भाकृअनुप
ICAR

प्रगति प्रतिवेदन
Progress Report
2016-17

अखिल भारतीय समन्वित गेहूँ एवं जौ सुधार परियोजना

AICRP on Wheat and Barley Improvement

उत्पादन वृद्धि से किसान समृद्धि

Higher Productivity for Farmers' Prosperity

जौ नेटवर्क

Barley Network

भा.कृ.अनु.प. – भारतीय गेहूँ एवं जौ अनुसंधान संस्थान, करनाल

ICAR – Indian Institute of Wheat and Barley Research, Karnal

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AICRP on Wheat & Barley

PROGRESS REPORT
2016-17

BARLEY NETWORK

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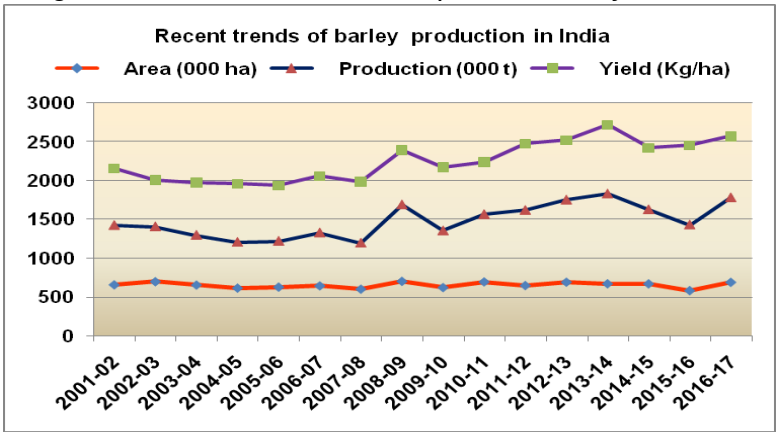
(A.S. Kharub)

CONTENTS

56th All India Wheat and Barley workers Meet (25-28 August 2017)

RESEARCH HIGHLIGHTS OF BARLEY NETWORK

The crop season 2016-17 was quite good in terms of production. According to 3rd advance estimates for Rabi 2016-17, nearly 1788 thousand tons of barley production in 693.0 thousand ha area with a productivity of 25.8 q/ha. In India Rajasthan is the largest state having >50% in production and 50% area followed by Uttar Pradesh. A concern is usually raised at various platforms for barley area decline, however, in last 16 years, the area has stabilized and there has been gain in production and productivity resulting in higher production. Though the MSP of barley (Rs.1325/-) is much lower than wheat (Rs.1625/-), but during current season the market price of barley remained higher (>Rs 1400/q). The monitoring teams surveyed the major barley growing areas during the season in addition to visiting the experiments at coordinated centres. The observations indicate that the crop season was by and large a disease free year in major barley growing areas, with some incidence of aphids in the plains and yellow rust in foothills and mid hills. The incidence of leaf blights was observed in the eastern zone.



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

State	Area (000 ha)			Production (000 T)			Yield (q/ ha)		
	2014-15	2015-16	2016-17	2014-15	2015-16	2016-17	2014-15	2015-16	2016-17
Bihar	10.5	10.7	11.0	14.8	13.9	14.0	14.1	13.04	12.70
Gujrat	-	13.0	-	-	17.0	-	-	13.08	-
Haryana	33.0	29.0	40.0	99.0	99.0	139.0	30.0	34.14	34.75
H.P.	20.1	19.2	20.4	30.1	34.3	35.5	15.0	17.86	17.38
J&K	12.6	6.7	10.3	7.2	4.1	6.2	5.7	6.22	5.98
M.P.	43.0	97.0	120.0	54.0	176.2	261.6	12.6	18.17	21.80
Punjab	18.0	9.0	12.0	65.0	33.3	44.0	36.1	37.00	36.67
Rajasthan	340.7	256.0	281.3	840.9	766.4	808.1	24.7	29.93	28.73
U. P.	167.0	124.0	170.0	481.0	269.0	447.0	28.8	21.69	26.29
Uttrakhand	21.0	18.9	22.0	29.0	18.5	26.0	13.8	9.83	11.82
All India	673.2	583.4	693.1	1626.3	1431.8	1781.4	24.2	24.39	25.80

**Third advance estimates*

New initiatives were undertaken to improve productivity of barley, malting quality, food purpose barley, lodging tolerance through screening of germplasm, pre-breeding, integration of molecular breeding and to popularize the health benefits of barley (high antioxident, higher beta glucan content) Linkages with national and international organisations, industries and farmers were also strengthened.

Release of new barley varieties for different zones

Three barley varieties namely RD2794, RD2849 and DWRB123 were released and notified by CVRC for commercial cultivation during 2016-17. The details of the varieties as hereunder:

Sr.No.	Variety	Parentage	Zone	Developed at	Production condition
1.	RD2794	RD2035/RD2683	NWPZ/NEPZ	RARI, Durgapura	Saline/alkaline conditions
2.	RD2849	DWRUB52/PL705	NWPZ	RARI, Durgapura	Irrigated timely sown malt barley
3.	DWRB123	DWRUB54/DWR51	NWPZ	ICAR-IIWBR, Karnal	Irrigated timely sown malt barley

State released varieties

During the year 2016-17, the variety VLB94 was notified for rainfed conditions of Uttarakhand and the details are given in the table below-

Sr.No.	Variety	Parentage	Zone	Developed at	Production condition
1	VLB94	DL237/VLB58	Uttarakhand	ICAR-VPKAS, Almora	Timely sown rainfed conditions

Registration of genetic stocks-

Three genetic stocks namely DWRB128, DWRB143 and DWRB137 were registered with ICAR-NBPGR for different traits and details are as per below:

Sr. No.	Genetic stocks	INGR No.	National ID No.	Trait
1	DWRB128	16002	IC0617170	Resistant to stripe rust in two row genetic back ground
2	DWRB143	16003	IC0617171	Highly resistant to stripe rust in six row genetic back ground
3	DWRB137	17012	IC620682	Highly resistant to stripe rust at seedling and adult plant stages

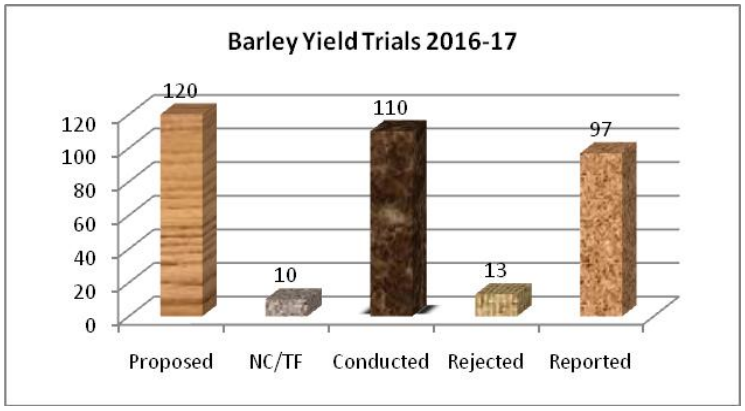
Registration of varieties with PPV&FRA

During the year 13 barley varieties applications under extant category were submitted for the protection with PPV&FRA. The applications were submitted for the varieties namely, BHS380, BHS400, DWRB73, DWRUB64, DWRUB52, DWRB92, DWRB91, DWRB101, HBL391, HUB113, VLB56, VLB85 and VLB118. Out of these varieties the protection was granted for the varieties viz., DWRB73, DWRUB64, DWRUB52, DWRB91, DWRB92 and DWRB101.

CROP IMPROVEMENT

COORDINATED YIELD EVALUATION TRIALS

- Out of 120 yield evaluation trials proposed 110 (91.7%) trials were conducted. Ten trials were either not conducted/failed and data were not received in time. After the analysis, only 97 trials (80.8% of proposed, 88.2% of conducted) were found good for reporting.



- These trials were conducted at 12 main centres and 35 testing centres (including ICAR, SAUs and State Department of Agriculture) during *rabi* 2016-17.
- In all 116 test entries contributed by 12 centres, were evaluated against 33 checks in the coordinated yield trials under rainfed (plains and hills), Irrigated (plains) and saline soils conditions under timely/ late sown 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.

Entries in AVT Final year evaluation-

During 2016-17, 04 entries were evaluated in different zones under barley advanced trials. The entry DWRB137 was evaluated for timely sown irrigated conditions of CZ and NEPZ, whereas

the genotypes RD2907 (AVT-SST), RD2899 (AVT-CZ) and RD2917 (AVT-MB-TS) were also in the final year evaluation.

Sr. No.	Trial name	Entry
1	AVT-FB-CZ	DWRB137, RD2899
2	AVT-FB-NEPZ	DWRB137
3	AVT-SST	RD2907
4.	AVT-MB-TS	RD2917

Promising entries in IVTs during 2016-17

Based upon the revised promotion criteria i.e. significantly superior at 10%, monitoring reports and disease and pest reactions the entries namely DWRB160, HUB253, HBL778, PL892 and RD2948 were found suitable for the promotion into advanced varietal evaluation in different trial series. The details of these promising varieties are as hereunder:

Sr. No.	Trial name	Zone	Entry
1	IVT-MB-TS	NWPZ	DWRB160
2	IVT-RF	NEPZ	HUB253
3	AVT-RF-Grain	NHZ	HBL778
4	IVT-FB	CZ	PL892
5	IVT-FB	NEPZ	PL892, RD2948

Malt Barley Evaluation

Irrigated

- The AVT-MB (IR-TS) was proposed at 11 centres in NWPZ and data of 10 locations, except Mathura (RMT) were reported. The trial comprised of 2 test entries and 5 checks where the entry RD2917 was in the final year of evaluation.The trial mean grain yield was exhibited as 49.2 q/ha, which ranged from 39.3 q/ha (Karnal) to 67.5 q/ha (Sri Ganganangar) indicating a wide difference across the centres. The entry RD2917 (52.7 q/ha) was significantly superior to best check DWRB123 (50.5 q/ha).
- The IVT-MB (IR-TS) was proposed at 9 centres in NWPZ and data of all the locations, except Mathura (RMT) reported. The trial comprised of 21 test entries and 5 checks.The trial mean grain yield was observed as 45.7 q/ha, which ranged from 32.4 q/ha (Karnal) to 60.6 q/ha (Durgapura) indicating good genotypic performances across the centres. The entry DWRB160 (53.3 q/ha) and DWRB136 (49.4 q/ha) was superior to latest malt barley check DWRB123 (48.5 q/ha). The genotype DWRB160 was observed with extra-long spikes (12.5-13 cm) and very high 1000 grain wt. of 61 g (58-72g).
- The IVT-MB (IR-LS) was proposed at 7 centres in NWPZ nd data of all the locations except Ludhiana (LSM) were considered for compilation. The trial comprised of 08 test entries and 3 checks. The trial mean grain yield was depicted as 41.3 q/ha, which ranged from 33.2 q/ha (Hisar) to 59.0 q/ha (Pantnagar), respectively. The six-rowed check DWRUB64 ranked first (44.6 q/ha). The entry DWRB163 was found at par with the best check.

Feed Barley Evaluation

Rainfed

- Under rain-fed barley three trials (AVT-RF-NEPZ, AVT-RF-NHZ and IVT-RF-NEPZ) were conducted. In AVT-RF-NEPZ trial, the new genotype JB 328 was inferior to all the checks for grain yield. In AVT-RF-NHZ trial, 17 test entries were evaluated, the test entry UPB 1061 ranking first with grain yield 26.81 q/ha, and was statistically at par with the best check HBL113 (26.49 q/ha) for grain yield. In IVT-RF-NEPZ trial, 15 test entries were evaluated. The new genotype HUB253 ranked first with 29.83 q/ha and was significantly superior to the best check K603 (28.12 q/ha).

Irrigated

- Under irrigated barley trials a total of five trials (AVT-IR-CZ, AVT-IR-NEPZ, IVT-FB-IR-NWPZ, IVT-FB-IR-NEPZ and IVT-FB-IR-CZ) were conducted.
- In AVT-IR-CZ trial, two test entries DWRB137 and RD2899 were evaluated, and ranked first and second, respectively. Both the test entries were statistically at par with the best check RD2786.
- In AVT-IR-NEPZ trial, the genotype DWRB137 was in the second year of AVT testing and two genotypes HUB250 and RD2921 were in the first year of AVT. None of the test entries was found superior over the best check.
- Out of the 21 test entries evaluated in IVT-FB-IR-NEPZ trial, the entries namely RD2948, DWRB167, KB1531, PL892 and UPB1064 were found significantly superior to the best check RD2552 (34.78 q/ha)
- Test entry DWRB167 obtained 55.66 q/ha grain yield and first rank, was statistically at par with best check RD2552 with 55.19 q/ha in IVT-FB-IR-NWPZ trial.
- In IVT-FB-IR-CZ trial, the entries namely JB347, KB1531, PL892 and PL898 were found significantly superior to the best check BH959 (35.18 q/ha).

Dual purpose

- In dual purpose barley trials, five trials (AVT-DP-IR-TS-CZ, AVT-DP-RF-TS-NHZ, IVT-DP-IR-TS-NWPZ, IVT-DP-IR-TS-NEPZ and IVT-DP-IR-TS-CZ)were conducted.
- The test entry RD2927 was evaluated in AVT-DP-IR-TS-CZ trial was statistically at par with the best check variety RD 2552 for grain yield and for forage yield, this genotype ranked third and was inferior to the best check.
- None of the 14 test entries evaluated in AVT-DP-RF-TS-NHZ trial was superior to the best check. The test entries VLB147, VLB150 and VLB153 were numerically high to the best check BHS380 for grain yield but were lower for forage yield than the check BHS380. Similarly test entry BHS453 was higher for forage yield but found lower in grain yield.
- In initial varietal trials of dual purpose barley (IVT-DP-IR-TS- NWPZ, IVT-DP-IR-TS- NEPZ and IVT-DP-IR-TS- CZ) though some test entries had better grain yield while the others gave better forage yields, but no test entry was found to have even numerical superiority in both for grain as well as forage yield over the best check.

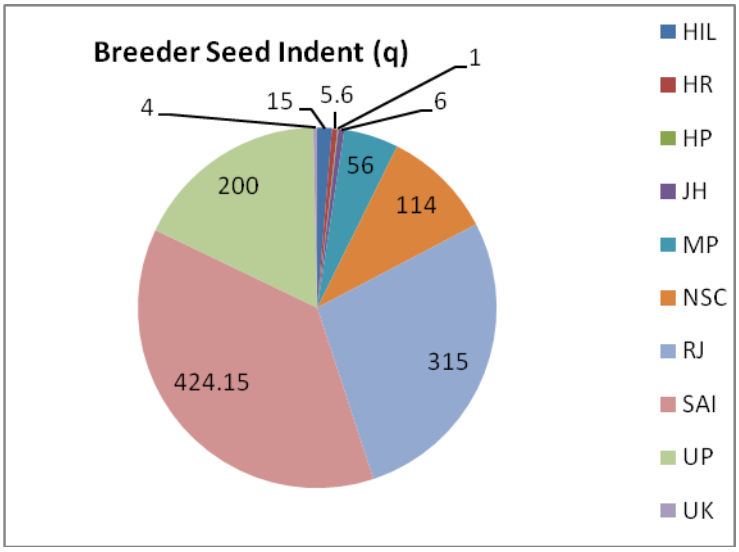
Salinity

- An AVT (SAL/ALK) trial was conducted with fifteen new genotypes, including one test entry RD2907 in second year of evaluation. The new genotype RD2907 (40.92 q/ha) was statistically at par with the best check NDB1445.

Breeder seed production

A consolidated indent of 1140.75 q breeder seed of 38 varieties was received from Deputy Commissioner (Seeds), DAC, Ministry of Agriculture & Farmers Welfare, Govt. of India. The indent included requirement of eight states (Rajasthan, Uttar Pradesh, Uttarakhand, Haryana, Madhya Pradesh, Punjab, Jharkhand and Himachal Pradesh), National Seeds Corporation and National Seed Association of India for the season Rabi 2016-17. The major proportion of the breeder seed indent was placed by NSAI (424.15q) followed by Rajasthan (315.00q), Uttar Pradesh (200.00q), National Seed Corporation (114.00q), Madhya Pradesh (56.00q) etc. From variety point of view, the highest indent was received for variety RD2786 (186.00q) followed by RD2794 (121.00), PL426 (96.15q), DWRUB52 (94.30q), RD2035 (71.40q), HUB113 (63.00q) etc.

A net production of 1521.86q breeder seed was reported, which was slightly deficit (+381.11q) in comparison to the total allocated quantity of 1138. 1140.75q. The maximum production was reported for RD2786 (300.00q) followed by RD2794 (160.00q), PL 426 (110.29q), DWRUB 52 (93.60q) HUB 113 (90.00q). The nucleus seed 77.90q was produced against the targeted quantity of 56.19 q of 33 varieties.



GERMPLASM EVALUATION & EXCHANGE

An Elite International Barley Germplasm Nursery (EIBGN) constituted with 45 genotypes selected from different international trials and nurseries and six standard checks was supplied for evaluation to all the twelve cooperating centres of Barley Network. A National Genetic Stock Nursery (NBGSN) was constituted with 27 promising genotypes and evaluated at eleven locations. During the *rabi* of 2016-17 season three International trials and three nurseries which comprised a total of 420 germplasm lines received from ICARDA, were evaluated along with suitable Indian check varieties at different locations(four sets each of the International Trial/Nursery). A total of 193 promising entries were selected by the breeders pursuing barley improvement in different SAUs, ICAR institutes and BARC, Mumbai during a Field Day organized on 8th March 2017 at ICAR-IIWBR, Karnal.

International trials and nurseries evaluated during crop season 2016-17

Sr. No.	Trial/ Nurseries	Genotypes received from ICARDA	Indian National checks	Number of Sets	Locations
1.	4th GSYT	24	K603	4	Kanpur, Faizabad, Rewa, Karnal
2.	IBYT-HI	24	BH946	4	Durgapura, Hisar, Ludhiana, Karnal
3.	INBYT-HI	24	BHS352/ Geetanjali	4	Bajaura, Karnal, Ludhiana, Kanpur
4.	4th GSBSN	145	Lakhan	4	Kanpur, Faizabad, Rewa, Karnal
5.	IBON-HI	108	BH946	4	Durgapura, Hisar, Ludhiana, Karnal
6.	INBON-HI	95	BHS352/ Geetanjali	4	Bajaura, Karnal, Ludhiana, Kanpur

ZONAL MONITORING

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

been circulated for necessary action by concerned breeders and other scientists and copies of the same is appended in the report for record.

Zonal monitoring visits of the barley teams

Zone	Date	Centres visited
CZ	15-17 Feb., 2017	Kota, Udaipur, Vallabhnagar, Bansnwara
NEPZ	22-25 Feb., 2017	Kanpur, Dalipnagar, Faizabad,Varanasi, Saini
NWPZ &CZ	28Feb,- 03March, 2017	Mathura, Kumher, Morena, Gwalior, Vanasthli, Durgapura, Bawal
NWPZ	5-9, March, 2017	Hisar, Sriganganagar, Bhatinda, Ludhiana, Dhoulakuan Modipuram,
NHZ I	12-14, April, 2017	Ranichauri Majhera, Hawalbagh (Almora)
NHZ II	18-21 April, 2017	Shimla, Berthein, Kangra, Malan, Palampur, Bajaura, Katrain

CROP PROTECTION

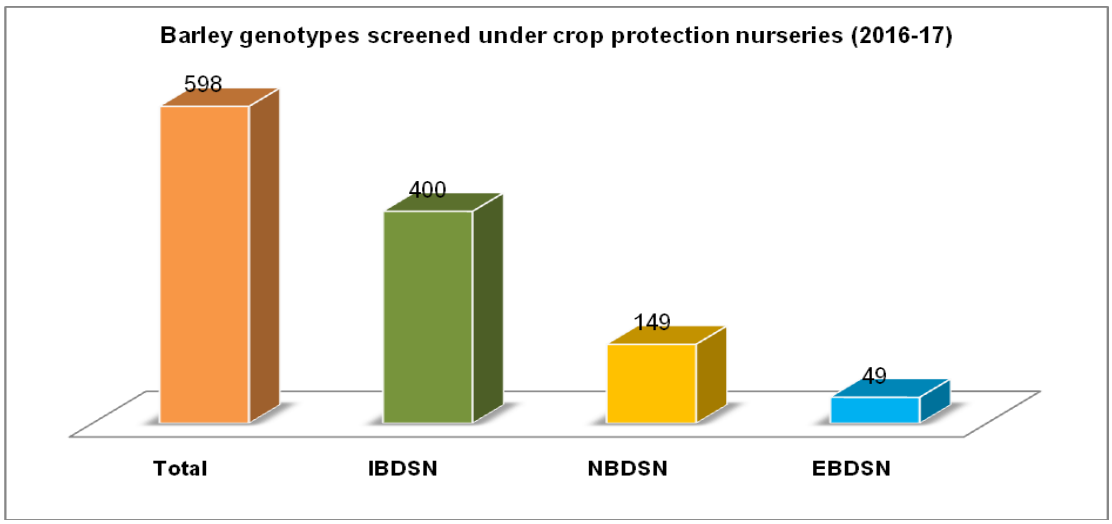
Barley Crop Health Status

During the crop season 2016-17 surveys were conducted by scientist from different cooperating centres for recording the presence of barley diseases and insects. There is no report of any rust in farmer's fields during this season. However, foliar blight, loose smut, covered smut and bacterial streak diseases of barley were noticed *in traces* to 5 per cent at villages of Jaipur district of Rajasthan. Whereas, in Eastern Uttar Pradesh leaf blight was common and in some fields it is upto 67 (on 0-9 scale, double digit system). In few fields covered and loose smut were also observed but incidence was very low less than 1%. In the hilly areas of Himachal Pradesh very few fields with very low incidence of powdery mildew was observed. Overall barley crop was healthy in all the barley growing areas in India.

Status of resistance in breeding lines and advanced entries

Adult plant resistance (APR)

A total 598 entries were screened during the year 2016-17, under various nurseries (IBDSN, NBDSN and EBDSN) for resistance against various diseases, aphid and CCN at different cooperating centers. There were 400 entries under IBDSN, 149 were for NBDSN and 49 for EBDSN.



Out of 400 IBDSN entries tested, 42 entries were found free from yellow rust (ACI = 0) and 183 entries showed resistant reaction having ACI less than 10. In case of leaf blight screening, 32 entries were found resistant (Avg. disease score 13-35 with HS < 57) against leaf blight. A total 149 entries from AVT and IVT yield trials including checks were screened against stripe rust and leaf blight. Among that 19 found free and 66 showed resistance (below 10 ACI) to yellow rust, and 10 were resistant to foliar blight (Avg. disease score 13-35 with HS < 57). Out of 49 entries

screened in EBDSN, 7 entries are found free from yellow rust, whereas 33 shown resistant reaction. Twelve entries also showed resistance against leaf blight.

Evaluation for seedling rust resistance

Rust resistance in NBDSN lines

None of the NBDSN entry was found to have resistance to all the tested pathotypes of black, brown or yellow rust. Resistance to all the pathotypes of black and brown rust was observed only in VLB147. Eleven entries were resistant to all the pathotypes of brown and yellow rusts.

Rust resistance in NBDSN lines

Resistant to	Number of lines	Detail of lines
Brown and yellow	11	JB328, PL891, RD2715, RD2786, RD2927, RD2954, RD2955, RD2956, RD2957, RD2958, RD2959
Black and brown	01	VLB147

Rust resistance in EBDSN lines

One EBDSN entry (BCU7746) was resistant to all the tested pathotypes of black, brown and yellow rusts. There were ten entries showing resistance to all the pathotypes of yellow and brown rust. Except these there was no EBDSN entry showing resistance to all the pathotypes of black and brown rust or black and yellow rust.

Rust resistance in EBDSN lines

Resistant to	Number of lines	Detail of lines
All	01	BCU7746
Brown and yellow	10	DWRB127, HBL113, HBL757, RD2909, RD2913, RD2914, VLB130, RD2917, PL891, RD2941

Chemical control of barley foliar blight

Various fungicides were evaluated against foliar blight at different locations viz. Varanasi, Dharwar, Kanpur and Faizabad. At all the centers both the treatments ST with Vitavax power + Propiconazole @ 0.1% spray and ST with Vitavax power + Tebuconazole (Folicur) @ 0.1% spray showed lowest disease severity and significantly superior over control.

Aphid Screening

During crop season 2016-17, data on screening of NBDSN entries against aphids recorded at four centers. None of entry was found to be resistant at all the centres,. At Karnal centre, six entries were found to moderately resistant (grade 3). These were BH1019, BHS457, DWRB164, JB328, JB346 and JB347.

Chemical control of Aphid

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. At Ludhiana, chlorantranilipride (0.86 aphids/tiller) was found to be the best treatment, at Vijapur, observation taken after 15th day after spray revealed lowest aphid population in the plots treated with acetamiprid and it was at par with all the treatments except chlorantranilipride and control.

Barley Resource Management

The barley resource management group is involved in the evaluation of advanced barley genotypes and updating the package of practices under the “All India Coordinated Wheat and Barley Improvement Project”. During 2016-17, the experiments were carried out at 16 locations covering the states of Himachal Pradesh, Uttarakhand, Punjab, Haryana, Rajasthan, Uttar Pradesh and Madhya Pradesh. A total of five trials with AVT second year entries were conducted. All the 16 proposed trials

for varietal evaluation were conducted and reported. In special trials, 54 trials were proposed, conducted and reported at different locations. The significant findings are:

- In AVT malt barley trial, the new genotype RD 2917 was at par in grain yield with best check DWRB 101 in NWPZ. In AVT feed barley trial, the test entry DWRB 137 of feed barley recorded significantly higher grain yield (4031 kg ha-1) as compared to all the checks in NEPZ. In Central zone, the test entries DWRB 137 and RD 2899 were at par with the best check RD 2786. In salinity AVT trial, the new testing genotype RD 2907 was at par with RD 2552. The test entry also responded up to 90 kg N/ ha under salinity.
- In tillage experiment conducted in NWPZ, the yield gain was not noticed but there is saving in the cost of cultivation, time and energy and so increase in net profit. In the same trial conducted in NHZ, the yield was significantly more under conventional tillage.
- The trial on seed rate and varieties conducted in NHZ revealed that variety BHS 400 and VLB 118 recorded significantly higher yield under 100 kg seed ha^{-1}, whereas, HBL 113 and BHS 352 recorded significantly higher yield by using 75 kg seed ha^{-1}.
- The trial conducted on integrated use of nutrients in NWPZ, reported that FYM and mulching has an additive effect on yield and soil fertility. In NEPZ, application of fertilizers coupled with FYM application @ 5 ton ha^{-1}, mulching @ 6 ton ha^{-1} and foliar spray of ZnSo4@ 0.5% or two foliar sprays of KCl @ 0.5 % resulted in significantly higher grain yield as compared to other treatments. Use of biofertilisers *Azotobacter* + *Phosphosolublizing* bacteria along with recommended dose of fertiliser also increased the productivity in NEPZ, NHZ and NWPZ. In CZ, Biomix application was found superior to biofertiliser application.
- Significantly higher grain yield was recorded when potash was applied through murate of potash as compared to sulphate of potash but there is no definite trend for quality characteristics.
- Plant growth regulators, chlormequat-chlorid (CCC) @1.25 L ha^{-1} at GS_{30-31} followed by ethephon(Cerone) @1.0 L ha^{-1} at GS_{39-40} recorded significantly higher grain yield in NWPZ and NEPZ
- The maximum grain yield (4965 kg ha^{-1}) was obtained when barley crop was sown at a spacing of 22.5 cm in NWPZ, NEPZ and CZ. Row spacing had non- significant effect on grain yield, ear head m^{-2} and grains per ear head.

QUALITY EVALUATION

MALTING QUALITY

The Barley Network Unit took up the evaluation of grain samples of Advanced Varietal Trial (AVT) and Initial Varietal Trial (IVT) on malt barley received from various test sites at its central facility for malting quality evaluation. The malt barley varietal trials were conducted in NWPZ during Rabi 2016-17, in two sowing dates as separate sets. The grain samples were received from seven locations (Hisar, Karnal, Bawal, Ludhiana, Bathinda, Durgapura and Pantnagar) in timely sown and from six locations (Hisar, Karnal, Bathinda, Ludhiana, Pantnagar and Durgapura,) in late sown conditions. This year a total of 262 samples were received. There were 16 test entries in IVT (TS) which were analyzed with five checks, while 8 test entries in IVT (LS) were evaluated with three checks. In case of AVT (TS), two entries (DWRB 150 and RD 2917) with five checks were analyzed. There were several entries observed promising for individual traits, after the detailed analysis across locations in the NWP Zone. This was done by the system of scoring giving due weightage to important traits. Thus based on the ten important traits (a maximum possible score of 30), entries PL 895 and DWRB 162 were having better overall malting quality score under timely sown conditions.

Promising entries* for individual malting quality trait

Traits	Promising entries	
	Timely sown	**Late sown**
Test Weight	-	DWRB 163
Bold Grains (%)	DWRB 162, DWRB 160, RD 2963, RD 2964, PL 896, DWRB 161, RD 2962, RD 2965	-
Thousand grain weight	DWRB 150, RD 2917, DWRB 160, RD 2964, RD 2965, BH 1017, RD 2963, DWRB 162, DWRB 136, RD 2962	DWRB 160
Husk Content	PL 895, BH 1017, PL 896, DWRB 136, KB 1523, DWRB 162, RD 2962, RD 2965, BH 1018, PL 899	DWRB 163
Beta glucan	UPB 1065, BH 1018, KB 1535	DWRB 161
Malt Friability	PL 895, PL 899, DWRB 161	-
Hot water extract	DWRB 150, DWRB 161, RD 2964	DWRB164, DWRB163, RD2966, DWRB161
Filtration Rate	UPB 1065, KB 1523, RD 2963, BH 1017, PL 899	DWRB 161, RD 2966, DWRB 163, DWRB 170, DWRB 164, RD 2968
Diastatic Power	DWRB 162	-
Kolbach Index	RD 2917, KB 1523, DWRB 161, UPB 1065, DWRB 162, KB 1535	-
Over all MQ	PL 895, DWRB 162	-

**Superior than the best check*

BARLEY QUALITY SCREENING NURSERY

This year (2016-17 season) genotypes of INBON (2014-15) and INBYT-HI (2014-15) tested last year were again grown for verification of traits at Karnal, Ludhiana, Durgapura and Pantnagar, with respect to grain physical quality traits. The traits analysed were hectoloitre weight (kg/hl), grain plumpness, thousand grain weight (g) and protein content (% dry weight). In case of INBON (2014-15) the genotype 68,71 and 43 were found promising taking thousand grain weight and bold grain percentage in consideration. In case of INBYT-HI (2014-15), two genotypes E 18 and E 8 were found promising taking into consideration the bold grain percentage.

FEED BARLEY

The feed grain samples from various trials and grown at different locations were analysed for few physical parameters and protein content. A total of 816 samples were received encompassing ten trials and grown in their respective zones. The entries with highest value for each of the parameter analyzed are listed below:

No.	Trial	Zone	Test weight	Thousand grain weight	Bold grain (%)	Thin grain (%)
1	AVT (RF)	NHZ	BHS 352 ©	UPB1063	UPB1063	UPB1063
2	AVT (IR)	NEPZ	RD 2921	Jyoti ©	HUB 113 ©	RD 2921
3	AVT (IR)	Central Zone	DWRB 137	DWRB 137	DWRB 137	DWRB 137
4	IVT (IR-FB)	NWPZ/NEPZCZ	KARAN16 (c)	BH902 (c)	RD2948	RD2948
5	AVT (RF)	NEPZ	K 560 ©	JB 328	K 603 (c)	Lakhan ©
6	IVT (RF)	NEPZ	DWRB 166	RD 2961	RD 2961	RD 2961
7	AVT (SAL/ALK)	NWPZ/NEPZ	DWRB165	BH 1017	RD 2957	RD 2957
8	IVT (DPB)	NWPZ/NEPZ/CZ	KB 1530	RD 2952	RD 2954	RD 2952
9	AVT (GB)	NHZ	BHS 352 ©	UPB 1063	UPB 1063	UPB 1063
10	AVT (DPB)	NHZ	HBL276 (c)	BHS447	BHS454	BHS454

Molecular (DNA) Markers based Profiling of AVT Final Year Entries and Checks

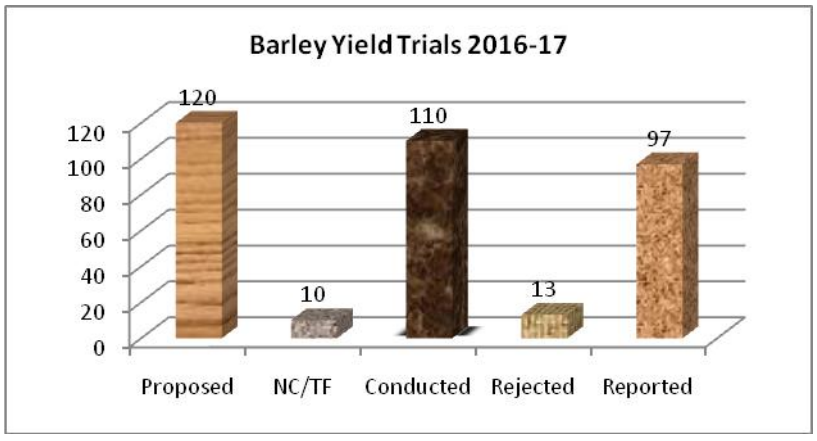
Total 45 SSR/STS markers covering all the seven chromosomes of barley were screened with final year test entries (DWRB137, K1055, RD2899, RD2907 & RD2917) and their respective checks (BH902, BH959, DWRB101, DWRB123, DWRUB52, HUB113, Jyoti, K508, NDB1173, NDB1445, PL751, RD2552, RD2786, RD2794 & RD2849) to develop molecular profiles. Total 83 alleles were scored in selected genotypes for PCR based amplification profiles of AVT final year trials. The number of alleles ranged from 1 to 4 with an average of 1.85 alleles per locus. The band fragment sizes varied from 109 bp to 1500 bp with PIC values ranging from 0.0 to 0.68. . Average PIC across seven linkage groups of barley varies from 0.42 to 0.68 for final year AVT. These molecular statistics were comparable with previous crop season (2015-16) final year AVT entries. This suggested that genetic variability of barley genotypes has maintained for major barley sowing regions of India. During molecular analysis, chromosome 3H (PIC=0.68) was found most variable followed by 2H (PIC=0.50) whereas chromosome 1H (PIC=0.42) was observed least variable. The dendrogram generated using binary (0/1) data clearly indicates that the final year test entries does not cluster at one place and are quite diverse from check lines. The twenty genotypes were grouped within similarity coefficient (GS) ranging from 0.60 to 0.9 and showed sufficient genetic variability at molecular level. The cluster tree divided into two sub-clusters at GS= 0.62. One major cluster grouped eleven genotypes including two test entries (K1055 & RD2907) and another cluster comprised nine genotypes including three test entries viz. DWRB137, RD2899 & RD2917. All twenty genotypes used of final year AVT trial could be distinguished using screened molecular markers.

BREAK UP OF BARLEY NETWORK YIELD TRIALS

(RABI 2016- 17)

S. No.	Trial Name	No. of Trials				
		Proposed	Not Conducted / Failed/ Not Received/rejected	Data Received	Data Rejected	Data Reported
1.	AVT (RF) Hills	11	2 (Rajaouri& Sundernagar)	9	1 (Almora)	8
2.	AVT (IR-FB)-NEPZ	7	1 (Faizabad)	6	-	6
3.	AVT (IR-FB)-CZ	6	-	6	1 (Banswara)	5
4.	AVT (RF-FB)-NEPZ	9	-	9	1(Mirzapur)	8
5.	AVT (IR-DP)-CZ	7	-	7	3 (Banswara, Gwalior, Anand)	4
6.	AVT (IR-TS) Malt Barley	11	1(Mathura)	10	-	10
7.	AVT-SST	7	1 (Kumher)	6	-	6
8.	AVT (Dual Type) Hills	5	1 (Palampur)	4	1 (Majhera)	3
9.	IVT (IR-FB) Plains	17	1 (Tabiji)	16	2(Banswara& Karnal)	14
10.	IVT (IR-TS) Malt Barley	9	1 (Mathura)	8	-	8
11.	IVT (IR-LS) Malt Barley	7	-	7	1(Ludhiana)	6
12.	IVT (Dual Type) Plains	15	1 (Modipuram)	14	3 (Bikaner, Anand & Banaswara)	11
13.	IVT-RF-NEPZ (Grain)	9	1(Mirzapur)	8	-	8
	TOTAL	**120**	**10**	**110**	**13**	**97**
				91.7%	**10.8%**	**88.2%(R) 80.8%(P)**

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



Performance of test sites during Rabi 2016-17

No.	Centres	No. of Trials		Trials Rejected		
		Allotted	Conducted	No.	Name	Reason
(A) MAIN CENTRES						
1.	Almora	2	2	1	AVT-RF-NHZ	LSM
2.	Bajaura	2	2	-	-	-
3.	Durgapura	5	5	-	-	-
4.	Faizabad	7	7	1	AVT-IR-NEPZ	RMT
5	Hisar	6	6	-	-	-
6.	Kanpur	5	5	-	-	-
7.	Karnal	5	5	1	IVT-IR-FB	LSM
8.	Ludhiana	5	5	1	IVT-MB-LS	LSM
9.	Rewa	5	5	-	-	-
10.	Shimla	2	2	-	-	-
11.	Varanasi	5	5	-	-	-
12.	Pantnagar	4	4	-	-	-
	Total (A)	**53**	**53**	**4**		

Contd….

Performance of test sites during Rabi 2016-17(contd….)

No.	Centres	No. of Trials		Trials Rejected		
		Allotted	Conducted	No.	Name	Reason
(B)	**TESTING CENTRES /SAU / DEPTT. OF AGRIC.**					
1.	Anand	2	2	2	IVT-IR-DP, AVT-DP-CZ	Incomplete data
2.	Bawal	2	2	-	-	-
3.	Banasthali	1	1	-	-	-
4.	Banswara	4	4	4	AVT-IR-CZ, AVT-DP-CZ, IVT-FB, IVT-DP	UR, Incomplete data
5.	Bathinda	3	3	-		
6.	Berthein	1	1	-		
7.	Bikaner	1	1	1	IVT-DP-Plains	LSM
8.	Bikaner, CSWRI	1	1	-	-	-
9.	Dalipnagar	1	1	-	-	-
10.	Dhaulakuan	1	1	-	-	-
11.	Gwalior	3	3	1	AVT-DP-CZ	Incomplete data
12	Jabalpur	1	1	-	-	-
13.	Kangra	1	1	-	-	-
14.	Katrain	1	1	-	-	-
15.	Kota	3	3	-	-	-
16.	Kumher	1	1	1	AVT-SST	LS
17.	Majhera	2	2	1	AVT-DP-NHZ	LSM
18.	Malan	1	1	-	-	-
19.	Mathura	2	2	2	AVT-IR-TS-MB, IVT-IR-TS-MB	RMT
20.	Mirzapur	2	1	1	AVT-RF-NEPZ	LSM
21.	Morena	3	3	-	-	-
22.	Modipuram	4	3	-	IVT-DP	NR
23.	Palampur	1	-	-	-	-
24	Pusa, RAU	4	4	-	-	-
25	Rajauri	1	-	-	-	-
26	Ranchi	2	2	-	-	-
27	Ranichauri	1	1	-	-	-
28.	Sagar	2	2	-	-	-
29.	Saini	2	2	-	-	-
30	Sriganganagar	1	1	-	-	-
31	Sunder Nagar	1	-	-	-	NC
32.	Tabiji	1	1	-	IVT-IR-FB	NR
33	Tissuhi	2	2	-	-	-
34	Udaipur	4	4	-	-	-
35.	Sabour	4	4	-	-	-
	Total (B)	**67**	**62**	**11**		

RMT= rejected by monitoring team, TF= trial failed, LSM= low yield levels LS= late sowing, HCV= High CV, UR= Unrealistic yield, LR = Late receipt of results, ES = Early sowing than recommended dates LS= late sowing than recommended dates NC= Not conducted, NR=Not reported.

