless trial, entry IVT/AVT-IR-FB-6 had very poor germination. Therefore, data of this entry may be excluded for data analysis/compilation.

(ii) AGRONOMY TRIAL:

Two barley agronomy trials such as SPL-3 and SPL-4 were conducted at Kanpur, Ayodhya (Masauda) and Varansi locations as per technical programme. The trials were in good condition at all the three locations.

(iii) PATHOLOGICAL NURSERIES:

Three nurseries such as IBDSN, NBDSN and EBDSN were planted at Kanpur, Kumarganj and Varanasi centres. One trial on chemical control of leaf blight was also planted at Kanpur centre. All the nurseries and trial were in good condition at all the three locations monitored.

(iv) ENTOMOLOGY TRIAL:

One entomological trial entitled *Eco-friendly management of foliar aphid* along with NBDSN nursery was conducted at Kanpur centre as per technical programme.

(P.K.Gupta)

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(S.P. Singh)

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(Dr. R.K. Singh)

Professor, Deptt. Of Agronomy,
BHU, Varansi

(Jogendra Singh)

Principal Scientist
Seed and Research Unit,
ICAR-IIWBR, Hisar

Zonal Monitoring Report NHZ (Barley Trials) 2018-19

Team-II

Period of visit: 8.4.19 to 13.4.19

Name of team members:

Dr. Dharam Pal, ICAR-IARI Regional Station, Tutikandi Centre, Shimla
Dr JP Jaiswal, GB Pant University, Pantnagar
Dr. Chuni Lal, ICAR-IIWBR, Karnal
Dr. OP Gangwar, ICAR- IIWBR, Regional Station, Flowerdale, Shimla

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, AVT-Barley- (Dual purpose)	Very Good
Berthin	IVT/AVT-Barley- Grain	Very Good
Kangra	IVT/AVT-Barley- Grain	Very Good
Malan	IVT/AVT-Barley- Grain	Very Good
Palampur	IVT/AVT-Barley- (Dual purpose)	Very Good
Bajaura	IVT/AVT-Barley- Grain, AVT-Barley- (Dual purpose)	Very Good

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

Trials not conducted / rejected by monitoring team: Nil

Entries showing promising performance in breeding trials:

Trial	Entry	Remarks
IVT/AVT-Barley- Grain	NHGBZ1816, NHGBZ1802, NHGBZ1808, NHGBZ1819	Good agronomic visual score
AVT-Barley- (Dual purpose)	NHDBZ1804	Good agronomic visual score

Entries recommended for purification:

Trial	Entry	Remarks
IVT/AVT-Barley- Grain	NHGBZ-1810	Few off types for plant height
	NHGBZ-1821	Few off types for drooping/non-drooping ears

Entries recommended to be dropped from further testing: Nil

Entries exhibiting higher diseases incidence / insect infestation: Nil

Report on Agronomical Trials:

Centre	Trial	Remark
Malan	SPL1, SPL2, SPL4, SPL6	Nicely conducted and responses were visible except SPL4.
Bajaura*	SPL1, SPL2, SPL4, SPL6	Nicely conducted and treatment effects were visible in all the trials

*The agronomical trials were observed as excellent.


Report on Pathological Nurseries:

Centre	Remark
Bajaura	Barley plant pathological nurseries were conducted satisfactorily. Yellow rust infection on barley infector ranged from 60S to 80S. The data (EBDSN, NBDSN, IBDSN) was recorded and verified. EBDSN entries were free from yellow rust. Yellow rust severity in entries of NBDSN (77, 96) and IBDSN (37, 38, 65, 68, 71, 73, 74, 79, 87, 89, 116, 224, 226, 227, 228, 229, 230, 231, 234, 235, 236 and 237) ranged from 40S to 80S.

Special comments, if any –

Signature of the monitoring team members


(DHARAM LAL)


(J. P. Jaiswal)


(Anil)
(Chemist)


(C. P. Langwar)

Proforma for Zonal Monitoring Report

Zone: NHZ

Name of team members:

Name	Centre
Dr K. Venkatesh	ICAR-IIWBR, Karnal
Dr Lakshmi Kant Dr K K Mishra	ICAR-VPKAS, Almora
Dr Gurudev Singh	CSK HPKV, HAREC Bajaura
Dr Vijay Rana	CSK HPKV, RWRC, Malan

Centres visited:

Centre	Date
Ranichauri	24.04.19
Majhera	25.04.19
Hawalbagh	26.04.19

Breeding trials allocated & monitored:

Centre		Trial	Remark
Ranichauri	Barley	AVT-TS-RF Grain	Good (3 rd Replication rejected)
Majhera	Barley	AVT-TS-RF Grain	Very Good
		AVT-TS-RF Dual	Very Good
Hawalbagh	Barley	AVT-TS-RF Grain	Good *
		AVT-TS-RF Dual	Very Good*

* Damaged by heavy hailstorm. Damage varies from entry to entry. Drooping ear entries showing comparatively less damage in both wheat and barley.