Trial wise locations during Rabi 2016-17

S no.	Trial Name	Locations	Total
1	AVT (RF)-NHZ	Bajaura, Berthein, Kangra, Katrain, Malan, Shimla, Sundernagar, Almora, Ranichauri, Majhera, Rajauri	11
2	AVT-DP-NHZ	Shimla, Bajaura, Palampur, Almora, Majhera	5
3	AVT-IR- NEPZ	Kanpur, Faizabad, Varansi, Rewa, Pusa(RAU), Sabour, Ranchi	7
4	AVT-IR-CEN	Kota, Udaipur, Banaswara, Gwalior, Morena, Sagar	6
5	AVT-RF-NEPZ	Kanpur, Faizabad, Varanasi, Mirzapur, Tissshui, Saini, Rewa, Pusa (RAU), Sabour	9
6	AVT-DP-CZ	Kota, Udaipur, Banswara, Anand, Morena, Gwalior, Sagar	7
7	AVT (IR-TS) Malt Barley	Dhaulakuan, Hisar, Karnal, Bawal, Bathinda, Ludhiana, Durgapura, Modipuram, Mathura, Pantnagar, Sriganganagar	11
8	AVT-SST	Dalipnagar, Faizabad (2), Hisar,IIWBR Hisar, Kumher, Bansthali	7
9	IVT (IR-TS) Malt Barley	Bawal, Hisar, Karnal, Ludhiana, Bathinda, Durgapura, Modipuram, Mathura, Pantnagar	9
10	IVT (IR-LS) Malt Barley	Hisar, Karnal, Ludhiana, Bathinda, Durgapura, Modipuram, Pantnagar	7
11	IVT (IR-TS) Feed Barley	Hisar, Karnal, Ludhiana, Durgapura,Tabiji, Banswara, Udaipur, Pantnagar, Kanpur, Varanasi, Faizabad, Rewa, Morena, Gwalior, Pusa(RAU), Sabour, Ranchi	17
12	IVT (Dual Type) Plains	Bikaner, Bikaner (CSWRI), Durgapura, Kota, Udaipur, Banswara, Jabalpur, Rewa, Hisar, Ludhiana, Kanpur, Faizabad, Varanasi, Anand, Modipuram	15
13	IVT (RF)-NEPZ	Kanpur, Varanasi, Faizabad, Mirzapur, Tissuhi, Rewa, Pusa, Sabour,Saini	9
	Total		**120**

Center wise Summary Rabi 2016-17

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	AVT(M)TS, , IVT(M)TS, IVT(M)-LS, IVT (IR)-DP , IVT-IR-FB	5
4.	Faizabad	SST(2 SETS),), IVT(RF)-NEPZ, AVT-RF-NEPZ, AVT-IR-NEPZ, IVT-IR-FB, IVT (DUAL)Plains	7
5	Hisar	AVT(M)TS, IVT-IR-FB, IVT(M)TS, IVT(M)LS, AVT-SST, IVT-(Dual) Plains	6
6.	Kanpur	IVT(RF)-NEPZ, AVT-(RF)-NEPZ, AVT-(IR)-NEPZ, IVT(IR)-FB, IVT- DP,	5
7.	Karnal	AVT(M)TS, IVT(M)TS, IVT(M)LS, AVT-SST, IVT-IR-FB	5
8.	Ludhiana	AVT(M)TS, IVT(M)TS, IVT(M)LS, AVT-SST, IVT-IR-FB	5
9.	Rewa	IVT(RF)-NEPZ, AVT(RF)-NEPZ, AVT(IR)-NEPZ, IVT-IR-FB, IVT(DP)Plains	5
10.	Shimla	AVT(RF)-NHZ, AVT-RF(DUAL)-NHZ	2
11.	Varanasi	IVT(RF)-NEPZ, AVT-RF-NEPZ, AVT-IR-NEPZ, IVT-IR-FB, IVT(DUAL) Plains	5
12.	Pantnagar	AVT(M)TS, IVT(M)TS, IVT(M)LS, IVT(IR)-FB	4
		Sub Total	**53**
(B)TESTING CENTRES /SAU / DEPTT. OF AGRIC.			
S No.	Centre	Trials proposed	Total
1.	Anand	AVT-DP-CZ, IVT(DUAL)-TS	2
2.	Bawal	IVT(M)TS, AVT(M)TS	2
3.	Banasthali	AVT-SST	1
4.	Banswara	IVT(IR)-FB, AVT(IR)CEN, AVT-DP-CZ, IVT(IR)DP	4
5.	Bathinda	IVT(M)TS, IVT(M)LS,AVT(M)TS	3
6.	Berthein	AVT(RF)NHZ	1
7.	Bikaner	IVT(IR)Dual	1
8.	Bikaner, CSWRI	IVT(IR)Dual	1
9.	Dalipnagar	AVT-SST	1
10.	Dhaulakuan	AVT(M)TS	1
11.	Gwalior	IVT(IR)FB, AVT(IR)CEN, AVT-DP-CZ	3
12	Jabalpur	IVT(IR)Dual	1
13	Kangra	AVT(RF)NHZ	1
14.	Katrain	AVT(RF)NHZ	1
15.	Kota	AVT(IR)CEN, AVT-DP-CZ, IVT(IR)Dual	3
16.	Kumher	AVT-SST	1
17.	Majhera	AVT(RF)Dual, AVT(RF)NHZ	2
18.	Malan	AVT(RF)NHZ	1
19.	Mathura	IVT(M)TS, AVT(M)TS	2
20.	Mirzapur	IVT(RF) NEPZ, AVT(RF)NEPZ	2
21.	Morena	IVT(IR)FB, AVT(IR)CEN, AVT-DP-CZ	3
22.	Modipuram	IVT(M)TS, IVT(M)LS, AVT(M)TS, IVT-IR-Dual	4
23.	Palampur	AVT(RF)-Dual	1
24.	Pusa, RAU	IVT(RF)NEPZ ,AVT(RF)NEPZ, AVT(IR)NEPZ, IVT(IR)FB	4
25	Rajauri	AVT(RF)NHZ	1
26	Ranchi	AVT-IR-NEPZ, IVT-TS-MB	2
27	Ranichauri	AVT(RF)NHZ	1
28	Sagar	AVT(IR)CEN, AVT-DP-CZ	2
29	Saini	AVT-RF-NEPZ, IVT-RF-NEPZ	2
30	Sriganganagar	AVT(M)TS	1
31	Sunder Nagar	AVT(RF)NHZ	1
32	Tabiji	IVT(IR)FB	1
33	Tissuhi	IVT(RF)-NEPZ, AVT(RF)NEPZ	2
34	Udaipur	AVT (IR)CEN, AVT-DP-CZ, IVT(IR)TS-Dual, IVT(IR)TS	4
35	Sabour	IVT-RF-NEPZ , AVT(RF)NEPZ, AVT(IR)NEPZ, IVT(IR)FB	4
		SUB TOTAL	**67**
		G TOTAL (A+B)	**120**

PARENTAGE OF BARLEY STRAINS UNDER COORDINATED EVALUATION DURING RABI 2016-17

No.	CONTRIBUTING CENTRE	SYMBOL
1	ALMORA, ICAR-VPKAS	VLB
2	BAJAURA, RRS (CSKHPKV)	HBL
3	DURGAPURA, RARI (SKNAU)	RD
4	FAIZABAD, NDUA&T	NDB
5	HISAR, CCSHAU	BH
6	KANPUR, CSAUA&T	KB
7	KARNAL,ICAR-IIWBR	DWRB, DWRUB
8	LUDHIANA, PAU	PL
9	PANTNAGAR, GBPUA&T	UPB
10	REWA, JNKVV	JB
11	SHIMLA, RS, ICAR-IARI	BHS
12	VARANASI, BHU	HUB

Sr. No.	Entries	Parentage
ICAR-IARI, RS, Shimla		
1	BHS447	CONDOR-BAR/3/PATTY.B/RUDA//ALELI/4/ALELI/5/FOSTER
2	BHS452	AWBLACK/ATHS//ARAR/3/9Cr.279-07/ROHO/4/ALANDA-01
3	BHS453	LEGACY/4/TOCTE//GOB/HUMAI 10/3/ATAH92/ALELI/5/ARUPO/K8755//MORA
4	BHS454	ABN-B/KC-B//RAISA/3/ALELI/4/MERIT.B (2009-10)
5	BHS455	BGS/SSN-01//RHN/3/QB813-2 (2009-10)
6	BHS456	IBYT-HI-25 (2012-13)
7	BHS457	AWBLACK/ATHS//ARAR/3/9Cr.279-07/ROHO/4/ALANDA-01
8	BHS458	TRA-B/1038//PETUNIA 1/3/PENCO/7/CONGONA/5/CENB /3/ LBIRAN /UNA8217//GLORIABAR/COME/4/SEN/6/QUINA/8/BLLU/RUSSEL// CABUYA/3/ M9846//CCXX14.ARZ/3/PACO CBSS01M00725D-0TOPY -13M -1M-1Y-1M-0Y
9	BHS459	LAMONIA94/EXCEL-BAR
10	BHS460	CLE150/W89.11369//CHERI/3/CANELA
GBPUA&T, Pantnagar		
11	UBP1061	PL 830/BH902
12	UBP1062	INBON-HI-10 (2013-14)
13	UBP1063	DWR 28/(RD 2503/ROBUST/BORR/8/ZARZA 15/GLORIA-BAR/4/SOTOL//...
14	UBP1064	1st GSBSN-80 (2013-14)
15	UBP1065	IBYT-HI-16 (2012-13)
16	UBP1066	IBYT-HI-11 (2013-14)
ICAR-VPKAS, Almora		
17	VLB146	INDIANUR-57(2009-10)
18	VLB147	INDIANUR-42(2009-10)
19	VLB149	INDIANUR-51(2009-10)
20	VLB150	EC667475
21	VLB151	20thIBON-52
22	VLB152	PENCO/CHEVRON-AR/3/ATACO/BERMEJO//HIGO/4/PETUNIA 1/5/FRESA
23	VLB153	VM 51
24	VLB154	ADABELLA/5/LEGACY/4/TOCTE//GOB/HUMAI10/3/ATAH92/ALELI
CSKHPKV, RRS, Bajaura		
25	HBL 764	PETUNIA 2/3/AGA VE/SUMBARD400//MARCO/4/PETUNIA 1/5/TRA-B/1038// PETUNIA 1/3/ PENCO/6/BLLU
26	HBL 765	CI10622/CI5824//PAICO/3/GLORIA-BAR/COPAL/4/BBSC*2/5/PINON
27	HBL 776	ZIGZIG/BLLU//PETUNIA 1

28	HBL 777	IBYT-HI-13 (2012-13)
29	HBL 778	INBYT-HI-2 (2012-13)
30	HBL 780	IBYT-W-18 (2012-13)
31	HBL 781	INBON-HI-26 (2013-14)
CCSHAU, Hisar		
32	BH1017	NBGSN-13 (2009)/DWRB73
33	BH1018	EIBGN-HI-55 (2013)
34	BH1019	IBON-HI-119 (2014-15)
BHU, Varanasi		
35	HUB250	RD2618/RD2660
36	HUB252	JB 18/31st IBON-4-01
37	HUB253	JB 18/31st IBON-4-02
38	HUB257	31st IBON-4-2
39	HUB258	EMBSN-27/RD2503
40	HUB259	C 138/RD2503
JNKVV, Rewa		
41	JB 328	26th IBYT-7-1/JB14
42	JB 346	22nd IBYT-2/ DL88
43	JB 347	EIBGN07-18 / RD2503
44	JB 348	DL88/BG105
45	JB 349	JB47/ RD2683
46	JB 350	RD2651/PL508
SKNAU, RARI, Durgapura		
47	RD2899	RD2592/RD2035//RD2715
48	RD2907	RD103/RD2518//RD2592
49	RD2917	PL705/RD2668//DWR46
50	RD2921	RD2508/RD2743
51	RD2927	RD2624/RD2696
52	RD2947	RD2552/RD2786
53	RD2948	RD2660/RD2811
54	RD2949	RD2552/RD2786
55	RD2950	RD2636/RD2521//RD 2503
56	RD2951	RD2552/RD2743
57	RD2952	RD2552/RD2743
58	RD2953	RD2552/RD2786
59	RD2954	RD2808/ RD2743
60	RD2955	RD2666/DWR46
61	RD2956	DL472/BL2//RD2508
62	RD2957	RD2552/RD2786
63	RD2958	RD2552/RD2786
64	RD2959	RD2636/RD2521//RD2503
65	RD2960	RD2552/RD2786
66	RD2961	RD2636/RD2521//RD2503
67	RD2962	DWR49/RD2615
68	RD2963	RD2606/RD2719//RD2668
69	RD2964	DWRUB52/RD2651
70	RD2965	DWRUB54/RD2503
71	RD2966	DWRUB52/RD2651
72	RD2967	RD2606/RD2719//RD2668
73	RD2968	DWR49/RD2615
PAU,Ludhiana		
74	PL891	IBON 343/12th HSBN-176
75	PL892	RD2683/RD2552
76	PL893	BL29/BH657
77	PL894	BL29/BH657
78	PL895	BM7/BM12
79	PL896	DWRUB52 /PL768
80	PL897	PL751/BH 902

81	PL898	PL751/BH 902
82	PL899	VJM 531/BL 36
CSAUA&T, Kanpur		
83	KB1501	BH 910/K 878
84	KB1506	BH 910/K 878
85	KB1507	RD 2742/K 877
86	KB1521	RD 2792/K 925
87	KB1523	K 508/ RD 2676
88	KB1527	PL 816/K 551
89	KB1528	PL 816/K 551
90	KB1530	EIBGN-68 (2014-15)
91	KB1531	EIGBN-67 (2014-15)
92	KB1535	EIBGN-69 (2014-15)
93	KB1541	2nd GSBYT-07 (2014-15)
94	KB1545	IBYT-HI-23(2013-14)
95	KB1546	IBYT-HI-08 (2013-14)
96	KB1548	1st GSBYT-24 (2013-14)
NDUA&T, Faizabad		
97	NDB1651	DL 470/RD 2035
98	NDB1653	NB-2/K 580
99	NDB1655	EIBGN-66 (2008-09)
100	NDB1660	1st GSBSN-19 (2013-14)
101	NDB1665	1st GSBSN-32 (2013-14)
102	NDB1673	1st GSBSN-106 (2013-14)
ICAR-IIWBR, Karnal		
103	DWRB136	DWRUB54/XANADU
104	DWRB137	DWR28/DWRUB64
105	DWRB150	DWRB54/XANADU
106	DWRB160	DWRB62/DWRB73
107	DWRB161	RD2668/NDB1173
108	DWRB162	DWR78/DWRB74
109	DWRB163	DWRUB54/RD2035
110	DWRB164	DWRB73/DWRB82
111	DWRB165	PETUNIA.1/LAMOLIN95
112	DWRB166	P.STO/3/LBIRAN/UNA80//LIGNEE640/4/BLLU/5/
113	DWRB167	P.STO/3/P.STO/3/LBIRAN/UNA80//LIGNEE640/4/BLLU/5/PETUNIA.1/6/ LEGACY
114	DWRB168	EXCEL-BAR/4/GLORIA-BAR/COME//LIGNEE640/3/SPB
115	DWRB169	MSEL/GOB
116	DWRB170	DWRB62/DWRB73
Checks		
1	Azad	K12/K19
2	BH902	BH495/RD2552
3	BH946	BHMS22A/BH549//RD2552
4	BH959	BH393/BH331
5	BHS352	HBL240/BHS504//VLB129
6	BHS380	VOILET/MJA/7/ABN-B6/BA/GAL//FZA-B/5/DG/DC-B/PT-BAR/3/RA-B/BA/3/4/TRYIGAL
7	BHS400	34th IBON-9009
8	DWRB73	PL710/DWR17
9	DWRB91	DWR46/RD2552
10	DWRB101	DWR28/BH581
11	DWRB123	DWRUB54/DWR51
12	DWRUB52	DWR17/K551
13	DWRUB64	DL472/PL705
14	HBL113	SELECTION FROM ZYPHYZE
15	HBL276	HBL233/HBL238
16	HUB113	KARAN280/C138

17	JYOTI	K 12/C 251
18	K508	K394/K141
19	K560	K404/DL479
20	K603	K257/C138
21	Karan16	AZAM (DWARF)1/EB7576
22	Lakhan	K12/IB226
23	NDB943	K 1178/Karan 748
24	NDB1173	BYTLRA 3-(1994-95)/NDB217
25	NDB1445	NDB940/Ratna
26	PL751	K226/PL226
27	RD2035	RD103/PL101
28	RD2552	RD2035/DL472
29	RD2715	RD387/BH602//RD2035
30	RD2786	RD2634/NDB1020//K425
31	RD2794	RD2035/RD2683
32	RD2849	ISEBON-128 (08-09)/PL705
33	VLB118	14th EMBSN-9313

ADVANCED VARIETAL TRIAL (RAINFED) – NEPZ

- The AVT-RF-NEPZ trial was allotted to nine centres and all the centres reported the data. The data of Mirzapur were not included for zonal mean compilation due to low site mean.
- The zonal mean was depicted as 20.87 q/ha and the highest mean grain yield was observed at Rewa (38.90 q/ha).
- The check varieties K 560 and Lakhan ranked first and second in the pooled analysis with 22.56 and 22.48 q/ha grain yield, respectively.
- The AVT first year genotype JB 328 was ranked fourth and was inferior to all the checks for grain yield.

INITIAL VARIETAL TRIAL (RAINFED) – NEPZ

- This trial was allotted to nine centres, but Mirzapur centre did not conduct this trial.
- All the remaining eight locations have reported the data and were considered for pooled analysis.
- The highest general mean for grain yield (38.50 q/ha) across the locations was obtained at Rewa centre, followed by Pusa (35.70 q/ha) and the zonal mean across the entries and the centres was 24.75 q/ha for this trial.
- The test entry HUB253 ranked first with 29.83 q/ha across the centres and locations, and was significantly superior to the best check variety K603 (28.12 q/ha).

ADVANCED VARIETAL TRIAL (RAINFED) – NH ZONE

- This trial with 17 test entries was conducted at nine locations, and all the locations reported the data. Data of Almora location was not considered for pooled analysis because low yield levels.
- The highest general mean for grain yield (36.15q/ha) was obtained at Berthin centre and zonal mean grain yield across the entries was 22.38 q/ha.
- The test entry UPB 1061 ranking first with grain yield 26.81 q/ha, was numerically superior and statistically at par with the best check HBL113 (26.49 q/ha) for grain yield.

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

Entry	Saini			Kanpur			Varanasi			Rewa			Faizabad			Tissuhi			Sabour			Pusa			Pooled (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
JB 328	17.17	4	0	17.36	4	0	8.37	4	0	40.80	1	1	18.33	3	0	19.81	1	1	3.31	4	0	24.03	2	0	18.65	4	0
K 560 (C)	17.83	3	0	18.91	2	1	21.58	3	0	37.30	4	1	22.13	2	1	18.68	3	1	13.46	3	0	30.56	1	1	22.56	1	1
K 603 (C)	20.91	2	1	19.31	1	1	23.99	1	1	39.40	2	1	10.74	4	0	16.10	4	0	20.13	1	1	7.73	4	0	19.79	3	0
Lakhan (C)	21.01	1	1	18.19	3	1	22.06	2	0	38.10	3	1	23.08	1	1	19.32	2	1	19.36	2	1	18.72	3	0	22.48	2	1
G.M.	19.23			18.44			19.00			38.90			18.57			18.48			14.06			20.26			20.87		
S.E.(M)	0.62			0.77			0.44			1.43			0.40			0.75			0.59			0.56			0.27		
C.D. (10%)	1.55			1.91			1.09			3.56			0.99			1.87			1.46			1.39			0.65		
C.V. (%)	7.95			10.21			5.67			9.04			5.29			9.99			10.28			6.79					
DOS	09-11-2016			26-10-2016			07-11-2016			11-11-2016			01-11-2016			04-11-2016			18-11-2016			30-11-2016					

ADVANCED VARIETAL TRIAL (Rainfed) **ZONE: NEPZ**

Summary of ancillary and disease data **RABI – 2016-17**

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	Colour	1000 g.w Mean & Range	H/N	RUST		Smut		Hel. Disease		CCN	APHID (1-5)
										YL HS ACI	BR	L (%)	C (%)	Spot leaf (%)	Leaf Blight (1-9)		
JB 328	79 (66-107)	121 (101-131)	75 (54-96)	66 (15-137)	3 (1-6)	6	LY	40 (36-48)	H	-				99	99		
K 560 (C)	79 (65-109)	120 (100-131)	83 (61-108)	70 (33-129)	3 (1-5)	6	LY	43 (39-46)	H					36	56		
K 603 (C)	80 (68-110)	120 (113-130)	81 (45-117)	62 (24-108)	3 (2-4)	6	LY	41 (32-46)	H					36	89		
Lakhan (C)	78 (65-108)	120 (101-129)	84 (61-110)	70 (50-98)	3 (1-5)	6	LY	40 (37-44)	H					57	89		

IVT-RF-TS-NEPZ

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

Entry	Code	Saini			Varanasi			Kanpur			Tissuhi			Faizabad			Rewa			Sabour			Pusa			Pooled		
		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
DWRB166	IVTRFNEPZ-16	19.57	10	0	20.53	10	0	24.64	1	1	16.91	13	0	21.14	14	0	38.9	8	1	11.1	11	0	45.65	4	0	24.8	9	0
HUB252	IVTRFNEPZ-5	20.92	6	0	25.97	5	0	19.84	10	0	19.93	8	0	22.28	13	0	39.8	3	1	27.45	2	0	26.09	15	0	25.28	8	0
HUB253	IVTRFNEPZ-17	15.76	16	0	27.78	4	0	20.92	6	0	22.34	5	1	31.4	3	1	37.8	13	1	27.16	3	0	55.43	1	1	29.83	1	1
JB349	IVTRFNEPZ-1	22.83	5	0	29.59	2	1	18.3	13	0	23.55	3	1	31.46	2	1	39.6	4	1	24.49	5	0	33.7	9	0	27.94	3	0
JB350	IVTRFNEPZ-15	20.11	7	0	22.34	8	0	23.1	2	1	18.72	11	0	22.95	11	0	40.1	1	1	13.82	10	0	29.71	12	0	23.86	13	0
KB1506	IVTRFNEPZ-11	15.22	17	0	13.89	14	0	22.46	3	1	16.91	13	0	22.95	11	0	39.9	2	1	16.97	8	0	46.74	3	0	24.38	11	0
KB1521	IVTRFNEPZ-8	16.17	15	0	16.3	12	0	22.46	3	1	16.91	13	0	29.89	5	1	36.6	17	0	10.37	13	0	18.12	17	0	20.85	16	0
KB1541	IVTRFNEPZ-2	16.85	14	0	10.27	17	0	18.03	15	0	4.53	17	0	31.16	4	1	38.9	7	1	5.93	17	0	27.17	14	0	19.1	17	0
KB1545	IVTRFNEPZ-13	19.02	11	0	12.68	16	0	18.48	11	0	16.3	16	0	15.4	17	0	38	11	1	10.74	12	0	42.75	6	0	21.67	15	0
NDB1651	IVTRFNEPZ-3	27.99	3	0	24.76	6	0	18.39	12	0	21.14	6	0	27.6	7	0	39.4	6	1	20.49	7	0	29.35	13	0	26.14	4	0
PL893	IVTRFNEPZ-12	32.61	1	1	21.74	9	0	11.41	17	0	18.72	11	0	21.07	15	0	36.82	16	1	21.2	6	0	40.94	7	0	25.56	6	0
PL897	IVTRFNEPZ-7	23.37	4	0	13.89	14	0	20.74	7	0	19.32	9	0	27.17	8	0	38.3	9	1	7.47	16	0	33.7	9	0	23	14	0
RD2959	IVTRFNEPZ-14	31.52	2	1	16.3	12	0	18.03	14	0	25.36	1	1	23.25	10	0	37.9	12	1	8.91	15	0	47.1	2	0	26.05	5	0
RD2960	IVTRFNEPZ-6	17.93	12	0	28.99	3	1	19.93	9	0	20.53	7	0	25.06	9	0	37.4	15	1	9.61	14	0	32.97	11	0	24.05	12	0
RD2961	IVTRFNEPZ-10	20.11	7	0	19.32	11	0	18.03	15	0	23.55	3	1	18.9	16	0	37.5	14	1	16.71	9	0	43.12	5	0	24.66	10	0
K603 (C)	IVTRFNEPZ-4	20.11	7	0	31.4	1	1	20.56	8	0	24.76	2	1	29.29	6	1	39.4	5	1	24.68	4	0	34.78	8	0	28.12	2	0
LAKHAN (C)	IVTRFNEPZ-9	17.66	13	0	22.95	7	0	21.2	5	0	19.32	9	0	32	1	1	38.1	10	1	33.47	1	1	19.57	16	0	25.53	7	0
	G.M.	21.04			21.10			19.79			19.34			25.47			38.50			17.09			35.70			24.75		
	S.E.(M)	1.51			1.14			0.98			1.54			1.23			1.45			0.84			1.44			0.46		
	C.D. (10%)	3.57			2.70			2.33			3.65			2.91			3.43			2.00			3.42			1.07		
	C.V. (%)	14.32			10.79			9.92			15.91			9.63			7.52			9.88			8.08					
	DOS	09-11-2016			07-11-2016			26-10-2016			03-11-2016			29-10-2016			10-11-2016			05-11-2016			27-11-2016					

INTIAL VARIETAL TRIAL-(RF) **ZONE: NEPZ**

Summary of ancillary and disease data **RABI – 2016-17**

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	Colour	1000 g.w Mean & Range	H/N	RUST			SMUT		Hel. Disease		APHID (1-5)
											YL	BR	BL	L (%)	C (%)	Leaf Blight	Spot Leaf	
DWRB166	IVTRFNEP-16	79 (67-110)	121 (108-131)	70 (46-105)	72 (33-138)	3 (1-5)	6	LY	42 (38-46)	H				0		68	46	S
HUB252	IVTRFNEP-5	73 (62-92)	119 (104-128)	75 (56-97)	60 (26-99)	4 (2-5)	6	Y	42 (24-49)	H				0		89	24	S
HUB253	IVTRFNEP-17	75 (62-98)	120 (108-129)	76 (40- 115)	65 (23-124)	3 (1-5)	6	Y	44 (37-49)	H				0		57	36	S
JB349	IVTRFNEP-1	73 (62-93)	118 (105-131)	77 (61-103)	72 (35-118)	3 (1-5)	6	Y	45 (39-48)	H				0		35	24	R
JB350	IVTRFNEP-15	76 (64-107)	121 (107-131)	66 (36-92)	72 (50-94)	3 (1-5)	6	LY	43 (28-50)	H				0		89	46	S
KB1506	IVTRFNEP-11	77 (61-107)	123 (107-130)	73 (45-105)	69 (33-110)	3 (1-6)	6	LY	42 (37-48)	H				0		89	99	S
KB1521	IVTRFNEP-8	90 (67-116)	128 (108-152)	72 (54-103)	68 (32-93)	3 (1-4)	6	LY	40 (25-46)	H				0		89	57	S
KB1541	IVTRFNEP-2	93 (70-110)	132 (112-153)	71 (44-102)	64 (29-98)	4 (1-6)	6	Y	39 (28-45)	H				0		99	36	R
KB1545	IVTRFNEP-13	78 (66-108)	122 (106-131)	68 (45-106)	69 (37-119)	3 (2-5)	6	Y	43 (30-52)	H				0		79	46	S
NDB1651	IVTRFNEP-3	74 (60-97)	118 (104-129)	68 (41-95)	82 (59-113)	3 (1-5)	6	Y	39 (32-44)	H				0		68	99	S
PL893	IVTRFNEP-12	77 (64-102)	121 (105-131)	64 (44-97)	76 (37-100)	4 (2-5)	6	LY	43 (31-52)	H				0		79	57	S
PL897	IVTRFNEP-7	80 (67-99)	124 (114-132)	58 (42-78)	72 (34-127)	3 (1-5)	6	Y	41 (30-50)	H				0		89	89	S
RD2959	IVTRFNEP-14	76 (65-100)	122 (108-131)	77 (58-103)	74 (45-106)	3 (1-4)	6	Y	44 (38-53)	H				0		99	99	S
RD2960	IVTRFNEP-6	79 (66-106)	123 (103-131)	68 (46-95)	66 (25-113)	3 (1-5)	6	LY	44 (35-50)	H				0.01		89	47	S
RD2961	IVTRFNEP-10	76 (62-106)	121 (105-132)	74 (51-103)	66 (33-132)	3 (2-5)	6	Y	48 (37-56)	H				0		89	99	S
K603 (C)	IVTRFNEP-4	79 (64-97)	122 (104-131)	81 (57-111)	76 (36-102)	3 (1-6)	6	LY	42 (30-49)	H				0		78	46	S
LAKHAN (C)	IVTRFNEP-9	79 (67-108)	124 (107-133)	78 (56-106)	62 (22-104)	3 (1-5)	6	LY	42 (32-50)	H				0		57	47	S

AVT-RF-TS-NH ZONE

Location wise means in q/ha

	Kangra			Majhera			Malan			Bajaura			Shimla			Katrain			Berthin			Ranichouri			Pooled		
Entry	**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**
BHS 457	17.93	19	0	14.61	16	0	21.74	7	0	25.62	17	0	15.02	9	0	22.25	8	0	41.3	5	0	12.41	19	0	21.36	12	0
BHS 458	20.38	16	0	17.04	10	0	17.78	15	0	26.71	16	0	13.25	18	0	15.22	18	0	36.23	10	0	16.55	11	0	20.39	16	0
BHS 459	26.9	7	0	16.28	11	0	28.11	2	1	41.93	2	1	13.77	13	0	14.49	20	0	36.59	9	0	15.96	12	0	24.25	9	0
BHS 460	30.98	2	1	19.86	5	1	18.26	12	0	31.06	10	0	23.86	1	1	22.56	5	0	42.75	4	0	17.73	8	0	25.88	4	1
HBL 764	19.02	18	0	17.07	9	0	10.64	21	0	20.26	21	0	13.33	16	0	18.94	13	0	23.19	21	0	13	17	0	16.93	21	0
HBL 765	21.2	15	0	14.36	17	0	16.67	18	0	22.75	19	0	12.83	19	0	12	21	0	30.8	19	0	13	17	0	17.95	19	0
HBL 778	25	10	0	13.81	19	0	17.15	16	0	35.09	6	0	10.26	21	0	23.7	4	0	31.16	18	0	17.14	10	0	21.66	11	0
HBL 780	12.77	21	0	7.35	21	0	20.66	8	0	25.31	18	0	15.11	8	0	19.15	11	0	33.33	14	0	13.59	16	0	18.41	18	0
UPB 1061	32.07	1	1	17.85	8	0	19.3	9	0	38.98	4	0	13.64	14	0	27.74	2	1	50.72	1	1	14.18	14	0	26.81	1	1
UPB 1062	27.72	5	0	22.55	1	1	16.84	17	0	29.11	14	0	12.53	20	0	17.39	14	0	31.16	17	0	11.23	20	0	21.07	14	0
UPB 1063	22.83	13	0	14.9	14	0	16.62	19	0	27.56	15	0	14.64	10	0	16.15	16	0	34.06	12	0	9.46	21	0	19.53	17	0
VLB 146	24.18	11	0	16.26	12	0	17.97	14	0	30.43	12	0	16.17	6	0	22.46	7	0	48.55	2	1	18.03	7	0	24.26	8	0
VLB 149	26.36	8	0	14.79	15	0	18.51	11	0	31.13	9	0	19.02	3	0	22.15	9	0	44.93	3	0	24.23	1	1	25.14	7	0
VLB 150	26.09	9	0	21.42	2	1	22.83	5	0	36.34	5	0	15.36	7	0	19.05	12	0	38.04	8	0	23.05	2	1	25.27	6	0
VLB 151	28.8	4	0	20.89	3	1	28.42	1	1	39.75	3	0	16.23	5	0	21.74	10	0	34.42	11	0	18.91	5	0	26.15	3	1
VLB 152	23.91	12	0	15.93	13	0	18.03	13	0	29.58	13	0	13.87	12	0	15.01	19	0	32.97	15	0	17.73	8	0	20.88	15	0
VLB 154	19.29	17	0	12.02	20	0	26.32	3	1	31.44	8	0	13.56	15	0	16.77	15	0	31.52	16	0	19.5	4	0	21.31	13	0
HBL 113 (C)	22.83	13	0	20.79	4	1	21.82	6	0	43.25	1	1	21.21	2	0	22.56	5	0	38.77	7	0	20.69	3	0	26.49	2	1
BHS 352 (C)	14.94	20	0	14.33	18	0	14.63	20	0	21.51	20	0	18.27	4	0	15.73	17	0	25.36	20	0	14.18	14	0	17.37	20	0
VLB 118 (C)	27.17	6	0	18.79	6	0	18.94	10	0	30.90	11	0	13.33	17	0	27.84	1	1	34.06	12	0	15.96	12	0	23.37	10	0
BHS 400 (C)	30.91	3	1	18.25	7	0	24.57	4	1	35.09	6	0	14.00	11	0	23.80	3	0	39.13	6	0	18.32	6	0	25.51	5	0
G.M.	23.87			16.63			19.80			31.13			15.20			19.84			36.15			16.42			22.38		
S.E.(M)	0.61			1.55			1.66			0.98			0.69			0.97			1.53			1.12			0.42		
C.D. (10%)	1.44			3.67			3.91			2.32			1.63			2.28			3.62			2.64			0.99		
C.V. (%)	5.11			18.66			16.73			6.30			9.09			9.73			8.48			13.62					
DOS	09-11-2016			03-11-2016			08-11-2016			08-11-2016			09-11-2016			05-11-2016			26-10-2016			05-11-2016					

ADVANCED VARIETAL TRIAL (RF) Hills **ZONE: NHZ**

Summary of ancillary and disease data **RABI – 2016-17**

ENTRY	AGRONOMIC CHARACTERS						GRAIN CHARACTERS			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		Leaf Stripe (1-9)	Leaf Spot (1-9)	PM
										YL	BR	BL	L (%)	C (%)			
BHS 457	118 (81-153)	168 (145-198)	76 (55-98)	73 (39-96)	3 (2-4)	6	Y	40 (38-42)	H	5S						2	0
BHS 458	121 (91-160)	170 (140-203)	76 (55-98)	62 (32-107)	3 (1-5)	6	Y	45 (38-51)	H	5S						2	Ts
BHS 459	124 (96-160)	171 (148-200)	73 (50-97)	73 (34-118)	2 (1-5)	6	Y	39 (35-43)	H	F						0	0
BHS 460	128 (99-163)	169 (142-201)	78 (55-109)	99 (36-153)	2 (1-4)	2	Y	45 (39-50)	H	F						0	0
HBL 764	126 (94-164)	171 (146-198)	73 (50-103)	64 (32-92)	2 (1-4)	6	A	40 (35-44)	HL	F						1	0
HBL 765	124 (94-163)	170 (143-196)	80 (45-113)	65 (32-86)	2 (1-4)	6	A	40 (36-44)	HL	F						1	0
HBL 778	122 (94-163)	169 (142-201)	72 (45-88)	71 (35-114)	2 (1-5)	6	Y	42 (39-44)	H	F						1	0
HBL 780	132 (92-160)	173 (150-196)	78 (50-108)	81 (34-121)	2 (1-5)	2	Y	46 (37-58)	H	10S						0	0
UPB 1061	126 (103-157)	168 (148-196)	70 (50-95)	75 (33-123)	2 (1-5)	6	Y	41 (38-44)	H	F						1	0
UPB 1062	125 (96-162)	168 (140-195)	82 (60-114)	62 (26-88)	2 (1-4)	6	A	39 (35-53)	HL	F						0	0
UPB 1063	123 (96-158)	168 (142-196)	80 (50-102)	74 (29-114)	2 (1-4)	2	Y	52 (48-55)	H	5S						2	0
VLB 146	124 (96-162)	169 (142-197)	74 (45-92)	75 (38-99)	2 (1-3)	6	Y	35 (30-38)	H	F						1	0
VLB 149	127 (103-165)	174 (150-202)	76 (55-98)	97 (46-163)	3 (1-5)	2	Y	41 (40-43)	H	F						0	0
VLB 150	130 (104-166)	171 (150-202)	63 (50-74)	102 (53-165)	2 (1-3)	2	Y	40 (37-42)	H	F						1	0
VLB 151	124 (90-166)	170 (142-198)	73 (24-99)	90 (42-132)	3 (1-6)	2	Y	50 (46-56)	H	F						0	0
VLB 152	125 (94-164)	170 (140-199)	76 (43-104)	69 (31-107)	3 (1-4)	6	Y	39 (34-42)	H	F						0	0
VLB 154	115 (83-158)	168 (141-196)	81 (55-105)	69 (33-106)	2 (1-6)	6	Y	40 (33-46)	H	F						2	0
BHS 400 ©	128 (100-165)	173 (151-202)	79 (50-105)	84 (43-135)	2 (1-5)	6	Y	40 (38-42)	H	TS						2	0
BHS 352 ©	120 (90-151)	167 (145-194)	79 (60-98)	63 (40-101)	2 (1-3)	6	A	38 (29-45)	HL	10S						1	0
HBL 113 ©	126 (103-164)	171 (148-198)	72 (55-87)	95 (52-143)	2 (1-4)	2	Y	37 (32-42)	H	F						0	0
VLB 118 ©	126 (96-162)	171 (146-202)	79 (50-108)	74 (33-107)	3 (1-6)	6	Y	44 (38-48)	H	F						2	0

ADVANCED VARIETAL TRIAL (IRRIGATED)-NEPZ

- This trial was allotted to seven centres and all the centres have reported the data and data of Faizabad location was not considered for pooled analysis as it was rejected by the monitoring team.
- In this trial one test entry DWRB137 was in the second year of AVT, whereas two test entries HUB250 and RD2921 were in the first year of AVT.
- The highest general mean for grain yield (46.01 q/ha) was recorded at Rewa centre.
- General mean for grain yield on pooling of data was 35.22 q/ha.
- The check variety RD2552 ranked first giving the highest grain yield (37.80 q/ha) across the locations of the zone.
- The test entries DWRB137, HUB250 and RD2921 ranked second, fifth and third, respectively.

ADVANCED VARIETAL TRIAL (IRRIGATED)-CZ

- The trial was allotted to six centres and data of Banswara centre were not considered for pooled analysis due to unrealistic yield.
- The trial comprised of two final year genotypes namely DWRB137 and RD2899 with 03 checks viz., BH959, PL751 and RD2786.
- The highest location mean for grain yield (44.19 q/ha) was obtained at Kota centre followed by Gwalior centre (40.16 q/ha).
- Zonal mean for grain yield across the entries and the centres was 36.54 q/ha for this trial.
- The test entries DWRB137 and RD2899 ranked first and second, respectively.

AVT- IR-NEPZ

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

Entry	Kanpur			Varanasi			Rewa			Sabour			Pusa			Ranchi			Pooled		
	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
DWRB 137*	43.42	1	1	39.61	2	1	47.80	3	1	31.09	2	0	28.62	3	0	26.38	7	0	36.2	2	0
HUB 250	32.17	7	0	40.10	1	1	44.70	5	0	38.39	1	1	22.28	6	0	33.37	6	0	35.2	5	0
RD 2921	42.12	3	1	32.61	6	0	48.70	1	1	27.53	3	0	22.28	6	0	39.09	3	0	35.4	3	0
HUB 113 (C)	34.51	5	0	35.27	5	0	43.2	7	0	24.65	4	0	27.54	4	0	43.45	2	1	34.8	6	0
JYOTI (C)	34.35	6	0	32.13	7	0	45.6	4	1	20.27	7	0	24.46	5	0	35.32	4	0	32.0	7	0
K 508 (C)	41.96	4	1	37.2	3	0	43.65	6	0	23.23	5	0	30.43	1	1	34.9	5	0	35.2	4	0
RD 2552 (C)	43.37	2	1	36.71	4	0	48.4	2	1	22.49	6	0	30.07	2	1	45.74	1	1	37.8	1	1
G.M.	38.84			36.23			46.01			26.81			26.53			36.89			35.2		
S.E.(M)	1.52			0.63			1.51			0.73			0.67			2.17			0.54		
C.D. (10%)	3.72			1.54			3.70			1.78			1.64			5.32			1.30		
C.V. (%)	7.81			3.46			6.56			5.42			5.03			11.76					
DOS	25-11-2016			20-11-2016			23-11-2016			10-11-2016			18-11-2016			28-11-2016					

* second year of AVT

ADVANCED VARIETAL TRIAL (IR) **ZONE: NEPZ**

Summary of ancillary and disease data **RABI – 2016-17**

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	Colour	1000 g.w Mean & Range	H/N	RUST			Smut	Hel. Disease		CCN	APHID (1-5)
										YL HS ACI	BR	BL	C (%)	Spot leaf (%)	Leaf Blight (1-9)		
DWRB 137*	75 (66-87)	119 (110-128)	91 (62-120)	118 (79-168)	3 (1-5)	6	LY	44 (41-49)	H				0.01	46	78		
HUB 250	76 (69-85)	117 (110-126)	102 (84-115)	104 (78-154)	2 (1-4)	6	LY	41 (37-48)	H				0	12	78		
RD 2921	78 (66-89)	119 (103-127)	96 (79-108)	117 (60-175)	3 (1-5)	6	LY	41 (37-49)	H				0	47	89		
HUB 113 (C)	78 (66-90)	117 (103-126)	95 (79-107)	109 (68-140)	2 (1-4)	6	LY	43 (38-50)	H				0	36	78		
JYOTI (C)	*76 (65-84)*	*119 (114-126)*	*108 (93-129)*	*109 (66-149)*	*3 (1-5)*	*6*	*LY*	*42 (35-50)*	*H*				*0*	*36*	*89*		
K 508 (C)	77 (69-89)	118 (112-123)	94 (77-111)	113 (81-151)	3 (1-5)	6	LY	39 (34-46)	H				0	46	89		
RD 2552 (C)	76 (69-85)	120 (114-125)	95 (75-109)	123 (80-170)	3 (1-5)	6	LY	40 (34-51)	H				0	47	78		

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

Entry	Kota			Udaipur			Sagar			Gwalior			Morena			Pooled		
	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
DWRB137*	46.59	2	0	41.84	1	1	31.94	2	0	47.17	2	1	32.07	3	1	39.9	1	1
RD2899*	53.09	1	1	32.68	4	0	35.28	1	1	34.90	4	0	31.79	4	1	37.5	2	1
BH959 (C)	38.21	4	0	32.91	3	0	30.69	3	0	30.89	5	0	33.42	2	1	33.2	5	0
PL751 (C)	37.32	5	0	37.28	2	1	27.08	5	0	40.45	3	0	30.76	5	1	34.6	4	0
RD2786 (C)	45.72	3	0	32.07	5	0	28.47	4	0	47.37	1	1	33.61	1	1	37.4	3	1
G.M.	44.19			35.36			30.69			40.16			32.33			36.5		
S.E.(M)	2.17			2.46			0.71			2.72			2.99			1.05		
C.D. (10%)	5.47			6.20			1.80			6.84			7.53			2.56		
C.V.	9.83			13.93			4.65			13.53			18.48					
DOS	16-11-2016			17-11-2016			25-11-2016			16-11-2016			19-11-2016					

* second year of AVT

ADVANCED VARIETAL TRIAL (IR) **ZONE: CZ**

Summary of ancillary and disease data **RABI – 2016-17**

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	Colour	1000 g.w Mean & Range	H/N	RUST			Smut	Hel. Disease		CCN	APHID (1-5)
										YL HS ACI	BR	BL	C (%)	STR (%)	Leaf Blight (1-9)		
DWRB137*	68 (60-81)	115 (111-120)	76 (45-92)	114 (67-160)	3 (2-4)	6	W	47 (36-58)	H								
RD2899*	71 (68-80)	115 (108-120)	81 (63-101)	128 (74-177)	2 (2-2)	6	W	45 (35-50)	H								
BH959 (C)	68 (61-77)	112 (102-119)	87 (65-98)	108 (66-138)	3 (3-3)	6	W	42 (36-49)	H								
PL751(C)	67 (60-79)	109 (96-118)	78 (54-89)	110 (65-179)	5 (4-5)	6	W	42 (37-47)	H								
RD2786 (C)	72 (66-77)	114 (97-120)	91 (63-128)	111 (66-155)	4 (1-6)	()	R	45 (38-50)	H								

INITIAL VARIETAL TRIAL-FEED BARLEY (IRRIGATED)-NWPZ

- This trial was conducted at five locations and the data of Karnal centre were not considered for pooling due to low yield levels.
- The highest general mean for grain yield (52.25q/ha) was obtained at Durgapura centre and the zonal mean was obtained as 46.45 q/ha for the trial.
- Test entry DWRB167 obtained 55.66 q/ha grain yield and first rank, was statistically at par with best check RD2552 with 55.19 q/ha.

INITIAL VARIETAL TRIAL-FEED BARLEY (IRRIGATED)-NEPZ

- This trial was conducted at seven locations and data from all the centres were considered for reporting.
- The highest general mean for grain yield (43.96q/ha) was obtained at Kanpur and the zonal mean across the entries for grain yield was 32.05 q/ha.
- The entries namely RD2948, DWRB167, KB1531, PL892 and UPB1064 were found significantly superior to the best check RD2552 (34.78 q/ha)

INITIAL VARIETAL TRIAL-FEED BARLEY (IRRIGATED)-CZ

- This trial was conducted at four locations and the data of Banswara centre were not considered for pooling due to the unrealistic yield levels.
- The highest general mean for grain yield (43.50 q/ha) was obtained at Gwalior centre.
- The zonal mean across the entries for grain yield was 33.37 q/ha for this trial.
- The entries namely JB347, KB1531, PL892 and PL898 were found significantly superior to the best check BH959 (35.18 q/ha)

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

Entry	Code	Durgapura			Hisar			Ludhiana			Pant nagar			Pooled		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
BH1019	IVTIRFB-3	38.65	25	0	44.08	10	0	50.36	18	0	43.24	12	0	44.08	22	0
DWRB167	IVTIRFB-11	65.22	3	1	45.89	8	0	63.41	3	1	48.1	4	1	55.66	1	1
DWRB169	IVTIRFB-22	51.93	17	0	37.5	21	0	51.81	17	0	37	21	0	44.56	20	0
HUB252	IVTIRFB-8	51.33	18	0	39.43	17	0	55.8	8	0	41.03	16	0	46.9	15	0
JB346	IVTIRFB-10	44.69	22	0	45.29	9	0	58.7	5	0	40.96	17	0	47.41	12	0
JB347	IVTIRFB-23	57.37	9	0	48.37	5	0	45.65	22	0	51.24	2	1	50.66	6	0
KB1501	IVTIRFB-16	34.42	27	0	37.86	20	0	57.97	6	0	35.65	23	0	41.48	24	0
KB1528	IVTIRFB-5	56.16	11	0	39.86	16	0	47.83	20	0	33.82	25	0	44.41	21	0
KB1531	IVTIRFB-24	44.69	22	0	39.89	15	0	61.59	4	1	41.99	15	0	47.04	13	0
NDB1653	IVTIRFB-12	57.97	8	0	37.44	22	0	53.62	12	0	43.4	10	0	48.11	11	0
NDB943	IVTIRFB-7	57.37	9	0	31.64	25	0	23.91	28	0	36.33	22	0	37.31	26	0
PL891	IVTIRFB-17	35.02	26	0	29.26	28	0	36.96	27	0	38.61	19	0	34.96	27	0
PL892	IVTIRFB-26	49.52	19	0	41.67	14	0	45.65	22	0	43.38	11	0	45.05	18	0
PL894	IVTIRFB-1	43.78	24	0	51.93	2	1	67.21	1	1	44.14	8	0	51.77	5	0
PL898	IVTIRFB-28	47.71	20	0	43.3	12	0	52.9	14	0	38.85	18	0	45.69	16	0
RD2947	IVTIRFB-15	60.99	6	0	33.21	24	0	46.74	21	0	47.19	6	1	47.03	14	0
RD2948	IVTIRFB-9	58.57	7	0	34.99	23	0	63.77	2	1	44.08	9	0	50.35	9	0
RD2949	IVTIRFB-19	62.2	5	1	31.4	26	0	42.39	25	0	27.37	27	0	40.84	25	0
RD2950	IVTIRFB-21	53.74	15	0	38.04	18	0	40.22	26	0	37.65	20	0	42.41	23	0
UPB1064	IVTIRFB-4	56.16	11	0	43.72	11	0	54.71	10	0	47.23	5	1	50.45	8	0
UPB1066	IVTIRFB-27	53.14	16	0	38.04	18	0	57.97	7	0	48.45	3	1	49.4	10	0
BH902 (C)	IVTIRFB-6	54.35	13	0	52.72	1	1	52.9	14	0	42.13	14	0	50.52	7	0
BH946 (C)	IVTIRFB-25	68.24	1	1	50.39	4	1	55.8	9	0	44.49	7	0	54.73	3	1
BH959 (C)	IVTIRFB-20	45.89	21	0	47.1	7	0	53.99	11	0	33.18	26	0	45.04	19	0
HUB113 (C)	IVTIRFB-2	65.82	2	1	47.22	6	0	53.26	13	0	43.05	13	0	52.34	4	0
KARAN16 (C)	IVTIRFB-14	28.38	28	0	29.89	27	0	43.48	24	0	25.47	28	0	31.81	28	0
RD2552 (C)	IVTIRFB-18	65.22	3	1	51.36	3	1	52.9	16	0	51.29	1	1	55.19	2	1
RD2786 (C)	IVTIRFB-13	54.35	13	0	42.27	13	0	49.64	19	0	34.95	24	0	45.3	17	0
	G.M.	52.25			41.21			51.47			40.87			46.45		
	S.E.(M)	2.58			1.72			2.64			1.90			1.12		
	C.D. (10%)	6.07			4.06			6.22			4.47			2.64		
	C.V. (%)	9.87			8.37			10.27			9.28					
	DOS	10-11-2016			14-11-2016			10-11-2016			25-11-2016					

INITIAL VARIETAL TRIAL (IR-FB) **ZONE: NWPZ**

Summary of ancillary and disease data **RABI – 2016-17**

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	Colour	1000 g.w Mean & Range	H/N	RUST		SMUT		Spot Leaf	Leaf Blight	Net Leaf
											YL (Max &ACI)	BL	L (%)	C (%)			
BH1019	IVTIRFB-3	88 (73-99)	131 (118-144)	99 (84-107)	97 (59-142)	3 (2-4)	6	Y	48 (40-52)	H	0		0	0	4	23	
DWRB167	IVTIRFB-11	83 (62-93)	128 (115-143)	94 (80-103)	93 (58-122)	3 (2-5)	6	Y	40 (36-47)	H	0		0	0	0	12	
DWRB169	IVTIRFB-22	85 (67-98)	128 (119-139)	92 (80-99)	96 (51-133)	2 (1-3)	6	Y	41 (37-46)	H	0		Ts	0	1	12	
HUB252	IVTIRFB-8	79 (61-86)	128 (115-137)	109 (100-116)	80 (46-113)	3 (1-4)	6	Y	44 (43-48)	H	0		0	0	0	0	
JB346	IVTIRFB-10	77 (57-85)	126 (113-137)	86 (77-95)	106 (71-138)	2 (1-3)	6	Y	39 (36-40)	H	0		0	0	0	12	
JB347	IVTIRFB-23	82 (62-93)	127 (116-135)	95 (70-109)	100 (72-122)	3 (1-5)	6	Y	39 (26-49)	H	80S		Ts	0	0	35	
KB1501	IVTIRFB-16	80 (57-93)	129 (118-142)	95 (65-112)	96 (55-155)	2 (1-4)	6	Y	45 (41-48)	H	0		0	0	0	23	
KB1528	IVTIRFB-5	85 (72-91)	128 (118-135)	104 (92-113)	137 (77-172)	2 (1-4)	2	Y	55 (45-60)	H	0		0	Ts	0	0	
KB1531	IVTIRFB-24	82 (62-94)	130 (118-144)	90 (68-100)	141 (80-170)	3 (2-4)	2	Y	47 (37-55)	H	0		0	0	0	0	
NDB1653	IVTIRFB-12	88 (66-100)	131 (118-143)	98 (75-115)	106 (71-130)	3 (3-4)	6	Y	40 (32-47)	H	5S		0	Ts	0	45	
NDB943	IVTIRFB-7	81 (67-88)	124 (114-132)	100 (81-111)	88 (49-115)	2 (1-4)	6	Y	35 (27-40)	HL	100S		0	Ts	0	45	
PL891	IVTIRFB-17	88 (74-99)	128 (115-137)	109 (95-117)	132 (84-183)	2 (1-4)	2	Y	45 (36-49)	HL	0		0	0	0	0	
PL892	IVTIRFB-26	88 (74-98)	133 (123-144)	101 (80-114)	97 (64-138)	4 (3-5)	6	Y	44 (42-46)	H	0		0	0	0	0	
PL894	IVTIRFB-1	82 (61-91)	128 (117-139)	92 (85-98)	110 (71-153)	2 (1-3)	6	Y	40 (35-43)	H	0		0	0	0	12	
PL898	IVTIRFB-28	84 (66-98)	128 (118-143)	93 (72-103)	94 (57-124)	3 (2-5)	6	Y	46 (40-53)	H	TS		0	0	0	12	
RD2947	IVTIRFB-15	85 (72-98)	132 (123-143)	102 (95-112)	101 (69-150)	2 (1-4)	6	Y	44 (41-48)	H	0		0	0	0	45	
RD2948	IVTIRFB-9	75 (57-82)	129 (118-141)	100 (85-104)	108 (58-168)	3 (1-4)	6	Y	48 (46-50)	H	0		0	0	0	0	
RD2949	IVTIRFB-19	80 (64-89)	128 (115-138)	100 (85-111)	99 (64-122)	3 (2-4)	6	Y	43 (36-48)	H	0		Ts	0	0	45	
RD2950	IVTIRFB-21	80 (59-91)	128 (116-139)	104 (83-114)	95 (53-131)	3 (2-4)	6	Y	43 (41-45)	HL	0		0	0	0	0	
UPB1064	IVTIRFB-4	91 (76-102)	132 (122-145)	98 (80-108)	102 (72-140)	3 (2-5)	6	Y	43 (40-46)	H	40S		0	0	1	35	

UPB1066	IVTIRFB-27	90 (81-100)	131 (123-140)	93 (76-100)	97 (61-135)	2 (1-3)	6	Y	43 (41-44)	H	0		0	0	0	23	
BH902	IVTIRFB-6	87 (73-99)	132 (122-144)	104 (97-112)	97 (59-116)	4 (3-5)	6	Y	46 (41-52)	H	0		TS	Ts	0	0	
BH946	IVTIRFB-25	85 (66-98)	129 (118-142)	96 (72-110)	89 (50-112)	3 (2-5)	6	Y	44 (38-51)	H	0		Ts	0	1	0	
BH959	IVTIRFB-20	80 (56-94)	129 (114-140)	83 (65-94)	109 (75-144)	3 (2-5)	6	Y	41 (38-43)	H	0		0	Ts	0	0	
HUB113	IVTIRFB-2	90 (76-100)	132 (122-144)	100 (91-104)	112 (72-162)	3 (2-4)	6	Y	42 (40-44)	H	0		0	0	0	35	
KARAN16	IVTIRFB-14	85 (59-96)	130 (123-137)	96 (64-109)	92 (53-125)	2 (1-3)	6	Y	37 (33-44)	HL	0		0	Ts	0	0	
RD2552	IVTIRFB-18	87 (71-100)	132 (124-144)	96 (75-111)	99 (75-122)	3 (2-4)	6	Y	43 (34-48)	H	0		0	0	0	23	
RD2786	IVTIRFB-13	82 (67-94)	130 (116-141)	101 (94-106)	88 (61-117)	2 (1-4)	6	Y	43 (37-49)	H	0		0	0	0	35	

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

Entry	Code	Varanas			Rewa			Faizaba			Kanpur			Ranch			Sabou			Pusa			Pooled		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
BH1019	IVTIRFB-3	39.86	4	0	26.56	17	1	29.29	12	0	51.09	3	1	40.89	8	0	28.31	13	0	35.51	12	0	35.93	8	0
DWRB167	IVTIRFB-11	45.89	1	1	28.8	3	1	30.5	9	0	39.27	23	0	35.94	15	0	41.47	2	1	51.81	3	0	39.1	2	1
DWRB169	IVTIRFB-22	32	15	0	27.35	16	1	28.23	15	0	39.95	22	0	11.77	27	0	29.21	11	0	32.97	16	0	28.78	20	0
HUB252	IVTIRFB-8	33.21	14	0	28.35	7	1	24.15	21	0	44.57	12	0	38.14	10	0	43.39	1	1	28.62	19	0	34.35	10	0
JB346	IVTIRFB-10	43.48	2	1	22.08	24	0	31.7	8	0	37.36	26	0	37.01	13	0	30.11	9	0	29.35	18	0	33.01	15	0
JB347	IVTIRFB-23	31.22	18	0	22.42	23	0	32.25	6	0	43.89	13	0	37.1	12	0	35.11	5	0	36.96	10	0	34.14	12	0
KB1501	IVTIRFB-16	30.8	19	0	28.55	6	1	32.31	4	0	38.99	24	0	34.32	18	0	22.87	22	0	41.67	7	0	32.79	16	0
KB1528	IVTIRFB-5	33.21	11	0	21.67	28	0	27.78	18	0	49.05	6	0	31.79	21	0	26.34	18	0	36.59	11	0	32.35	17	0
KB1531	IVTIRFB-24	39.79	5	0	21.84	26	0	35.63	1	1	51.22	2	1	22.97	23	0	33.81	6	0	51.09	4	0	36.62	5	0
NDB1653	IVTIRFB-12	29.11	23	0	23.63	19	0	28.08	16	0	43.89	13	0	46.76	6	0	24.73	21	0	40.94	8	0	33.88	13	0
NDB943	IVTIRFB-7	31.88	17	0	27.7	13	1	19.93	26	0	43.21	16	0	14.52	26	0	25.01	20	0	24.64	21	0	26.7	25	0
PL891	IVTIRFB-17	30.5	22	0	21.81	27	0	20.83	22	0	54.35	1	1	15.49	25	0	19.09	24	0	34.42	14	0	28.07	21	0
PL892	IVTIRFB-26	32	15	0	28.57	5	1	32	7	0	48.64	7	0	47.39	4	0	26.46	17	0	43.84	6	0	36.99	4	0
PL894	IVTIRFB-1	40.94	3	0	27.39	15	1	24.76	20	0	40.76	19	0	7.95	28	0	28.8	12	0	24.64	21	0	27.89	22	0
PL898	IVTIRFB-28	33.21	11	0	28.74	4	1	27.48	19	0	42.53	17	0	35.72	16	0	36.65	3	0	34.78	13	0	34.16	11	0
RD2947	IVTIRFB-15	12.68	27	0	21.93	25	0	17.51	27	0	46.47	11	0	47.53	3	0	3.58	28	0	24.64	21	0	24.91	26	0
RD2948	IVTIRFB-9	36.84	6	0	29.55	1	1	34.12	3	1	47.55	9	0	33.79	19	0	35.22	4	0	63.04	1	1	40.02	1	1
RD2949	IVTIRFB-19	11.17	28	0	29.3	2	1	14.82	28	0	41.44	18	0	34.89	17	0	3.61	27	0	31.52	17	0	23.82	27	0
RD2950	IVTIRFB-21	35.33	7	0	28.34	8	1	20.08	25	0	33.7	28	0	25.6	22	0	26.04	19	0	38.77	9	0	29.69	19	0
UPB1064	IVTIRFB-4	33.21	11	0	26.2	18	0	29.89	11	0	47.01	10	0	55.88	1	1	33.31	7	0	34.06	15	0	37.08	3	0
UPB1066	IVTIRFB-27	22.64	24	0	23.01	21	0	28.99	14	0	40.49	20	0	32.18	20	0	19.33	23	0	20.65	27	0	26.76	23	0
BH902 (C)	IVTIRFB-6	35.02	8	0	27.92	10	1	29.23	13	0	43.34	15	0	36.1	14	0	32.75	8	0	47.83	5	0	36.03	7	0
BH946 (C)	IVTIRFB-25	35.02	8	0	28.06	9	1	30.5	9	0	40.08	21	0	37.79	11	0	26.56	16	0	55.8	2	0	36.26	6	0
BH959 (C)	IVTIRFB-20	30.68	21	0	27.73	12	1	28.08	17	0	37.77	25	0	39.72	9	0	29.71	10	0	27.17	20	0	31.55	18	0
HUB113 (C)	IVTIRFB-2	33.82	10	0	22.75	22	0	32.31	4	0	51.09	4	1	42.48	7	0	27.88	14	0	22.1	26	0	33.2	14	0
KARAN16 (C	IVTIRFB-14	22.22	25	0	23.1	20	0	20.11	24	0	35.87	27	0	15.53	24	0	13.21	25	0	23.91	25	0	21.99	28	0
RD2552 (C)	IVTIRFB-18	30.8	20	0	27.75	11	1	34.42	2	1	49.59	5	1	49.36	2	0	27.25	15	0	24.28	24	0	34.78	9	0
RD2786 (C)	IVTIRFB-13	19.44	26	0	27.6	14	1	20.23	23	0	47.83	8	0	47.2	5	0	4.03	26	0	20.65	27	0	26.71	24	0
	G.M.	31.64			26.03			27.33			43.96			34.14			26.21			35.08			32.05		
	S.E.(M)	1.28			1.38			1.27			2.06			2.71			1.26			1.43			0.65		
	C.D. (10%)	3.02			3.24			2.98			4.85			6.39			2.97			3.37			1.50		
	C.V.(%)	8.12			10.58			9.27			9.37			15.90			9.63			8.17					
	DOS	18-11-2016			24-11-2016			09-11-2016			24-11-2016			10-11-2016			18-11-2016			29-11-2016					

INTIAL VARIETAL TRIAL (FB) **ZONE: NEPZ**

Summary of ancillary and disease data **RABI 2016-17**

Entry	Code	AGRONOMIC CHARACTERS						GRAIN CHARACTERISTICS			DISEASE REACTION						
											RUST		SMUT		Hel. Disease		APHID (1-5)
		H. days Mean & Range	M. days Mean & Range	Height Mean & Range (cm)	Tillering per meter Mean & Range	Str. Stn. Mean & Range	Two/ Six Row	Colour	1000 g.w Mean & Range	H/N	YL (Max &ACI)	BR	L (%)	C (%)	Spot Leaf	Leaf Blight	
BH1019	IVTIRFB-3	79 (72-89)	122 (114-129)	94 (82-107)	97 (74-129)	3 (1-5)	6	LY	43 (39-48)	H				0.01	34	68	
DWRB167	IVTIRFB-11	75 (71-80)	117 (113-129)	93 (73-103)	91 (48-143)	3 (1-5)	6	LY	39 (30-50)	H					24	68	
DWRB169	IVTIRFB-22	78 (69-82)	119 (114-129)	86 (75-109)	99 (54-156)	2 (1-5)	6	LY	42 (39-48)	H					12	78	
HUB252	IVTIRFB-8	72 (66-77)	115 (107-123)	100 (77-117)	94 (62-148)	4 (3-5)	6	LY	40 (32-44)	H					23	57	
JB346	IVTIRFB-10	74 (66-79)	113 (106-121)	91 (75-105)	108 (73-163)	3 (1-6)	6	Y	37 (32-46)	H					24	68	
JB347	IVTIRFB-23	73 (67-79)	115 (107-124)	88 (68-104)	106 (84-146)	3 (1-6)	6	LY	39 (34-45)	H					36	89	
KB1501	IVTIRFB-16	74 (69-79)	117 (108-128)	99 (81-116)	91 (60-148)	3 (1-5)	6	LY	41 (32-53)	H				0.01	89	68	
KB1528	IVTIRFB-5	77 (69-88)	120 (112-130)	98 (84-119)	113 (78-176)	2 (1-4)	2	LY	47 (39-52)	H					23	68	
KB1531	IVTIRFB-24	74 (66-80)	114 (105-120)	86 (71-94)	119 (86-162)	3 (1-6)	2	LY	44 (41-48)	H				0.01	35	78	
NDB1653	IVTIRFB-12	79 (74-88)	121 (114-129)	95 (84-109)	107 (54-149)	4 (1-6)	6	Y	37 (30-40)	H				0.01	35	78	
NDB943	IVTIRFB-7	74 (69-77)	116 (112-124)	96 (71-116)	89 (56-144)	3 (1-5)	6	A	38 (32-48)	HL			0.01	0.01	69	79	
PL891	IVTIRFB-17	81 (70-88)	119 (115-123)	100 (91-112)	106 (80-173)	2 (1-4)	2	A	44 (38-52)	HL					24	89	
PL892	IVTIRFB-26	77 (70-87)	120 (114-128)	97 (82-109)	98 (72-153)	3 (1-6)	6	Y	44 (38-51)	H			0.01		89	89	
PL894	IVTIRFB-1	77 (70-83)	119 (113-130)	88 (70-105)	109 (63-167)	3 (1-5)	6	LY	39 (36-44)	H					23	56	
PL898	IVTIRFB-28	76 (73-79)	117 (113-120)	91 (66-110)	107 (60-160)	3 (2-5)	6	Y	41 (38-46)	H					57	68	
RD2947	IVTIRFB-15	74 (67-81)	115 (109-123)	91 (77-103)	97 (74-140)	4 (2-6)	6	Y	39 (32-47)	H			0.01		99	89	
RD2948	IVTIRFB-9	72 (61-80)	115 (104-122)	99 (82-118)	99 (54-176)	3 (1-5)	6	Y	43 (37-48)	H					35	68	

RD2949	IVTIRFB-19	73 (63-75)	113 (103-122)	98 (78-114)	90 (60-160)	3 (2-5)	6	Y	33 (27-40)	H			0.01	0.01	99	99	
RD2950	IVTIRFB-21	74 (65-79)	116 (104-124)	102 (84-122)	105 (61-152)	3 (1-6)	6	A	40 (34-48)	HL					24	68	
UPB1064	IVTIRFB-4	77 (67-84)	120 (113-129)	87 (69-104)	107 (69-161)	3 (1-6)	6	Y	40 (36-45)	H					68	68	
UPB1066	IVTIRFB-27	79 (71-86)	119 (112-128)	93 (72-109)	105 (67-158)	3 (2-5)	6	LY	37 (30-44)	H					57	89	
BH902 (C)	IVTIRFB-6	77 (67-89)	122 (115-128)	97 (68-112)	109 (86-148)	3 (1-5)	6	Y	45 (42-50)	H			0.01	0.01	35	56	
BH946 (C)	IVTIRFB-25	76 (71-81)	118 (113-127)	97 (79-110)	111 (74-165)	3 (1-5)	6	LY	41 (36-44)	H					46	89	
BH959 (C)	IVTIRFB-20	74 (66-80)	115 (110-121)	81 (65-94)	110 (74-142)	3 (1-5)	6	LY	37 (31-42)	H					79	89	
HUB113 (C)	IVTIRFB-2	80 (73-90)	120 (113-128)	93 (75-110)	101 (69-160)	3 (1-6)	6	Y	39 (32-44)	H					47	68	
KARAN16 (C)	IVTIRFB-14	77 (69-90)	118 (113-122)	94 (83-109)	96 (63-148)	4 (2-6)	6	A	38 (31-44)	HL					24	89	
RD2552 (C)	IVTIRFB-18	76 (70-83)	119 (112-124)	94 (82-104)	116 (78-151)	3 (1-4)	6	Y	39 (29-48)	H					58	89	
RD2786 (C)	IVTIRFB-13	76 (70-81)	115 (104-124)	95 (77-106)	98 (60-176)	4 (2-6)	6	Y	37 (29-44)	H			0.01	0.01	99	99	

IVT-IR-TS-FB-CZ

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

Entry	Code	Udaipur			Gwalior			Morena			Pooled		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
BH1019	IVTIRFB-3	26.87	21	0	37.02	20	0	25.11	19	0	29.67	20	0
DWRB167	IVTIRFB-11	21.14	26	0	43.46	11	0	21.16	26	0	28.58	24	0
DWRB169	IVTIRFB-22	28.68	17	0	44	10	0	22.72	25	0	31.8	18	0
HUB252	IVTIRFB-8	32.22	9	1	44.54	9	0	29.6	12	1	35.45	8	0
JB346	IVTIRFB-10	29.23	15	0	35.04	23	0	23.15	23	0	29.14	22	0
JB347	IVTIRFB-23	34.69	7	1	54.59	6	0	31.78	4	1	40.35	5	1
KB1501	IVTIRFB-16	28.68	17	0	42.24	13	0	31.16	8	1	34.03	13	0
KB1528	IVTIRFB-5	25.42	23	0	36.55	21	0	24.71	20	0	28.89	23	0
KB1531	IVTIRFB-24	30.25	12	0	67.46	2	1	29.35	13	1	42.36	3	1
NDB1653	IVTIRFB-12	24.88	24	0	40.85	15	0	30.25	10	1	31.99	17	0
NDB943	IVTIRFB-7	26.3	22	0	35.18	22	0	23.73	22	0	28.4	25	0
PL891	IVTIRFB-17	15.58	28	0	34.51	24	0	16.63	27	0	22.24	28	0
PL892	IVTIRFB-26	30.46	11	0	67.64	1	1	29.17	14	1	42.43	2	1
PL894	IVTIRFB-1	29.41	14	0	40.89	14	0	31.67	5	1	33.99	14	0
PL898	IVTIRFB-28	33.61	8	1	61.09	3	1	34.78	1	1	43.16	1	1
RD2947	IVTIRFB-15	36.68	2	1	48.01	8	0	24.46	21	0	36.38	6	0
RD2948	IVTIRFB-9	28.93	16	0	33.18	27	0	30.14	11	1	30.75	19	0
RD2949	IVTIRFB-19	29.83	13	0	37.46	19	0	30.87	9	1	32.72	16	0
RD2950	IVTIRFB-21	27.6	20	0	49.68	7	0	27.9	16	0	35.06	10	0
UPB1064	IVTIRFB-4	31.04	10	0	38.5	17	0	32.97	3	1	34.17	12	0
UPB1066	IVTIRFB-27	28.11	19	0	54.82	5	0	25.54	17	0	36.16	7	0
BH902 (C)	IVTIRFB-6	36.37	4	1	34.39	25	0	33.7	2	1	34.82	11	0
BH946 (C)	IVTIRFB-25	36.62	3	1	56.54	4	0	31.41	6	1	41.53	4	1
BH959 (C)	IVTIRFB-20	34.87	6	1	39.49	16	0	31.16	7	1	35.18	9	0
HUB113 (C)	IVTIRFB-2	37.5	1	1	27.33	28	0	22.9	24	0	29.24	21	0
KARAN16 (C)	IVTIRFB-14	18.09	27	0	42.83	12	0	14.75	28	0	25.22	27	0
RD2552 (C)	IVTIRFB-18	35.3	5	1	37.49	18	0	28.88	15	1	33.89	15	0
RD2786 (C)	IVTIRFB-13	21.89	25	0	33.34	26	0	25.25	18	0	26.83	26	0
	G.M.	29.29			43.50			27.32			33.37		
	S.E.(M)	2.31			4.47			2.76			1.91		
	C.D. (10%)	5.43			10.52			6.51			4.50		
	C.V.(%)	15.75			20.53			20.23					
	DOS	24-11-2016			16-11-2016			29-11-2016					

INTIAL VARIETAL TRIAL (FB) **ZONE: CZ**

Summary of ancillary and disease data **RABI – 2016-17**

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	Colour	1000 g.w Mean & Range	H/N	RUST			SMUT		Hel. Disease		APHID (1-5)
											YL	BR	BL	L (%)	C (%)	STR (%)	Leaf Blight	
BH1019	IVTIRFB-3	76 (68-83)	117 (104-124)	80 (73-89)	196 (119-283)	3	6	W	45 (38-49)	H								
DWRB167	IVTIRFB-11	75 (61-91)	109 (90-117)	84 (68-99)	185 (103-297)	1	6	W	38 (37-39)	H								
DWRB169	IVTIRFB-22	78 (72-91)	116 (104-124)	83 (76-96)	188 (105-265)	0	6	W	38 (36-42)	H								
HUB252	IVTIRFB-8	74 (66-91)	112 (98-123)	89 (76-99)	188 (115-264)	2	6	W	41 (38-45)	H								
JB346	IVTIRFB-10	74 (64-92)	112 (101-119)	79 (70-85)	178 (118-259)	2	6	W	38 (37-39)	H								
JB347	IVTIRFB-23	73 (69-76)	114 (101-125)	89 (72-102)	191 (115-245)	2	6	W	39 (38-40)	H								
KB1501	IVTIRFB-16	74 (62-92)	113 (101-119)	82 (65-93)	175 (99-265)	2	6	W	42 (40-43)	H								
KB1528	IVTIRFB-5	78 (70-91)	113 (99-121)	90 (82-97)	228 (167-277)	3	2	W	50 (45-56)	H								
KB1531	IVTIRFB-24	77 (68-91)	114 (103-124)	78 (66-86)	219 (117-300)	1	2	A	45 (39-51)	H								
NDB1653	IVTIRFB-12	73 (62-79)	112 (92-123)	86 (76-101)	190 (122-292)	1	6	W	42 (35-49)	H								
NDB943	IVTIRFB-7	77 (70-88)	112 (98-122)	89 (74-100)	180 (100-267)	1	6	A	40 (38-43)	HL								
PL891	IVTIRFB-17	78 (61-89)	112 (90-121)	92 (66-109)	223 (143-273)	0	2	A	44 (40-50)	HL								
PL892	IVTIRFB-26	78 (71-89)	113 (99-122)	77 (66-89)	185 (129-259)	2	6	W	42 (35-50)	H								
PL894	IVTIRFB-1	78 (71-95)	111 (100-120)	84 (75-91)	200 (131-274)	1	6	W	36 (31-39)	H								
PL898	IVTIRFB-28	77 (68-88)	116 (107-122)	83 (76-92)	193 (134-257)	1	6	W	42 (38-50)	H								
RD2947	IVTIRFB-15	77 (72-88)	114 (100-121)	83 (67-103)	195 (132-268)	2	6	A	45 (40-48)	H								
RD2948	IVTIRFB-9	73 (63-88)	115 (100-124)	85 (77-94)	185 (105-277)	1	6	W	44 (36-51)	H								
RD2949	IVTIRFB-19	77 (68-90)	113 (104-120)	79 (62-103)	179 (86-301)	2	6	W	40 (34-46)	H								

RD2950	IVTIRFB-21	75 (68-82)	113 (104-120)	86 (80-102)	205 (113-280)	0	6	A	38 (35-39)	HL									
UPB1064	IVTIRFB-4	76 (66-83)	116 (106-124)	87 (76-92)	230 (155-298)	2	6	W	39 (31-49)	H									
UPB1066	IVTIRFB-27	82 (74-93)	117 (105-123)	84 (75-94)	204 (142-284)	0	6	A	40 (36-45)	H									
BH902 (C)	IVTIRFB-6	74 (68-78)	112 (100-122)	85 (75-100)	207 (118-298)	2	6	W	41 (33-46)	H									
BH946 (C)	IVTIRFB-25	74 (69-79)	113 (100-122)	83 (68-95)	208 (131-277)	2	6	A	38 (34-43)	H									
BH959 (C)	IVTIRFB-20	66 (61-69)	110 (90-123)	87 (76-102)	206 (163-282)	4	6	W	38 (34-43)	H									
HUB113 (C)	IVTIRFB-2	74 (68-79)	115 (96-125)	78 (71-88)	206 (117-280)	2	6	W	41 (38-45)	H									
KARAN16 (C)	IVTIRFB-14	74 (70-80)	114 (102-123)	93 (76-102)	183 (91-281)	0	6	A	38 (36-39)	HL									
RD2552 (C)	IVTIRFB-18	73 (61-83)	114 (96-124)	81 (69-88)	192 (115-267)	3	6	W	42 (40-46)	H									
RD2786 (C)	IVTIRFB-13	78 (70-94)	113 (103-121)	89 (80-105)	166 (95-283)	0	6	W	38 (28-46)	H									

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

- The trial was allotted to five centres and was not conducted at Palampur centre. The data of Majhera centre were not considered for pooled analysis due to low grain yield.
- General means both for grain (26.49 q/ha) and forage (45.43 q/ha) yields were highest at Almora location.
- The test entries VLB147, VLB150 and VLB153 were numerically high to the best check BHS380 for grain yield but were lower for forage yield than the check variety BHS380. Similarly test entry BHS453 was higher for forage yield but found lower in grain yield.

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

- Thie trial was allotted to seven centres and the data from Anand , Gwalior (incomplete data) and Banswara (unrealistic yield) were not considered for pooling.
- The highest location mean for grain yield (37.98 q/ha) was obtained at Udaipur centre but highest forage yield was obtained at Morena centre.
- The Zonal mean for grain yield in the pooled analysis was 29.30 q/ha, whereas it was 223.19 q/ha for forage yield.
- RD 2552 was the best check variety with 31.92 q/ha grain yield (rank 2) and 234.34 q/ha forage yield (rank 1).
- The test entry RD2927 ranked first with 32.33 q/ha grain yield and was statistically at par with the best check variety and third for forage yield (211.83 q/ha) and was inferior to the check variety for forage yield.

INITIAL VARIETAL TRIAL- DUAL PURPOSE BARLEY (IRRIGATED-TIMELY SOWN)-NWPZ

- This trial was conducted at five locations and the data of RAU, Bikaner were not considered for pooled analysis due to low yield levels.
- The highest general means for grain (50.79 q/ha) and forage (174.36 q/ha) yields were obtained at Ludhiana and Durgapura centres, respectively.
- The zonal means for grain and forage yields were 34.68 q/ha and 143.58 q/ha, respectively.
- Pooled analysis over locations revealed RD2552 (rank 2) and RD2035 (rank 6) as the best checks for grain and forage yields, respectively.
- The test entry UBP1066 ranked first for grain yield and was significantly superior to the best check RD2552 followed by NDB1660, which was at par for grain yield to the best check RD2552. Whereas, for forage yield the entry NDB1660 and UPB1066 were at par with the check RD2552.

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

- The trial was conducted at four locations in this zone and data from all the centres were compiled for pooled analysis.
- The highest general means for grain (36.62q/ha) and forage (133.94 q/ha) yields were obtained at Rewa and Varanasi centres, respectively.
- The zonal means for grain and forage yields were 30.14 q/ha and 112.54 q/ha, respectively for this trial.
- The check RD2552 performed better than all the test entries for grain and forage yield concurrently.

INITIAL VARIETAL TRIAL- DUAL PURPOSE BARLEY (IRRIGATED-TIMELY SOWN)-CZ

- This trial was conducted at five locations in this zone and data from Anand and Banswara locations were incomplete, hence were not considered for pooled analysis
- The highest location means for grain (31.85 q/ha) and forage (237.52q/ha) yields were obtained at Udaipur centre.
- The zonal means for grain and forage yields were 28.54 q/ha and 197.97q/ha, respectively.
- The check RD2715 performed better than all the test entries for grain and forage yield concurrently.

AVT-DUAL PURPOSE BARLEY-RAINFED TIMELY SOWN-NHZ
Location wise & Zonal means (Grain Yield in q/ha)

Entry	Bajaura			Shimla			Almora			Pooled		
	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
BHS 447	22.59	8	0	17.51	3	0	30.13	3	1	23.41	6	0
BHS 452	25.47	6	0	11.97	15	0	23.75	14	0	20.39	11	0
BHS 453	21.43	10	0	18.48	2	1	24.68	13	0	21.53	9	0
BHS 454	22.28	9	0	12.11	14	0	27.7	8	0	20.7	10	0
BHS 455	21.43	10	0	14.98	9	0	28.43	7	0	21.61	7	0
HBL 764	19.8	13	0	13.8	10	0	16.63	17	0	16.74	16	0
HBL 776	16.93	15	0	10.76	16	0	26.97	12	0	18.22	15	0
HBL 777	17.31	14	0	9.32	17	0	18.06	15	0	14.9	17	0
HBL 778	24.69	7	0	12.18	13	0	17.94	16	0	18.27	14	0
VLB 147	27.72	1	1	16.93	5	0	27.64	9	0	24.09	3	0
VLB 150	26.16	3	1	16.3	6	0	32.02	2	1	24.83	2	1
VLB 151	15.06	17	0	17.51	3	0	27.03	11	0	19.87	12	0
VLB 152	21.35	12	0	13.54	11	0	29.91	4	0	21.6	8	0
VLB 153	25.54	5	0	13.2	12	0	33.24	1	1	23.99	4	0
BHS 380 (C)	26.16	3	1	16.29	7	0	28.89	6	0	23.78	5	0
BHS 400 (C)	27.56	2	1	20.64	1	1	29.76	5	0	25.99	1	1
HBL 276 (C)	15.68	16	0	16.12	8	0	27.54	10	0	19.78	13	0
G.M.	22.19			14.80			26.49			21.16		
S.E.(M)	0.72			0.96			1.36			0.60		
C.D. (10%)	1.70			2.28			3.23			1.43		
C.V. (%)	6.45			12.96			10.28					
DOS	08-11-2016			04-11-2016			25-10-2016					

AVT-DUAL PURPOSE BARLEY-RAINFED TIMELY SOWN-NHZ
Location wise & Zonal means (Forage Yield in q/ha)

Entry	Bajaura			Shimla			Almora			Pooled		
	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
BHS 447	16.54	12	0	22.13	7	0	52.17	4	0	30.28	8	0
BHS 452	34.63	1	1	29.19	2	0	32.9	15	0	32.24	5	0
BHS 453	24.53	5	0	33.23	1	1	65.98	1	1	41.25	1	1
BHS 454	23.21	6	0	19.88	11	0	50.55	5	0	31.21	6	0
BHS 455	22.52	8	0	18.25	14	0	49.56	6	0	30.11	9	0
HBL 764	18.32	11	0	18.48	13	0	39.02	14	0	25.27	13	0
HBL 776	13.59	14	0	12.97	17	0	32.15	16	0	19.57	17	0
HBL 777	26.4	4	0	15.99	15	0	31.72	17	0	24.7	16	0
HBL 778	20.11	10	0	19.02	12	0	41.35	12	0	26.83	11	0
VLB 147	11.26	17	0	20.11	10	0	43.38	10	0	24.92	14	0
VLB 150	15.61	13	0	15.3	16	0	43.65	9	0	24.85	15	0
VLB 151	12.58	16	0	25.93	4	0	53.33	3	0	30.61	7	0
VLB 152	13.35	15	0	22.9	6	0	39.98	13	0	25.41	12	0
VLB 153	29.66	2	0	20.11	9	0	47.84	8	0	32.53	4	0
BHS 380 (C)	27.10	3	0	23.52	5	0	48.43	7	0	33.02	3	0
BHS 400 (C)	21.82	9	0	21.74	8	0	43.36	11	0	28.97	10	0
HBL 276 (C)	22.75	7	0	26.24	3	0	56.98	2	0	35.32	2	0
G.M.	20.82			21.47			45.43			29.24		
S.E.(M)	1.70			1.17			2.16			1.00		
C.D. (10%)	4.04			2.78			5.13			2.37		
C.V.	16.38			10.91			9.52					
DOS	08-11-2016			04-11-2016			25-10-2016					

ADVANCED VARIETAL TRIAL - RF –DUAL **ZONE: NHZ**

Summary of ancillary and disease data **RABI – 2016-17**

ENTRY	AGRONOMIC CHARACTERS						GRAIN CHARACTERISTICS			DISEASE REACTION							
	H. days Mean & Range	M. days Mean & Range	Height Mean & Range (cm)	Tillering per meter Mean & Range	Str. Stn. Mean & Range	Two/ Six Row	Grain Colour	1000 g.w Mean & Range	H/N	RUST			SMUT		Hel. Disease		Aphid
										YL	BR	BL	L (%)	C (%)	Spot (%)	Leaf Blight	
BHS 447	133 (120-143)	177 (171-184)	61 (42-82)	85 (60-118)	2 (1-3)	2	Y	45 (40-49)	H	F						-	
BHS 452	124 (113-133)	175 (168-183)	58 (45-72)	78 (62-100)	2 (1-3)	6	Y	37 (35-42)	H	F						11	
BHS 453	127 (114-139)	175 (168-183)	65 (56-76)	77 (60-96)	2 (1-3)	2	Y	43 (36-48)	H	F						12	
BHS 454	131 (120-139)	178 (174-185)	58 (49-67)	67 (58-78)	2 (1-2)	6	Y	42 (37-46)	H	F						-	
BHS 455	129 (117-136)	174 (168-182)	60 (50-71)	68 (55-82)	2 (1-3)	6	Y	35 (30-40)	H	F						-	
HBL 764	133 (119-147)	175 (170-186)	63 (56-69)	60 (48-70)	2 (1-3)	6	A	32 (29-36)	HL	F						11	
HBL 776	133 (119-146)	176 (171-187)	60 (48-66)	53 (47-59)	2 (1-3)	6	A	37 (34-44)	HL	F						01	
HBL 777	127 (112-140)	175 (169-186)	62 (58-69)	54 (45-65)	2 (1-3)	6	A	39 (35-42)	HL	F						11	
HBL 778	131 (118-142)	177 (171-186)	60 (51-65)	64 (57-73)	2 (1-2)	6	Y	41 (36-48)	H	5S						01	
VLB 147	142 (127-153)	181 (175-189)	55 (46-60)	93 (66-137)	2 (1-3)	2	Y	37 (30-40)	H	F						12	
VLB 150	141 (128-153)	180 (175-188)	51 (45-54)	92 (70-125)	2 (1-2)	2	Y	39 (33-44)	H	F						-	
VLB 151	138 (128-147)	176 (170-184)	65 (58-72)	86 (63-97)	2 (1-3)	2	Y	42 (39-47)	H	F						-	
VLB 152	132 (119-142)	176 (173-184)	53 (40-63)	73 (58-102)	2 (1-2)	6	Y	35 (30-40)	H	F						-	
VLB 153	126 (110-139)	175 (169-184)	56 (45-66)	64 (60-71)	2 (1-3)	6	Y	37 (35-43)	H	F						-	
BHS 380 ©	133 (121-139)	179 (172-186)	59 (52-66)	74 (65-86)	2 (1-3)	6	Y	36 (29-40)	H	TS						-	
BHS 400 ©	137 (120-146)	179 (170-186)	61 (55-69)	64 (57-77)	2 (1-3)	6	Y	38 (34-40)	H	TS						-	
HBL 276 ©	133 (111-143)	173 (167-182)	64 (50-74)	73 (59-84)	2 (1-3)	6	A	28 (22-34)	HL	F						-	

AVT- DUAL PURPOSE-IRRIGATED TIMELY SOWN-CZ
Location wise & Zonal means (Grain Yield in q/ha)

Varieties	Kota			Sagar			Morena			Udaipur			Pooled		
	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
RD 2927	31.47	1	1	32.78	2	0	22.36	3	1	42.71	1	1	32.33	1	1
AZAD (C)	23.19	4	0	29.72	4	0	22.86	1	1	34.90	4	0	27.67	4	0
RD 2035 (C)	30.22	2	1	31.11	3	0	18.57	5	1	33.24	5	0	28.28	3	0
RD 2552 (C)	27.71	3	0	36.11	1	1	22.52	2	1	41.35	2	1	31.92	2	1
RD 2715(C)	20.24	5	0	26.67	5	0	20.56	4	1	37.68	3	0	26.29	5	0
G.M.	26.57			31.28			21.37			37.98			29.30		
S.E.(M)	1.13			0.68			1.82			0.84			0.60		
C.D. (10%)	2.85			1.71			4.58			2.53			1.48		
C.V. (%)	8.53			4.35			17.01			3.13					
DOS	16-11-2016			15-11-2016			29-11-2016			17-11-2016					

AVT- DUAL PURPOSE-IRRIGATED TIMELY SOWN-CZ
Location wise & Zonal means (Forage Yield in q/ha)

Entries	Kota			Sagar			Morena			Udaipur					
	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
RD 2927	191.3	3	0	68.5	3	0	288.0	5	0	299.5	2	1	211.8	3	0
AZAD (C)	136.9	5	0	73.6	2	1	373.2	2	1	241.5	3	0	206.3	5	0
RD 2035 (C	146.1	4	0	74.4	1	1	378.6	1	1	236.7	5	0	209.0	4	0
RD 2552 (C	199.3	2	0	62.4	5	0	371.4	3	1	304.3	1	1	234.3	1	1
RD 2715 (C	228.5	1	1	67.6	4	0	355.1	4	1	241.5	3	0	223.2	2	1
G.M.	180.4			69.3			353.3			264.7			216.9		
S.E.(M)	6.17			0.80			18.6			18.3			6.70		
C.D. (10%)	15.55			2.02			46.91			55.08			16.55		
C.V. (%)	6.84			2.32			10.54			9.76					
DOS	16-11-2016			15-11-2016			29-11-2016			17-11-2016					

ADVANCED VARIETAL TRIAL (IR) - DUAL **ZONE: CZ**

Summary of ancillary and disease data **RABI 2016-17**

ENTRY	AGRONOMIC CHARACTERS						GRAIN CHARACTERS		
	H. days Mean & Range	M. days Mean & Range	Height Mean & Range (cm)	Tillering per meter Mean & Range	Str. Stn. Mean & Range	Two/ Six Row	Colour	1000 g.w Mean & Range	H/N
RD 2927	80 (56-95)	115 (100-129)	77 (59-105)	126 (74-227)	1.5 (0-3)	6	W	43 (36-49)	H
AZAD (C)	77 (60-95)	115 (101-142)	74 (55-91)	118 (53-195)	1.5 (1-2)	6	A	41 (32-50)	H
RD 2035 (C)	78 (62-94)	115 (104-134)	76 (59-96)	123 (61-191)	2.5 (2-3)	6	W	37 (27-46)	H
RD 2552 (C)	79 (60-93)	115 (105-135)	72 (58-88)	118 (66-225)	3 (3-3)	6	R	41 (34-47)	H
RD 2715 (C)	80 (58-95)	116 (105-133)	69 (43-83)	112 (50-199)	1.5 (0-3)	6	W	39 (32-45)	H

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

Entries	Code	Hisar			Durgapura			Ludhiana			Pooled		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
JB348	IVTIRTSDP-2	30.8	6	0	27.78	11	0	57.07	4	1	38.55	7	0
KB1527	IVTIRTSDP-14	24.43	10	0	27.78	11	0	48.01	11	0	33.4	12	0
KB1530	IVTIRTSDP-9	22.25	11	0	38.95	2	0	39.25	14	0	33.48	11	0
NDB1660	IVTIRTSDP-8	33.21	4	0	36.84	5	0	57.49	1	1	42.51	2	0
RD2951	IVTIRTSDP-4	16.09	13	0	36.23	6	0	51.33	9	0	34.55	9	0
RD2952	IVTIRTSDP-15	17.27	12	0	35.93	7	0	48.31	10	0	33.84	10	0
RD2953	IVTIRTSDP-1	25.54	8	0	8.76	14	0	57.37	3	1	30.56	13	0
RD2954	IVTIRTSDP-11	14.67	14	0	10.87	13	0	47.71	12	0	24.42	14	0
UPB1064	IVTIRTSDP-7	31.58	5	0	33.21	8	0	54.65	6	0	39.81	6	0
UPB1065	IVTIRTSDP-13	33.45	3	0	37.74	3	0	42.27	13	0	37.82	8	0
UBP1066	IVTIRTSDP-5	25.36	9	0	57.37	1	1	56.76	5	1	46.5	1	1
AZAD (C)	IVTIRTSDP-3	29.59	7	0	37.74	3	0	54.35	7	0	40.56	5	0
RD2035 (C)	IVTIRTSDP-12	36.84	2	1	28.99	10	0	57.37	2	1	41.06	4	0
RD2552 (C)	IVTIRTSDP-6	38.41	1	1	31.4	9	0	53.74	8	0	41.18	3	0
RD2715 (C)	IVTIRTSDP-10	13.1	15	0	8.76	14	0	36.23	15	0	19.36	15	0
	G.M.	26.17			30.56			50.79			35.84		
	S.E.(M)	1.01			1.49			0.92			0.67		
	C.D. (10%)	2.40			3.55			2.19			1.60		
	C.V. (%)	7.70			9.76			3.62					
	DOS	15-11-2016			10-11-2016			19-11-2016					