Trials not conducted/rejected by monitoring team:

Centre	Trial	Remark
	3 rd Replication of AVT-TS-RF Grain	rejected at Ranichauri

Entries recommended for purification

Trial	Entry	Remarks
Barley		
AVT-TS-RF- Dual	NHGBZ 1804	Few 6 row offtype plants
	NHGBZ 1817	Few tall droopy offtype plants
	NHGBZ 1818	Few 2 row offtype plants

Report on Pathological Nurseries:

Centre	Nursery	Remark
Hawalbagh	Barley	
	NBDSN	Conducted properly but disease pressure was low.
	EBDSN	Conducted properly but disease pressure was low.
	IBDSN	Conducted properly but disease pressure was low.

Special comments, if any

1. The crop is still in milking stage, data may be expected by the end of June from Ranichauri and mid-June from Hawalbagh.
2. The terrace width of most of the terraces at Centers like Ranichauri, are around 3.5 to 3.0 Metres. For such centers the plot size may be reduced to 3.0 X 1.20 M.
3. A single replication at Ranichauri not accommodated in single terrace. Therefore, use of Alpha lattice design will be more useful here.

Sd/-
Dr K Venkatesh
ICAR-IIWBR,
Karnal

Sd/-
Dr Vijay Rana
CSK HPKV
RWRC Malan

Sd/-
Dr Gurudev Singh
CSKHPKV
HAREC, Bajaura

Sd/-
Dr K K Mishra
ICAR-VPKAS
Almora

Sd/-
Dr Lakshmi Kant
ICAR-VPKAS
Almora

Barley Network (AICW&BIP)
Monitoring Report of Central Zone

Duration: 15-16 February, 2019

Location visited: Udaipur, Vallabhnagar and Vijapur

Team Members

- Dr. Jogendra Singh, Principal Scientist (Plant Breeding) & Scientist Incharge, Seed and Research Unit, ICAR-IIWBR, Hisar
- Dr. Anil Khippal, Principal Scientist, Agronomy, IIWBR, Karnal
- Dr. Abhay Dashora, Asstt. Prof., Deptt of Plant Breeding and Genetics, MPUAT, Udaipur (Raj).
- Dr. SS Rajput, Professor, Deptt of Plant Breeding and Genetics, RARI, Durgapur (Raj).

The team constituted by the Director, IIWBR, Karnal for monitoring of Barley trials in Central Zone, assembled at MPUAT, Udaipur on 15th February, 2019 and visited the different locations as per schedule.

(v) BREEDING TRIALS:

A. Location wise observations:

Udaipur

Two barley coordinated trials (IVT-IR-FB and IVT/AVT-IR-FB-Hulless) were monitored on 15th February, 2019 at the Centre. Both experiments were found in good condition. There was no incidence of rusts and leaf spot observed in any trial. However, minor incidence of covered smut was observed in few entries.

Vallabhnagar

Only one trial, AVT-SAL/ALK was monitored at ARSS, Vallabhnagar on 15th February, 2019 and the trial was found in good condition.

Vijapur

Two breeding trials viz; IVT-IR-FB and IVT/AVT-IR-FB-Hulless were monitored at Vijapur on 16th February, 2019. The trials were planted as per technical programme and found in good condition. However, lodging was observed in few entries in both the trials.

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 and Vijapur.

C: Entries observed as segregating/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
IVT-IR-FB	IVT-IR-FB-11, IVT-IR-FB-14,	IVT-IR-FB-1, IVT-IR-FB-9, IVT-IR-FB-10, IVT-IR-FB-13, IVT-IR-FB-19 and IVT-IR-FB-20
IVT/AVT-IR-FB-Hulless	IVT-FB-9, IVT-FB-10	IVT-FB-3, IVT-FB-5
AVT-SAL/ALK	AVT-SST-2, AVT-SST-11, AVT-SST-14	AVT-SST-1

Note: In IVT/AVT-IR-FB-Hulless trial, entry IVT-FB-6 has no germination at Vijapur and Udaipur centres

(vi) AGRONOMY TRIAL:

At Udaipur centre following agronomy trials were monitored.