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

Varieties	Code	Hisar			Durgapura			Ludhiana			Pooled		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
JB348	IVTIRTSDP-2	94.57	10	0	206.52	4	0	115.94	12	0	139.01	10	0
KB1527	IVTIRTSDP-14	103.26	8	0	170.89	10	0	189.61	2	1	154.59	3	0
KB1530	IVTIRTSDP-9	121.38	5	0	208.33	3	0	164.25	8	0	164.65	2	1
NDB1660	IVTIRTSDP-8	78.99	15	0	204.11	5	0	166.67	6	0	149.92	5	0
RD2951	IVTIRTSDP-4	135.87	2	1	191.43	8	0	171.5	5	0	166.26	1	1
RD2952	IVTIRTSDP-15	95.65	9	0	201.69	6	0	158.21	9	0	151.85	4	0
RD2953	IVTIRTSDP-1	135.51	3	1	85.14	13	0	183.57	4	1	134.74	12	0
RD2954	IVTIRTSDP-11	107.25	6	0	83.94	14	0	166.67	6	0	119.28	15	0
UPB1064	IVTIRTSDP-7	80.07	13	0	173.61	9	0	106.28	13	0	119.99	14	0
UPB1065	IVTIRTSDP-13	104.71	7	0	201.09	7	0	124.4	11	0	143.4	9	0
UBP1066	IVTIRTSDP-5	89.13	11	0	256.64	1	1	86.96	15	0	144.24	8	0
AZAD (C)	IVTIRTSDP-3	79.71	14	0	224.34	2	0	99.03	14	0	134.36	13	0
RD2035 (C)	IVTIRTSDP-12	126.45	4	0	169.69	11	0	153.38	10	0	149.84	6	0
RD2552 (C)	IVTIRTSDP-6	83.7	12	0	166.97	12	0	187.2	3	1	145.95	7	0
RD2715 (C)	IVTIRTSDP-10	142.75	1	1	70.95	15	0	193.24	1	1	135.65	11	0
	G.M.	105.27			174.36			151.13			143.58		
	S.E.(M)	5.05			6.49			5.62			3.32		
	C.D. (10%)	12.02			15.45			13.37			7.91		
	C.V.	9.60			7.45			7.43					
	DOS	15-11-2016			10-11-2016			19-11-2016					

INITIAL VARIETAL TRIAL (DUAL) PLAINS **ZONE: NWPZ**

Summary of ancillary and disease data **RABI – 2016-17**

Entry	Code	AGRONOMIC CHARACTERS						GRAIN CHARACTERISTICS			DISEASE / PEST REACTION							
		H. days Mean & Range	M. days Mean & Range	Height Mean & Range (cm)	Tillering per meter Mean & Range	Str. Stn. Mean & Range	Two/ Six Row	Grain Colour	1000 g.w Mean & Range	H/N	RUSTS			SMUTS		Spot Leaf	Net leaf	Aphid (1-5)
											YL	BR	BL	L (%)	C (%)			
JB348	IVTIRTSDP-2	89 (79-98)	130 (122-143)	81 (70-97)	99 (62-136)	3 (1-4)	6	Y	38 (35-41)	H					0	23		
KB1527	IVTIRTSDP-14	89 (78-98)	130 (122-142)	94 (85-105)	92 (64-123)	3 (2-4)	6	Y	38 (34-44)	H					0	12		
KB1530	IVTIRTSDP-9	89 (81-100)	131 (122-144)	85 (79-90)	108 (80-123)	3 (1-4)	6	Y	37 (34-46)	H					Ts	23		
NDB1660	IVTIRTSDP-8	91 (79-105)	136 (131-144)	91 (70-107)	103 (72-120)	2 (1-3)	6	Y	41 (39-42)	H					0	57		
RD2951	IVTIRTSDP-4	86 (79-100)	131 (125-143)	76 (58-96)	88 (62-125)	2 (1-3)	6	Y	41 (35-49)	H					0	57		
RD2952	IVTIRTSDP-15	89 (80-105)	135 (131-142)	83 (74-96)	81 (60-113)	3 (2-3)	6	Y	39 (35-50)	H					0	14		
RD2953	IVTIRTSDP-1	86 (80-98)	128 (119-142)	78 (52-97)	89 (55-129)	3 (2-3)	6	Y	36 (26-45)	H					0	58		
RD2954	IVTIRTSDP-11	83 (75-98)	127 (121-137)	81 (68-98)	88 (58-129)	2 (1-3)	6	Y	37 (30-50)	H					0	78		
UPB1064	IVTIRTSDP-7	89 (80-105)	131 (119-144)	84 (70-93)	123 (75-163)	3 (1-4)	6	Y	43 (35-49)	H					0	23		
UPB1065	IVTIRTSDP-13	90 (82-98)	129 (120-143)	90 (80-109)	98 (62-137)	3 (1-4)	6	Y	35 (28-40)	H					0	57		
UBP1066	IVTIRTSDP-5	97 (84-122)	134 (130-143)	84 (72-99)	110 (80-146)	3 (1-4)	6	Y	44 (42-45)	H					0	46		
AZAD (c)	IVTIRTSDP-3	94 (82-102)	136 (131-144)	93 (80-106)	93 (70-126)	3 (2-4)	6	Y	41 (39-45)	H					0	56		
RD2035 (c)	IVTIRTSDP-12	91 (81-98)	129 (120-141)	78 (55-90)	113 (60-156)	2 (1-3)	6	Y	35 (32-39)	H					0	35		
RD2552(c)	IVTIRTSDP-6	94 (81-105)	135 (129-144)	80 (62-98)	109 (72-147)	2 (1-3)	6	Y	39 (36-42)	H					0	12		
RD2715 (c)	IVTIRTSDP-10	81 (75-88)	125 (110-138)	88 (80-99)	89 (55-129)	3 (2-4)	6	Y	34 (28-50)	H					0	78		

IVT- DUAL PURPOSE BARLEY-IRRIGATED-TIMELY SOWN-NEPZ

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

Entry	Code	Varanasi			Kanpur			Faizabad			Rewa			Pooled		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
JB348	IVTIRTSDP-2	28.45	10	0	23.91	15	0	29.47	6	0	36.6	8	1	29.61	9	0
KB1527	IVTIRTSDP-14	29.67	7	0	26.09	13	0	29.89	5	0	34.8	14	1	30.11	8	0
KB1530	IVTIRTSDP-9	19.15	13	0	27.85	10	0	26.57	11	0	39.6	1	1	28.29	13	0
NDB1660	IVTIRTSDP-8	35.07	4	0	28.67	8	1	27.78	8	0	37.2	6	1	32.18	4	0
RD2951	IVTIRTSDP-4	25.56	11	0	26.9	11	0	26.69	10	0	36.9	7	1	29.01	12	0
RD2952	IVTIRTSDP-15	34.71	5	0	26.36	12	0	28.38	7	0	38.4	2	1	31.96	6	0
RD2953	IVTIRTSDP-1	24.42	12	0	31.52	2	1	25.36	13	0	36.2	10	1	29.38	10	0
RD2954	IVTIRTSDP-11	8.08	14	0	29.62	5	1	18.12	14	0	38.1	3	1	23.48	14	0
UBP1066	IVTIRTSDP-5	35.72	3	0	28.94	7	1	27.17	9	0	35.3	12	1	31.79	7	0
UPB1064	IVTIRTSDP-7	42.54	1	1	30.3	4	1	32.31	3	0	36.3	9	1	35.36	2	1
UPB1065	IVTIRTSDP-13	30.93	6	0	24.18	14	0	26.57	11	0	34.4	15	1	29.02	11	0
AZAD (C)	IVTIRTSDP-3	29.43	8	0	30.71	3	1	30.5	4	0	37.3	5	1	31.98	5	0
RD2035 (C)	IVTIRTSDP-12	29.01	9	0	28.4	9	1	36.53	2	1	37.8	4	1	32.94	3	0
RD2552 (C)	IVTIRTSDP-6	39.61	2	0	31.52	1	1	37.2	1	1	35.4	11	1	35.93	1	1
RD2715 (C)	IVTIRTSDP-10	2.83	15	0	29.08	6	1	17.36	15	0	35	13	1	21.07	15	0
	G.M.	27.68			28.27			27.99			36.62			30.14		
	S.E.(M)	1.23			1.38			1.23			2.60			0.86		
	C.D. (10%)	2.92			3.29			2.93			6.20			2.02		
	C.V. (%)	8.87			9.77			8.79			14.23					
	DOS	17-11-2016			24-11-2016			08-11-2016			15-11-2016					

IVT- DUAL PURPOSE BARLEY-IRRIGATED-TIMELY SOWN-NEPZ

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

Entry	Code	Varanasi			Kanpur			Faizabad			Rewa			Pooled		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
JB348	IVTIRTSDP-2	109.9	13	0	172.28	1	1	65.82	13	0	120.41	1	1	117.1	5	0
KB1527	IVTIRTSDP-14	141.3	7	0	141.85	5	0	70.71	10	0	96.8	10	0	112.67	9	0
KB1530	IVTIRTSDP-9	111.11	12	0	134.24	8	0	96.01	5	0	90.76	12	0	108.03	11	0
NDB1660	IVTIRTSDP-8	118.36	10	0	155.43	3	0	79.29	9	0	98.85	9	1	112.98	8	0
RD2951	IVTIRTSDP-4	187.2	2	1	113.59	12	0	67.33	12	0	90.76	12	0	114.72	7	0
RD2952	IVTIRTSDP-15	137.08	8	0	123.37	10	0	84.24	8	0	90.4	14	0	108.77	10	0
RD2953	IVTIRTSDP-1	179.35	3	0	84.78	14	0	112.02	3	1	89.37	15	0	116.38	6	0
RD2954	IVTIRTSDP-11	150.97	5	0	145.11	4	0	68.84	11	0	109.42	4	1	118.58	3	0
UBP1066	IVTIRTSDP-5	52.54	15	0	140.76	6	0	96.01	6	0	96.68	11	0	96.5	14	0
UPB1064	IVTIRTSDP-7	70.05	14	0	67.93	15	0	64.01	14	0	107.79	5	1	77.45	15	0
UPB1065	IVTIRTSDP-13	148.55	6	0	140.76	6	0	117.45	2	1	106.28	6	1	128.26	2	0
AZAD (C)	IVTIRTSDP-3	132.85	9	0	130.71	9	0	102.05	4	0	103.56	8	1	117.29	4	0
RD2035 (C)	IVTIRTSDP-12	154.59	4	0	121.2	11	0	38.16	15	0	103.68	7	1	104.41	13	0
RD2552 (C)	IVTIRTSDP-6	118.36	10	0	89.67	13	0	95.41	7	0	118.6	2	1	105.51	12	0
RD2715 (C)	IVTIRTSDP-10	196.86	1	1	171.47	2	1	118.66	1	1	110.57	3	1	149.39	1	1
	G.M.	133.94			128.88			85.07			102.26			112.54		
	S.E.(M)	7.04			5.06			4.78			9.86			3.49		
	C.D. (10%)	16.74			12.03			11.38			23.46			8.26		
	C.V. (%)	10.51			7.85			11.25			19.28					
	DOS	17-11-2016			24-11-2016			08-11-2016			15-11-2016					

INITIAL VARIETAL TRIAL (DUAL) PLAINS **ZONE: NEPZ**

Summary of ancillary and disease data **RABI – 2016-17**

Entry	Code	AGRONOMIC CHARACTERS						GRAIN CHARACTERISTICS			DISEASE / PEST REACTION							
		H. days Mean & Range	M. days Mean & Range	Height Mean & Range (cm)	Tillering per meter Mean & Range	Str. Stn. Mean & Range	Two/ Six Row	Grain Colour	1000 g.w Mean & Range	H/N	RUSTS			SMUTS		Spot leaf	leaf Blight	Aphid (1-5)
											YL	BR	BL	L (%)	C (%)			
JB348	IVTIRTSDP-2	82 (80-86)	121 (115-126)	84 (73-90)	88 (58-116)	1 (1-1)	6	Y	39 (36-42)	H						**13**	35	
KB1527	IVTIRTSDP-14	81 (76-85)	117 (108-124)	97 (86-103)	93 (73-109)	3 (2-3)	6	LY	39 (35-43)	H						**36**	35	
KB1530	IVTIRTSDP-9	82 (78-85)	121 (112-129)	80 (66-98)	105 (78-130)	2 (1-2)	6	LY	40 (36-45)	H						**24**	46	
NDB1660	IVTIRTSDP-8	83 (80-85)	125 (117-130)	98 (85-118)	99 (72-122)	3 (3-3)	6	LY	40 (38-41)	H						**36**	46	
RD2951	IVTIRTSDP-4	80 (70-86)	120 (108-127)	93 (80-99)	99 (74-122)	2 (2-2)	6	Y	42 (37-46)	H						**46**	46	
RD2952	IVTIRTSDP-15	82 (78-84)	121 (113-127)	94 (84-100)	96 (75-135)	2 (2-2)	6	LY	39 (38-41)	H						**35**	24	
RD2953	IVTIRTSDP-1	85 (82-87)	124 (121-130)	90 (84-96)	96 (78-112)	2 (1-2)	6	Y	36 (30-44)	H						**79**	67	
RD2954	IVTIRTSDP-11	81 (75-86)	119 (112-128)	90 (77-105)	97 (63-129)	2 (1-2)	6	Y	36 (24-41)	H						**99**	89	
UPB1064	IVTIRTSDP-7	84 (83-86)	125 (121-130)	86 (75-98)	103 (85-130)	2 (1-2)	6	LY	40 (36-42)	H						**12**	24	
UPB1065	IVTIRTSDP-13	84 (80-86)	121 (113-129)	102 (94-110)	92 (75-118)	2 (2-2)	6	LY	36 (30-42)	H						**23**	35	
UBP1066	IVTIRTSDP-5	87 (81-91)	126 (120-130)	87 (77-109)	114 (83-136)	2 (2-2)	6	LY	39 (31-46)	H						**13**	24	
AZAD (C)	IVTIRTSDP-3	83 (81-86)	123 (117-128)	105 (93-122)	100 (70-125)	3 (3-3)	6	Y	41 (39-42)	H						**23**	57	
RD2035 (C)	IVTIRTSDP-12	81 (78-86)	118 (111-125)	88 (73-98)	98 (67-121)	3 (3-3)	6	Y	38 (29-43)	H						**79**	46	
RD2552 (C)	IVTIRTSDP-6	82 (80-84)	123 (120-127)	94 (83-104)	94 (74-128)	2 (1-2)	6	LY	38 (35-40)	H						**35**	45	
RD2715 (C)	IVTIRTSDP-10	81 (77-85)	118 (112-127)	98 (88-110)	87 (45-120)	2 (1-3)	6	Y	32 (17-41)	H						**99**	89	

INITIAL VARIETAL TRIAL- DUAL PURPOSE BARLEY (IRRIGATED-TIMELY SOWN)-CZ

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

Entry	Code	Kota			Udaipur			Jabalpur			Pooled		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
JB348	IVTIRTSDP-2	25.18	8	0	40.25	1	1	18.42	12	0	27.95	8	0
KB1527	IVTIRTSDP-14	22.4	10	0	31.04	10	0	25.36	9	0	26.27	10	0
KB1530	IVTIRTSDP-9	20.23	13	0	34.48	3	1	9.84	15	0	21.52	14	0
NDB1660	IVTIRTSDP-8	41	1	1	32.13	8	0	32.79	3	0	35.31	3	0
RD2951	IVTIRTSDP-4	23.01	9	0	19.81	15	0	27.78	7	0	23.53	12	0
RD2952	IVTIRTSDP-15	29.41	7	0	31.1	9	0	28.02	6	0	29.51	6	0
RD2953	IVTIRTSDP-1	18.66	15	0	33.57	5	0	29.95	4	0	27.4	9	0
RD2954	IVTIRTSDP-11	21.14	12	0	30.04	11	0	16	13	0	22.39	13	0
UBP1066	IVTIRTSDP-5	34.24	4	0	40.19	2	1	36.35	2	0	36.93	2	1
UPB1064	IVTIRTSDP-7	36.41	3	0	33.09	7	0	48.01	1	1	39.17	1	1
UPB1065	IVTIRTSDP-13	19.69	14	0	28.96	13	0	15.16	14	0	21.27	15	0
AZAD (C)	IVTIRTSDP-3	33.88	6	0	26.81	14	0	29.47	5	0	30.05	5	0
RD2035 (C)	IVTIRTSDP-12	34.06	5	0	29.17	12	0	22.4	10	0	28.54	7	0
RD2552 (C)	IVTIRTSDP-6	36.59	2	0	33.76	4	0	27.17	8	0	32.51	4	0
RD2715 (C)	IVTIRTSDP-10	21.56	11	0	33.36	6	0	22.28	11	0	25.73	11	0
	G.M.	27.83			31.85			25.93			28.54		
	S.E.(M)	1.10			2.64			1.46			1.07		
	C.D. (10%)	2.61			6.27			3.48			2.54		
	C.V. (%)	7.87			16.56			11.28					
	DOS	16-11-2016			18-11-2016			08-12-2016					

INITIAL VARIETAL TRIAL- DUAL PURPOSE BARLEY (IRRIGATED-TIMELY SOWN)-CZ

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

Entry	Code	Kota			Udaipur			Jabalpur			Pooled		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
JB348	IVTIRTSDP-2	193.48	11	0	205.31	12	0	96.01	14	0	164.94	13	0
KB1527	IVTIRTSDP-14	152.78	15	0	229.47	10	0	102.05	13	0	161.43	14	0
KB1530	IVTIRTSDP-9	180.56	13	0	259.66	6	0	106.28	11	0	182.17	10	0
NDB1660	IVTIRTSDP-8	183.57	12	0	205.31	12	0	143.72	4	0	177.54	12	0
RD2951	IVTIRTSDP-4	251.81	5	0	271.74	4	0	118.36	8	0	213.97	5	0
RD2952	IVTIRTSDP-15	245.77	6	0	235.51	9	0	120.77	7	0	200.68	7	0
RD2953	IVTIRTSDP-1	226.45	10	0	314.01	1	1	131.64	5	0	224.03	4	0
RD2954	IVTIRTSDP-11	282.61	2	1	277.78	3	1	158.21	3	0	239.53	3	0
UBP1066	IVTIRTSDP-5	155.8	14	0	108.7	15	0	123.79	6	0	129.43	15	0
UPB1064	IVTIRTSDP-7	258.45	4	0	169.08	14	0	117.75	9	0	181.76	11	0
UPB1065	IVTIRTSDP-13	241.55	7	0	253.62	7	0	111.11	10	0	202.09	6	0
AZAD (C)	IVTIRTSDP-3	236.11	8	0	217.39	11	0	103.26	12	0	185.59	9	0
RD2035 (C)	IVTIRTSDP-12	315.22	1	1	295.89	2	1	199.88	1	1	270.33	1	1
RD2552 (C)	IVTIRTSDP-6	234.9	9	0	247.58	8	0	89.98	15	0	190.82	8	0
RD2715 (C)	IVTIRTSDP-10	282.61	2	1	271.74	4	0	181.16	2	1	245.17	2	0
	G.M.	229.44			237.52			126.93			197.97		
	S.E.(M)	16.09			16.60			7.91			8.14		
	C.D. (10%)	38.27			39.50			18.81			19.39		
	C.V.	14.02			13.98			12.46					
	DOS	16-11-2016			18-11-2016			08-12-2016					

INITIAL VARIETAL TRIAL (DUAL) PLAINS **ZONE: CZ**

Summary of ancillary and disease data **RABI – 2016-17**

ENTRY	Code	AGRONOMIC CHARACTERS						GRAIN CHARACTERISTICS			DISEASE / PEST REACTION							
		H. days Mean & Range	M. days Mean & Range	Height Mean & Range (cm)	Tillering per meter Mean & Range	Str. Stn. Mean & Range	Two/ Six Row	Grain Colour	1000 g.w Mean & Range	H/N	RUSTS			SMUTS		Blight	CCN	Aphid (1-5)
											YL	BR	BL	L (%)	C (%)			
JB348	IVTIRTSDP-2	80 (60-90)	113 (90-137)	65 (54-82)	109 (68-139)	0.5 (0-1)	6	W	40 (28-48)	H								
KB1527	IVTIRTSDP-14	79 (72-83)	116 (102-137)	70 (46-93)	99 (93-105)	1.5 (0-3)	6	W	40 (34-48)	H								
KB1530	IVTIRTSDP-9	78 (68-84)	113 (99-137)	64 (48-88)	93 (38-124)	2 (1-3)	6	W	44 (37-52)	H								
NDB1660	IVTIRTSDP-8	78 (68-84)	116 (98-136)	69 (46-99)	116 (66-158)	3 (2-4)	6	A	43 (29-52)	H								
RD2951	IVTIRTSDP-4	79 (62-87)	112 (94-134)	59 (49-76)	97 (94-99)	1 (1-1)	6	W	46 (38-60)	H								
RD2952	IVTIRTSDP-15	82 (68-87)	113 (100-136)	61 (44-77)	94 (86-108)	1 (1-1)	6	A	44 (37-51)	H								
RD2953	IVTIRTSDP-1	77 (58-85)	111 (90-133)	65 (48-81)	98 (75-110)	2 (0-4)	6	W	42 (38-46)	H								
RD2954	IVTIRTSDP-11	78 (67-85)	115 (97-139)	65 (46-79)	100 (86-108)	1 (0-2)	6	A	50 (42-56)	H								
UPB1064	IVTIRTSDP-7	77 (58-85)	111 (88-134)	66 (47-76)	148 (88-188)	1.5 (1-2)	6	A	43 (34-48)	H								
UPB1065	IVTIRTSDP-13	78 (58-88)	106 (57-138)	66 (51-82)	110 (65-161)	1.5 (0-3)	6	W	40 (35-52)	H								
UBP1066	IVTIRTSDP-5	78 (68-89)	112 (98-135)	73 (50-92)	122 (89-180)	1 (0-2)	6	A	41 (31-52)	H								
AZAD (C)	IVTIRTSDP-3	77 (56-84)	114 (96-138)	69 (48-93)	116 (95-137)	3 (3-3)	6	W	48 (40-58)	H								
RD2035 (C)	IVTIRTSDP-12	79 (58-91)	113 (98-132)	64 (52-74)	139 (98-178)	2.5 (1-4)	6	W	42 (38-50)	H								
RD2552 (C)	IVTIRTSDP-6	76 (58-86)	112 (89-136)	67 (47-79)	147 (38-217)	2 (2-2)	6	A	41 (36-48)	H								
RD2715 (C)	IVTIRTSDP-10	79 (70-87)	112 (100-131)	70 (55-90)	104 (91-121)	3.5 (3-4)	6	W	39 (31-48)	H								

MALT BARLEY

AVT-MB-TS:

- The AVT-MB (IR-TS) was proposed at 11 centres in NWPZ and data of 10 locations, except Mathura (RMT) were considered for zonal mean compilation.
- The trial comprised of 2 test entries and 5 checks viz. BH 902 (six-row, feed barley) and DWRUB52, DWRB101, DWRB123 and RD2849 (all two-row malt barley), where the entry RD2917 was in the final year of evaluation.
- The trial mean grain yield was exhibited as 49.2 q/ha, which ranged from 39.3 q/ha (Karnal) to 67.5 q/ha (Sri Ganganangar) indicating a wide difference across the centres. The entry RD2917 (52.7 q/ha) was significantly superior ranked first followed by the best check DWRB123 (50.5 q/ha) and BH902 (50.1 q/ha).

IVT-MB-TS:

- The IVT-MB (IR-TS) was proposed at 9 centres in NWPZ and data of all the locations, except Mathura (RMT) were considered for zonal mean compilation.
- The trial comprised of 21 test entries and 5 checks viz. BH 902 (six-row, feed barley) and DWRUB52, DWRB101, DWRB123 and RD2849 (all two-row malt barley).
- The trial mean grain yield was observed as 45.7 q/ha, which ranged from 32.4 q/ha (Karnal) to 60.6 q/ha (Durgapura) indicating good genotypic performances across the centres. The entry DWRB160 (53.3 q/ha) was significantly superior and ranked first followed by the feed barley check BH902 (49.9 q/ha), DWRB136 (49.4 q/ha) and the latest malt barley check DWRB123 (48.5 q/ha).
- The genotype DWRB160 was observed with extra-long spikes (12.5-13 cm) and very high 1000 grain wt. of 61 g (58-72g).

IVT-MB-LS:

- The IVT-MB (IR-LS) was proposed at 7 centres in NWPZ and data of all the locations, except Ludhiana (LSM) were considered for zonal mean compilation.
- The trial comprised of 08 test entries and 3 checks viz. DWRUB64 (six-row, malt barley) and DWRB73 and DWRB91 (both two-row malt barley).
- The trial mean grain yield was depicted as 41.3 q/ha, which ranged from 33.2 q/ha (Hisar) to 59.0 q/ha (Pantnagar), respectively. The six-rowed check DWRUB64 ranked first (44.6 q/ha), where as the variety DWRB73 was exhibited as two-row best check and ranked 5th with mean grain yield of 42.5 q/ha. The entry DWRB163 was found significantly superior and ranked second with 44.5 q/ha grain yield followed by DWRB160 (43.5 q/ha) and DWRB170 (42.8 q/ha).

AVT-MB-TS-NWPZ

Location wise (Grain Yield in q/ha)

Varieties	Bawal			Durgapura			Hisar			SG Nagar			Ludhiana			Bhatinda		
	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
DWRB150	43.7	6	0	70.1	2	0	41.0	4	1	66.5	6	0	51.2	4	1	35.6	6	0
RD2917*	53.1	1	1	76.2	1	1	42.1	3	1	74.8	1	1	52.3	1	1	47.5	2	0
BH902©	48.9	4	1	66.7	4	0	43.7	2	1	70.0	3	1	45.6	6	0	53.7	1	1
DWRUB52©	43.5	7	0	63.0	5	0	36.4	7	0	54.8	7	0	44.4	7	0	44.2	4	0
DWRB101©	48.1	5	0	47.5	7	0	36.9	6	0	67.9	5	0	52.1	3	1	35.2	7	0
DWRB123©	50.0	3	1	61.4	6	0	45.2	1	1	68.0	4	0	52.3	1	1	44.1	5	0
RD2849©	50.4	2	1	68.1	3	0	40.5	5	0	70.6	2	1	47.9	5	0	44.7	3	0
G.M.	48.2			64.7			40.8			67.5			49.4			43.6		
S.E.(M)	2.0			2.4			1.8			2.3			1.4			2.4		
C.D.	4.9			6.0			4.4			5.7			3.4			5.8		
C.V.	8.3			7.5			8.9			6.9			5.6			10.9		
DOS	10-11-2016			11-11-2016			13-11-2016			22-11-2016			16-11-2016			24-11-2016		

Location wise (Grain Yield in q/ha)

Varieties	Pantnagar			Karnal			Dhaulakuan			Modipuram			NWPZ		
	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
DWRB150	55.7	1	1	40.2	3	1	48.9	1	1	44.1	3	0	49.7	4	0
RD2917*	55.5	2	1	39.0	5	1	48.1	2	1	38.3	7	0	52.7	1	1
BH902©	51.4	5	0	40.1	4	1	39.5	5	0	41.0	5	0	50.1	3	0
DWRUB52©	47.6	7	0	38.4	6	1	44.8	4	0	47.9	1	1	46.5	6	0
DWRB101©	52.8	4	1	40.7	2	1	38.8	6	0	40.5	6	0	46.0	7	0
DWRB123©	53.9	3	1	41.3	1	1	46.5	3	1	42.1	4	0	50.5	2	0
RD2849©	50.2	6	0	35.7	7	0	37.2	7	0	46.8	2	1	49.2	5	0
G.M.	52.4			39.3			43.4			43.0			49.2		
S.E.(M)	1.3			2.0			1.6			1.1			0.6		
C.D.	3.2			4.9			3.8			2.8			1.4		
C.V.	4.9			10.3			7.2			5.3					
DOS	25-11-2016			21-11-2016			22-11-2016			21-11-2016					

ADVANCED VARIETAL TRIAL MALT BARLEY (TS) **ZONE : NWPZ**

Summary of ancillary and disease data **RABI – 2016-17**

Sr. No.	ENTRY	AGRONOMIC CHARACTERS						GRAIN CHARACTERISTICS			DISEASE REACTION							
		H. days Mean & Range	M. days Mean & Range	Height Mean & Range (cm)	Tillering per meter Mean & Range	Str. Stn. Mean & Range	Two/ Six row	Grain Colour	1000 g.w. Mean & Range	H/ N	RUST			SMUT		Leaf Blight	CCN	APHID (1-5)
											YL	BR	BL	L (%)	C (%)			
1	DWRB150	84 (69-96)	127 (116-142)	91 (69-104)	137 (53-203)	2 (1-4)	2	Y	54 (52-57)	H				0	Ts-s			
2	RD2917	79 (59-95)	128 (118-140)	90 (72-110)	127 (83-185)	2 (1-4)	2	Y	53 (49-59)	H				0	Ts			
3	BH902 (c)	88 (72-98)	131 (120-146)	99 (84-117)	104 (63-168)	3 (1-4)	6	Y	47 (43-52)	H				Ts	0			
4	DWRUB52 (c)	78 (56-95)	126 (116-146)	82 (62-97)	132 (95-170)	2 (1-3)	2	Y	50 (38-60)	H				Ts	Ts-s			
5	DWRB101 (c)	80 (56-95)	128 (118-144)	88 (68-99)	126 (84-221)	3 (1-4)	2	Y	48 (42-53)	H				Ts	Ts			
6	DWRB123 (c)	81 (60-94)	128 (118-143)	89 (72-101)	129 (82-162)	2 (1-4)	2	Y	51 (45-55)	H				0	s			
7	RD2849 (c)	80 (57-94)	129 (119-146)	87 (66-101)	138 (87-193)	2 (1-4)	2	Y	49 (45-52)	H				0	Ts			

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

Varieties	Codes	Bawal			Durgapura			Hisar			Ludhiana			Bathinda			Pantnagar			Karnal			Modipuram			NWPZ		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
BH1017	IVT-MB-TS-9	39.1	25	0	61.7	11	0	37.8	8	0	54.2	10	0	49.2	12	0	39.7	18	0	37.2	3	0	52.2	4	1	46.4	12	0
BH1018	IVT-MB-TS-5	47.9	17	0	72.5	1	1	31.9	22	0	57.4	6	1	48.5	13	0	39.3	20	0	35.1	10	0	53.2	2	1	48.2	6	0
DWRB136	IVT-MB-TS-22	51.8	11	0	61.0	14	0	42.4	3	1	57.4	6	1	42.2	19	0	54.6	1	1	35.7	7	0	50.1	7	1	49.4	3	0
DWRB160	IVT-MB-TS-6	55.4	5	1	67.9	6	1	42.9	2	1	59.7	4	1	50.6	9	0	51.0	4	1	45.4	1	1	53.5	1	1	53.3	1	1
DWRB161	IVT-MB-TS-15	34.8	26	0	54.0	22	0	36.7	10	0	49.5	17	0	40.5	21	0	45.6	12	0	34.7	12	0	35.1	25	0	41.3	24	0
DWRB162	IVT-MB-TS-1	48.8	16	0	63.3	8	0	36.2	12	0	56.0	8	1	43.9	17	0	42.3	14	0	35.3	9	0	52.2	5	1	47.3	9	0
KB1523	IVT-MB-TS-19	56.8	3	1	62.5	10	0	32.6	20	0	42.1	22	0	39.5	23	0	44.8	13	0	35.7	7	0	38.2	20	0	44.0	19	0
KB1535	IVT-MB-TS-10	46.8	19	0	55.6	20	0	32.1	21	0	49.1	18	0	37.0	26	0	46.9	8	0	29.8	17	0	35.4	24	0	41.6	23	0
KWS Irina	IVT-MB-TS-24	50.9	14	0	52.5	23	0	24.8	26	0	34.7	26	0	42.8	18	0	45.9	9	0	19.7	26	0	39.5	17	0	38.9	26	0
PL895	IVT-MB-TS-21	55.0	7	1	59.8	16	0	33.9	17	0	55.1	9	1	49.4	11	0	51.1	3	1	34.9	11	0	37.2	22	0	47.0	11	0
PL896	IVT-MB-TS-7	51.6	13	0	61.7	11	0	43.3	1	1	52.8	14	0	45.8	15	0	38.4	23	0	36.5	4	0	38.2	19	0	46.0	13	0
PL899	IVT-MB-TS-26	47.6	18	0	61.7	13	0	35.5	14	0	54.2	10	0	41.2	20	0	47.8	7	0	26.9	22	0	40.9	16	0	44.5	18	0
RD2962	IVT-MB-TS-14	42.9	23	0	64.0	7	0	40.1	6	1	44.9	21	0	45.5	16	0	39.9	17	0	35.8	6	0	47.5	10	0	45.1	17	0
RD2963	IVT-MB-TS-23	42.7	24	0	52.5	23	0	34.6	15	0	53.7	12	0	38.3	25	0	37.4	24	0	28.5	20	0	47.7	8	0	41.9	22	0
RD2964	IVT-MB-TS-2	51.8	12	0	41.7	26	0	28.8	25	0	38.4	25	0	53.7	5	0	37.0	25	0	27.2	21	0	47.5	9	0	40.8	25	0
RD2965	IVT-MB-TS-25	43.6	22	0	57.1	18	0	33.2	19	0	41.7	23	0	47.9	14	0	52.3	2	1	26.3	23	0	46.1	13	0	43.5	20	0
RGT Planet	IVT-MB-TS-3	59.2	1	1	56.7	19	0	39.5	7	1	50.5	16	0	49.7	10	0	49.8	6	0	29.3	18	0	45.7	14	0	47.5	8	0
Traveller	IVT-MB-TS-16	58.0	2	1	63.3	9	0	31.4	23	0	46.3	20	0	56.5	2	1	39.9	16	0	31.8	16	0	38.6	18	0	45.7	15	0
UPB1065	IVT-MB-TS-11	46.4	20	0	68.7	5	1	36.2	12	0	41.7	23	0	54.8	3	0	42.3	15	0	25.4	24	0	52.4	3	1	46.0	14	0
Xanadu	IVT-MB-TS-12	50.7	15	0	59.4	17	0	29.2	24	0	47.2	19	0	53.9	4	0	38.8	22	0	23.8	25	0	36.6	23	0	42.4	21	0
Zhana	IVT-MB-TS-17	54.1	8	1	49.0	25	0	33.6	18	0	58.3	5	1	40.1	22	0	45.9	10	0	33.3	14	0	47.3	11	0	45.2	16	0
BH902(c)	IVT-MB-TS-4	45.0	21	0	71.0	3	1	42.3	5	1	53.7	12	0	62.6	1	1	50.3	5	1	41.5	2	1	32.8	26	0	49.9	2	0
DWRUB52(c)	IVT-MB-TS-20	53.9	9	1	60.2	15	0	34.6	15	0	62.5	1	1	52.2	7	0	36.8	26	0	32.9	15	0	44.3	15	0	47.2	10	0
DWRB101(c)	IVT-MB-TS-13	55.4	5	1	71.0	3	1	37.8	9	0	62.0	2	1	38.7	24	0	39.5	19	0	36.3	5	0	46.3	12	0	48.4	5	0
DWRB123(c)	IVT-MB-TS-8	52.1	10	0	54.8	21	0	36.4	11	0	60.2	3	1	52.8	6	0	45.6	11	0	33.9	13	0	51.8	6	1	48.5	4	0
RD2849(c)	IVT-MB-TS-18	56.3	4	1	72.5	2	1	42.4	3	1	52.8	14	0	51.0	8	0	39.3	21	0	29.1	19	0	37.7	21	0	47.6	7	0
G.M.		49.9			60.6			35.8			51.4			47.2			43.9			32.4			44.2			45.7		
S.E.(M)		2.4			2.9			1.6			3.3			2.8			2.0			2.3			1.8			0.9		
C.D.		5.5			6.9			3.8			7.8			6.5			4.8			5.5			4.3			2.0		
C.V.		9.4			9.7			9.0			12.9			11.7			9.3			14.3			8.2					
DOS		10-11-2016			11-11-2016			13-11-2016			10-11-2016			24-11-2016			25-11-2016			21-11-2016			22-11-2016					

INITIAL VARIETAL TRIAL (TS) MALT BARLEY **ZONE : NWPZ**

Summary of ancillary and disease data **RABI – 2016-17**

Sr. No.	ENTRY	AGRONOMIC CHARACTERS						GRAIN CHARACTERISTICS			DISEASE REACTION							
		H. days Mean & Range	M. days Mean & Range	Height Mean & Range (cm)	Tillering per meter Mean & Range	Str. Stn. Mean & Range	Two/ Six row	Grain Colour	1000 g.w Mean & Range	H/N	RUST			SMUT		Net Spot	CCN	APHID (1-5)
											YL	BR	BL	L (%)	C (%)			
1	BH1017	83 (60-97)	129 (116-140)	94 (75-102)	127 (90-179)	2 (1-3)	2	Y	58 (51-65)	H	0			TS	TS	5		
2	BH1018	82 (61-94)	128 (118-141)	94 (86-100)	132 (72-227)	2 (1-3)	2	Y	51 (48-55)	H	0			0	TS	0		
3	DWRB136	82 (60-94)	126 (116-136)	92 (85-98)	121 (85-172)	2 (1-3)	2	Y	53 (47-59)	H	0			0	TS	0		
4	DWRB160	84 (72-96)	128 (121-136)	95 (86-107)	115 (80-172)	2 (1-4)	2	Y	61 (58-72)	H	0			0	0	0		
5	DWRB161	79 (63-92)	124 (118-130)	95 (80-105)	121 (57-173)	2 (1-4)	2	Y	47 (38-52)	H	0			0	S	0		
6	DWRB162	81 (67-95)	126 (118-130)	91 (80-99)	138 (87-203)	2 (1-3)	2	Y	54 (46-61)	H	0			0	TS	0		
7	KB1523	83 (55-94)	127 (124-134)	98 (85-107)	94 (72-130)	2 (1-4)	6	Y	45 (36-56)	H	0			0	0	0		
8	KB1535	82 (63-91)	126 (116-135)	94 (75-106)	98 (55-133)	2 (1-4)	6	Y	44 (36-53)	H	0			0	0	0		
9	KWS Irina	92 (60-108)	134 (116-145)	78 (57-90)	127 (85-161)	2 (1-4)	2	Y	41 (35-46)	H	0			0	0	0		
10	PL895	84 (69-98)	128 (119-139)	96 (87-106)	135 (69-184)	2 (1-4)	2	Y	53 (48-56)	H	0			TS	TS	0		
11	PL896	84 (73-94)	128 (120-137)	96 (84-107)	133 (77-212)	2 (1-4)	2	Y	50 (47-55)	H	0			TS	TS	0		
12	PL899	84 (60-97)	128 (116-138)	97 (80-117)	131 (90-170)	2 (1-3)	2	Y	47 (44-49)	H	0			0	0	0		
13	RD2962	80 (57-92)	126 (116-133)	91 (82-100)	114 (68-165)	2 (1-4)	2	Y	55 (51-59)	H	0			TS	0	0		
14	RD2963	79 (63-90)	126 (118-133)	103 (93-114)	129 (97-173)	2 (1-4)	2	Y	57 (48-62)	H	0			0	0	0		

15	RD2964	77 (58-95)	125 (117-130)	96 (85-107)	109 (68-155)	2 (1-4)	2	Y	56 (50-62)	H	0			TS	TS	0		
16	RD2965	78 (58-92)	126 (116-134)	89 (70-97)	119 (85-165)	2 (1-4)	2	Y	53 (42-61)	H	0			0	TS	0		
17	RGT Planet	91 (69-105)	133 (120-144)	89 (80-96)	137 (89-199)	2 (1-3)	2	Y	46 (41-51)	H	40S			0	0	0		
18	Traveller	93 (76-106)	133 (121-144)	84 (76-95)	137 (87-208)	2 (1-4)	2	Y	48 (42-54)	H	10S			0	0	0		
19	UPB1065	79 (58-89)	126 (118-133)	97 (85-113)	93 (71-125)	2 (1-3)	6	Y	40 (35-48)	H	0			TS	TS	0		
20	Xanadu	86 (56-103)	129 (115-140)	86 (77-95)	138 (104-194)	2 (1-3)	2	Y	45 (38-53)	H	5S			0	0	0		
21	Zhana	88 (71-102)	130 (120-141)	91 (78-102)	122 (100-168)	2 (1-3)	2	Y	51 (46-60)	H	10S			0	0	0		
22	BH902 (c)	84 (56-101)	132 (126-141)	98 (88-111)	106 (70-145)	2 (1-3)	6	Y	47 (37-50)	H	40S			TS	TS	0		
23	DWRB101 (c)	82 (68-93)	128 (118-138)	93 (84-97)	135 (93-179)	2 (1-4)	2	Y	50 (49-52)	H	0			TS	0	0		
24	DWRB123 (c)	80 (57-92)	127 (118-138)	93 (85-99)	139 (97-185)	2 (1-3)	2	Y	53 (50-57)	H	0			TS	TS	0		
25	DWRUB52 (c)	80 (58-96)	128 (116-142)	95 (87-110)	138 (100-173)	2 (1-4)	2	Y	48 (43-52)	H	0			0	TS	0		
26	RD2849 (c)	83 (69-95)	129 (120-141)	91 (68-100)	136 (78-175)	2 (1-4)	2	Y	49 (42-53)	H	0			0	TS	0		

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

Varieties	Codes	Durgapura			Hisar			Bhatinda			Pantnagar			Karnal			Modipuram			NWPZ*		
		Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
DWRB160	IVTIRMBLS-10	38.6	5	0	32.9	7	0	35.4	9	0	63.8	3	1	49.8	1	1	40.5	5	1	43.5	3	1
DWRB161	IVTIRMBLS-1	39.4	4	0	33.4	6	0	34.4	10	0	62.4	5	1	35.7	7	0	42.1	1	1	41.3	7	0
DWRB163	IVTIRMBLS-7	30.9	9	0	34.3	4	0	63.5	1	1	62.6	4	1	36.0	6	0	39.5	7	1	44.5	2	1
DWRB164	IVTIRMBLS-2	38.2	6	0	33.6	5	0	46.3	2	0	64.1	1	1	32.8	9	0	38.0	10	1	42.2	6	0
DWRB170	IVTIRMBLS-11	47.5	2	1	30.9	10	0	42.0	6	0	61.2	6	1	34.1	8	0	41.3	3	1	42.8	4	1
RD2966	IVTIRMBLS-3	30.5	10	0	32.9	7	0	45.1	3	0	55.6	8	0	37.9	3	0	40.0	6	1	40.3	9	0
RD2967	IVTIRMBLS-9	29.3	11	0	22.2	11	0	22.4	11	0	54.6	9	0	28.0	11	0	41.9	2	1	33.1	11	0
RD2968	IVTIRMBLS-6	32.8	8	0	32.3	9	0	41.6	8	0	49.7	11	0	36.0	5	0	39.4	8	1	38.6	10	0
DWRB73(c)	IVTIRMBLS-4	48.2	1	1	36.2	2	0	43.4	4	0	51.0	10	0	36.5	4	0	39.4	9	1	42.5	5	0
DWRB91(c)	IVTIRMBLS-5	40.5	3	0	35.6	3	0	41.7	7	0	64.1	2	1	29.5	10	0	35.6	11	0	41.2	8	0
DWRUB64(c)	IVTIRMBLS-8	36.3	7	0	40.7	1	1	43.2	5	0	60.0	7	1	46.9	2	1	40.6	4	1	44.6	1	1
G.M.		37.5			33.2			41.7			59.0			36.7			39.9			41.3		
S.E.(M)		1.8			1.5			2.5			2.2			2.6			1.8			0.9		
C.D.		4.2			3.7			6.0			5.3			6.3			4.4			2.0		
C.V.		10.7			10.2			13.1			8.3			15.7			10.2					
DOS		15-12-2016			14-12-2016			20-12-2016			24-12-2016			20-12-2016			15-12-2016					

**Data from Ludhiana (LSM) were not included in zonal mean*

INTIAL VARIETAL TRIAL - MB (LS) **ZONE : NWPZ**

Summary of ancillary and disease data **RABI – 2016-17**

Sr. No.	ENTRY	AGRONOMIC CHARACTERS						GRAIN CHARACTERISTICS			DISEASE REACTION							
											RUST			SMUT		Hel. Disease		
		H. days Mean & Range	M. days Mean & Range	Height Mean & Range (cm)	Tillering per meter Mean & Range	Str. Stn. Mean & Range	Two/ Six row	Colour	1000 g.w Mean & Range	H/N	YL	BR	BL	L (%)	C (%)	Leaf Blight	CCN	APHID (1-5)
1	DWRB160	78 (69-83)	113 (110-117)	87 (67-99)	113 (62-160)	2 (1-3)	2	Y	56 (45-68)	H				0	Ts			
2	DWRB161	72 (64-78)	110 (106-115)	92 (70-105)	134 (71-250)	2 (1-3)	2	Y	49 (41-52)	H				Ts	0			
3	DWRB163	76 (68-85)	111 (107-115)	78 (59-86)	123 (87-190)	2 (1-4)	2	Y	50 (43-55)	H				0	0			
4	DWRB164	75 (69-82)	112 (108-116)	82 (66-92)	113 (69-150)	2 (1-3)	2	Y	51 (38-58)	H				0	0			
5	DWRB170	76 (69-81)	112 (118-117)	86 (66-97)	126 (59-230)	2 (1-3)	2	Y	52 (44-60)	H				0	0			
6	RD2966	76 (69-84)	112 (108-114)	85 (70-97)	112 (68-150)	2 (1-4)	2	Y	51 (44-59)	H				0	0			
7	RD2967	77 (71-85)	112 (108-117)	89 (72-100)	120 (58-200)	2 (1-3)	2	Y	54 (42-65)	H				0	0			
8	RD2968	74 (67-80)	112 (109-117)	94 (94-72)	115 (79-151)	3 (1-4)	2	Y	52 (41-59)	H				0	0			
9	DWRB73 (c)	74 (66-79)	113 (111-118)	79 (66-89)	88 (59-130)	2 (1-4)	2	Y	42 (30-50)	H				0	0			
10	DWRB91 (c)	79 (73-83)	113 (111-118)	83 (65-96)	111 (60-150)	2 (1-3)	2	Y	57 (50-67)	H				0	0			
11	DWRUB64 (c)	74 (68-79)	111 (104-117)	84 (62-96)	117 (81-145)	2 (1-4)	6	Y	58 (46-66)	H				0	0			

SOIL SALINITY TOLERANCE YIELD TRIAL

- This trial was allotted to 7 locations and the data of Kumher centre were not considered for pooled analysis due to late sowing.
- The highest location mean (56.10 q/ha) for grain yield was recorded at Banasthali centre.
- The zonal mean across the centres was 35.76 q/ha and the check NDB1445 was revealed as best and stood at rank second.
- The final year entry RD2907, ranked first with 40.92 q/ha grain yield, which was statistically at par with the best check variety NDB1445.