1. Evaluation of herbicides for control of broad leaved weeds in barley.
2. Study the effect of organics on malting quality of different varieties of malt barley. Both trials were planted as per the technical programme and were found in good condition.

(vii) ENTOMOLOGY TRIAL:

Only one entomological trial entitled *Eco-friendly management of foliar aphid* was conducted at Vijapur centre as per technical programme. Different treatment effects were clearly observed.

Sd/-

Dr. Abhay Dashora

Assistant Professor
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Sd/-

Dr. SS Rajput

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Dr. Anil Khippal

Principal Scientist, Agronomy,
ICAR-IIWBR, Karnal (Haryana)

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Dr. Jogendra Singh

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Barley Front Line Demonstrations (BFLDs) during 2018-19

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

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

S. No.	Zone and Centre	BFLDs Allotted	BFLDs Conducted	Area Sown	No. of Farmers
1.	CSKHPKV, HAREC, Bajaura, Kullu (HP)	4.8	1.2	1	6
2.	ICAR-IARI, RS, Amartara Cottage, Shimla (HP)	4.8	4	4	36
3.	NDUA&T, Kumarganj, Faizabad (UP)	4.8	2	2	07
4.	KVK (IAS-BHU), Barkachha, Mirzapur (UP)	4.8	2	2	05
5.	CSAUA&T, Kanpur (UP)	4.8	4.8	5.2	13
6.	BHU, Varanasi (UP)	4.8	4.8	4.8	11
7.	PAU, Ludhiana (Punjab)	3.2	3.2	3.2	08
8.	KVK (PAU), Khokhar Khurd, Mansa (Punjab)	4.8	4.8	4.8	12
9.	CCSHAU, Hisar (Haryana)	4.8	4.8	4.8	12
10.	KVK (BB Ashram), Rampura, Rewari (Haryana)	4.8	4.8	4.8	11
11.	KVK (CCSHAU), Bhiwani (Haryana)	4.8	4.8	6.8*	9
12.	RARI (SKNAU), Durgapura, Jaipur (Rajasthan)	6.4	6.4	6.4	16
13.	KVK (Pragati Trust), Chomu, Jaipur (Rajasthan)	4	4	4	13
14.	KVK (AU-Kota), Hindauncity, Karauli (Raj)	4.8	4.8	4.8	12
15.	RCOA (MPUA&T), Udaipur (Rajasthan)	4.8	4.8	4.8	12
16.	KVK (MPUA&T), Rajasmand (Rajasthan)	4.8	4.8	4.8	11
17.	KVK (JNKVV), Kuthulia Farm, Rewa (MP)	4.8	4.8	4.8	12
18.	KVK (JNKVV), Purushottampur, Panna (MP)	4.8	4.8	4.8	14
19.	KVK (JNKVV), Nowgaon, Chhatarpur (MP)	4.8	4.8	4.8	12
20.	KVK (RVSKVV), Biaora, Kothi Bagh, Rajgarh, MP	4.8	4.8	8*	20
21.	COA (JNKVV), Ganj Basoda, Vidisha (MP)	4.8	4.8	4.8	12
	Total	100	90	95.4	264

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

State wise distribution of barley FLDs during *rabi* 2018-19 (in hectares)

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

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

Zone wise distribution of barley FLDs during *rabi* 2018-19 (in hectares)

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

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

Zone wise productivity over regional check during *rabi* 2018-19

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

*** -Significant at 1 per cent level

The yield gain due to improved varieties over regional mean yield was highest in NEPZ (44.29 %) followed by NHZ (35.26 %), CZ (23.53 %) and NWPZ (17.73 %) (Table 8).

Zone wise productivity over national check during rabi 2018-19

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

***- Significant at 1 per cent level

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

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

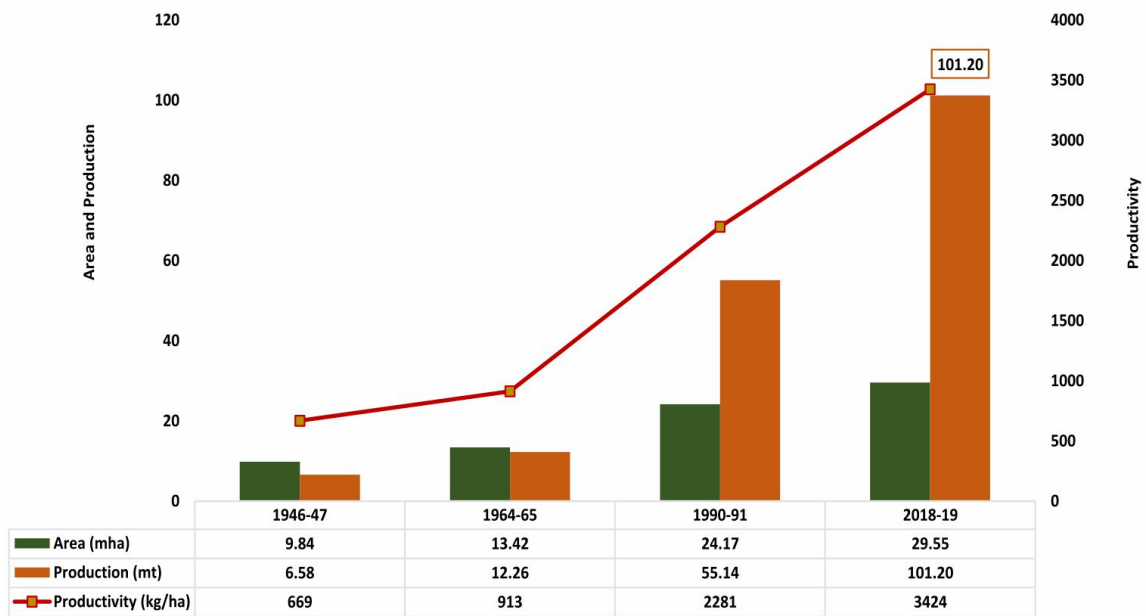
Zone and Centre	Improved variety	Average yield (q/ha)	Check variety	Average yield (q/ha)	Yield gain over check (%)
Bajaura	HBL 713	32.17	HBL 113	28.80	11.69 NS
Shimla	BHS 380	23.33	Local	19.00	22.79***
Shimla	BHS 400	24.71	Local	19.86	24.42***
Faizabad	DWRB 137	34.71	Local	26.43	31.35***
Mirzapur	DWRB 137	43.08	Amber	32.13	34.10***
Kanpur	K1055	49.14	Jyoti	38.73	26.88**
Kanpur	DWRB 137	52.75	Azad	40.00	31.88 NS
Varanasi	DWRB 137	42.98	RD 2552	34.09	26.09***
Varanasi	RD 2907	42.21	HUB 113	41.25	02.34 NS
Varanasi	RD 2907	42.59	Jyoti	33.18	28.36***
Ludhiana	RD 2907	40.50	PL 807	38.25	05.88*
Mansa	RD 2907	45.38	PL 807	33.50	35.45***
Hisar	RD 2907	42.08	BH 393	40.50	03.91 NS
Rewari	RD 2907	55.23	BH 393	51.75	06.72***
Bhiwani	RD 2907	38.35	BH 393	36.98	03.72 NS
Durgapura Jaipur	RD 2907	63.72	RD 2035	61.19	04.14***
Chomu Jaipur	RD 2907	48.79	RD 2035	42.19	15.66***
Karauli	RD 2907	62.50	RD 2035	54.50	14.69***
Udaipur	RD 2899	42.70	RD 2035	38.30	11.49***
Udaipur	DWRB 137	42.00	RD 2035	39.00	07.69 NS
Rajasmad	DWRB 137	41.50	Local	31.60	31.33***
Rajasmad	RD 2899	39.40	Local	32.30	21.98***
Rewa	DWRB 137	29.49	JB 58	22.77	29.54***
Rewa	RD 2899	32.97	JB 58	23.05	43.02***
Panna	DWRB 137	32.45	JB 58	27.07	19.89***
Panna	RD 2899	32.16	JB 58	27.38	17.46***
Chhattarpur	DWRB 137	24.07	JB 58	20.07	19.93 NS
Chhattarpur	RD 2899	23.33	JB 58	20.33	14.75**
Rajgarh	RD 2899	28.00	Local	20.00	40.00 NS
Rajgarh	DWRB 137	27.50	Local	18.00	52.78 NS
Vidisha	DWRB 137	50.00	Local	41.00	21.95***
Vidisha	RD 2899	50.00	Local	40.00	25.00 NS

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

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



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



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