AVT (SAL/ALK)-NWPZ and NEPZ

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

Entry	Hisar			Faizabad-I			Faizabad-II			Dalipnaga			Banasthali			DWR Hisar			Pooled		
	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G	Yield	Rk	G
BH1017	37.74	4	0	34.72	13	0	33.33	19	0	16.3	17	0	45.29	18	0	23.96	9	0	31.89	17	0
DWRB165	26	18	0	30.19	18	0	35.33	17	0	22.64	10	0	48.19	17	0	21.93	15	0	30.71	19	0
DWRB168	32.13	10	0	37.98	9	1	39.86	10	0	19.93	13	0	52.9	15	0	21.58	17	0	34.06	14	0
HUB258	36.71	6	0	39.86	6	1	38.04	12	0	17.21	16	0	56.16	12	0	19.82	19	0	34.63	11	0
KB1507	32.85	9	0	39.86	6	1	39.13	11	0	35.51	1	1	59.78	7	1	23.72	10	0	38.47	4	0
KB1523	31.1	16	0	34.42	15	0	43.42	5	0	24.46	6	0	51.81	16	0	22.33	14	0	34.59	13	0
KB1546	32.13	10	0	31.1	17	0	35.02	18	0	28.08	4	0	39.49	19	0	25.67	7	0	31.92	16	0
NDB1655	30.16	17	0	43.78	1	1	43.78	4	0	22.19	12	0	60.14	5	1	23.16	12	0	37.2	6	0
NDB1665	33.82	7	0	41.24	5	1	43.06	6	0	22.64	10	0	63.04	2	1	22.54	13	0	37.72	5	0
NDB1673	36.84	5	0	41.97	4	1	44.08	3	0	19.93	13	0	58.33	9	1	20.39	18	0	36.92	9	0
RD2907	43.54	2	1	39.25	8	1	42.75	7	0	34.42	2	1	53.62	14	0	31.93	2	1	40.92	1	1
RD2955	32.91	8	0	43.18	3	1	36.84	13	0	15.4	19	0	57.61	10	1	21.73	16	0	34.61	12	0
RD2956	31.58	13	0	35.63	12	0	36.53	15	0	24.46	6	0	67.03	1	1	27.46	6	0	37.11	8	0
RD2957	31.52	14	0	34.72	13	0	36.84	14	0	29.44	3	0	58.7	8	1	28.28	5	0	36.58	10	0
RD2958	31.58	12	0	16	19	0	35.51	16	0	19.02	15	0	61.23	3	1	24.34	8	0	31.28	18	0
NDB1173 (C)	23.1	19	0	37.44	11	0	41.06	8	0	15.4	18	0	57.25	11	1	23.56	11	0	32.97	15	0
NDB1445 (C)	38.04	3	0	43.78	2	1	48.31	1	1	23.55	9	0	60.14	6	1	31.27	4	1	40.85	2	1
RD2552 (C)	45.41	1	1	32.31	16	0	44.69	2	0	24.37	8	0	60.51	4	1	31.61	3	1	39.81	3	1
RD2794 (C)	31.52	14	0	37.74	10	0	40.16	9	0	26.27	5	0	54.71	13	0	32.58	1	1	37.16	7	0
G.M.	33.61			36.59			39.88			23.22			56.10			25.15			35.76		
S.E.(M)	2.03			2.47			1.49			1.32			4.41			1.66			1.01		
C.D. (10%)	4.81			5.85			3.52			3.13			10.45			3.93			2.36		
C.V. (%)	12.08			13.51			7.45			11.39			15.73			13.21					
DOS	14-11-2016			25-11-2016			25-11-2016			17-11-2016			15-11-2016			18-11-2016					

ADVANCED VARIETAL TRIAL – Salinity **ZONE: NWPZ / NEPZ**

Summary of ancillary and disease data **RABI – 2016-17**

ENTRY	AGRONOMIC CHARACTERS						GRAIN CHARACTERISTICS			DISEASE REACTION							
										RUST			SMUT		Hel. Disease		Leaf Blight
	H. days Mean & Range	M. days Mean & Range	Height Mean & Range (cm)	Tillering per meter Mean & Range	Str. Stn. Mean & Range	Two / Six Row	Colour	1000 g.w Mean & Range	H/ N	YL	BR	BL	L (%)	C (%)	Spot Leaf	Net Leaf	
BH1017	82 (72-91)	119 (109-131)	82 (70-96)	77 (56-122)	1 (1-2)	2	Y	45 (37-51)	H			0	Ts	0	2	78	
DWRB165	83 (72-92)	120 (108-134)	89 (73-126)	83 (56-116)	2 (1-4)	6	Y	41 (38-46)	H			0	0	0	0	46	
DWRB168	80 (72-89)	120 (106-132)	90 (83-101)	95 (79-130)	1 (1-3)	6	Y	44 (41-50)	H			0	0	0	2	57	
HUB258	76 (68-85)	115 (104-129)	78 (60-94)	75 (51-110)	1 (1-2)	6	Y	40 (33-46)	H			0	0	2	0	46	
KB1507	77 (64-85)	117 (103-129)	91 (77-113)	80 (62-98)	2 (1-4)	6	Y	39 (38-40)	H			0	0	0	0	78	
KB1523	86 (82-89)	124 (121-131)	87 (68-105)	82 (63-116)	2 (1-3)	6	Y	41 (36-46)	H			0	0	0	0	67	
KB1546	87 (85-89)	124 (117-131)	80 (66-91)	88 (79-114)	2 (1-3)	6	Y	39 (37-43)	H			0	0	0.01	0	78	
NDB1655	81 (71-88)	120 (104-131)	87 (64-110)	79 (62-102)	2 (1-3)	6	Y	41 (35-45)	H			0	0	0	2	67	
NDB1665	85 (83-88)	124 (120-131)	87 (60-119)	81 (64-94)	2 (1-4)	6	Y	42 (39-44)	H			0	0	0	2	57	
NDB1673	77 (66-86)	115 (101-128)	85 (70-99)	80 (60-112)	2 (1-5)	6	Y	39 (30-43)	H			0	0	Ts	0	24	
RD2907	80 (74-88)	119 (108-133)	90 (73-112)	80 (62-102)	2 (1-4)	6	Y	43 (36-48)	H			0	0	0	0	36	
RD2955	84 (80-86)	120 (111-130)	83 (68-95)	72 (58-104)	2 (1-3)	6	Y	41 (37-46)	H			0	0	0	2	45	
RD2956	79 (73-85)	122 (113-129)	89 (72-110)	79 (61-91)	2 (1-3)	6	Y	43 (38-48)	H			0	0	0	37	35	
RD2957	82 (72-88)	121 (114-130)	83 (60-109)	76 (42-103)	2 (1-3)	6	Y	43 (42-44)	H			0	Ts	0	36	46	
RD2958	83 (79-86)	122 (112-130)	93 (65-123)	79 (55-104)	2 (1-4)	6	Y	40 (37-44)	H			0	Ts	0	4	78	
NDB1445 (C)	82 (75-90)	122 (116-132)	88 (72-112)	73 (52-100)	2 (1-4)	6	Y	37 (34-40)	H			0	0	0	5	35	
NDB1173 (C)	84 (82-85)	123 (118-132)	85 (68-113)	91 (75-104)	2 (1-4)	6	Y	38 (35-42)	H			0	0	0	2	67	
RD2552 (C)	80 (69-90)	120 (108-133)	90 (74-112)	84 (69-112)	2 (1-4)	6	Y	40 (36-42)	H			0	0	0	24	67	
RD2794 (C)	84 (79-88)	123 (116-132)	90 (74-107)	95 (73-122)	2 (1-3)	6	Y	40 (33-49)	H			Ts	Ts	0.01	3	78	

Rejected Trials

AVT (RF) NEPZ

Entry	Mirzapur		
	Yield (q/ha)	Rk	G
JB 328	3.88	4	0
K 560 (C)	7.07	2	0
K 603 (C)	8.94	1	1
Lakhan (C)	6.96	3	0
G.M.	6.71		
S.E.(M)	0.62		
C.D. (10%)	1.54		
C.V. (%)	22.66		
DOS	5.11.2016		
Reason	LSM		

AVT(IR)TS CZ

Entry	Banswara		
	Yield (q/ha)	Rk	G
DWRB137	76.09	4	0
RD2899	98.07	1	1
BH959 (C)	76.81	3	0
PL751 (C)	77.54	2	0
RD2786 (C)	68.36	5	0
G.M.	79.37		
S.E.(M)	2.41		
C.D. (10%)	6.08		
C.V. (%)	6.08		
DOS	25.11.2016		
Reason	UR		

AVT-IR-NEPZ

Entry	Faizabad		
	Yield (q/ha)	Rk	G(10%)
DWRB 137	37.51	2	0
HUB 250	33.22	3	0
RD 2921	46.22	1	1
HUB 113 (C)	30.31	4	0
JYOTI (C)	29.36	5	0
K 508 (C)	28.67	6	0
RD 2552 (C)	25.00	7	0
G.M.	32.90		
S.E.(M)	0.88		
C.D. (10%)	2.15		
C.V. (%)	5.33		
DOS	1.11.2016		
Reason	RMT		

AVT SST

Entry	Kumher		
	Yield (q/ha)	Rk	G
BH1017	35.94	12	0
DWRB165	46.13	7	1
DWRB168	34.65	14	0
HUB258	54.62	3	1
KB1507	49.12	6	1
KB1523	43.48	9	0
KB1546	35.39	13	0
NDB1655	53.19	4	1
NDB1665	38.72	10	0
NDB1673	38.72	10	0
RD2907	33.22	15	0
RD2955	57.57	1	1
RD2956	32.81	17	0
RD2957	30.57	18	0
RD2958	33.22	15	0
NDB1173 (C)	57.34	2	1
NDB1445 (C)	45.45	8	0
RD2552 (C)	17.87	19	0
RD2794 (C)	50.82	5	1
G.M.	41.52		
S.E.(M)	5.10		
C.D. (10%)	14.45	12.06602	
C.V. (%)	24.55		
DOS	31.12.2016		
Reason	LS		

AVT-DP-CZ (Grain yield)

Entry	Banswara			Gwalior			Anand		
	Yield (q/ha)	Rk	G	Yield (q/ha)	Rk	G	Yield (q/ha)	Rk	G
RD 2927	75.60	2	0	42.84	1	1	4.60	5	0
AZAD (C)	67.63	4	0	41.57	2	1	12.62	2	1
RD 2035 (C)	86.96	1	1	34.77	5	1	9.30	3	0
RD 2552 (C)	70.29	3	0	39.18	4	1	13.92	1	1
RD 2715 (C)	67.15	5	0	39.92	3	1	7.59	4	0
G.M.	73.53			39.66			9.61		
S.E.(M)	2.76			3.73			0.64		
C.D. (10%)	6.95			9.39			1.62		
C.V. (%)	7.51			18.79			13.39		
DOS	25.11-16			16.11.2016			19.11.2016		
Reason	UR			Incomplete data			Incomplete data		

AVT-DP-CZ (Forage yield)

Entry	Banswara		
	Yield (q/ha)	Rk	G
RD 2927	78.02	2	1
AZAD (C)	67.63	4	0
RD 2035 (C)	87.44	1	1
RD 2552 (C)	68.36	3	0
RD 2715 (C)	67.15	5	0
G.M.	73.72		
S.E.(M)	5.24		
C.D. (10%)	13.20		
C.V. (%)	14.22		
DOS	25.11-16		
Reason	UR		

AVT Rainfed (NHZ)

Entry	Almora		
	Yield (q/ha)	Rk	G
BHS 457	6.14	13	0
BHS 458	5.43	16	0
BHS 459	5.92	15	0
BHS 460	6.09	14	0
HBL 764	6.52	11	0
HBL 765	4.40	20	0
HBL 778	4.89	17	0
HBL 780	4.89	17	0
UPB 1061	7.34	5	0
UPB 1062	4.84	19	0
UPB 1063	3.04	21	0
VLB 146	7.12	9	0
VLB 149	8.80	2	0
VLB 150	12.17	1	1
VLB 151	6.68	10	0
VLB 152	6.30	12	0
VLB 154	7.17	7	0
BHS 352 ©	8.64	3	0
BHS 400 ©	8.59	4	0
HBL 113 ©	7.17	7	0
VLB 118 ©	7.28	6	0
G.M.	6.64		
S.E.(M)	0.28		
C.D. (10%)	0.67		
C.V. (%)	8.49		
DOS	17.10.2016		
Reason	LSM		

AVT DP-Rainfed (NHZ) -Majhera

Entry	Grain Yield, (q/ha)			Forage Yield, (q/ha)		
	Yield	Rk	G	Yield	Rk	G
BHS 447	7.11	15	0	29.71	12	0
BHS 452	12.36	2	1	61.14	1	1
BHS 453	10.37	8	0	36.68	7	0
BHS 454	10.55	7	0	49.82	2	0
BHS 455	11.46	4	1	28.89	13	0
HBL 764	12.91	1	1	38.50	5	0
HBL 776	7.43	14	0	38.04	6	0
HBL 777	11.73	3	1	38.50	4	0
HBL 778	9.06	10	0	35.78	8	0
VLB 147	4.80	17	0	28.08	15	0
VLB 150	10.19	9	0	28.80	14	0
VLB 151	8.15	13	0	24.28	17	0
VLB 152	6.48	16	0	26.27	16	0
VLB 153	10.69	6	1	30.80	11	0
BHS 380 ©	8.74	11	0	34.87	9	0
BHS 400 ©	11.41	5	1	33.24	10	0
HBL 276 ©	8.51	12	0	41.21	3	0
G.M.	9.53			35.57		
S.E.(M)	0.94			2.89		
C.D. (10%)	2.22			6.86		
C.V. (%)	19.67			16.27		
DOS	3.11.2016			3.11.2016		
Reason	LGY			LGY		

IVT-DP(IR) TS
(Grain Yield)

Entry	Code	Anand			Bikaner		
		Yield (q/ha)	Rk	G	Yield(q/ha)	Rk	G
JB348	IVTIRTSDP-2	10.33	10	0	8.45	13	0
KB1527	IVTIRTSDP-14	20.28	7	0	11	8	0
KB1530	IVTIRTSDP-9	7.78	11	0	16.78	1	1
NDB1660	IVTIRTSDP-8	24.37	6	0	14.7	2	1
RD2951	IVTIRTSDP-4	5.24	14	0	8.62	12	0
RD2952	IVTIRTSDP-15	12.57	8	0	5.99	15	0
RD2953	IVTIRTSDP-1	5.75	12	0	9.55	10	0
RD2954	IVTIRTSDP-11	28.55	3	0	8.24	14	0
UBP1066	IVTIRTSDP-5	30.99	2	0	11.9	6	0
UPB1064	IVTIRTSDP-7	5.4	13	0	12.84	5	0
UPB1065	IVTIRTSDP-13	11.4	9	0	8.67	11	0
AZAD (C)	IVTIRTSDP-3	26.71	4	0	11.53	7	0
RD2035 (C)	IVTIRTSDP-12	26.28	5	0	13.29	4	0
RD2552 (C)	IVTIRTSDP-6	5.24	14	0	13.57	3	0
RD2715 (C)	IVTIRTSDP-10	37.11	1	1	9.71	9	0
	G.M.	17.20			10.99		
	S.E.(M)	1.50			1.00		
	C.D. (10 %)	3.59			2.37		
	C.V. (%)	17.39			18.12		
	DOS	11/21/2016			11/22/2016		
	Reason	Incomplete data			LSM		

Banswara incomplete data

IVT-DP(IR) TS(Forage Yield)

Entry	Code	Bikaner (NWPZ)			Banswara (CZ)		
		Yield (q/ha)	Rk	G	Yield (q/ha)	Rk	G
JB348	IVTIRTSDP-2	107.82	6	0	248.2	2	1
KB1527	IVTIRTSDP-14	127.31	2	1	204.1	5	0
KB1530	IVTIRTSDP-9	132.34	1	1	174.5	9	0
NDB1660	IVTIRTSDP-8	79.93	12	0	183	7	0
RD2951	IVTIRTSDP-4	114.36	5	1	162.4	11	0
RD2952	IVTIRTSDP-15	83.06	10	0	183	8	0
RD2953	IVTIRTSDP-1	102.64	7	0	244	3	1
RD2954	IVTIRTSDP-11	61.46	15	0	147.8	14	0
UBP1066	IVTIRTSDP-5	77.52	13	0	161.8	12	0
UPB1064	IVTIRTSDP-7	82.9	11	0	170.5	10	0
UPB1065	IVTIRTSDP-13	63.64	14	0	152.2	13	0
AZAD (C)	IVTIRTSDP-3	125.37	3	1	253.1	1	1
RD2035 (C)	IVTIRTSDP-12	125.05	4	1	201.7	6	0
RD2552 (C)	IVTIRTSDP-6	83.69	9	0	208.9	4	0
RD2715 (C)	IVTIRTSDP-10	91.47	8	0	146.7	15	0
G.M.		97.24			189.5		
S.E.(M)		8.84			13.3		
C.D. (10 %)		21.02			31.52		
DOS		22.11.2016			25.11.2016		
Reason		LSM			Incomplete Data		

Anand (incomplete data)

IVT-MB-LS- Yield (Q/ha)

Genotypes	Codes	Ludhiana		
		Yield	Rk	G
DWRB160	IVTIRMBLS-10	26.4	8	0
DWRB161	IVTIRMBLS-1	29.9	4	1
DWRB163	IVTIRMBLS-7	27.8	7	0
DWRB164	IVTIRMBLS-2	29.2	5	1
DWRB170	IVTIRMBLS-11	21.5	10	0
RD2966	IVTIRMBLS-3	28.5	6	1
RD2967	IVTIRMBLS-9	20.1	11	0
RD2968	IVTIRMBLS-6	29.9	3	1
DWRB73 (c)	IVTIRMBLS-4	31.3	2	1
DWRB91 (c)	IVTIRMBLS-5	23.6	9	0
DWRUB64 (c)	IVTIRMBLS-8	31.9	1	1
G.M.		27.3		
S.E.(M)		1.6		
C.D.		3.9		
C.V.		12.8		
DOS		14-12-2016		
Reason		LSM		

IVT-IR-FB

Entry	Code	Banswara			Karnal		
		Yield (q/ha)	Rk	G	Yield	Rk	G
BH1019	IVTIRFB-3	138.89	6	0	32.19	9	0
DWRB167	IVTIRFB-11	129.23	8	0	37.60	5	1
DWRB169	IVTIRFB-22	118.96	11	0	39.12	4	1
HUB252	IVTIRFB-8	99.03	19	0	39.26	2	1
JB346	IVTIRFB-10	98.43	20	0	12.80	27	0
JB347	IVTIRFB-23	109.3	16	0	29.93	13	0
KB1501	IVTIRFB-16	181.76	2	1	17.84	25	0
KB1528	IVTIRFB-5	86.35	24	0	26.17	17	0
KB1531	IVTIRFB-24	141.91	5	0	25.60	18	0
NDB1653	IVTIRFB-12	83.94	26	0	24.15	20	0
NDB943	IVTIRFB-7	120.17	10	0	28.96	15	0
PL891	IVTIRFB-17	91.18	23	0	28.53	16	0
PL892	IVTIRFB-26	147.95	4	0	33.37	8	0
PL894	IVTIRFB-1	109.3	17	0	13.15	26	0
RD2947	IVTIRFB-15	130.43	7	0	35.27	6	0
RD2948	IVTIRFB-9	85.75	25	0	29.37	14	0
RD2949	IVTIRFB-19	-	-	-	12.27	28	0
RD2950	IVTIRFB-21	112.32	13	0	42.37	1	1
UPB1064	IVTIRFB-4	92.39	22	0	32.10	10	0
BH902 (C)	IVTIRFB-6	188.41	1	1	30.97	12	0
BH946 (C)	IVTIRFB-25	170.89	3	0	18.46	24	0
BH959 (C)	IVTIRFB-20	110.51	14	0	19.25	23	0
HUB113 (C)	IVTIRFB-2	109.9	15	0	19.30	22	0
KARAN16(C)	IVTIRFB-14	120.77	9	0	25.36	19	0
RD2552 (C)	IVTIRFB-18	100.24	18	0	34.08	7	0
RD2786 (C)	IVTIRFB-13	97.22	21	0	39.21	3	1
UPB1066	IVTIRFB-27	114.13	12	0	31.55	11	0
PL898	IVTIRFB-28	80.31	27	0	22.22	21	0
G.M.		117.40			27.87		
S.E.(M)		5.90			2.10		
C.D. (10 %)		13.90			4.94		
C.V. (%)		10.05			15.05		
DOS		25.11.2016			11/24/2016		
Reason		UR			Low yield		

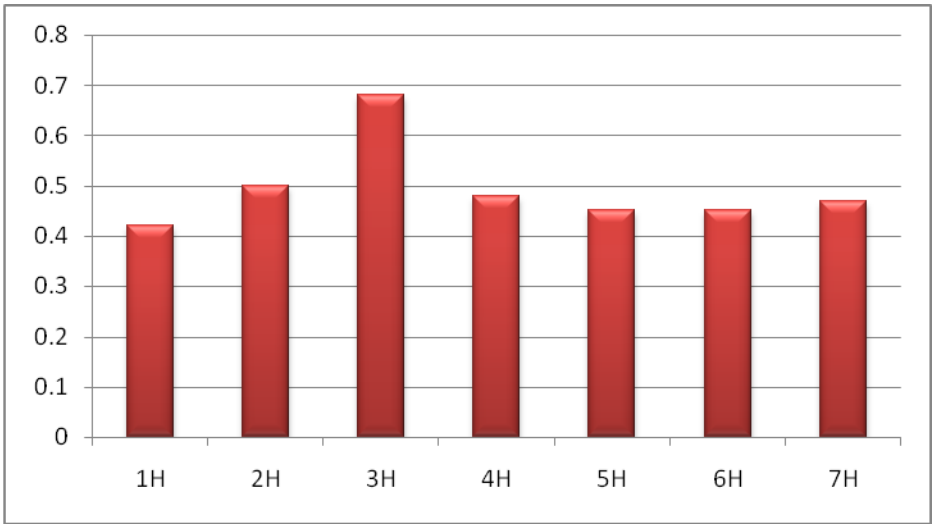
Molecular Report - AVT Final Year Trials (2016-17)

Test entries developed for different agro climatic zones and end-use were characterized at molecular level to analyze genetic variability in final year advanced varietal trials 2016-17. A set of nineteen genotypes including four test entries (DWRB137, RD2899, RD2907 & RD2917) and their checks (BH902, BH959, DWRB101, DWRB123, DWRUB52, HUB113, Jyoti, K508, NDB1173, NDB1445, PL751, RD2552, RD2786, RD2794 & RD2849) were screened using barley specific microsatellite markers. Total 45 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 83 alleles were scored on PCR based amplification profiles for 20 genotypes. The number of alleles ranged from 1 to 4 with an average of 1.85 alleles per locus. The band fragment size varied from 106 bp to 1500 bp with PIC values ranging from 0.0 to 0.68.

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 generated clearly indicates that the final year test entries do not cluster at one place and are quite diverse from each other as well as from their respective checks.

These genotypes grouped within similarity coefficient (GS) value from 0.60 to 0.90 and showed sufficient genetic variability at molecular level. The cluster tree for twenty genotypes divided into two clusters at GS= 0.62. One major cluster grouped eleven genotypes including test entry (RD2907) and another cluster comprised nine genotypes including three test entries viz. DWRB137, RD2899 & RD2917. All genotypes were distinguished and could be discriminated using selected 45 SSR/STS markers set. 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.

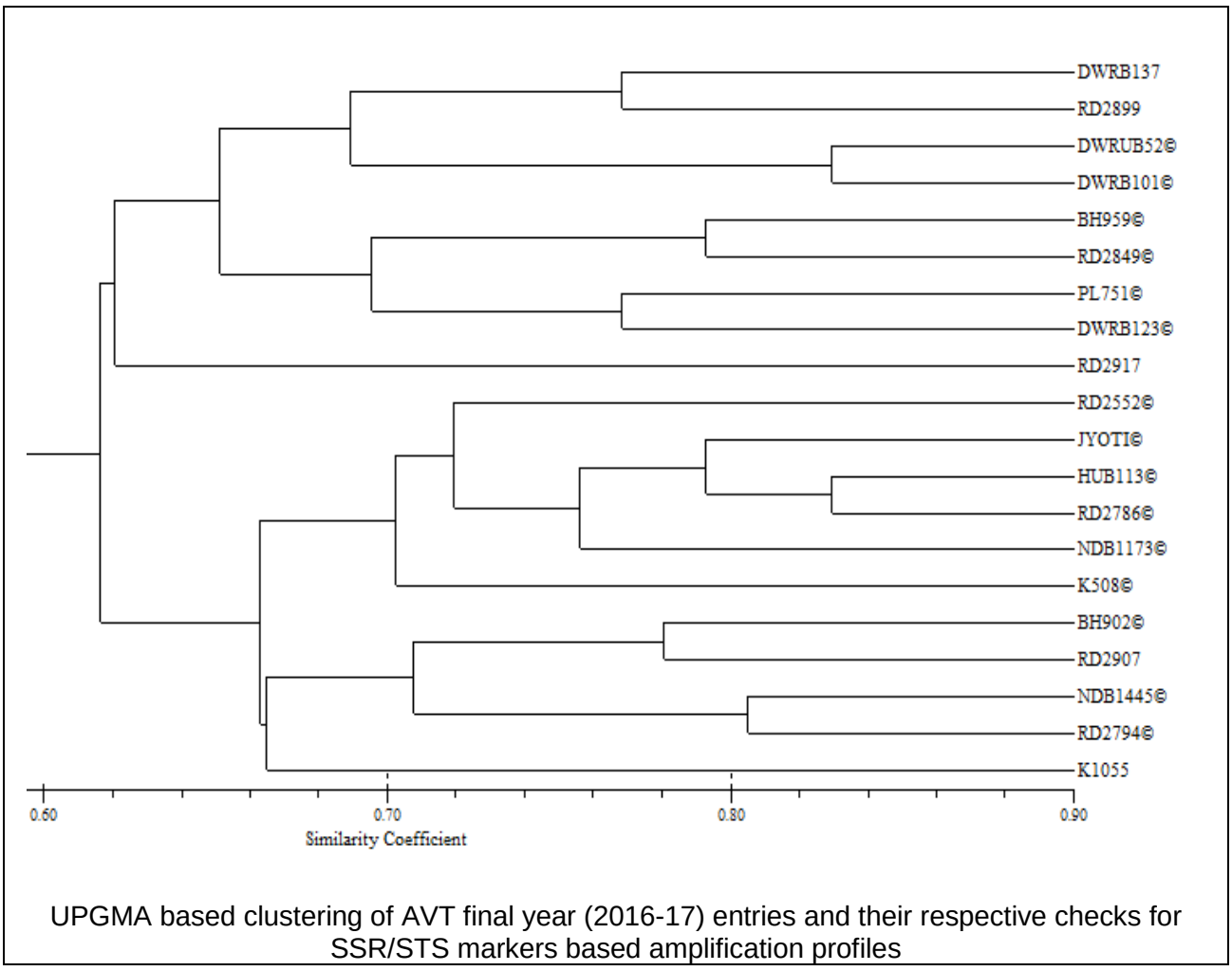
Polymorphic information content (PIC) score when compared across seven linkage groups of barley revealed variability ranging between 0.42 to 0.50 at molecular except for chromosome 3H that revealed 68% variability at molecular among AVT final year test entries and their checks.



Polymorphic information content scored for seven linkage groups of barley genome for final year AVT trials 2016-17

Protocol for developing Molecular profiles

Development of Molecular profiles: An equal number of fresh, young leaves (ten days old) of five plants from each of AVT entries- DWRB137, RD2899, RD2907 & RD2917 and checks BH902, BH959, DWRB101, DWRB123, DWRUB52, HUB113, Jyoti, K508, NDB1173, NDB1445, PL751, RD2552, RD2786, RD2794 & RD2849, were bulked for DNA extraction. Total genomic DNA was isolated using the modified CTAB method (Saghai-Maroof *et al*, 1984). A set of 45 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 m M 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 imagining system (Syngene Synoptics Ltd. USA).



UPGMA based clustering of AVT final year (2016-17) entries and their respective checks for SSR/STS markers based amplification profiles

Molecular Profiles of Barley AVT Trials-Final Year Entries (2016-17)

Marker	Chr	DWRB 137	RD 2552 (c)	JYOTI (c)	HUB 113 (c)	K 508 (c)	RD 2899	PL 751 (c)	RD 2786 (c)	BH 959 (c)	RD 2917	DWR UB52 (c)	BH 902 (c)	DWRB 101 (c)	DWRB 123 (c)	RD 2849 (c)	RD 2907	NDB 1173 (c)	NDB 1445 (c)	RD 2794 (c)
Bmac154	1H	130	130	130	130	130	130	130	130	130	110	130	130	130	130	130	130	130	130	130
Bmac213	1H	168	155	155	155	168	168	168	168	155	168	180	168	180	168	180	180	180	168	180
Bmag382	1H	109	109	109	109	109	109	109	109	109	109	109	109	109	109	109	109	109	109	109
Bmag579	1H	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126
MGB402	1H	260	240	260	260	240	240	260	240	240	240	260	260	260	260	260	240	260	260	260
ScSSR10477	1H	140	150	150	150	160	150	150	150	150	150	150	140	150	200	150	150	150	150	150
HvHVA1	1H	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136
Bmac175	2H	180	155	155	155	155	180	**155**	**155**	**155**	180	180	155	180	155	180	180	155	155	180
EBmac640	2H	176	190	176	190	190	190	190	190	190	190	190	190	176	190	190	190	190	176	190
Bmag15	2H	181	181	181	181	181	181	181	181	181	181	181	181	181	181	181	181	181	181	181
EBmac525	2H	149	149	149	149	149	149	149	149	149	149	149	149	149	149	149	149	149	149	149
EBmac623	2H	154	154	168	168	168	154	168	154	154	154	168	168	168	154	154	168	154	154	154
cMWG658	2H	600	600	580	600	600	580	580	600	580	600	600	600	580	580	580	600	580	580	600
Ebmatc 39	2H	190	N	190	150	150	150	150	150	150	170	150	170	150	190	150	150	170	150	150
Bmag6	3H	274	274	274	274	274	274	274	274	274	274	274	274	274	274	274	274	274	274	274
Bmag603	3H	122	140	140	140	140	140	122	140	140	122	122	140	122	122	122	140	122	122	122
Bmag877	3H	153	153	165	153	165	153	153	153	165	165	153	165	165	153	165	165	153	153	165
Ebmac541	3H	140	120	106	106	106	140	106	106	106	140	120	106	140	120	120	120	106	120	106
MWG 847	3H	345	345	345	345	345	345	345	345	345	345	345	345	345	345	345	345	345	345	345
Bmag225	3H	185	140	185	165	165	140	140	165	185	165	185	165	185	185	185	165	165	165	165
ABG500	4H	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189
HVM40	4H	160	160	150	150	150	150	160	150	160	150	150	150	150	160	160	150	150	150	150
HVM67	4H	136	136	126	126	126	136	136	126	136	136	136	126	136	136	136	126	126	126	126
HvMLOH1A	4H	185	175	175	175	175	185	185	175	185	185	185	175	185	175	185	175	175	175	175
Ksug10	4H	1500	1500	1500	1500	1500	1500	1500	1500	1500	1300	1300	1300	1500	1500	1300	1300	1300	1300	1500
MWG634	4H	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800
WG622	4H	161	161	161	161	161	161	161	161	161	161	161	161	161	161	161	161	161	161	161
Bmag337	5H	165	145	145	145	165	165	145	145	145	145	165	145	165	145	145	145	145	165	145
Bmag751	5H	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189
Bmag812	5H	167	147	157	147	157	167	147	167	167	157	157	167	157	157	167	167	157	147	147
GMS61	5H	145	145	145	145	135	145	135	145	145	135	145	145	145	135	145	145	145	145	145
ABG458	6H	248	248	248	248	248	248	248	248	248	248	248	248	248	248	248	248	248	248	248

Bmac40	6H	236	210	236	236	236	210	220	210	236	236	210	210	210	210	236	210	236	210	210
Bmac500	6H	190	190	190	110	190	190	190	190	190	190	190	110	110	110	190	190	190	110	110
Bmag173	6H	160	150	150	150	150	150	160	150	150	160	150	150	150	160	150	150	160	160	160
GBM1215	6H	240	240	240	240	200	240	240	240	240	200	200	240	200	200	200	240	240	240	200
HVM11	6H	150	175	175	175	175	150	175	175	175	175	150	175	175	175	175	150	175	150	150
MWG2029	6H	245	245	260	245	260	245	245	260	260	245	245	245	245	245	245	245	245	245	245
ABC15864	7H	167	167	167	167	167	167	167	167	167	167	167	167	167	167	167	167	167	167	167
Bmac64	7H	140	140	155	155	140	140	155	155	155	155	140	155	140	155	155	155	155	140	140
Bmac162	7H	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Bmac167	7H	195	195	195	195	195	195	195	195	195	195	195	195	195	195	195	195	195	195	195
Bmag110	7H	135	135	135	135	135	135	145	135	145	145	145	145	145	145	145	135	135	145	145
Bmag369	7H	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191
Bmag 359	7H	150	150	150	150	150	150	150	150	150	130	150	130	150	150	150	130	150	130	130

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

International Trials and Nurseries

There has been a continuous flow of germplasm from ICARDA in the form of different international trials and international germplasm nurseries. During 2016-17 *rabi* season six trials and nurseries were supplied from ICARDA which included a total of 420 genotypes for different production conditions. These trials and nurseries were evaluated at different selected locations of barley network. One set each of these nurseries and trials was also sown at ICAR-IIWBR, Karnal, and barley breeders from SAUs and ICAR institutes were given an opportunity to select desirable germplasm from these international trials and nurseries during a Field Day organized on 8th March, 2017 at Indian Institute of Wheat and Barley Research, Karnal and a total of 193 germplasm were selected. In addition, one set each of EIBGN and NBGSN, was also supplied to different barley network locations for evaluation.

International trials and nurseries evaluated during crop season 2016-17

Sr. No.	Trial/Nurseries	Genotypes received from ICARDA	Indian National check	Number of Sets	Locations
1.	4th GSYT-2017	24	K603	4	Kanpur, Faizabad, Rewa, Karnal
2.	IBYT-HI-2017	24	BH946	4	Durgapura, Hisar, Ludhiana, Karnal
3.	INBYT-HI-2017	24	BHS352/ Geetanjali	4	Bajaura, Karnal, Ludhiana, Kanpur
4.	4th GSBSN-2017	145	Lakhan	4	Kanpur, Faizabad, Rewa, Karnal
5.	IBON-HI-2017	108	BH946	4	Durgapura, Hisar, Ludhiana, Karnal
6.	INBON-HI-2017	95	BHS352/ Geetanjali	4	Bajaura, Karnal, Ludhiana, Kanpur

International Barley Yield Trial-High Input (IBYT-HI-2017)

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 yield data (tabulated below) indicated that performance of the entries for grain yield varied across the locations and it was not linear. Location-wise analysis revealed that the check variety BH946 ranked first at two locations (Hisar and Ludhiana) and was in the first non-significant group (NSG) at three locations (Hisar, Karnal and Ludhiana). However, at Durgapura, this check variety ranked 9th and was also not in the first NSG. Five test entries IBYT-HI-17 Nos. 8, 9, 3, 7, 1 were superior in yield and were in the first NSG. Four and ten entries including check variety, respectively at Hisar and Karnal, were in the first NSG. At Ludhiana location only the check variety was in first NSG. Based on field performance and plant type, 17-entries (1, 2, 3, 6, 7, 8, 12, 14, 15, 16, 17, 18, 19, 20, 21, 22 and 23) were selected by the barley breeders during the field day.

Table. Grain yield, ranking and grouping of barley genotypes evaluated under IBYT-HI-(2017) at different locations in *rabi* 2016-17 season

Genotypes (IBYT-HI-17)	Durgapura			Hisar			Karnal			Ludhiana		
	Yield	RK	G	Yield	RK	G	Yield	RK	G	Yield	RK	G
1.	46.7	5	1	28.6	16	0	27.8	14	0	16.0	23	0
2.	35.8	16	0	24.2	20	0	23.4	22	0	12.7	24	0
3.	49.2	3	1	37.9	9	0	26.9	16	0	25.0	15	0
4.	39.2	12	0	31.7	14	0	26.8	18	0	24.6	17	0
5.	43.3	7	0	23.5	21	0	16.1	25	0	25.4	13	0
6.	40.8	10	0	28.3	17	0	26.8	17	0	35.0	4	0
7.	47.5	4	1	18.7	23	0	28.6	10	1	29.1	6	0
8.	51.7	1	1	49.7	3	1	30.3	7	1	35.4	3	0
9.	51.7	1	1	49.8	2	1	25.2	19	0	28.0	8	0
10.	35.0	17	0	29.7	15	0	31.0	4	1	26.0	11	0
11.	40.0	11	0	26.4	18	0	20.8	23	0	28.5	7	0
12.	43.3	7	0	34.2	13	0	30.2	8	1	24.7	16	0
13.	28.3	22	0	43.7	6	0	30.0	9	1	34.2	5	0
14.	32.5	18	0	36.8	10	0	28.1	13	0	26.1	10	0
15.	29.2	21	0	42.4	8	0	38.4	1	1	11.8	25	0
16.	36.7	15	0	15.8	24	0	27.4	15	0	22.0	20	0
17.	20.0	24	0	24.3	19	0	32.5	2	1	25.8	12	0
18.	38.3	14	0	36.2	12	0	28.6	11	1	20.9	22	0
19.	45.8	6	0	36.5	11	0	28.4	12	0	25.3	14	0
20.	31.7	19	0	19.1	22	0	30.4	6	1	37.9	2	0
21.	17.5	25	0	15.6	25	0	24.4	20	0	23.1	19	0
22.	28.3	22	0	43.5	7	0	32.0	3	1	23.3	18	0
23.	30.0	20	0	45.5	5	0	19.6	24	0	26.1	9	0
24.	39.2	12	0	47.7	4	1	23.8	21	0	21.9	21	0
25.	42.5	9	0	53.3	1	1	30.8	5	1	45.9	1	1
Mean	37.8			33.7			27.5			26.2		
S.E.m	1.8			2.5			3.3			1.2		
C.D. (5%)	5.2			7.5			9.9			3.7		
C.V.(%)	6.7			10.5			16.9			6.7		
D.O.S.	29.11.2016			15.11.2016			23.11.2016			28.11.2016		

Table. Mean and range (in parenthesis) across the locations for ancillary characters of barley genotypes evaluated under IBYT-HI-(2017) in *rabi* 2016-17 season

S.No.	Variety	Days to Heading (Mean & Range)	Days to Maturity (Mean & Range)	Plant Height (cm) (Mean & Range)
1	IBYT-HI-1	82 (64-92)	124 (108-137)	86 (69-98)
2	IBYT-HI-2	85 (67-97)	125 (109-138)	86 (77-97)
3	IBYT-HI-3	85 (69-92)	126 (110-138)	97 (79-115)
4	IBYT-HI-4	94 (75-104)	128 (111-140)	81 (63-93)
5	IBYT-HI-5	89 (72-98)	127 (111-138)	81 (61-100)
6	IBYT-HI-6	85 (69-98)	124 (108-137)	93 (82-104)
7	IBYT-HI-7	85 (68-97)	126 (110-138)	89 (80-94)
8	IBYT-HI-8	82 (66-92)	123 (109-134)	89 (83-99)
9	IBYT-HI-9	80 (64-90)	123 (106-136)	96 (90-105)
10	IBYT-HI-10	81 (64-95)	122 (101-136)	91 (78-103)
11	IBYT-HI-11	88 (72-97)	128 (112-137)	85 (73-100)
12	IBYT-HI-12	87 (72-97)	127 (111-138)	92 (76-103)
13	IBYT-HI-13	85 (67-95)	123 (103-134)	89 (82-99)
14	IBYT-HI-14	82 (65-91)	123 (106-134)	80 (71-93)
15	IBYT-HI-15	80 (65-88)	123 (103-134)	101 (84-117)
16	IBYT-HI-16	83 (65-97)	124 (106-137)	86 (74-99)
17	IBYT-HI-17	80 (64-91)	122 (103-134)	85 (60-98)
18	IBYT-HI-18	83 (65-95)	124 (103-138)	85 (61-99)
19	IBYT-HI-19	79 (61-91)	122 (100-134)	87 (59-99)
20	IBYT-HI-20	78 (61-91)	122 (101-138)	92 (78-114)
21	IBYT-HI-21	92 (72-104)	131 (115-140)	89 (79-104)
22	IBYT-HI-22	81 (66-90)	121 (102-136)	102 (87-115)
23	IBYT-HI-23	82 (64-93)	124 (106-134)	87 (75-96)
24	IBYT-HI-24	93 (80-99)	130 (117-139)	94 (86-118)
25	IBYT-HI-25	86 (66-96)	126 (108-137)	90 (70-108)

International Naked Barley Yield Trial-High Input (INBYT-HI-2017)

This trial comprising of twenty-four test entries and one check variety Geetanjali at Karnal, Ludhiana, and Kanpur; and BHS352 at Bajaura locations were evaluated in an Alpha-Lattice Design with two replications. At Kanpur location only two test entries 6 and 3, which also ranked first and second, respectively, belonged to the first NSG. At Karnal, ten test entries were in the first NSG. At Ludhiana, only two test entries 8 and 6 ranking first and second, respectively belonged to first NSG. At Bajaura three test entries 20, 2, 24 ranking first, second and third, respectively, were in the first NSG. Except the test entries 9, 12, 15, 16 and 18, all the remaining nineteen test entries were selected by the breeders during the field day.

Table. Grain yield, ranking and grouping of barley genotypes evaluated under INBYT-HI-(2017) at different locations in *rabi* 2016-17 season

Genotype (INBYT-HI)	Kanpur*			Karnal*			Ludhiana*			Bajaura**		
	Yield	RK	G	Yield	RK	G	Yield	RK	G	Yield	RK	G
1.	22.9	12	0	11.4	25	0	17.5	12	0	30.2	21	0
2.	20.8	18	0	23.5	3	1	9.2	25	0	58.1	2	1
3.	32.1	2	1	22.8	6	1	23.8	4	0	35.8	14	0
4.	30.4	5	0	23.2	4	1	23.5	5	0	36.0	13	0
5.	31.3	3	0	22.5	7	1	12.2	23	0	31.4	19	0
6.	35.0	1	1	23.2	5	1	29.6	2	1	26.1	24	0
7.	29.2	6	0	16.2	17	0	19.2	9	0	30.9	20	0
8.	30.8	4	0	17.5	16	0	30.0	1	1	42.6	8	0
9.	22.1	14	0	19.1	13	0	14.2	18	0	24.0	25	0
10.	21.7	17	0	21.2	9	1	12.9	21	0	29.4	22	0
11.	27.1	8	0	24.0	2	1	15.8	15	0	46.0	6	0
12.	22.1	16	0	18.0	15	0	22.8	6	0	42.6	7	0
13.	20.4	23	0	20.8	10	1	18.3	11	0	34.6	16	0
14.	28.3	7	0	20.3	11	1	24.0	3	0	46.3	5	0
15.	17.5	24	0	13.8	22	0	20.3	8	0	35.5	15	0
16.	22.9	12	0	14.7	19	0	13.3	20	0	28.6	23	0
17.	20.8	18	0	18.4	14	0	14.6	16	0	50.5	4	0
18.	23.3	11	0	13.1	24	0	10.8	24	0	34.1	17	0
19.	20.8	18	0	14.1	21	0	17.0	14	0	36.1	12	0
20.	23.8	10	0	15.8	18	0	12.5	22	0	60.2	1	1
21.	17.1	25	0	14.4	20	0	18.8	10	0	32.1	18	0
22.	20.8	18	0	13.2	23	0	14.3	17	0	38.5	9	0
23.	25.4	9	0	26.9	1	1	22.5	7	0	37.8	10	0
24.	22.1	14	0	19.1	12	0	14.0	19	0	52.8	3	1
25. (Geetanjali* / BHS352**LC)	20.8	18	0	22.4	8	1	17.2	13	0	36.3	11	0
Mean	24.4			18.8			17.9			38.3		
S.E.m	1.1			2.3			1.5			3.1		
C.D. (5%)	3.1			6.9			4.5			9.2		
C.V. (%)	6.1			17.3			12.2			11.3		
D.O.S.	25.11.16			23.11.16			28.11.2016			17.11.2016		

Table. Mean and range (in parenthesis) across the locations for ancillary characters of barley genotypes evaluated under INBYT-HI-(2017) at different locations in *rabi* 2016-17 season

Genotype (INBYT-HI-17)	Days to Heading (Mean & Range)	Days to Maturity (Mean & Range)	Plant Height (cm) (Mean & Range)
1.	103 (86-130)	143 (125-181)	95 (77-107)
2.	105 (89-134)	140 (124-173)	82 (72-95)
3.	97 (81-123)	137 (121-170)	90 (83-94)
4.	96 (83-125)	139 (122-173)	97 (83-109)
5.	99 (86-127)	139 (123-174)	87 (78-97)
6.	95 (83-130)	139 (118-179)	96 (79-112)
7.	99 (83-132)	140 (119-180)	92 (71-106)
8.	100 (86-130)	140 (122-180)	89 (65-108)
9.	101 (84-136)	141 (119-182)	88 (78-96)
10.	106 (88-142)	142 (120-182)	88 (74-105)
11.	95 (82-123)	138 (122-171)	92 (75-110)
12.	103 (87-132)	143 (125-180)	81 (65-99)
13.	104 (88-134)	144 (125-182)	81 (61-93)
14.	98 (84-127)	141 (123-179)	97 (83-105)
15.	94 (82-124)	139 (122-173)	99 (81-108)
16.	106 (89-137)	139 (120-174)	84 (67-96)
17.	99 (83- 132)	138 (117-176)	95 (88-113)
18.	100 (84-128)	141 (122-176)	96 (84-109)
19.	102 (84-132)	139 (116-174)	92 (79-101)
20.	97 (83-128)	139 (122-174)	94 (79-112)
21.	103 (89-130)	143 (124-180)	96 (81-106)
22.	99 (86-128)	139 (122-176)	91 (72-110)
23.	95 (83-126)	139 (121-176)	98 (82-112)
24.	91 (81-120)	134 (115-167)	100 (98-105)
25. (Geetanjali* / BHS352**LC)	93 (79-128)	137 (120-174)	84 (65-106)

4th Global Spring Barley Yield Trail (4th GSBYT-2017)

This trial comprised of twenty-five entries including one check variety K603 and was evaluated at four locations (Kanpur, Karnal, Rewa and Faizabad). Performance of entries for grain yield revealed three and sixteen entries falling in first NSG at Kanpur and Karnal, whereas seventeen entry in first NSG at Rewa and Faizabad. Based on field observations on plant and spike characters, 19-genotypes (4,6,7,8,9,10, 1, 2, 3, 4, 5, 8, 9, 10, 11, 13, 14,15, 16, 17, 18, 20, 21,22,23,24 and 25) were selected by the barley breeders of different centre during the field day organized at ICAR-IIWBR, Karnal.

Table. Grain yield, ranking and grouping of barley genotypes evaluated under 4th GSBYT-(2017) at different locations in *rabi* 2016-17 season

Genotype	Kanpur			Karnal			Rewa			Faizabad		
(4th GSBYT-17)	Yield	RK	G	Yield	RK	G	Yield	RK	G	Yield	RK	G
1. K603(LC)	29.1	4	0	30.2	12	1	23.6	11	1	32.8	1	1
2.	23.0	13	0	23.8	19	0	22.4	19	0	22.3	15	1
3.	22.6	14	0	29.2	15	1	25.0	2	1	25.1	13	1
4.	20.0	18	0	29.4	14	1	20.8	25	0	19.9	22	0
5.	26.9	5	0	26.3	17	0	22.8	15	1	29.2	5	1
6.	17.2	24	0	26.0	18	0	21.0	24	0	22.0	17	1
7.	24.3	10	0	18.2	23	0	22.9	14	1	25.2	12	1
8.	21.3	17	0	10.8	25	0	22.4	20	0	14.8	24	0
9.	19.0	21	0	31.4	9	1	21.7	21	0	31.3	3	1
10.	21.9	16	0	31.5	8	1	23.2	13	1	14.3	25	0
11.	17.3	23	0	23.1	20	0	22.8	17	1	17.0	23	0
12.	13.7	25	0	28.6	16	1	22.6	18	0	22.2	16	1
13.	34.0	2	1	34.1	5	1	25.1	1	1	31.7	2	1
14.	22.3	15	0	37.6	1	1	24.7	4	1	27.2	9	1
15.	37.5	1	1	13.5	24	0	24.9	3	1	20.0	21	0
16.	19.3	20	0	21.9	21	0	24.6	5	1	28.3	6	1
17.	24.3	10	0	31.0	10	1	24.0	10	1	28.1	7	1
18.	19.6	19	0	21.5	22	0	24.2	9	1	26.5	10	1
19.	26.1	7	0	34.9	3	1	23.3	12	1	27.4	8	1
20.	23.5	12	0	32.7	7	1	24.5	6	1	21.2	18	0
21.	25.6	8	0	30.3	11	1	24.5	7	1	29.7	4	1
22.	25.3	9	0	35.2	2	1	24.2	8	1	23.0	14	1
23.	33.8	3	1	33.1	6	1	21.1	23	0	25.3	11	1
24.	26.7	6	0	29.6	13	1	21.4	22	0	20.8	19	0
25.	18.7	22	0	34.9	4	1	22.8	16	1	20.8	20	0
Mean	23.7			28.0			23.2			24.2		
S.E.m	1.3			3.5			0.8			3.8		
C.D. (5%	3.8			10.6			2.4			11.3		
C.V. (%)	7.5			17.8			4.9			22.1		
D.O.S.	24.11.2016			23.11.2016						26.11.2016		

Table. Mean and range (in parenthesis) across the locations for ancillary characters of barley genotypes evaluated under 4th GSBYT-(2017) at different locations in *rabi* 2016-17 season

Genotype (4th GSBYT-17)	Days to Heading (Mean & Range)	Days to Maturity (Mean & Range)	Plant Height (cm) (Mean & Range)
1. (K603; LC)	81 (74-86)	122 (111-137)	97 (87-103)
2.	89 (71-104)	131 (121-139)	86 (62-103)
3.	90 (71-99)	130 (124-136)	83 (65-105)
4.	88 (73-97)	128 (120-137)	87 (70-110)
5.	86 (72-96)	127 (119-137)	89 (80-99)
6.	86 (72-93)	128 (122-137)	83 (62-105)
7.	85 (70-97)	127 (116-137)	93 (81-107)
8.	89 (71-102)	128 (120-138)	90 (75-107)
9.	89 (71-100)	130 (123-137)	86 (70-98)
10.	87 (71-98)	127 (119-135)	86 (70-109)
11.	90 (70-98)	131 (124-137)	89 (72-102)
12.	89 (71-101)	130 (120-137)	89 (78-107)
13.	88 (73-97)	128 (119-138)	94 (78-114)
14.	90 (70-98)	131 (124-138)	84 (68-108)
15.	84 (72-92)	127 (121-134)	97 (80-110)
16.	79 (70-83)	122 (117-133)	89 (79-103)
17.	88 (72-96)	129 (120-139)	89 (72-113)
18.	85 (73-97)	125 (119-134)	87 (73-105)
19.	91 (73-101)	131 (124-138)	92 (84-106)
20.	87 (70-98)	129 (125-138)	92 (71-112)
21.	86 (71-97)	129 (121-136)	92 (75-115)
22.	89 (74-98)	126 (107-136)	95 (78-111)
23.	80 (74-85)	123 (114-134)	87 (82-102)
24.	85 (72-94)	126 (121-134)	82 (62-99)
25.	89 (70-100)	129 (119-138)	87 (70-100)

International Barley Observation Nursery-High Input (IBON-HI-2017)

The IBON comprising of 112 entries including one local check (BH946), repeated four times, were grown at four locations namely, Durgapura, Hisar, Ludhiana and Karnal. The means and range for ancillary characters, and mean yields worked out as q/ha across the test locations for the top 25 higher yielding entries are tabulated and given below. Only three test entries 77, 72 and 76 gave equal or higher mean grain yield across the locations over the average yield of the check variety BH946. A total of 45 entries (2,3,6,8,9,10,11,12, 15,30, 31, 36,37, 38, 39, 40, 46, 48, 51, 52,54,55,56,63,64,66,67,70,71,75,76,79,83,85,91, 94, 95, 96,97,98,99,100 and 109) were selected by the barley breeders during the field day.

Table. Mean and range (in parenthesis) across the locations for ancillary characters of barley genotypes evaluated under IBON-HI-(2017) at different locations in *rabi* 2016-17 season

Genotype (IBON-HI-2017)	Days to Heading	Days to Maturity	Plant Height (cm)	Yield (q./ha)
77	85 (80-90)	127 (113-139)	104 (97-112)	42 (37-53)
72	83 (65-93)	125 (111-135)	91 (75-99)	36 (26-55)
76	85 (78-89)	126 (113-138)	105 (93-113)	35 (27-45)
16	84 (70-89)	126 (112-137)	92 (67-104)	34 (22-58)
85	82 (57-91)	122 (103-135)	89 (76-101)	33 (17-43)
54	82 (72-87)	125 (114-135)	96 (82-106)	33 (23-45)
75	82 (72-89)	125 (110-138)	97 (83-117)	32 (24-45)
11	85 (70-91)	126 (112-134)	97 (75-109)	32 (17-55)
90	93 (80-99)	131 (117-141)	98 (79-119)	32 (17-58)
53	79 (62-86)	122 (102-135)	92 (83-102)	32 (26-48)
109	79 (65-85)	120 (101-132)	90 (82-99)	32 (27-41)
74	90 (80-96)	127 (114-135)	92 (82-103)	32 (25-45)
84	77 (59-84)	122 (105-134)	97 (80-121)	32 (13-45)
66	81 (64-91)	124 (106-136)	93 (88-104)	31 (25-49)
73	88 (76-94)	127 (114-135)	91 (81-101)	31 (20-41)
39	76 (62-82)	119 (102-134)	97 (88-105)	31 (12-40)
70	83 (66-89)	124 (106-134)	80 (62-89)	31 (24-43)
67	83 (70-91)	125 (111-138)	90 (83-102)	30 (20-50)
18	87 (73-93)	127 (115-138)	99 (77-114)	30 (20-45)
83	78 (56-89)	122 (102-134)	96 (87-106)	30 (18-41)
91	71 (58-78)	116 (101-133)	83 (66-93)	30 (13-45)
56	79 (64-87)	122 (104-135)	101 (92-109)	30 (13-41)
BH946 (LC)	85 (71-92)	126 (112-137)	94 (81-111)	35 (20-62)

International Naked Barley Observation Nursery–High Input-2017 (INBON-HI-2017)

This nursery consisting of 100-entries including one local check(BHS352/ Geetanjali) repeated four times was grown at Bajaura; Karnal, Ludhiana and Kanpur. 41-test entries gave grain yield higher than the average yields (23 q/ha) of checks. Breeders from different centres selected 45 entries (2,3,6,8,9,10,11,12,15,30,31,36,37,38,39,40,46,48, 51, 52, 54, 55, 56, 63, 64, 66, 67, 70, 71,75,76,77,78,79,83,85,91,94,95,96,97,98,99,100 and 101) during the field day.

Table. Mean and range (in parenthesis) across the locations for ancillary characters of barley genotypes evaluated under INBON-HI- (2017) at different locations in *rabi* 2016-17 season

Genotype (INBON-HI-17)	Days to Heading	Days to Maturity	Plant Height (cm)	Yield (q./ha)
24	100 (83-128)	141 (120-174)	95 (87-103)	34 (28-43)
67	98 (86-130)	138 (123-171)	85 (10-116)	32 (25-42)
48	95 (81-124)	139 (120-176)	93 (70-105)	31 (15-51)
97	99 (85-128)	140 (123-171)	102 (97-108)	30 (17-52)
25	102 (84-133)	142 (121-179)	78 (64-96)	30 (20-50)
60	92 (81-120)	135 (118-166)	95 (83-108)	30 (22-37)
2	94 (83-123)	136 (121-171)	95 (77-111)	29 (18-37)
15	96 (84-125)	139 (122-170)	84 (69-103)	29 (15-40)
40	90 (77-120)	133 (116-168)	97 (80-105)	28 (20-35)
37	99 (82-130)	139 (121-176)	96 (85-105)	28 (13-38)
66	103 (86-133)	141 (123-176)	100 (83-110)	28 (24-32)
51	98 (85-124)	141 (123-174)	91 (75-117)	28 (18-40)
22	104 (86-132)	143 (125-178)	102 (84-113)	28 (18-37)
42	102 (86-132)	142 (125-178)	88 (59-110)	27 (18-44)
1	91 (80-120)	134 (118-169)	95 (78-115)	27 (23-32)
65	99 (86-125)	138 (124-168)	109 (94-121)	27 (20-32)
75	91 (79-120)	135 (120-164)	112 (105-117)	26 (10-37)
3	97 (84-123)	139 (121-174)	93 (74-117)	26 (13-33)
100	93 (75-130)	136 (119-168)	101 (97-104)	26 (18-33)
47	99 (82-131)	140 (121-178)	99 (76-107)	26 (10-45)
38	111 (84-134)	143 (125-180)	85 (64-99)	26 (18-43)

26	99 (84-131)	142 (121-180)	86 (72-93)	26 (17-38)
52	100 (84-130)	140 (121-176)	109 (99-129)	26 (20-31)
99	90 (80-118)	133 (116-166)	107 (100-113)	25 (18-33)
87	95 (84-120)	138 (120-166)	108 (94-119)	25 (17-29)
6	101 (88-130)	139 (120-170)	87 (64-117)	25 (12-41)
9	97 (85-128)	137 (120-171)	90 (75-108)	25 (8-47)
16	110 (86-132)	140 (125-172)	80 (65-99)	25 (20-29)
83	88 (0-132)	109 (0-171)	67 (0-97)	25 (0-45)
93	97 (85-123)	137 (121-166)	94 (85-106)	25 (23-27)
18	111 (85-130)	140 (122-171)	81 (65-100)	25 (17-35)
41	94 (82-123)	139 (122-176)	89 (78-101)	25 (18-33)
13	98 (84-127)	138 (122-171)	92 (76-106)	25 (12-36)
96	95 (82-121)	138 (120-166)	100 (96-103)	24 (20-35)
58	99 (89-123)	139 (125-166)	101 (87-107)	24 (17-33)
5	110 (87-130)	140 (125-170)	96 (78-118)	24 (18-28)
62	98 (84-132)	140 (123-171)	95 (82-105)	24 (20-28)
88	97 (84-132)	141 (122-174)	100 (87-116)	24 (17-37)
7	111 (89-132)	140 (125-169)	81 (61-100)	24 (13-40)
21	99 (84-125)	138 (121-170)	97 (82-115)	24 (17-32)
63	101 (86-131)	142 (126-174)	89 (68-107)	24 (15-32)
Getanjali/BHS352 (LC)	100 (83-128)	139 (121-174)	92 (76-105)	23 (16-30)

4th Global Spring Barley Screening Nursery-2017 (4th GSBSN-2017)

This nursery consisted of 150 entries including a local check Lakhan repeated five times at each location. This nursery was raised at four locations namely, Kanpur, Faizabad, Rewa and Karnal. Sixteen entries, as tabulated below, gave grain yield higher than the average yield of the check variety Lakhan. During the field day organized at ICAR-IIWBR, Karnal, barley breeders from different centres selected as many as 45 entries (2,3,6,8,9, 10,11,12,15, 30,31,36,37, 38,39, 40, 46, 51, 52, 54, 55,56,63, 64, 66, 67,70,71,75, 76, 77, 78,79, 83,85, 91,94,95, 96, 97,98,99,100 and 109) as per their requirements.

Table. Mean and range (in parenthesis) across the locations for ancillary characters of barley genotypes evaluated under 4th GSBSN-(2017) at different locations in *rabi* 2016-17 season

Genotype (4th GSBSN-17)	Days to Heading	Days to Maturity	Plant Height (cm)	Yield (q/ha)
6	79 (71-82)	122 (111-134)	92 (81-101)	51 (35-77)
61	86 (75-91)	128 (121-139)	101 (90-117)	51 (47-55)
62	87 (70-97)	130 (123-138)	99 (92-119)	50 (34-63)
91	86 (70-96)	128 (121-137)	104 (91-113)	46 (32-67)
125	83 (73-89)	125 (116-134)	92 (83-99)	46 (39-54)
99	89 (72-99)	129 (121-137)	100 (97-102)	45 (35-53)
59	77 (70-83)	121 (112-130)	96 (83-105)	45 (33-68)
50	84 (74-91)	128 (123-138)	89 (78-96)	45 (35-50)
75	86 (70-97)	126 (121-134)	87 (60-102)	44 (31-51)
3	87 (72-97)	126 (120-139)	100 (82-121)	44 (20-75)
4	85 (74-92)	126 (118-134)	98 (82-113)	44 (20-65)
63	87 (74-97)	126 (121-133)	103 (88-119)	43 (27-67)
94	89 (77-97)	132 (126-138)	97 (85-106)	43 (25-57)
7	87 (76-97)	127 (123-134)	104 (92-124)	43 (37-47)
65	80 (71-85)	124 (116-133)	99 (93-106)	43 (20-55)
92	89 (73-98)	128 (121-136)	98 (90-106)	43 (34-48)
Lakhan (LC)	80 (58-94)	119 (94-138)	97 (76-115)	42 (25-57)

Elite International Barley Germplasm Nursery (EIBGN-2016-17)

This nursery was constituted with 45-germplasm lines and six released varieties (BH946, BH959, BHS400, RD2715, DWRB101 and HUB113) as checks. These 45 promising germplasm lines were selected from different international trials and nurseries based on their performance in *rabi* 2016-17 under respective trials/nurseries. A set of 75 entries including six checks repeated five times at each location were evaluated in an augmented design at twelve locations in NEPZ (Kanpur, Faizabad, Varanasi, Rewa), NHZ (Shimla, Almora, Bajaura) and NWPZ (Karnal, Hisar, Durgapura, Ludhiana, Pantnagar) in *rabi* season of 2016-17. Each entry was sown in a plot of four rows each of 2.5 m length and spaced at 30 cm. The data was received from all the locations except Almora. The data for grain yield recorded in grams (g) per plot (3 m^2) was pooled across the locations of a zone and is given zone wise in the following table. Similarly, data for ancillary characters is tabulated below zone wise as mean and range for a character across the locations of a zone.

In general high yields were obtained in NWPZ and the least were in NEPZ. The check variety BH946 was adjudged to be the best check in NWPZ and NHZ, where as in NEPZ, HUB 113 was the best among the checks. No test entry was statistically superior in NWPZ and NEPZ over the best check of the respective zone. In NHZ, two test entries 3rdGSYT-(2016)-18 and IBYT-HI-(2016)-4 registered statistically significant higher grain yield over the best check BH946. In NWPZ one entry{IBON-HI-(2016)-111}; in NEPZ three entries {IBYT-HI-(2016)-3, IBON-HI-(2016)-111 and IBON-HI-(2016)-136}; and in NHZ twelve entries {IBYT-HI-(2016)-3, IBYT-HI-(2016)-9, IBYT-HI-(2016)-17, IBYT-HI-(2016)-18, IBYT-HI-(2016)-19, INBYT-HI-(2016)-2, 3rdGSBSN-(2016)-11, 3rdGSBSN-(2016)-19, IBON-HI-(2016)-107, IBON-HI-(2016)-111, IBON-HI-(2016)-136 and INBON-HI-(2016)-74} gave numerically higher grain yields over the best check of the respective zone. One test entry IBON-HI-(2016)-111 has given numerically higher grain yield in all the zone over the best check of the respective zone, and has ranked first, second and third in the NWPZ, NEPZ and NHZ, respectively.

Table. Zonal means for grain yield, ranking and grouping of barley genotypes evaluated under EIBGN-2017 at different locations in *rabi* 2016-17 season

Sr. No.	Genotype	Grain Yield (q/ha)								
		NWPZ	Rk	G	NEPZ	Rk	G	CZ	Rk	G
1	3rdGSYT-(2016)-2	34.6	9	1	25.5	6	1	19.5	33	0
2	3rdGSYT-(2016)-3	26.4	30	0	23.0	16	0	24.0	17	0
3	3rdGSYT-(2016)-6	27.8	26	0	23.6	11	1	21.7	28	0
4	3rdGSYT-(2016)-10	29.9	18	0	24.1	9	1	23.2	24	0
5	3rdGSYT-(2016)-18	34.9	8	1	25.9	4	1	36.5	2	1
6	3rdGSYT-(2016)-22	24.7	37	0	23.6	12	1	23.0	26	0
7	3rdGSYT-(2016)-23	34.0	10	0	20.3	25	0	21.2	29	0
8	3rdGSYT-(2016)-24	31.5	15	0	23.5	13	1	19.0	35	0
9	IBYT-HI-(2016)-2	28.8	22	0	22.1	22	0	20.7	31	0

10	IBYT-HI-(2016)-3	36.9	4	1	26.3	3	1	32.1	4	0
11	IBYT-HI-(2016)-4	29.5	20	0	23.7	10	1	40.6	1	1
12	IBYT-HI-(2016)-9	30.0	17	0	25.9	5	1	26.1	14	0
13	IBYT-HI-(2016)-12	29.8	19	0	22.4	19	0	24.6	15	0
14	IBYT-HI-(2016)-15	28.6	23	0	17.6	37	0	23.6	19	0
15	IBYT-HI-(2016)-17	36.6	6	1	19.4	29	0	30.7	6	0
16	IBYT-HI-(2016)-18	38.3	3	1	23.1	15	1	26.7	13	0
17	IBYT-HI-(2016)-19	32.3	13	0	25.2	7	1	31.4	5	0
18	INBYT-HI-(2016)-2	29.2	21	0	19.3	31	0	29.2	10	0
19	INBYT-HI-(2016)-3	26.9	28	0	21.7	23	0	23.1	25	0
20	INBYT-HI-(2016)-10	28.0	25	0	19.2	32	0	23.4	20	0
21	INBYT-HI-(2016)-11	26.7	29	0	19.8	28	0	14.6	42	0
22	INBYT-HI-(2016)-12	20.4	43	0	18.3	33	0	19.2	34	0
23	INBYT-HI-(2016)-14	22.0	41	0	13.8	45	0	23.2	22	0
24	INBYT-HI-(2016)-16	33.6	11	0	19.9	27	0	23.2	22	0
25	INBYT-HI-(2016)-22	28.5	24	0	15.8	39	0	18.2	37	0
26	3rdGSBSN-(2016)-11	39.7	2	1	22.3	21	0	29.4	9	0
27	3rdGSBSN-(2016)-19	36.9	5	1	23.4	14	1	30.6	8	0
28	3rdGSBSN-(2016)-29	31.5	14	0	22.3	20	0	20.5	32	0
29	3rdGSBSN-(2016)-35	24.9	36	0	15.7	40	0	24.0	18	0
30	3rdGSBSN-(2016)-109	16.2	45	0	19.4	30	0	15.1	41	0
31	3rdGSBSN-(2016)-127	26.3	32	0	18.0	34	0	17.3	39	0
32	IBON-HI-(2016)-5	25.5	34	0	16.1	38	0	21.2	30	0
33	IBON-HI-(2016)-33	25.4	35	0	14.7	42	0	14.3	43	0
34	IBON-HI-(2016)-34	23.7	38	0	15.1	41	0	13.9	44	0
35	IBON-HI-(2016)-79	18.3	44	0	13.9	44	0	8.1	45	0
36	IBON-HI-(2016)-107	35.5	7	1	14.5	43	0	28.0	12	0
37	IBON-HI-(2016)-111	45.3	1	1	30.7	2	1	33.2	3	0
38	IBON-HI-(2016)-136	32.4	12	0	31.4	1	1	30.6	7	0
39	INBON-HI-(2016)-1	21.6	42	0	20.7	24	0	18.7	36	0
40	INBON-HI-(2016)-11	30.5	16	0	24.8	8	1	23.4	20	0
41	INBON-HI-(2016)-12	22.2	40	0	22.5	18	0	17.9	38	0
42	INBON-HI-(2016)-13	26.3	31	0	22.9	17	0	24.1	16	0
43	INBON-HI-(2016)-22	23.7	39	0	20.3	26	0	16.4	40	0
44	INBON-HI-(2016)-63	26.3	33	0	17.6	36	0	22.7	27	0
45	INBON-HI-(2016)-74	27.2	27	0	17.9	35	0	28.1	11	0
	GM	29.1			21.0			23.5		
	CD (5%)	10.97			8.34			7.31		
Checks										
1	BH 946	41.31			22.78			25.93		
2	BH 959	34.54			19.19			20.55		
3	BHS 400	28.95			19.13			19.54		
4	RD 2715	35.37			20.45			17.87		
5	DWRB 101	35.40			19.75			21.46		
6	HUB 113	39.13			26.15			24.43		

Table : Mean and range (in parenthesis) across the locations for ancillary characters of barley genotypes evaluated under EIBGN-(2017) at different locations of NWPZ in *rabi* 2016-17 season

Genotype	Days to Heading	Days to Maturity	Plant Height (cm)	Tillers/m	Spike Length (cm)	Grain/ Spike	1000-grain weight (g)	2/6 Row
3rdGSYT-(2016)-2	94 (82-100)	131 (123-137)	91 (74-101)	94 (78-104)	7 (5-9)	75 (60-84)	42 (38-46)	6
3rdGSYT-(2016)-3	89 (64-100)	129 (118-137)	88 (60-105)	142 (84-226)	9 (7-10)	28 (22-33)	49 (45-52)	2
3rdGSYT-(2016)-6	96 (81-107)	133 (120-139)	99 (73-119)	94 (56-138)	7 (6-8)	64 (56-68)	42 (42-43)	6
3rdGSYT-(2016)-10	91 (76-102)	133 (123-140)	102 (86-119)	85 (65-103)	10 (8-10)	69 (66-72)	41 (38-46)	6
3rdGSYT-(2016)-18	78 (60-85)	124 (115-134)	90 (65-112)	92 (58-148)	9 (7-11)	74 (64-84)	44 (40-46)	6
3rdGSYT-(2016)-22	97 (85-107)	135 (125-142)	95 (74-115)	98 (81-139)	8 (7-9)	76 (72-82)	36 (33-38)	6
3rdGSYT-(2016)-23	94 (82-102)	131 (120-135)	90 (65-115)	161 (97-245)	9 (8-10)	28 (26-28)	50 (46-57)	2
3rdGSYT-(2016)-24	92 (81-98)	127 (116-135)	86 (70-107)	141 (73-202)	8 (7-8)	25 (22-27)	47 (42-53)	2
IBYT-HI-(2016)-2	83 (66-92)	126 (116-135)	97 (78-113)	131 (101-160)	8 (7-9)	31 (26-33)	51 (48-54)	2
IBYT-HI-(2016)-3	85 (64-91)	124 (115-136)	90 (72-105)	104 (82-187)	8 (7-11)	74 (60-90)	37 (35-42)	6
IBYT-HI-(2016)-4	88 (69-94)	129 (115-136)	85 (62-110)	104 (80-145)	8 (7-9)	78 (72-84)	37 (35-39)	6
IBYT-HI-(2016)-9	91 (75-99)	131 (118-136)	82 (56-110)	84 (78-92)	8 (7-10)	76 (68-80)	37 (35-40)	6
IBYT-HI-(2016)-12	82 (61-90)	126 (116-134)	97 (80-112)	99 (80-120)	9 (8-10)	75 (66-82)	39 (30-47)	6
IBYT-HI-(2016)-15	88 (70-97)	127 (114-137)	101 (90-112)	108 (72-198)	8 (7-10)	79 (72-84)	37 (34-39)	6
IBYT-HI-(2016)-17	94 (77-100)	133 (122-141)	91 (78-110)	110 (84-158)	9 (7-11)	77 (63-86)	41 (37-46)	6
IBYT-HI-(2016)-18	81 (61-93)	125 (113-135)	87 (61-108)	109 (67-165)	8 (6-11)	71 (66-78)	36 (33-38)	6
IBYT-HI-(2016)-19	89 (72-98)	129 (120-141)	86 (65-104)	126 (64-171)	9 (7-11)	30 (27-33)	50 (46-54)	2
INBYT-HI-(2016)-2	91 (76-98)	129 (118-142)	89 (73-110)	108 (80-138)	9 (7-10)	65 (62-66)	36 (31-40)	6
INBYT-HI-(2016)-3	84 (62-93)	124 (114-135)	101 (85-117)	97 (73-114)	9 (7-11)	73 (70-76)	38 (34-43)	6
INBYT-HI-(2016)-10	86 (64-93)	125 (114-135)	101 (80-123)	98 (65-165)	9 (8-10)	75 (66-84)	35 (33-37)	6
INBYT-HI-(2016)-11	94 (76-103)	132 (118-139)	94 (73-111)	105 (69-156)	8 (7-10)	62 (54-72)	39 (34-45)	6
INBYT-HI-(2016)-12	95 (76-102)	132 (119-140)	93 (70-106)	94 (58-128)	8 (7-10)	60 (56-64)	35 (31-39)	6
INBYT-HI-(2016)-14	93 (72-102)	133 (120-141)	89 (67-103)	95 (63-134)	9 (8-11)	69 (60-78)	32 (31-34)	6
INBYT-HI-(2016)-16	86 (64-93)	129 (118-142)	96 (74-111)	101 (54-197)	9 (8-10)	72 (66-78)	40 (36-44)	6
INBYT-HI-(2016)-22	92 (77-97)	132 (116-142)	100 (88-115)	93 (75-132)	10 (9-11)	70 (60-78)	37 (34-43)	6
3rdGSBSN-	78	125	90	80	8	66	44	6

(2016)-11	(59-85)	(114-135)	(72-106)	(62-94)	(7-9)	(54-72)	(39-47)	
3rdGSBSN-(2016)-19	91 (79-97)	130 (116-138)	96 (83-109)	112 (76-185)	9 (8-10)	74 (72-78)	37 (33-41)	6
3rdGSBSN-(2016)-29	90 (72-97)	132 (119-138)	96 (75-106)	103 (80-125)	10 (8-11)	79 (76-82)	40 (37-43)	6
3rdGSBSN-(2016)-35	91 (70-101)	132 (118-141)	88 (64-103)	95 (67-128)	9 (6-11)	77 (60-86)	43 (40-46)	6
3rdGSBSN-(2016)-109	90 (76-102)	132 (120-142)	88 (77-100)	74 (51-88)	9 (8-10)	76 (60-87)	35 (32-38)	6
3rdGSBSN-(2016)-127	90 (71-97)	132 (120-138)	99 (72-119)	78 (56-89)	9 (8-10)	75 (64-84)	41 (39-44)	6
IBON-HI-(2016)-5	86 (60-94)	126 (113-134)	87 (61-106)	86 (72-129)	10 (8-11)	73 (66-82)	44 (40-46)	6
IBON-HI-(2016)-33	78 (57-87)	123 (113-134)	90 (72-103)	120 (77-223)	9 (7-11)	77 (66-88)	35 (33-37)	6
IBON-HI-(2016)-34	77 (56-85)	124 (113-134)	90 (66-110)	112 (82-140)	8 (7-11)	40 (24-78)	53 (32-65)	2
IBON-HI-(2016)-79	83 (74-90)	129 (118-134)	90 (67-111)	102 (80-120)	9 (7-11)	72 (66-78)	37 (34-41)	6
IBON-HI-(2016)-107	88 (72-93)	128 (114-138)	89 (73-99)	105 (76-153)	10 (8-11)	79 (72-84)	39 (37-40)	6
IBON-HI-(2016)-111	85 (69-92)	131 (121-138)	94 (78-110)	102 (64-148)	9 (7-10)	75 (66-84)	40 (37-44)	6
IBON-HI-(2016)-136	87 (72-92)	124 (113-135)	103 (97-111)	134 (92-187)	10 (8-12)	27 (24-32)	49 (44-54)	2
INBON-HI-(2016)-1	80 (58-88)	126 (115-135)	103 (83-114)	132 (88-165)	9 (7-11)	26 (22-31)	48 (44-55)	2
INBON-HI-(2016)-11	80 (59-88)	126 (115-135)	90 (75-100)	156 (63-250)	9 (7-10)	28 (26-30)	44 (37-47)	2
INBON-HI-(2016)-12	88 (68-98)	127 (118-132)	96 (83-105)	141 (102-170)	8 (7-10)	27 (24-31)	42 (38-46)	2
INBON-HI-(2016)-13	89 (70-98)	129 (116-140)	92 (73-103)	95 (81-107)	9 (8-10)	67 (48-78)	42 (40-46)	6
INBON-HI-(2016)-22	93 (78-99)	132 (121-141)	112 (92-131)	94 (43-164)	8 (7-9)	72 (60-80)	40 (38-42)	6
INBON-HI-(2016)-63	93 (77-99)	128 (113-138)	108 (88-127)	132 (84-195)	11 (9-12)	40 (29-72)	40 (37-42)	2
INBON-HI-(2016)-74	92 (62-105)	132 (116-142)	95 (72-108)	159 (72-260)	10 (8-11)	40 (29-66)	40 (37-47)	2
BH 946	87 (64-100)	129 (115-138)	93 (63-113)	107 (68-177)	8 (6-11)	72 (56-90)	45 (39-49)	6
BH 959	84 (57-100)	132 (116-140)	85 (67-101)	92 (47-135)	9 (7-11)	75 (66-84)	41 (31-46)	6
BHS 400	94 (72-102)	134 (120-143)	93 (70-107)	99 (50-165)	9 (6-10)	74 (60-84)	41 (33-47)	6
RD 2715	85 (64-100)	130 (116-138)	103 (88-122)	85 (38-152)	10 (7-11)	76 (60-94)	47 (39-53)	6
DWRB 101	82 (58-93)	129 (115-136)	88 (54-105)	141 (69-241)	8 (6-11)	29 (26-32)	51 (40-57)	2
HUB 113	87 (70-95)	132 (118-142)	92 (72-108)	107 (68-166)	8 (5-11)	67 (56-80)	46 (41-51)	6

Table : Mean and range (in parenthesis) across the locations for ancillary characters of barley genotypes evaluated under EIBGN-(2017) at different locations of NEPZ in *rabi* 2016-17 season

Genotype	Days to Heading	Days to Maturity	Plant Height (cm)	Tillers/m	Spike Length (cm)	Grain/ Spike	1000-grain weight (g)	2/6 Row
3rdGSYT-(2016)-2	78 (72-93)	119 (102-128)	95 (91-100)	112 (78-145)	8 (5-15)	48 (38-57)	40 (36-43)	6
3rdGSYT-(2016)-3	77 (69-92)	117 (100-126)	89 (81-98)	131 (66-192)	10 (6-20)	33 (22-57)	42 (39-50)	2
3rdGSYT-(2016)-6	82 (73-93)	119 (102-128)	100 (90-112)	113 (80-143)	9 (5-17)	58 (46-73)	41 (38-46)	6
3rdGSYT-(2016)-10	80 (69-93)	119 (100-128)	103 (92-115)	98 (57-126)	9 (5-19)	55 (37-67)	42 (38-50)	6
3rdGSYT-(2016)-18	80 (63-103)	119 (96-138)	91 (85-96)	105 (78-143)	11 (6-22)	57 (36-75)	37 (32-42)	6
3rdGSYT-(2016)-22	78 (72-89)	117 (104-128)	95 (90-101)	95 (60-127)	9 (6-18)	54 (41-65)	37 (29-43)	6
3rdGSYT-(2016)-23	78 (69-89)	118 (102-126)	91 (82-97)	116 (58-145)	10 (7-15)	32 (22-47)	42 (39-50)	2
3rdGSYT-(2016)-24	78 (68-89)	119 (102-128)	88 (82-93)	125 (56-172)	10 (7-18)	31 (22-52)	42 (38-47)	2
IBYT-HI-(2016)-2	74 (67-80)	115 (100-122)	90 (76-97)	141 (71-210)	10 (6-20)	33 (26-55)	42 (39-45)	2
IBYT-HI-(2016)-3	78 (66-91)	116 (98-123)	95 (90-100)	115 (72-156)	11 (7-22)	60 (47-74)	36 (34-40)	6
IBYT-HI-(2016)-4	78 (68-90)	118 (100-125)	94 (89-100)	114 (72-141)	9 (5-17)	56 (48-66)	36 (31-40)	6
IBYT-HI-(2016)-9	80 (70-91)	118 (102-125)	95 (92-100)	105 (78-138)	10 (7-18)	54 (39-72)	37 (33-42)	6
IBYT-HI-(2016)-12	77 (70-85)	116 (102-122)	94 (90-96)	87 (52-119)	11 (7-19)	58 (46-75)	38 (32-42)	6
IBYT-HI-(2016)-15	80 (71-87)	118 (104-123)	91 (88-92)	103 (78-128)	10 (6-17)	58 (47-72)	37 (34-40)	6
IBYT-HI-(2016)-17	86 (73-90)	121 (104-133)	94 (93-96)	104 (70-138)	10 (7-20)	53 (36-60)	38 (30-46)	6
IBYT-HI-(2016)-18	74 (67-80)	115 (98-126)	93 (84-106)	113 (79-143)	10 (6-21)	48 (25-71)	35 (27-41)	6
IBYT-HI-(2016)-19	78 (67-85)	116 (98-125)	91 (87-98)	114 (65-143)	10 (6-17)	39 (28-51)	46 (40-55)	2
INBYT-HI-(2016)-2	81 (71-90)	118 (103-124)	94 (83-106)	85 (45-124)	10 (7-22)	56 (42-69)	40 (37-41)	6
INBYT-HI-(2016)-3	76 (67-82)	114 (98-122)	94 (82-100)	91 (56-130)	10 (6-20)	58 (43-73)	40 (34-44)	6
INBYT-HI-(2016)-10	77 (67-87)	117 (98-126)	99 (87-105)	110 (52-176)	11 (7-19)	60 (46-71)	39 (34-46)	6
INBYT-HI-(2016)-11	81 (71-93)	119 (101-128)	96 (90-102)	102 (59-140)	9 (5-17)	49 (36-62)	36 (32-43)	6
INBYT-HI-(2016)-12	81 (70-93)	120 (101-128)	91 (84-100)	86 (56-132)	9 (5-18)	53 (35-71)	38 (33-43)	6
INBYT-HI-(2016)-14	81 (70-93)	120 (102-128)	91 (82-98)	97 (54-143)	10 (6-19)	50 (32-60)	39 (35-43)	6
INBYT-HI-(2016)-16	80 (69-89)	117 (100-125)	96 (88-101)	114 (71-165)	9 (6-16)	49 (37-54)	38 (32-43)	6
INBYT-HI-(2016)-22	84 (71-100)	122 (104-133)	89 (82-98)	97 (60-150)	10 (8-18)	57 (41-73)	39 (29-44)	6

3rdGSBSN-(2016)-11	75 (61-85)	113 (94-122)	91 (77-102)	94 (45-133)	11 (6-21)	60 (32-83)	40 (34-43)	6
3rdGSBSN-(2016)-19	79 (68-93)	119 (100-128)	95 (88-100)	97 (51-135)	9 (6-18)	51 (24-72)	37 (33-43)	6
3rdGSBSN-(2016)-29	78 (63-90)	116 (94-125)	91 (84-96)	82 (59-134)	10 (6-19)	50 (36-67)	38 (34-43)	6
3rdGSBSN-(2016)-35	80 (68-93)	118 (100-128)	91 (82-106)	82 (39-138)	11 (7-21)	48 (37-63)	43 (41-44)	6
3rdGSBSN-(2016)-109	79 (71-93)	118 (102-128)	94 (84-112)	94 (46-136)	10 (6-20)	59 (45-68)	38 (26-45)	6
3rdGSBSN-(2016)-127	79 (62-93)	117 (94-128)	104 (90-116)	91 (58-125)	11 (7-22)	58 (37-75)	39 (35-43)	6
IBON-HI-(2016)-5	78 (65-90)	118 (95-127)	97 (91-104)	96 (53-145)	10 (7-18)	55 (35-66)	39 (34-43)	6
IBON-HI-(2016)-33	74 (61-82)	112 (93-121)	97 (94-107)	100 (59-142)	10 (6-19)	51 (37-66)	39 (30-46)	6
IBON-HI-(2016)-34	73 (61-81)	115 (93-127)	99 (90-106)	106 (61-140)	11 (7-21)	46 (20-74)	44 (32-55)	2
IBON-HI-(2016)-79	74 (62-82)	112 (94-120)	102 (99-105)	108 (59-162)	10 (6-20)	41 (24-54)	37 (33-43)	6
IBON-HI-(2016)-107	81 (70-93)	119 (102-128)	89 (78-94)	92 (51-147)	11 (6-21)	54 (32-72)	41 (39-43)	6
IBON-HI-(2016)-111	77 (65-90)	116 (97-124)	97 (90-102)	89 (48-130)	11 (7-21)	69 (58-84)	41 (38-43)	6
IBON-HI-(2016)-136	77 (69-85)	118 (101-126)	103 (87-115)	108 (69-131)	11 (7-21)	40 (28-73)	43 (41-47)	2
INBON-HI-(2016)-1	78 (65-89)	116 (98-123)	102 (85-117)	104 (54-174)	11 (7-22)	34 (22-62)	42 (39-46)	2
INBON-HI-(2016)-11	74 (63-83)	114 (96-123)	99 (91-104)	120 (64-165)	11 (8-20)	34 (22-61)	41 (36-45)	2
INBON-HI-(2016)-12	80 (69-91)	119 (102-126)	101 (90-109)	113 (73-170)	11 (6-21)	35 (22-68)	41 (40-43)	2
INBON-HI-(2016)-13	80 (70-93)	118 (102-128)	97 (93-103)	84 (52-133)	11 (6-24)	64 (58-72)	41 (35-45)	6
INBON-HI-(2016)-22	81 (70-92)	118 (102-125)	98 (87-104)	74 (59-105)	10 (5-20)	60 (52-69)	38 (33-43)	6
INBON-HI-(2016)-63	83 (71-99)	121 (104-132)	97 (84-110)	93 (64-124)	12 (7-23)	34 (22-64)	41 (34-45)	2
INBON-HI-(2016)-74	83 (70-102)	120 (102-134)	89 (83-99)	91 (56-133)	12 (8-20)	33 (21-58)	39 (35-43)	2
BH 946	77 (62-90)	116 (95-126)	89 (74-103)	99 (52-191)	9 (6-19)	52 (26-78)	40 (31-47)	6
BH 959	77 (65-93)	116 (95-128)	81 (59-96)	75 (38-123)	10 (5-19)	55 (25-76)	40 (34-49)	6
BHS 400	83 (70-101)	120 (102-134)	91 (81-106)	89 (39-139)	9 (5-20)	57 (23-78)	40 (35-48)	6
RD 2715	76 (61-93)	115 (93-128)	94 (82-104)	82 (32-144)	10 (6-21)	58 (35-74)	40 (28-49)	6
DWRB 101	76 (61-90)	115 (92-128)	86 (71-96)	105 (54-236)	9 (5-19)	36 (22-58)	44 (37-50)	2
HUB 113	76 (61-89)	115 (93-126)	93 (73-107)	110 (50-219)	10 (5-20)	54 (35-78)	40 (35-45)	6

Table : Mean and range (in parenthesis) across the locations for ancillary characters of barley genotypes evaluated under EIBGN-(2017) at different locations of NHZ

Variety	Days to Heading	Days to Maturity	Plant Height (cm)	Tillers/m	Spike Length (cm)	Grain/ Spike	1000-grain weight (g)	2/6 Row
3rdGSYT-(2016)-2	124 (114-133)	167 (156-178)	84 (76-92)	122 (117-126)	8 (7-8)	57 (49-65)	33 (31-34)	6
3rdGSYT-(2016)-3	125 (117-133)	166 (155-176)	84 (82-85)	132 (120-143)	8 (7-9)	31 (24-38)	50 (48-51)	2
3rdGSYT-(2016)-6	122 (113-130)	165 (156-174)	99 (98-100)	85 (80-90)	6 (6-6)	45 (37-52)	48 (46-50)	6
3rdGSYT-(2016)-10	122 (115-128)	167 (158-176)	99 (98-99)	80 (71-88)	9 (8-9)	55 (45-64)	39 (35-43)	6
3rdGSYT-(2016)-18	112 (108-116)	165 (157-173)	85 (82-87)	94 (90-98)	7 (6-7)	52 (39-64)	44 (42-45)	6
3rdGSYT-(2016)-22	122 (113-130)	164 (157-171)	91 (83-98)	105 (105-105)	6 (5-6)	46 (37-54)	45 (45-45)	6
3rdGSYT-(2016)-23	122 (116-128)	161 (155-166)	75 (63-87)	152 (126-178)	8 (7-8)	30 (26-33)	42 (36-47)	2
3rdGSYT-(2016)-24	122 (116-128)	162 (155-168)	74 (65-83)	145 (98-191)	8 (6-9)	25 (24-25)	39 (34-44)	2
IBYT-HI-(2016)-2	119 (114-123)	159 (155-163)	91 (90-92)	163 (132-194)	8 (7-8)	29 (28-30)	51 (49-52)	2
IBYT-HI-(2016)-3	121 (114-128)	167 (157-176)	87 (82-91)	111 (101-121)	7 (7-7)	57 (49-64)	42 (39-44)	6
IBYT-HI-(2016)-4	121 (114-128)	165 (156-174)	90 (84-96)	112 (94-130)	8 (6-9)	51 (33-68)	40 (39-40)	6
IBYT-HI-(2016)-9	125 (119-130)	167 (156-178)	86 (82-90)	96 (90-101)	8 (7-8)	46 (38-54)	40 (38-41)	6
IBYT-HI-(2016)-12	119 (115-123)	167 (156-178)	89 (80-98)	144 (82-205)	9 (8-10)	60 (49-70)	42 (42-42)	6
IBYT-HI-(2016)-15	123 (118-128)	168 (156-179)	94 (86-102)	101 (87-114)	8 (8-8)	52 (41-62)	35 (34-36)	6
IBYT-HI-(2016)-17	125 (125-125)	168 (159-176)	89 (77-101)	100 (75-125)	8 (8-8)	53 (49-56)	45 (44-46)	6
IBYT-HI-(2016)-18	119 (112-125)	164 (157-171)	88 (85-91)	112 (95-128)	7 (7-8)	52 (41-62)	39 (37-40)	6
IBYT-HI-(2016)-19	122 (116-128)	162 (156-168)	86 (80-91)	189 (130-248)	9 (9-9)	38 (33-43)	51 (48-53)	2
INBYT-HI-(2016)-2	122 (117-127)	165 (156-173)	94 (90-98)	138 (134-142)	8 (8-8)	51 (41-60)	38 (35-40)	6
INBYT-HI-(2016)-3	120 (118-122)	162 (156-168)	104 (98-109)	134 (111-157)	8 (7-8)	56 (41-70)	35 (30-40)	6
INBYT-HI-(2016)-10	119 (117-121)	161 (156-166)	94 (88-99)	111 (92-130)	9 (8-9)	57 (49-64)	36 (34-37)	6
INBYT-HI-(2016)-11	129 (125-133)	165 (156-174)	76 (70-82)	102 (89-114)	6 (6-6)	48 (43-53)	35 (35-35)	6
INBYT-HI-(2016)-12	129 (125-133)	166 (156-174)	78 (69-87)	88 (66-110)	6 (5-6)	55 (49-60)	29 (28-29)	6
INBYT-HI-(2016)-14	123 (118-128)	166 (156-176)	78 (75-80)	116 (103-128)	7 (7-7)	48 (41-54)	37 (35-39)	6
INBYT-HI-(2016)-16	123 (121-124)	163 (156-169)	86 (78-94)	96 (80-111)	7 (6-7)	52 (49-55)	39 (35-42)	6
INBYT-HI-(2016)-22	126 (123-128)	164 (157-171)	81 (66-95)	100 (62-138)	8 (8-8)	53 (41-65)	35 (32-37)	6
3rdGSBSN-(2016)-11	119 (115-123)	164 (159-169)	82 (65-99)	99 (92-106)	9 (7-10)	51 (49-52)	45 (43-47)	6
3rdGSBSN-(2016)-19	118 (110-126)	163 (157-168)	82 (75-89)	132 (120-143)	7 (6-7)	56 (49-62)	39 (36-42)	6
3rdGSBSN-(2016)-29	118 (110-126)	163 (156-170)	87 (77-96)	128 (96-160)	8 (8-8)	54 (41-66)	36 (35-36)	6
3rdGSBSN-(2016)-35	124 (118-130)	164 (156-172)	83 (79-86)	98 (92-104)	8 (7-9)	52 (45-59)	45 (42-47)	6
3rdGSBSN-(2016)-109	122 (118-125)	166 (156-176)	83 (77-88)	89 (69-108)	9 (8-9)	56 (41-71)	38 (35-41)	6
3rdGSBSN-(2016)-127	117 (109-125)	164 (157-170)	87 (85-89)	108 (92-123)	8 (7-8)	52 (49-54)	42 (40-43)	6
IBON-HI-(2016)-5	118 (112-123)	163 (158-168)	89 (85-92)	98 (93-102)	8 (8-8)	46 (33-58)	44 (43-44)	6
IBON-HI-(2016)-33	115 (114-116)	161 (155-166)	86 (73-99)	121 (96-145)	6 (6-6)	51 (37-64)	37 (32-42)	6

IBON-HI-(2016)-34	110 (105-114)	162 (156-167)	95 (88-101)	146 (106-185)	7 (7-7)	25 (19-30)	55 (48-62)	2
IBON-HI-(2016)-79	112 (105-118)	162 (157-166)	83 (77-89)	93 (92-93)	8 (7-8)	60 (41-78)	37 (36-38)	6
IBON-HI-(2016)-107	119 (114-123)	164 (158-170)	91 (81-101)	143 (98-187)	7 (7-7)	54 (41-67)	41 (39-42)	6
IBON-HI-(2016)-111	119 (114-124)	165 (157-173)	97 (81-113)	133 (112-154)	8 (7-9)	53 (45-60)	42 (40-43)	6
IBON-HI-(2016)-136	118 (114-121)	162 (156-168)	99 (90-107)	135 (106-163)	9 (8-9)	34 (31-37)	49 (43-54)	2
INBON-HI-(2016)-1	114 (107-121)	161 (156-166)	100 (92-107)	126 (93-159)	8 (7-8)	29 (26-31)	44 (43-45)	2
INBON-HI-(2016)-11	116 (107-124)	163 (156-169)	82 (81-83)	141 (118-164)	8 (7-8)	32 (29-35)	39 (35-42)	2
INBON-HI-(2016)-12	116 (108-123)	161 (156-166)	95 (93-96)	147 (114-179)	7 (7-7)	29 (26-31)	43 (40-46)	2
INBON-HI-(2016)-13	120 (114-126)	163 (156-170)	80 (75-84)	74 (69-78)	8 (7-9)	54 (37-71)	42 (40-44)	6
INBON-HI-(2016)-22	122 (115-128)	168 (156-180)	102 (99-104)	60 (48-72)	8 (7-8)	50 (45-54)	45 (44-45)	6
INBON-HI-(2016)-63	123 (116-130)	161 (156-166)	104 (92-116)	141 (125-156)	10 (9-10)	29 (28-29)	40 (39-41)	2
INBON-HI-(2016)-74	111 (92-130)	164 (159-168)	94 (93-95)	140 (135-145)	10 (9-10)	32 (31-32)	40 (37-42)	2
BH 946	117 (108-126)	163 (155-170)	85 (77-94)	110 (76-157)	7 (6-8)	55 (37-70)	47 (41-53)	6
BH 959	118 (106-128)	167 (156-179)	83 (70-91)	81 (48-110)	8 (7-9)	55 (33-72)	46 (42-49)	6
BHS 400	129 (118-140)	169 (156-182)	89 (81-102)	84 (41-142)	7 (7-8)	53 (37-64)	46 (41-48)	6
RD 2715	113 (105-122)	163 (156-172)	91 (77-103)	79 (51-102)	9 (6-12)	52 (39-60)	47 (41-56)	6
DWRB 101	115 (106-125)	163 (156-170)	82 (68-95)	134 (75-195)	7 (6-7)	29 (19-45)	48 (40-54)	2
HUB 113	121 (112-126)	169 (157-179)	81 (74-97)	109 (52-144)	6 (5-6)	44 (33-50)	46 (40-50)	6

National Barley Genetic Stock Nursery (NBGSN-2017)

This nursery comprising of a set of 27 promising entries endowed with trait(s) of breeding value, received from network centres, were evaluated during *rabi* season of 2016-17. This nursery was supplied to 11-centres (Rewa, Karnal, Durgapura, Kanpur, Hisar, Faizabad, Varanasi, Bajaura, Ludhiana, Pantnagar and Shimla) of barley network. All the centres have reported the data. Genotype wise means and ranges obtained for different ancillary traits, and grain yield (g/plot) 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 - (2017) at different locations in *rabi* 2016-17 season

S.No.	Genotype	Special features	Days to Heading	Days to Maturity	Plant Height (cm)	Tillers/m	Spike Length (cm)	Grain/ Spike	1000-Grain weight (g)	Grain per plot (g)	2/6 Row
1	DWRB 101	Yellow rust resistance	87 (61-123)	130 (94-176)	83 (72-95)	119 (43-236)	8 (6-17)	29 (19-48)	50 (42-60)	545 (77-1060)	2
2	DWRB 123	Over all good malt quality	87 (63-121)	131 (96-172)	85 (72-97)	125 (53-185)	9 (7-17)	29 (23-39)	52 (39-60)	473 (80-1066)	2
3	DWRB 127	Yellow rust resistance	85 (61-121)	129 (94-170)	91 (77-104)	110 (32-208)	9 (7-17)	27 (23-40)	55 (39-65)	500 (55-974)	2
4	DWRB 136	Yellow rust resistance, Leaf blight	89 (67-123)	130 (100-169)	85 (72-102)	118 (48-226)	8 (6-16)	26 (20-38)	50 (31-59)	548 (60-1360)	2
5	DWRB 137	Yellow rust resistance	87 (65-121)	130 (98-171)	77 (59-97)	99 (39-189)	8 (7-15)	60 (40-88)	48 (41-58)	670 (90-1542)	6
6	DWRB 154	Yellow rust resistance, High protein, Over all good malt quality	89 (65-120)	131 (98-168)	84 (73-108)	113 (56-202)	9 (7-16)	26 (19-41)	58 (42-65)	585 (70-1345)	2
7	MBGSN 145	High yield and dwarf	88 (63-123)	130 (96-174)	81 (60-97)	123 (54-213)	8 (6-15)	30 (21-56)	55 (47-62)	606 (110-1275)	2
8	MBGSN 147	High yield and dwarf	93 (69-131)	133 (101-176)	77 (61-98)	92 (40-138)	10 (7-21)	67 (42-86)	38 (28-44)	503 (100-1146)	6
9	RD2900	Yellow and brown rust resistance	85 (58-123)	129 (94-170)	92 (68-112)	89 (49-122)	10 (6-19)	68 (41-88)	42 (29-67)	587 (60-1200)	6
10	RD2903	Yellow rust resistance	95 (60-213)	132 (96-176)	93 (78-111)	88 (48-130)	10 (7-22)	60 (40-90)	47 (32-55)	610 (42-1250)	6
11	RD2909	Yellow rust resistance	86 (61-121)	130 (97-174)	96 (75-119)	86 (36-128)	10 (7-18)	66 (41-90)	41 (27-48)	477 (44-1010)	6
12	RD2913	Yellow rust resistance	85 (61-120)	130 (98-168)	95 (82-112)	89 (44-135)	11 (7-19)	67 (40-96)	45 (38-53)	512 (45-1250)	6
13	RD2914	Yellow rust resistance	89 (64-125)	132 (98-178)	93 (73-113)	95 (49-182)	10 (6-20)	63 (32-85)	43 (31-51)	533 (53-1200)	6
14	RD2919	High beta-glucan	90 (71-120)	132 (101-172)	84 (70-99)	112 (58-154)	9 (7-17)	30 (22-60)	53 (41-60)	484 (80-1250)	2
15	RD2946	Over all good malt quality	88 (63-124)	131 (100-176)	97 (83-113)	101 (60-165)	10 (8-22)	31 (23-68)	58 (39-70)	471 (60-1000)	2
16	BH1001	High beta-glucan	93 (70-130)	133 (102-174)	90 (70-115)	138 (66-228)	10 (7-19)	28 (19-51)	48 (38-56)	528 (61-1200)	2
17	BH1003	Over all good malt quality	93 (72-130)	132 (102-171)	97 (75-115)	136 (54-262)	11 (6-19)	34 (25-64)	45 (37-52)	586 (68-1304)	2
18	BH1009	Yellow rust resistance	92 (67-128)	133 (98-178)	91 (66-104)	99 (36-169)	8 (6-15)	57 (30-72)	44 (37-50)	669 (47-1858)	6
19	BH1011	Yellow rust resistance	87 (61-124)	130 (97-174)	84 (60-103)	119 (52-190)	8 (5-16)	30 (15-66)	48 (42-54)	579 (27-1086)	2

20	BH1013	Yellow rust resistance	87 (63-121)	130 (98-174)	86 (62-101)	118 (55-225)	9 (6-18)	31 (19-58)	47 (37-55)	535 (40-1146)	2
21	BH1014	Yellow rust resistance	87 (63-121)	131 (98-176)	86 (68-99)	126 (44-225)	9 (6-19)	28 (22-44)	49 (40-58)	627 (50-1218)	2
22	VLB130	Yellow rust resistance, black rust	87 (66-123)	131 (100-177)	86 (62-102)	137 (48-300)	8 (6-18)	29 (17-64)	47 (36-54)	644 (50-1290)	2
23	VLB147	Yellow rust resistance	97 (70-132)	134 (104-181)	82 (58-104)	126 (51-198)	10 (7-20)	28 (20-45)	43 (29-55)	484 (58-1500)	2
24	HUB246	Yellow rust resistance	91 (69-131)	132 (100-169)	104 (70-133)	80 (28-120)	10 (6-22)	60 (30-74)	46 (33-56)	546 (32-1274)	6
25	HUB247	Yellow rust resistance	90 (61-125)	131 (96-178)	103 (66-127)	94 (48-135)	9 (5-20)	61 (31-78)	49 (39-55)	561 (32-1300)	6
26	PL874	Yellow rust resistance	88 (64-123)	131 (100--176)	86 (68-102)	124 (70-203)	8 (6-15)	31 (22-60)	46 (35-58)	520 (42-800)	2
27	PL890	High beta-glucan	88 (64-123)	131 (100-178)	86 (60-110)	134 (56-306)	9 (7-18)	30 (22-57)	49 (38-60)	651 (44-1690)	2

Seed Production Programme of Barley (Rabi, 2016-17)

Indent of Breeder Seed

To meet out the barley seed requirement of the country a consolidated indent of 1140.75q breeder seed of 38 varieties was received from Deputy Commissioner (Seeds), DAC, Ministry of Agriculture & Farmers Welfare, Govt. of India. The indent included the requirement of seven Indian states (Haryana, Himachal Pradesh, Jharkhand, Madhya Pradesh, Rajasthan, Uttar Pradesh and Uttarakhand) and three other national agencies (Hindustan Insecticides Limited, National Seeds Corporation and Seed Association of India). The highest indent was placed by NSAI (424.15q) followed by Rajasthan (315.00q), Uttar Pradesh (200.00q), National Seed Corporation (114.00q), Madhya Pradesh (56.00q) etc.

From variety point of view, the highest indent was received for variety RD2786 (186.00q) followed by RD2794 (121.00), PL426 (96.15q), DWRUB52 (94.30q), RD2035 (71.40q), HUB113 (63.00q) etc. Among all 38 varieties, more than half of the total indent was reported for these varieties.

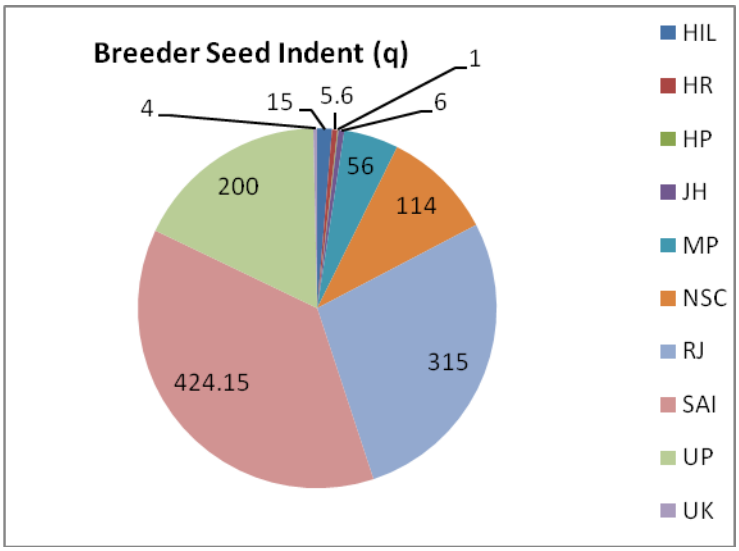


Fig.1: Breeder seed indent (q) of different agencies

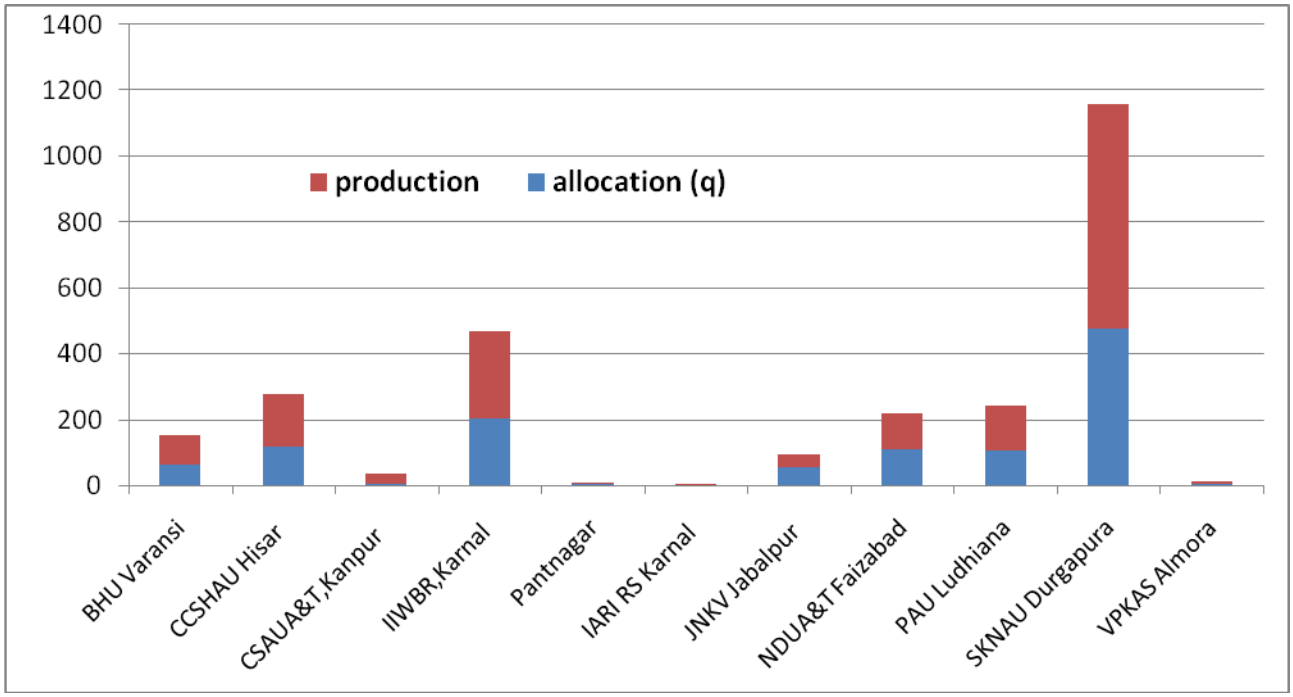
Production Status of Breeder Seed

The responsibility of 1140.75q breeder seed production of 38 barley varieties was assigned to 11 seed producing centres and the purity of breeder seed production was verified by conducting 'Grow out Test' at IIWBR, Karnal and various other centres.

On production front, a net quantity of 1521.86q was reported to be produced at different cooperating centres, which was significantly surplus (+381.11q) over the total allocated quantity (1140.75q) of breeder seed. Out of total 38 allocated varieties, the seed of 35 varieties was produced successfully and the rest of three varieties namely PL-172, NDB-1020 and PB 502 could not be produced due to non-availability of their nucleus seeds with the concerned cooperating centres. Among all varieties, the maximum production was reported for RD2786 (300.00q) followed by RD2794 (160.00q), PL 426 (110.29q), DWRUB 52 (93.60q) HUB 113

(90.00q) etc. From cooperating centers' point of view, the maximum production (680.50q) was reported from RARI-SKNV, Durgapura, followed by IIWBR, Karnal (265.83q) and CCS HAU Hisar (161.90q). In most of the varieties, sufficient breeder seed was produced to fulfill the DAC requirement. However, a deficit seed production was reported in a couple of varieties JB 58 (-20.19q), NDB 1445 (-9.00q), RD 2052 (-16.50q) etc. at different production centres.

Production and allocation of breeder seed at different centres



Test stock multiplication and Nucleus Seed production

To ensure the breeder seed requirement for next year, the responsibility of 56.90 q nucleus seed of 38 varieties was assigned to different cooperating centres. In response to this allocation, a total of 77.19q nucleus seed of 33 barley varieties was reported by different production centres. Maximum nucleus seed production was observed for variety RD2715 (7.0q) followed by DWRB101 (6.47q), PL 426(5.00q), RD2035 (5.0q) etc. The assignment of nucleus seed production of five varieties could not be accomplished by respective cooperating centres. Out of these five varieties, one variety (K508) is of CSUA&T Kanpur and rest four varieties (NDB-940, NDB1020, NDB1173 and NDB1445) belong to NDUA&T Faizabad. The total barley nucleus seed production (77.19q) is significantly surplus (+20.29q) to the allocated quantity (56.90q). In addition, test stock multiplication of DWRB-123 (80.0q) was also reported from National Seed Corporation Limited.

Barley Breeder Seed Indent for Rabi 2016-17 (Variety wise)

S.No.	Variety Name	Year	HIL	HR	HP	JH	MP	NSC	RJ	SAI	UP	UK	Total
1	BH-393	2002		2.00						58.90			60.90
2	BH 885	2012		0.30									0.30
3	BH-902	2010		3.00				21.00		6.90			30.90
4	BH-946	2014						8.00					8.00
5	BH-959	2015						6.00	10.00				16.00
6	Pusa Losar (BH-380)	2010			0.50								0.50
7	BHS-400 (Pusa Sheetal)	2014			0.50								0.50
8	DWRUB 52	2007		0.30				4.00		90.00			94.30
9	DWRUB64	2012				3.00		15.00		2.10	3.00		23.10
10	DWRB-73	2011									18.00		18.00
11	DWRB-92	2014									9.00		9.00
12	DWRB 101	2015						8.00		40.00	10.00		58.00
13	PL - 172	1987								6.40			6.40
14	PL-426	1996								96.15			96.15
15	PL-751	2007								1.00			1.00
16	PL-807	2011								2.00			2.00
17	RD-2035	1994								71.40			71.40
18	RD - 2052	1991								37.50			37.50
19	RD-2552	2000								1.40			1.40
20	RD-2624	2005								1.00			1.00
21	RD-2660	2006	1.00					32.00					33.00
22	RD-2715	2009	5.00					15.00	5.00				25.00
23	RD-2786	2013	2.00					4.00	180.00				186.00
24	RD-2794	2013						1.00	120.00				121.00
25	JB-58	2005					41.00						41.00
26	Jawahar Barley-1 (JB-110)	2010					15.00						15.00
27	MAHAMANA 113(HUB 113)	2014				3.00					60.00		63.00
28	NARENDRA BARLEY-2 (NDB-940)	2001								1.20			1.20
29	NARENDRA BARLEY-3 (NDB-1020)	2002								1.20			1.20
30	Narendra Barley-5 (NDB-943)	2009	5.00							1.20	40.00		46.20
31	NDB-1173	2005								1.20			1.20
32	NARENDRA BARLEY 1445 (NBD-1445)	2014									60.00		60.00
33	PRAGATI (K-508)	1998								1.80			1.80
34	K-509	1997								1.20			1.20
35	RITAMBHARA (K-551)	1998								0.40			0.40
36	PRB-502	2010								1.20			1.20
37	UPB-1008	2011										2.00	2.00
38	VL Jau 118 (VLB 118)	2015	2.00									2.00	4.00
		Total	*15.00*	*5.60*	*1.00*	*6.00*	*56.00*	*114.00*	*315.00*	*424.15*	*200.00*	*4.00*	**1140.75**

Barley Breeder Seed Indent for Rabi 2016-17 (Centre wise)

S. No.	Centre name	Variety Name	Year	HIL	HR	HP	JH	MP	NSC	RJ	SAI	UP	UK	Total
1	CCSHAU,Hisar	BH-393	2002		2.00						58.90			60.90
2		BH 885	2012		0.30									0.30
3		BH-902	2010		3.00				21.00		6.90			30.90
4		BH-946	2014						8.00					8.00
5		BH-959	2015						6.00	10.00				16.00
6	IARI,RS Shimla	Pusa Losar (BHS-380)	2010			0.50								0.50
7		BHS-400 (Pusa Sheetal)	2014			0.50								0.50
8	IIWBR, Karnal	DWRUB 52	2007		0.30				4.00		90.00			94.30
9		DWRUB64	2012				3.00		15.00		2.10	3.00		23.10
10		DWRB-73	2011									18.00		18.00
11		DWRB-92	2014									9.00		9.00
12		DWRB 101	2015						8.00		40.00	10.00		58.00
13	PAU,Ludhina	PL-172	1987								6.40			6.40
14		PL-426	1996								96.15			96.15
15		PL-751	2007								1.00			1.00
16		PL-807	2011								2.00			2.00
17	RARI,SKNAU, Durgapura	RD-2035	1994								71.40			71.40
18		RD - 2052	1991								37.50			37.50
19		RD-2552	2000								1.40			1.40
20		RD-2624	2005								1.00			1.00
21		RD-2660	2006	1.00					32.00					33.00
22		RD-2715	2009	5.00					15.00	5.00				25.00
23		RD-2786	2013	2.00					4.00	180.00				186.00
24		RD-2794	2013						1.00	120.00				121.00
25	JNKV, Jabalpur	JB-58	2005					41.00						41.00
26		Jawahar Barley-1 (JB-110)	2010					15.00						15.00
27	BHU, Varanasi	Mahamana -113 (HUB 113)	2014				3.00					60.00		63.00
28	NDUA&T,Faizabad	Narendra Barley -2 (NDB-940)	2001								1.20			1.20
29		Narendra Barley -3 (NDB-1020)	2002								1.20			1.20
30		Narendra Barley-5 (NDB-943)	2009	5.00							1.20	40.00		46.20
31		NDB-1173	2005								1.20			1.20
32		Narendra Barley-1445 (NBD-1445)	2014									60.00		60.00
33	CSAUA&T,Kanpur	Pragati (K-508)	1998								1.80			1.80
34		K-409									1.20			1.20
35		Ritambhara (K-551)	1998								0.40			0.40
36	GBPUA&T, Pantnagar	PRB-502	2010								1.20			1.20
37		UPB-1008	2011										2.00	2.00
38	VPKAS, Almora	VL Jau 118 (VLB 118)	2015	2.00									2.00	4.00
			Total	*15.00*	*5.60*	*1.00*	*6.00*	*56.00*	*114.00*	*315.00*	*424.15*	*200.00*	*4.00*	**1140.75**

Centre wise Breeder and Nucleus Seed Production of Barley (2016-17)

SN	Center	Variety	Year of Release	Breeder Seed				Nucleus seed			
				Indent (q)	Allocation (q)	Production (q)	Surplus(+)/Deficit (-) q	Indent (q)	Allocation (q)	Production (q)	Surplus(+)/ Deficit (-) q
1	BHU Varanasi	HUB-113	2014	63.00	63.00	90.00	+27.00	3.00	3.00	4.00	+1.00
		Total		63.00	63.00	90.00	+27.00	3.00	3.00	4.00	+1.00
2	CCS HAU, Hisar	BH-393	2002	60.90	60.90	68.80	+07.90	3.00	3.00	3.60	+0.60
		BH-885	2012	00.30	00.30	00.30	00.00	0.10	0.10	0.30	+0.20
		BH-902	2010	30.90	30.90	41.20	+10.30	1.50	1.50	2.10	+0.60
		BH-946	2014	08.00	08.00	18.40	+10.40	0.40	0.40	1.20	+0.80
		BH-959	2015	16.00	16.00	33.20	+17.20	1.00	1.00	1.80	+0.80
		Total		116.10	116.10	161.90	+45.80	6.00	6.00	9.00	+3.00
3	CSAUAT, Kanpur	K-409	1997	1.20	1.20	8.50	+7.30	0.10	0.10	0.65	+0.55
		K-508	1998	1.80	1.80	5.20	+3.40	0.10	0.10	Nil	-0.10
		K-551	1998	0.40	0.40	19.50	19.10	0.10	0.10	1.10	+1.00
		Total		3.40	3.40	33.20	+29.80	0.30	0.30	1.75	+1.45
4	IIWBR, Karnal	DWRUB-52	2007	94.30	94.30	93.60	-00.70	4.00	4.00	3.96	-0.04
		DWRUB-64	2012	23.10	23.10	28.00	+04.90	1.00	1.00	1.00	0.00
		DWRB-73	2011	18.00	18.00	18.63	+00.63	1.00	1.00	2.00	+1.00
		DWRB-92	2014	9.00	9.00	13.20	+04.20	0.50	0.50	1.00	+0.50
		DWRB-101	2015	58.00	58.00	74.00	+16.00	3.00	3.00	6.47	+3.47
		DWRB-123	2017	NIL	NIL	38.40	+38.40	1.00	1.00	3.20	+2.20
		Total		202.40	202.40	265.83	+63.43	10.50	10.50	17.63	+7.13
5	GBPUAT, Pantnagar	PRB-502	2010	1.20	1.20	NIL	-1.20	0.10	0.10	0.40	+0.30
		UPB-1008	2011	2.00	2.00	5.00	+3.00	0.10	0.10	0.60	+0.50
		Total		3.20	3.20	5.00	+1.80	0.20	0.20	1.00	+0.80
6	IARI, Karnal	BHS-380	2010	0.50	0.50	0.50	0.00	0.10	0.10	0.41	+0.31
		BHS-400	2014	0.50	0.50	2.50	+2.00	0.10	0.10	0.70	+0.60
		Total		1.00	1.00	3.00	+2.00	0.20	0.20	1.11	+0.91
7	JNKVV, Jabalpur	JB-58	2005	41.00	41.00	20.81	-20.19	2.00	2.00	1.50	-0.50
		JB-110	2010	15.00	15.00	16.33	+1.33	1.00	1.00	1.50	+0.50
		Total		56.00	56.00	37.14	-18.86	3.00	3.00	3.00	NIL
8	NDUA&T, Faizabad	NDB-940	2001	1.20	1.20	10.50	+9.30	3.00	3.00	0.00	-3.00
		NDB-1020	2002	1.20	1.20	NILL	-1.20	0.10	0.10	0.00	-0.10
		NDB-943	2009	46.20	46.20	34.00	-12.20	0.10	0.10	0.20	+0.10
		NDB-1173	2005	1.20	1.20	12.50	+11.30	2.00	2.00	0.00	-2.00
		NBD-1445	2014	60.00	60.00	51.00	-9.00	0.10	0.10	0.00	-0.10
		Total		109.80	109.80	108.00	-1.80	5.30	5.30	0.20	-5.10
9	PAU, Ludhiana	PL-172	1987	6.40	6.40	NIL	-6.40	0.30	0.30	2.00	+1.70
		PL-426	1996	96.15	96.15	110.29	+14.14	5.00	5.00	5.00	0.00
		PL-751	2007	1.00	1.00	16.00	+15.00	0.10	0.10	2.00	+1.90
		PL-807	2011	2.00	2.00	10.00	+8.00	0.10	0.10	2.00	+1.90
			Total	105.55	105.55	136.29	+30.74	5.50	5.50	11.00	+5.50
10	RARI, SKNAU, Durgapura	RD-2035	1994	71.40	71.40	70.00	-1.40	3.50	3.50	5.00	+ 1.50
		RD-2052	1991	37.50	37.50	21.00	-16.50	1.50	1.50	2.50	+1.00
		RD-2552	2000	1.40	1.40	02.00	+0.60	0.10	0.10	2.00	+1.90
		RD-2624	2005	1.00	1.00	00.50	-01.50	0.10	0.10	0.50	+0.40
		RD-2660	2006	33.00	33.00	75.00	+42.00	1.50	1.50	2.50	+1.00
		RD-2715	2009	25.00	25.00	52.00	+27.00	1.00	1.00	7.00	+6.00
		RD-2786	2013	186.00	186.00	300.00	+114.00	9.00	9.00	4.00	-5.00
		RD-2794	2013	121.00	121.00	160.00	+39.00	6.00	6.00	3.00	-3.00
			Total	476.30	476.30	680.50	+204.20	22.70	22.70	26.50	+3.80
11	VPKAS, Almora	VLB-118	2015	4.00	4.00	6.00	+2.00	0.20	0.20	2.00	+1.80
			Total	4.00	4.00	6.00	+2.00	0.20	0.20	2.00	+1.80
		Grand Total		1140.75	1140.75	1521.86	+381.11	56.90	56.90	77.19	+20.29

BARLEY CROP PROTECTION

Status of barley diseases

The surveys were conducted by scientists from different cooperating centres for recording the presence of barley diseases and insects in their command area throughout the crop season 2016-17. The scientists from cooperating centre RARI, Durgapura, Jaipur surveyed on 20th and 21st January 2017 in the area of Lalsot, Deedwan, Ramgarh, Salempura, Bhandana, Bichhya areas of district Dausa and Kalwad, Ramkui, Pachar, Idan ka bas, Bobas, Jobner, Dungari, Karansar, Harsoli, Kanarpura, Tadawas, Raythal & Punana areas of district Jaipur and also on 25th February 2017 in the area of Shapura, Pragpura, Paota, Nareheda, Chimanpura areas of district Jaipur to know the status of barley diseases on farmers field.

None of the rust was observed during this season. However, loose smut, *Drechslera* stripe, covered smut and bacterial streak diseases of barley were noted *in traces* to 5 per cent at village Deedwana (N 27° 23.324' and E 075° 49.157'), Bichhya (N 27° 23.324' and E 075° 49.157'), Lalsot (N26° 35.884' and E 076° 19.728', 336m), Bhandana (N 26° 53.338' and E 076° 14.832', 327m) of district Dausa and Bassi (N 27° 51.262' and E 076° 00.766', 344m), Champapura (N 26° 51.260' and E 076° 00.765'), Bobas (N 26° 51.260' and E 076° 00.765'), Jobner (N 26° 58.952' and E 075° 25.866', 380 m) Karansar (N 27° 04.521' and E 075° 27.155', 410m), Kanarpura (N 27° 11.050' and E 075° 34.305' 435m) of district Jaipur. However, 20 per cent incidence of loose smut was noted in variety RD2624 at village Idan ka bas (N 26° 51.260' and E 076° 00.765') and 25 percent incidence of *Drechslera* stripe was noted in variety BH 393 at village Tadawas (N 27° 08.099' and E 075° 32.619', 418m).

Survey from the scientist of BUH were conducted in March 2017 in the area of Mirzapur, Varanasi, Gazipur and Azamgarh where the commonly K-125, JYOTI, RATNA, Lakhan RD-2552, RD-2508 varieties were in the farmers field. No rust were observed in the surveyed area, whereas, leaf blight was common and in some fields it is upto 67. In few fields covered and loose smut were also observed but incidence was very low less than 1%.

Survey was also conducted in Almora and Bageshwar district and in very few fields very low incidence of only powdery mildew was observed. Overall barley crop was healthy in all the barley growing areas in India.

Incidence of barley rusts and pathotype distribution during 2016-17

Barley rusts were not prevalent in most of the areas. Thirteen samples of barley yellow rust from Himachal Pradesh, Uttarakhand, Rajasthan and four of brown rust from Jammu Kashmir and Himachal Pradesh were analyzed for pathotype distribution. Numerically pt. M of yellow rust was observed in more samples than 57. In case of brown rust of barley, pt. H3 was analyzed in all the samples.

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

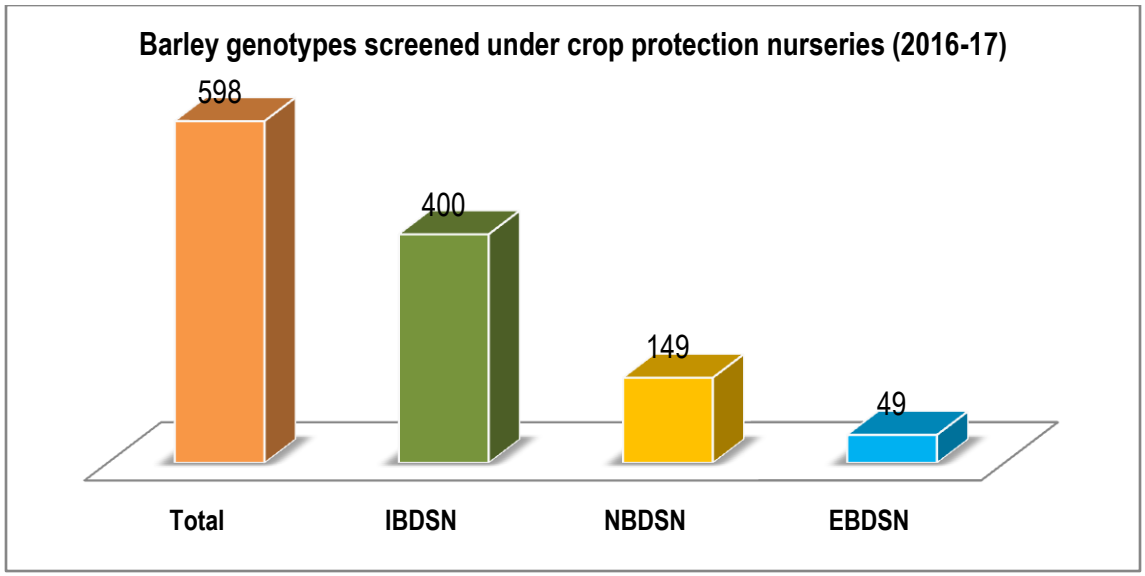
no report from any centre for presence of any of following quarantined pests (disease / insect pest) in their respective areas during the crop season 2016-17.

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)

A total 598 entries were screened during the year 2016-17, under various nurseries (IBDSN, NBDSN and EBDSN) for resistance against various diseases, aphid and CCN at different cooperating centers. There were 400 entries under IBDSN, 149 were for NBDSN and 49 for EBDSN. Seedling Resistance Test (SRT) for NBDSN and EBDSN entries was conducted at DWR Regional station, Shimla.



During this season, 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 screened for aphid in five locations viz., Vijapur, Ludhiana, Kanpur, Karnal and Durgapura and for CCN resistance at three locations Ludhiana, Hisar, and Durgapura.

Initial Barley Disease Screening Nursery (IBDSN) 2016-17

A total of 400 entries were screened under IBDSN during 2015-16 crop season for resistance against major diseases viz., stripe rust and leaf blight at various coordinating centres. The screening of stripe rust was done at Durgapura, Ludhiana, Almora, Bajaura, Dhaulakuan, Jammu and Karnal. The yellow rust severity remained very low at Almora and Dhaulakhuan so these data are not included. Leaf rust screening was done at Ludhiana but due to poor rust development the entries could not be screened properly for leaf rust resistance. The leaf blight screening was done at Dharwad, Pantnagar, Varanasi, Kanpur and Faizabad. The data from the Dharwad are

extraordinarily high, it may be that recordings were made very late in season, hence not included.

The inocula for stripe rusts 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 was applied by centres in the field during Jan..- Feb. 2017 and the scoring of blight disease was done at dough stage in double digit scale on F and F-1 leaf. The highest score (HS) was taken into consideration for leaf blight whereas in case of rust, 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, the genotypes showed an average score of 00-13 with highest score upto 35 at multilocation were considered highly resistant and genotypes with average score of 14-35 with HS 57 and 36 - 57 with highest score not exceeding 69 were considered as resistant (R) and moderately resistant (MR), respectively.

Out of 400 IBDSN entries tested, 42 entries were found free from yellow rust (ACI = 0) and 183 entries showed resistant reaction have ACI less than 10. In case of leaf blight screening, 32 entries were found resistant against leaf blight.

Yellow rust, ACI = 0, Entries – 42,	UPBM 2, PKB 1634, BK 1601, BK 1622, HBL 789, HBL 802, HBL 806, HBL 814, HBL 815, HBL 817, JB 360, JB 362, JB 363, BL 1216, BL 1238, BL 1278, PL 887, NDB 1698, BBM 760, BBM 762, VB 1607, BD 1713, BD 1717, BD 1719, BD 1721, BD 1725, BD 1727, BD 1729, BD 1730, BD 1731, BD 1732, BD 1738, BD 1739, BD 1744, BD 1745, BD 1746, BD 1748, BD 1749, DWRFB 14, DWRFB 19, DWRFB 20 and DWRNB 23
Yellow rust, ACI > 0 to 10, Entries – 183,	PKB 1605, JB 364, HBL 791, BD 1733, DWRNB 25, UPBM 4, UPBM 13, BK 1603, HBL 795, JB 361, BBM 763, BD 1714, BD 1740, DWRFB 15, BK 1609, BK 1614, BK 1634, HBL 807, BL 1296, VB 1603, PKB 1633, BK 1617, BK 1632, HBL 813, HBL 816, JB 357, BL 1228, BL 1294, VB 1601, VB 1620, VB 1623, VB 1627, BD 1720, BD 1726, BD 1728, BD 1747, BD 1750, DWRFB 12, UPBM 3, UPBM 15, BK 1616, BK 1619, HBL 792, HBL 804, JB 365, BD 1734, BD 1735, BD 1736, BH 1626, HBL 812, VB 1630, VB 1631, PKB 1621, HBL 825, PKB 1614, BK 1631, HBL 827, BBM 748, BK 1610, BH 1618, BH 1644, UPBM 6, BK 1608, BL 1293, PL 890, PKB 1620, BK 1612, HBL 819, JB 354, JB 366, VB 1624, VB 1632, BH 1628, VB 1629, UPBM 14, HBL 805, BBM 759, BD 1715, BBM 758, VB 1621, VB 1626, DWRFB 28, BD 1741, HBL 790, HBL 821, HBL 822, HBL 826, VB 1617, DWRNB 17, DWRNB 28, HBL 818, VB 1615, BBM 752, BK 1624, BK 1629, JB 355, BL 1279, NDB 1680, PKB 1609, BK 1602, BK 1607, HBL 823, BL 1237, BBM 756, BBM 766, HUBL 1609, HUBL 1616, VB 1609, DWRFB 10, BBM 767, BD 1742, PKB 1616, BK 1628, VB 1610, UPBM 10, BBM 754, JB 367, VB 1611, DWRFB 27, JB 371, BL 1233, BH 1616, BK 1615, HBL 797, HUBL 1610, BH 1601, BH 1627, BH 1646, BK 1605, BK 1621, UPBM 8, UPBM 11, HBL 787, NDB 1699, BBM 745, VB 1608, VB 1612, VB 1625, BH 1621, BH 1625, PKB 1632, DWRNB 20, PKB 1628, BH 1604, BH 1638, PL 891, DWRNB 18, PKB 1625, BK 1606, VB 1628, BH 1609, BH 1603, BH 1642, PKB 1638, BD 1716, DWRFB 23, DWRFB 29, PKB 1640, BK 1611, JB 353, BH 1602, BH 1637, BH 1640, BH 1606, BK 1618, HBL 810, VB 1619, VB 1618, BBM 751, VB 1605, BD 1712, BL 1165, BD 1711, BD 1737, BH 1639, BK 1627, VB 1622, BL 1217, PKB 1627, BH 1623, NDB 1682, BBM 764 and BH 1645
Leaf blight,	UPBM 1, PKB 1601, PKB 1615, PKB 1617, PKB 1622, PKB 1626, PKB 1627,

Avg. 13-35 with HS < 57, Entries - 32	PKB 1631, PKB 1632, PKB 1633, BK 1611, BK 1612, BK 1616, BK 1625, BK 1626, BK 1627, BK 1633, HBL 825, BL 1255, NDB 1700, BH 1604, BH 1611, BH 1623, BH 1625, BH 1626, BH 1645, DWRFB 1, DWRFB 7, DWRFB 8, DWRFB 28, DWRFB 29, and DWRNB 17

Reactions of different entries of barley in Initial Barley Disease Screening Nursery (IBDSN), 2016-17

S. No.	IBDSN Entries (2016- 17)	Yellow Rust		Leaf Blight	
		ACI	HS	Avg.	HS
1	UPBM 1	34.00	60S	35	46
2	UPBM 2	0.00	0	46	57
3	UPBM 3	0.96	5MS	57	67
4	UPBM 4	0.16	TMS	46	69
5	UPBM 5	12.00	30S	36	57
6	UPBM 6	1.80	5S	46	57
7	UPBM 7	58.00	80S	46	67
8	UPBM 8	6.00	20S	46	57
9	UPBM 9	34.00	60S	46	58
10	UPBM 10	4.60	15S	36	47
11	UPBM 11	6.00	20S	46	67
12	UPBM 12	20.00	40S	46	58
13	UPBM 13	0.16	TMS	46	57
14	UPBM 14	2.40	10S	46	47
15	UPBM 15	0.96	5MS	46	68
16	PKB 1601	68.00	100S	35	45
17	PKB 1602	62.00	80S	57	68
18	PKB 1603	64.00	100S	46	57
19	PKB 1604	84.00	100S	48	68
20	PKB 1605	0.04	TR	46	68
20A	Infector	84.00	100S	78	89
21	PKB 1606	13.00	30S	47	68
22	PKB 1607	68.00	100S	68	89
23	PKB 1608	52.00	80S	68	78
24	PKB 1609	4.00	20S	68	89
25	PKB 1610	58.00	80S	47	67
26	PKB 1611	56.00	80S	57	68
27	PKB 1612	60.00	80S	57	89
28	PKB 1613	56.00	80S	67	89
29	PKB 1614	1.40	5S	68	89
30	PKB 1615	36.20	80S	35	57
31	PKB 1616	4.40	20S	57	79

32	PKB 1617	12.00	40S	35	57
33	PKB 1618	10.60	20S	35	58
34	PKB 1619	12.00	60S*	47	78
35	PKB 1620	2.00	15MR	78	99
36	PKB 1621	1.20	5MS	78	89
37	PKB 1622	15.00	30S	35	47
38	PKB 1623	30.00	60S	46	58
39	PKB 1624	38.00	80S	57	89
40	PKB 1625	7.00	20S	56	89
40A	Infector	80.00	100S	79	89
41	PKB 1626	13.00	30S	35	36
42	PKB 1627	9.80	40S	35	46
43	PKB 1628	6.60	10S	56	89
44	PKB 1629	17.00	40S	57	89
45	PKB 1630	50.00	100S	67	89
46	PKB 1631	18.08	40S	35	47
47	PKB 1632	6.40	20S	35	45
48	PKB 1633	0.56	5MR	35	46
49	PKB 1634	0.00	0	57	69
50	PKB 1635	68.00	100S	57	67
51	PKB 1636	11.80	30S	36	58
52	PKB 1637	28.00	60S	45	57
53	PKB 1638	7.20	20S	57	89
54	PKB 1639	48.00	100S	68	89
55	PKB 1640	8.00	20S	47	69
56	BK 1601	0.00	0	46	67
57	BK 1602	4.00	20S	58	89
58	BK 1603	0.16	TMS	46	89
59	BK 1604	20.00	40S	36	57
60	BK 1605	5.80	15S	56	68
60A	Infector	80.00	100S	79	89
61	BK 1606	7.00	20S	57	79
62	BK 1607	4.00	10S	47	89
63	BK 1608	1.80	5S	57	89
64	BK 1609	0.40	5MR	57	68
65	BK 1610	1.60	5MS	46	56
66	BK 1611	8.00	15S	35	46
67	BK 1612	2.00	10S	35	56
68	BK 1613	28.00	60S	57	68

69	BK 1614	0.40	5MR	57	78
70	BK 1615	5.24	10S	58	79
71	BK 1616	1.00	5MS	35	57
72	BK 1617	0.80	5MS	57	69
73	BK 1618	8.40	40S*	57	68
74	BK 1619	1.00	5S	68	89
75	BK 1620	23.00	40S	67	78
76	BK 1621	5.80	20S	67	89
77	BK 1622	0.00	0	57	68
78	BK 1623	38.00	60S	46	46
79	BK 1624	3.60	10S	46	67
80	BK 1625	25.20	40S	35	45
80A	Infector	72.00	100S	88	98
81	BK 1626	19.00	40S	24	25
82	BK 1627	9.20	15S	35	57
83	BK 1628	4.40	15S	46	57
84	BK 1629	3.60	10S	46	68
85	BK 1630	11.20	20S	36	57
86	BK 1631	1.40	5S	46	78
87	BK 1632	0.80	5MS	36	38
88	BK 1633	13.84	40S	35	35
89	BK 1634	0.40	10R	46	68
90	HBL 787	6.00	20S	57	89
91	HBL 789	0.00	0	67	89
92	HBL 790	2.80	10S	36	59
93	HBL 791	0.08	TMR	58	89
94	HBL 792	1.00	5MS	57	68
95	HBL 793	12.00	60S*	45	89
96	HBL 795	0.16	TMS	57	89
97	HBL 797	5.40	15MS	78	89
98	HBL 798	23.60	40S	46	89
99	HBL 802	0.00	0	47	89
100	HBL 804	1.00	5S	67	89
100A	Infector	76.00	100S	79	89
101	HBL 805	2.40	10MS	57	68
102	HBL 806	0.00	0	46	89
103	HBL 807	0.40	5MR	47	58
104	HBL 809	17.60	40S	57	68
105	HBL 810	8.40	30S	47	69

106	HBL 812	1.04	5S	68	89
107	HBL 813	0.80	10MR	57	99
108	HBL 814	0.00	0	67	99
109	HBL 815	0.00	0	89	99
110	HBL 816	0.80	5MS	78	99
111	HBL 817	0.00	0	68	99
112	HBL 818	3.20	15MS	46	99
113	HBL 819	2.00	10S	46	68
114	HBL 820	13.00	30S	45	68
115	HBL 821	2.80	10S	46	68
116	HBL 822	2.80	10S	47	68
117	HBL 823	4.00	10S	36	46
118	HBL 825	1.20	5MS	35	45
119	HBL 826	2.80	30MR	45	56
120	HBL 827	1.40	5S	57	89
120A	Infector	80.00	100S	78	89
121	JB 353	8.00	40S*	57	78
122	JB 354	2.00	10S	56	67
123	JB 355	3.60	10MS	57	68
124	JB 356	15.00	30S	57	78
125	JB 357	0.80	5MS	78	89
126	JB 358	10.20	20S	68	68
127	JB 359	14.20	40S	57	68
128	JB 360	0.00	0	68	89
129	JB 361	0.16	TMS	68	89
130	JB 362	0.00	0	89	99
131	JB 363	0.00	0	89	99
132	JB 364	0.04	TR	89	99
133	JB 365	1.00	5S	89	99
134	JB 366	2.00	10S	78	99
135	JB 367	4.80	20S	78	99
136	JB 368	40.00	60S	68	89
137	JB 369	76.00	100S	78	89
138	JB 370	76.00	100S	68	89
139	JB 371	5.00	10S	67	99
140	BL 1111	33.00	60S	78	89
140A	Infector	76.00	100S	78	89
141	BL 1122	44.00	80S	46	57
142	BL 1144	16.40	60S	46	78

143	BL 1216	0.00	0	56	67
144	BL 1217	9.40	20S	46	78
145	BL 1220	11.60	40S	46	56
146	BL 1221	14.00	60S*	45	56
147	BL 1228	0.80	5MS	57	78
148	BL 1233	5.00	15S	56	67
149	BL 1237	4.00	20S	57	78
150	BL 1238	0.00	0	57	57
151	BL 1239	56.00	80S	46	47
152	BL 1241	68.00	100S	45	56
153	BL 1244	27.60	60S	47	57
154	BL 1245	30.00	80S	57	58
155	BL 1255	10.80	30S	35	56
156	BL 1165	9.00	20S	45	56
157	BL 1278	0.00	0	46	56
158	BL 1279	3.60	10S	46	56
159	BL 1290	40.00	60S	57	68
160	BL 1292	36.00	40S	46	56
160A	Infector	72.00	100S	79	89
161	BL 1293	1.80	5S	47	68
162	BL 1294	0.80	5MS	57	68
163	BL 1295	12.80	60S*	46	47
164	BL 1296	0.40	10R	47	58
165	PL 890	1.80	5S	46	56
166	PL 891	6.80	30S	46	56
167	PL 887	0.00	0	46	56
168	NDB 1676	49.00	80S	47	57
169	NDB 1677	23.00	60S	47	56
170	NDB 1678	39.00	60S	67	89
171	NDB 1679	36.00	60S	46	57
172	NDB 1680	3.80	10S	57	68
173	NDB 1681	38.00	80S	68	89
174	NDB 1682	10.00	20S	67	89
175	NDB 1683	15.00	60S*	57	68
176	NDB 1684	48.00	80S	57	69
177	NDB 1685	56.00	100S	67	68
178	NDB 1686	34.00	40S	57	68
179	NDB 1687	21.00	40S	67	78
180	NDB 1688	38.00	60S	46	57

180A	Infector	80.00	100S	89	99
181	NDB 1689	60.00	100S	46	57
182	NDB 1690	52.00	80S	46	56
183	NDB 1691	40.80	60S	45	57
184	NDB 1692	64.00	80S	56	78
185	NDB 1693	52.00	80S	46	56
186	NDB 1694	23.00	60S	46	57
187	NDB 1695	54.00	80S	47	68
188	NDB 1696	64.00	100S	46	67
189	NDB 1697	36.00	60S	47	58
190	NDB 1698	0.00	0	67	89
191	NDB 1699	6.00	20S	46	68
192	NDB 1700	37.00	60S	35	56
193	BBM 745	6.00	20S	46	56
194	BBM 746	10.40	30S	46	47
195	BBM 747	11.60	30S	46	56
196	BBM 748	1.40	5S	36	56
197	BBM 749	21.60	40S	46	78
198	BBM 750	11.40	30S	36	46
199	BBM 751	8.68	30S	46	46
200	BBM 752	3.48	15MS	45	57
200A	Infector	80.00	100S	78	89
201	BBM 753	23.00	80S	46	47
202	BBM 754	4.60	10S	47	59
203	BBM 755	38.00	60S	45	46
204	BBM 756	4.00	10S	46	56
205	BBM 757	18.40	40S	68	89
206	BBM 758	2.56	15MS	68	99
207	BBM 759	2.40	15MS	57	99
208	BBM 760	0.00	0	78	99
209	BBM 761	14.00	30S	67	99
210	BBM 762	0.00	0	67	99
211	BBM 763	0.16	TMS	78	99
212	BBM 764	10.00	40S*	78	99
213	BBM 765	18.40	40S	67	99
214	BBM 766	4.00	10S	67	99
215	BBM 767	4.20	20S	57	99
216	BBM 768	24.80	40S	57	99
217	BBM 769	20.20	80S*	57	89

218	HUBL 1601	64.00	100S	57	99
219	HUBL 1602	64.00	100S	46	56
220	HUBL 1603	31.20	100S	47	69
220A	Infector	80.00	100S	78	89
221	HUBL 1604	48.40	100S	57	68
222	HUBL 1605	21.60	60S	68	68
223	HUBL 1606	68.00	100S	67	99
224	HUBL 1607	52.00	80S	56	57
225	HUBL 1608	80.00	100S	47	68
226	HUBL 1609	4.00	10S	57	68
227	HUBL 1610	5.40	20S	57	68
228	HUBL 1611	38.00	80S	57	57
229	HUBL 1612	56.00	80S	46	56
230	HUBL 1613	60.00	100S	47	56
231	HUBL 1614	21.00	40S	57	68
232	HUBL 1615	60.00	80S	47	68
233	HUBL 1616	4.00	20S	57	78
234	HUBL 1617	64.00	100S	57	78
235	HUBL 1618	56.00	80S	46	78
236	HUBL 1619	40.00	60S	57	78
237	HUBL 1620	60.00	80S	57	57
238	HUBL 1621	48.80	80S	68	68
239	HUBL 1622	68.00	100S	57	67
240	HUBL 1623	60.00	100S	68	89
240A	Infector	80.00	100S	89	99
241	HUBL 1624	53.60	80S	57	57
242	HUBL 1625	68.00	100S	57	58
243	VB 1601	0.80	5MS	68	89
244	VB 1602	12.20	40MS	68	89
245	VB 1603	0.40	5MR	57	79
246	VB 1604	10.40	30S	47	58
247	VB 1605	8.80	20S	46	57
248	VB 1606	13.16	20S	46	68
249	VB 1607	0.00	0	57	89
250	VB 1608	6.00	20S	57	89
251	VB 1609	4.00	20S	57	68
252	VB 1610	4.48	20S	57	89
253	VB 1611	4.80	20S	57	89
254	VB 1612	6.00	20S	46	68

255	VB 1613	21.80	40S	46	47
256	VB 1614	16.00	60S	46	89
257	VB 1615	3.40	15S	46	57
258	VB 1616	20.00	60S	67	89
259	VB 1617	3.00	15S	57	89
260	VB 1618	8.60	20S	57	68
260A	Infector	80.00	100S	79	89
261	VB 1619	8.56	40S*	57	68
262	VB 1620	0.80	5MS	57	68
263	VB 1621	2.60	10MS	36	47
264	VB 1622	9.20	20S	67	89
265	VB 1623	0.80	5MS	68	89
266	VB 1624	2.00	10MS	46	68
267	VB 1625	6.00	20S	45	46
268	VB 1626	2.60	10MS	57	68
269	VB 1627	0.80	5MS	57	69
270	VB 1628	7.00	20S	58	69
271	VB 1629	2.36	10S	47	68
272	VB 1630	1.16	5S	46	57
273	VB 1631	1.16	5S	36	46
274	VB 1632	2.00	10S	46	56
275	BD 1711	9.00	20S	45	57
276	BD 1712	8.80	20S	57	89
277	BD 1713	0.00	0	58	89
278	BD 1714	0.16	TMS	68	89
279	BD 1715	2.40	10MS	68	89
280	BD 1716	7.28	15S	57	89
280A	Infector	60.00	100S	79	89
281	BD 1717	0.00	0	78	99
282	BD 1718	10.40	40S	68	89
283	BD 1719	0.00	0	68	89
284	BD 1720	0.80	5MS	57	89
285	BD 1721	0.00	0	78	89
286	BD 1722	11.08	20S	68	89
287	BD 1723	34.00	80S	67	99
288	BD 1724	38.00	80S	89	99
289	BD 1725	0.00	0	89	99
290	BD 1726	0.80	5MS	89	99
291	BD 1727	0.00	0	89	99

292	BD 1728	0.80	5MS	89	99
293	BD 1729	0.00	0	89	99
294	BD 1730	0.00	0	79	99
295	BD 1731	0.00	0	79	99
296	BD 1732	0.00	0	79	99
297	BD 1733	0.08	TMR	78	99
298	BD 1734	1.00	5S	79	99
299	BD 1735	1.00	5S	79	99
300	BD 1736	1.00	5S	79	99
300A	Infector	76.00	100S	89	89
301	BD 1737	9.00	20S	68	69
302	BD 1738	0.00	0	67	68
303	BD 1739	0.00	0	68	89
304	BD 1740	0.16	TMS	79	99
305	BD 1741	2.76	10MS	89	99
306	BD 1742	4.20	10MS	68	99
307	BD 1743	15.00	40S	68	99
308	BD 1744	0.00	0	89	99
309	BD 1745	0.00	0	89	99
310	BD 1746	0.00	0	67	99
311	BD 1747	0.80	5MS	89	99
312	BD 1748	0.00	0	89	89
313	BD 1749	0.00	0	68	89
314	BD 1750	0.80	5MS	68	89
315	BH 1601	5.40	15S	57	78
316	BH 1602	8.00	20S	46	46
317	BH 1603	7.16	20S	36	47
318	BH 1604	6.60	20S	35	46
319	BH 1605	42.00	80S	46	46
320	BH 1606	8.20	30S	46	68
320A	Infector	76.00	100S	79	79
321	BH 1607	15.00	40S	47	68
322	BH 1608	15.40	40S	46	58
323	BH 1609	7.00	20S	47	67
324	BH 1610	34.40	80S	57	69
325	BH 1611	48.80	80S	35	46
326	BH 1612	60.00	100S	46	47
327	BH 1613	14.00	40S	47	68
328	BH 1614	34.00	60S	68	89

329	BH 1615	52.00	80S	57	78
330	BH 1616	5.00	20S	57	99
331	BH 1617	21.60	60S	57	99
332	BH 1618	1.60	10MS	67	89
333	BH 1619	48.00	60S	47	58
334	BH 1620	10.80	30S	56	57
335	BH 1621	6.00	20S	57	78
336	BH 1622	20.00	30S	56	89
337	BH 1623	9.80	30S	35	47
338	BH 1624	17.00	30S	47	69
339	BH 1625	6.00	15S	35	46
340	BH 1626	1.00	5S	35	46
340A	Infector	72.00	100S	89	89
341	BH 1627	5.40	15S	47	57
342	BH 1628	2.16	10S	58	99
343	BH 1629	48.00	80S	46	56
344	BH 1630	17.00	40S	47	58
345	BH 1631	56.00	60S	46	47
346	BH 1632	19.40	60S	46	47
347	BH 1633	32.00	60S	46	68
348	BH 1634	21.00	40S	57	89
349	BH 1635	12.60	20S	57	78
350	BH 1636	19.40	40S	68	89
351	BH 1637	8.00	20S	57	78
352	BH 1638	6.60	20S	46	46
353	BH 1639	9.00	40S	47	57
354	BH 1640	8.00	20S	57	89
355	BH 1641	12.00	30S	46	58
356	BH 1642	7.16	20S	46	56
357	BH 1643	11.08	20S	46	56
358	BH 1644	1.60	10MS	46	67
359	BH 1645	10.00	30S	35	46
360	BH 1646	5.60	10S	46	57
360A	Infector	80.00	100S	78	89
361	DWRFB 1	57.00	100S	35	46
362	DWRFB 2	54.00	80S	46	57
363	DWRFB 3	22.80	80S	46	47
364	DWRFB 4	26.00	80S	46	67
365	DWRFB 5	41.00	60S	46	57

366	DWRFB 6	37.00	60S	56	67
367	DWRFB 7	37.00	60S	35	36
368	DWRFB 8	23.00	60S	35	46
369	DWRFB 9	38.80	80S	57	78
370	DWRFB 10	4.00	20S	46	68
371	DWRFB 11	16.00	80S*	45	57
372	DWRFB 12	0.80	5MS	46	47
373	DWRFB 13	12.80	60S*	47	58
374	DWRFB 14	0.00	0	56	67
375	DWRFB 15	0.16	TMS	46	58
376	DWRFB 16	42.00	80S	57	68
377	DWRFB 17	16.00	60S*	57	68
378	DWRFB 18	17.60	80S*	57	67
379	DWRFB 19	0.00	0	46	47
380	DWRFB 20	0.00	0	57	78
380A	Infector	76.00	100S	89	99
381	DWRFB 21	41.00	100S	46	56
382	DWRFB 22	37.50	60S	36	59
383	DWRFB 23	7.50	30S	46	59
384	DWRFB 24	36.25	60S	46	67
385	DWRFB 25	25.00	60S	46	57
386	DWRFB 26	36.00	60S	47	58
387	DWRFB 27	4.80	20S	46	58
388	DWRFB 28	2.60	10MS	35	57
389	DWRFB 29	7.60	15S	35	46
390	DWRNB 12	11.00	40S	56	89
391	DWRNB 17	3.00	10S	35	36
392	DWRNB 18	6.80	20S	46	89
393	DWRNB 20	6.40	20S	46	78
394	DWRNB 21	12.80	40S	67	89
395	DWRNB 22	20.80	30MS	57	69
396	DWRNB 23	0.00	0	46	57
397	DWRNB 25	0.08	TMR	46	68
398	DWRNB 26	24.00	60S	67	89
399	DWRNB 28	3.00	15MS	57	89
400	DWRNB 30	12.40	40S	46	57
400A	Infector	84.00	100S	79	89

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

National Barley Disease Screening Nursery (NBDSN, 2016-17)

A total 149 entries from AVT and IVT yield trials including checks were screened during 2016-17 against stripe rust, stem rust, leaf blight, aphids and cereal cyst nematode (CCN) at hot spot locations.

The screening of stripe rust was done at Durgapura, Ludhiana, Hisar, Almora, Bajaura, Dhaulakuan, Jammu and Karnal. The yellow rust severity remained very low at Hisar, Almora and Dhaulakhuan so these data are not included. Leaf rust screening was done at Ludhiana but due to poor rust development the entries could not be screened properly for leaf rust resistance. The leaf blight screening was done at Dharwad, Pantnagar, Varanasi, Kanpur and Faizabad. The data from the Dharwad are extraordinarily high, it may be that recordings were made very late in season, hence 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).

Yellow rust, ACI = 0, Entries – 19,	BH1017, BHS454, DWRB165, DWRB170, RD2899, RD2947, RD2949, RD2951, RD2954, RD2955, RD2956, RD2957, VLB150, VLB151, VLB154, DWRB73 (c), HUB113 (c), RD2786 (c) and RD2794 (c)
Yellow rust, ACI > 0 to 10, Entries – 66,	HBL764, PL895, DWRB136, RD2964, RD2966, BHS459, RD2917, RD2959, VLB147, JB350, PL892, BH1019, DWRB137, KB1531, RD2961, VLB153, BH1018, VLB152, BHS447, DWRB150, DWRB164, RD2907, RD2948, RD2965, HBL776, VLB149, BHS453, RD2927, HBL777, VLB146, RD2921, HBL765, RD2952, UPB1061, UPB1065, KB1530, RD2967, RD2958, BHS457, UPB1066, DWRB169, UPB1062, DWRB166, KB1546, DWRB168, BHS460, RD2963, DWRB160, HUB253, KB1545, RD2962, BHS380 (c), DWRB91 (c), HBL113 (c), VLB118 (c), DWRB101 (c), HBL276 (c), PL751 (c), DWRB123 (c), DWRUB64 (c), RD2849 (c), RD2715 (c), BHS400 (c), DWRUB52 (c), BHS352 (c) and RD2552 (c)
Leaf blight, Avg. 13-35 with HS < 57, Entries - 10	BHS447, HUB250, HUB252, PL891, PL894, RD2948, RD2960, UPB1063, BHS380 (c) and RD2794 (c)

Reactions of different entries of barley in National Barley Disease Screening Nursery (NBDSN), 2016-17

S. No.	NBDSN Entries	Yellow Rust		Leaf Blight		CCN	Aphid
		ACI	HS	Avg.	HS	HS	HS
1	BH1017	0.00	0	67	89	HS	5
2	BH1018	1.60	5MS	56	68	HS	5
3	BH1019	1.00	5S	68	89	HS	5
4	BHS447	2.00	10S	35	46	HS	5

5	BHS452	17.60	40S	36	47	HS	5
6	BHS453	2.40	10S	47	68	HS	5
7	BHS454	0.00	0	36	47	HS	5
8	BHS455	14.00	30S	57	79	HS	5
9	BHS457	5.20	20MS	47	89	HS	5
10	BHS458	12.16	40S*	68	99	HS	5
11	BHS459	0.40	5MR	46	68	HS	5
12	BHS460	7.20	20 S	36	69	HS	5
13	DWRB136	0.16	TMS	57	89	HS	5
14	DWRB137	1.00	5MS	67	78	S	5
15	DWRB150	2.00	10MS	46	89	HS	5
16	DWRB160	8.00	30 S	68	89	HS	5
17	DWRB161	12.60	20 S	46	46	HS	5
18	DWRB162	15.00	30S	57	58	HS	5
19	DWRB163	24.00	60S	46	67	S	5
20	DWRB164	2.00	10 S	67	89	HS	5
21	DWRB165	0.00	0	46	57	HS	5
22	DWRB166	7.00	20S	46	89	HS	5
23	DWRB167	29.20	80S	36	47	HS	5
24	DWRB168	7.16	20S	46	46	HS	5
25	DWRB169	5.80	20S	47	68	HS	5
26	DWRB170	0.00	0	68	89	S	5
27	HBL764	0.08	TMR	58	69	HS	5
28	HBL765	4.00	20 S	57	68	HS	5
29	HBL776	2.08	10 S	47	58	HS	5
30	HBL777	3.08	15 S	68	99	HS	5
31	HBL778	11.00	20 S	57	89	HS	5
32	HBL780	14.00	20 S	46	47	HS	5
33	HUB250	24.16	60 S	35	47	HS	5
34	HUB252	16.40	60 S*	35	46	HS	5
35	HUB253	8.00	20 S	36	57	HS	5
36	HUB258	50.00	100S	46	46	HS	5
37	JB328	10.80	40S*	78	89	HS	5
38	JB346	17.20	60S	36	47	HS	5
39	JB347	72.00	100S	57	68	S	5
40	JB348	29.00	60 S	46	68	HS	5
41	JB349	32.00	60S	46	68	HS	5
42	JB350	0.80	10MR	47	68	HS	5
43	KB1501	10.40	40 S*	68	78	HS	5

44	KB1506	25.00	60 S	56	99	HS	5
45	KB1521	11.40	30S	46	68	HS	5
46	KB1523	17.00	40S	56	89	HS	5
47	KB1527	50.00	80S	36	46	HS	5
48	KB1528	26.00	60 S	45	78	HS	5
49	KB1530	4.60	10S	57	89	HS	5
50	KB1531	1.08	5S	47	58	HS	5
51	KB1535	22.00	40S	46	68	HS	5
52	KB1541	45.00	80S	57	57	HS	5
53	KB1545	9.00	20S	46	68	HS	5
54	KB1546	7.00	15 S	57	69	HS	5
55	KB1560	27.00	40S	46	69	HS	5
56	KWS IRINA	26.00	60S	45	57	S	5
57	NDB1651	33.00	60S	56	67	HS	5
58	NDB1653	39.00	60 S	46	47	S	5
59	NDB1655	50.00	80 S	58	69	S	5
60	NDB1660	48.16	80 S	68	89	HS	5
61	NDB1665	56.00	80 S	46	78	S	5
62	NDB1673	14.00	30S	46	46	HS	5
63	PL891	18.00	40S	25	36	HS	5
64	PL892	0.80	5MS	57	68	HS	5
65	PL893	11.00	30 S	46	78	S	5
66	PL894	11.60	30 S	24	36	HS	5
67	PL895	0.08	TMR	56	67	S	5
68	PL896	15.00	40S	68	89	HS	5
69	PL897	13.60	40S	46	57	S	5
70	PL898	16.00	40S	46	56	S	5
71	PL899	15.80	60 S*	45	67	HS	5
72	RD2899	0.00	0	46	58	HS	5
73	RD2907	2.00	10S	68	89	HS	5
74	RD2917	0.40	5MR	46	47	HS	5
75	RD2921	3.80	10S	46	68	S	5
76	RD2927	2.80	10S	78	89	HS	5
77	RD2947	0.00	0	67	89	HS	5
78	RD2948	2.00	10S	23	35	S	5
79	RD2949	0.00	0	68	89	HS	5
80	RD2950	26.00	60 S	67	99	HS	5
81	RD2951	0.00	0	46	67	HS	5
82	RD2952	4.00	20S	46	68	HS	5

83	RD2953	12.00	40S*	68	69	HS	5
84	RD2954	0.00	0	57	89	HS	5
85	RD2955	0.00	0	68	99	HS	5
86	RD2956	0.00	0	78	99	HS	5
87	RD2957	0.00	0	78	89	HS	5
88	RD2958	5.08	20S	79	89	HS	5
89	RD2959	0.40	5MR	68	89	HS	5
90	RD2960	16.80	40S	35	36	HS	5
91	RD2961	1.20	5S	57	78	HS	5
92	RD2962	9.60	20 S	57	89	HS	5
93	RD2963	7.60	20S	57	68	HS	5
94	RD2964	0.20	5R	68	89	HS	5
95	RD2965	2.00	10 S	68	89	HS	5
96	RD2966	0.24	TMS	78	89	HS	5
97	RD2967	5.04	20 S	68	99	HS	5
98	RD2968	10.80	40 S*	57	69	HS	5
99	RGT PLANET	42.00	80S	45	89	S	5
100	TRAVELLER	29.00	60S	46	47	S	5
101	UPB1061	4.00	20 S	46	89	HS	5
102	UPB1062	6.88	30 S	67	99	HS	5
103	UPB1063	21.60	60S	35	57	HS	5
104	UPB1064	45.00	60S	57	89	HS	5
105	UPB1065	4.00	15S	57	57	HS	5
106	UPB1066	5.20	20 S	56	89	HS	5
107	VLB146	3.40	15 S	46	89	HS	5
108	VLB147	0.40	5MR	46	58	HS	5
109	VLB149	2.08	10S	57	89	HS	5
110	VLB150	0.00	0	46	68	HS	5
111	VLB151	0.00	0	36	59	HS	5
112	VLB152	1.80	5S	58	68	HS	5
113	VLB153	1.40	5S	68	99	HS	5
114	VLB154	0.00	0	56	89	HS	5
115	XANADU	24.60	60S	57	89	HS	5
116	ZHANA	10.80	40S*	46	56	S	5
117	AZAD (c)	72.00	100S	57	68	HS	5
118	BH902 (c)	32.00	40 S	57	68	HS	5
119	BH946 (c)	16.80	60S*	57	78	HS	5
120	BH959 (c)	19.68	60 S	89	99	S	5
121	BHS352 (c)	5.60	20S	68	78	HS	5

122	BHS380 (c)	0.04	TR	24	46	S	5
123	BHS400 (c)	4.40	20 S	36	47	HS	5
124	DWRB101 (c)	1.16	5S	67	89	HS	5
125	DWRB123 (c)	2.96	10S	57	99	HS	5
126	DWRB73 (c)	0.00	0	78	89	S	5
127	DWRB91 (c)	0.80	5MS	46	89	S	5
128	DWRUB52 (c)	5.40	15 S	57	89	HS	5
129	DWRUB64 (c)	3.60	10S	57	68	S	5
130	HBL113 (c)	0.80	5MS	58	69	HS	5
131	HBL276 (c)	2.00	10S	68	78	HS	5
132	HUB113 (c)	0.00	0	68	89	HS	5
133	JYOTI (c)	54.00	80 S	56	78	HS	5
134	K508 (c)	30.00	60S	57	67	HS	5
135	K560 (c)	58.00	80S	67	89	HS	5
136	K603 (c)	68.00	100S	47	47	HS	5
137	KARAN16 (c)	29.00	60 S	78	89	HS	5
138	LAKHAN (c)	72.00	100S	46	58	HS	5
139	NDB1173 (c)	17.00	40S	57	68	S	5
140	NDB1445 (c)	50.00	80 S	46	68	HS	5
141	NDB943 (c)	80.00	100S	58	89	HS	5
142	PL751 (c)	2.40	5MS	69	89	S	5
143	RD2035 (c)	76.00	100 S	68	89	S	5
144	RD2552 (c)	8.00	20S	68	89	HS	5
145	RD2715 (c)	4.00	10S	79	89	HS	5
146	RD2786 (c)	0.00	0	79	89	HS	5
147	RD2794 (c)	0.00	0	35	47	S	5
148	RD2849 (c)	3.80	10S	56	57	HS	5
149	VLB118 (c)	1.00	5S	58	69	HS	5
150	Infector	88.00	100S	89	89	S	5

* Out of 176 entries, few check varieties were found place in many trials and only one check is retained in NBDSN thus resulting 149 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.

Center wise reactions of different entries of barley in National Barley Disease Screening Nursery (NBDSN), 2016-17

S. No.	NBDSN Entries (2016-17)	Yellow Rust					Leaf Blight				CCN*		
		Durgapura	Ludhiana	Bajaura	Jammu	Karnal	Pantnagar	Varanasi	Kanpur	Faizabad	Ludhiana	Hisar	Durgapura
1	BH1017	0	0	0	0	0	45	89	68	67	S	HS	HS
2	BH1018	5MS	0	0	5MS	0	45	68	24	67	S	HS	R
3	BH1019	0	5S	0	0	0	67	89	47	47	S	HS	S
4	BHS447	10S	0	0	0	0	12	46	36	25	S	HS	S
5	BHS452	40S	0	40 S	0	10MS	23	47	47	35	S	HS	S
6	BHS453	10R	0	0	10S	0	37	46	68	25	S	HS	S
7	BHS454	0	0	0	0	0	35	47	36	36	S	HS	S
8	BHS455	30S	0	20 S	0	20S	79	68	24	36	S	HS	S
9	BHS457	20MS	0	0	10S	0	89	47	36	24	S	HS	S
10	BHS458	20MS	0	40 S	TMS	5MS	99	69	36	68	S	HS	S
11	BHS459	5MR	0	0	0	0	23	68	46	47	S	HS	S
12	BHS460	10MS	0	20 S	0	10MS	34	69	24	25	S	HS	S
13	DWRB136	0	0	0	TMS	0	58	89	02	57	S	HS	S
14	DWRB137	TS	0	0	5MS	0	56	57	68	78	S	R	S
15	DWRB150	5MR	0	0	0	10MS	45	89	02	57	S	HS	S
16	DWRB160	10S	0	30 S	0	0	56	89	57	79	S	HS	S
17	DWRB161	15S	0	20 S	20S	10MS	35	46	36	46	S	HS	HS
18	DWRB162	30S	5S	20 S	0	20S	58	57	46	47	S	HS	MR
19	DWRB163	60S	40S	0	0	20S	23	57	46	67	S	R	S
20	DWRB164	0	0	10 S	0	0	45	89	57	68	S	HS	S
21	DWRB165	0	0	0	0	0	23	57	NG	57	S	HS	S
22	DWRB166	20S	0	15 S	0	0	25	89	24	46	S	HS	S
23	DWRB167	80S	TS	40 S	5S	20S	35	47	24	36	S	HS	S
24	DWRB168	15S	0	0	TMS	20S	38	45	36	46	S	HS	S
25	DWRB169	20S	0	0	5S	5MS	35	47	36	68	S	HS	S
26	DWRB170	0	0	0	0	0	45	89	68	79	S	R	S
27	HBL764	TMR	0	0	0	0	69	69	46	58	S	HS	S
28	HBL765	0	0	20 S	0	0	57	68	36	47	S	HS	S
29	HBL776	TMR	0	10 S	0	0	35	57	46	58	S	HS	S
30	HBL777	TMR	0	15 S	0	0	99	69	36	68	S	HS	S
31	HBL778	15S	0	20 S	10S	10S	34	89	NG	58	S	HS	MR
32	HBL780	20S	0	20 S	20S	10S	45	47	36	36	S	HS	S
33	HUB250	30S	10S	60 S	TMS	20S	45	47	02	36	S	HS	S

34	HUB252	15MS	0	60 S	10S	0	45	46	13	35	S	HS	S
35	HUB253	20MS	0	20 S	0	5MS	25	35	57	35	S	HS	HS
36	HUB258	100S	60S	0	60S	30S	35	46	NG	46	S	HS	S
37	JB328	5MS	10S	0	40S	0	56	89	79	89	S	HS	S
38	JB346	60S	TS	0	5S	20S	34	47	36	36	S	HS	S
39	JB347	100S	60S	80 S	60S	60S	35	46	68	57	S	R	S
40	JB348	40S	5S	60 S	0	40S	35	68	24	67	S	HS	S
41	JB349	60S	10S	60 S	10S	20S	68	34	36	36	S	HS	S
42	JB350	10MR	0	0	0	0	25	68	36	47	S	HS	HS
43	KB1501	0	0	40 S	5MS	10MS	78	69	68	67	S	HS	S
44	KB1506	0	5S	60 S	40S	20S	99	NG	24	46	S	HS	S
45	KB1521	30S	0	15 S	5MS	10MS	24	68	46	57	MR	HS	S
46	KB1523	10S	0	15 S	40S	20S	45	89	24	67	S	HS	HS
47	KB1527	80S	10S	80 S	40S	40S	35	35	36	46	S	HS	S
48	KB1528	40S	5S	60 S	5S	20S	23	78	24	36	S	HS	HS
49	KB1530	10MS	0	0	5S	10S	89	46	68	36	S	HS	S
50	KB1531	TMR	0	0	5S	0	35	46	57	58	S	HS	S
51	KB1535	40S	10S	20 S	20S	20S	25	46	36	68	S	HS	S
52	KB1541	80S	5S	80 S	40S	20S	56	57	46	57	S	HS	S
53	KB1545	20S	0	15 S	10S	0	13	58	68	35	S	HS	S
54	KB1546	0	0	15 S	10S	10S	69	36	NG	57	S	HS	S
55	KB1560	20S	5S	40 S	40S	30S	69	36	02	57	S	HS	HS
56	KWS IRINA	60S	40S	0	10S	20S	56	34	13	57	S	R	S
57	NDB1651	60S	5S	60 S	20S	20S	35	57	46	67	S	HS	S
58	NDB1653	30S	5S	60 S	60S	40S	23	47	47	47	S	ND	S
59	NDB1655	80S	10S	80 S	40S	40S	69	47	NG	58	S	S	S
60	NDB1660	80S	20S	80 S	TMS	60S	89	57	57	47	S	HS	S
61	NDB1665	80S	40S	80 S	60S	20S	36	57	12	78	MR	ND	S
62	NDB1673	30S	10S	0	20S	10S	46	46	46	46	S	HS	S
63	PL891	40S	0	30 S	20S	0	12	36	24	36	S	HS	S
64	PL892	0	0	0	5MS	0	35	68	47	57	S	HS	S
65	PL893	15S	0	30 S	10S	0	78	47	02	58	S	ND	S
66	PL894	20S	0	30 S	5MS	5MS	12	35	24	36	S	HS	S
67	PL895	TMR	0	0	0	0	45	46	46	67	S	R	S
68	PL896	40S	0	15 S	0	20S	78	89	47	67	S	HS	S
69	PL897	40S	0	0	20S	10MS	23	57	36	46	S	R	S
70	PL898	40S	0	20 S	0	20S	56	47	24	45	S	R	S
71	PL899	20MR	TS	60 S	10S	0	24	46	24	67	S	HS	S
72	RD2899	0	0	0	0	0	45	46	36	58	S	HS	S

73	RD2907	0	0	0	10S	0	89	47	57	78	S	HS	S
74	RD2917	5MR	0	0	0	0	35	47	46	47	S	HS	MR
75	RD2921	5MS	10S	0	5S	0	68	47	02	57	S	ND	S
76	RD2927	0	10S	0	5MS	0	78	89	68	78	MR	HS	MR
77	RD2947	0	0	0	0	0	89	89	00	78	S	HS	S
78	RD2948	0	0	0	10S	0	23	35	00	24	S	R	S
79	RD2949	0	0	0	0	0	58	89	46	78	S	HS	S
80	RD2950	60S	0	60 S	10S	0	99	36	NG	67	S	HS	S
81	RD2951	0	0	0	0	0	23	47	46	67	S	HS	S
82	RD2952	0	0	0	20S	0	57	68	24	45	S	HS	S
83	RD2953	15S	5S	0	0	40S	67	69	NG	58	S	HS	S
84	RD2954	0	0	0	0	0	34	89	24	79	MR	HS	S
85	RD2955	0	0	0	0	0	99	46	46	79	S	HS	S
86	RD2956	0	0	0	0	0	99	89	46	79	S	HS	S
87	RD2957	0	0	0	0	0	89	89	36	79	S	R	HS
88	RD2958	TMR	5S	0	20S	0	89	89	68	68	S	HS	S
89	RD2959	5MR	0	0	0	0	67	89	36	78	S	HS	S
90	RD2960	40S	0	30 S	5MS	10S	23	35	36	36	S	HS	MR
91	RD2961	5R	5S	0	0	0	78	46	36	47	S	HS	S
92	RD2962	15S	0	20 S	5S	10MS	58	89	12	68	S	HS	HS
93	RD2963	20S	0	0	10S	10MS	58	68	24	67	S	HS	S
94	RD2964	5R	0	0	0	0	38	89	57	67	S	HS	S
95	RD2965	0	0	10 S	0	0	89	89	24	68	S	HS	S
96	RD2966	TMR	0	0	TMS	0	67	89	68	67	S	HS	MR
97	RD2967	TR	0	20 S	5S	0	99	47	46	78	S	HS	S
98	RD2968	10MR	0	40 S	10S	0	34	69	46	58	S	HS	S
99	RGT PLANET	80S	40S	40 S	10S	40S	35	89	00	47	S	R	S
100	TRAVELLER	60S	5S	40 S	20S	20S	35	34	46	47	MR	R	S
101	UPB1061	0	0	20 S	0	0	34	89	24	36	S	HS	S
102	UPB1062	TMR	0	30 S	0	5MS	99	89	13	78	S	HS	S
103	UPB1063	60S	0	40 S	10MS	0	45	57	13	36	S	HS	S
104	UPB1064	5S	60S	60 S	60S	40S	34	89	68	46	S	HS	S
105	UPB1065	15S	0	0	5S	0	45	47	57	57	S	HS	S
106	UPB1066	10R	0	20 S	5MS	0	34	89	36	46	S	HS	S
107	VLB146	5MR	0	15 S	0	0	46	89	02	57	S	HS	S
108	VLB147	5MR	0	0	0	0	56	58	12	36	S	HS	S
109	VLB149	TMR	0	0	10S	0	45	89	36	47	S	HS	S
110	VLB150	0	0	0	0	0	56	68	02	47	S	HS	S
111	VLB151	0	0	0	0	0	46	59	12	36	S	HS	S

112	VLB152	5S	0	0	5MS	0	68	68	36	58	S	HS	S
113	VLB153	5MR	0	0	5S	0	99	89	24	68	S	HS	S
114	VLB154	0	0	0	0	0	23	89	24	67	S	HS	S
115	XANADU	60S	5S	30 S	20S	10MS	45	89	24	58	S	HS	S
116	ZHANA	40S	0	5 MR	5MS	10MS	56	46	24	36	S	R	S
117	AZAD (c)	100S	60S	80 S	60S	60S	35	68	68	68	S	HS	HS
118	BH902 (c)	30S	40S	40 S	10S	40S	67	68	36	57	S	HS	S
119	BH946 (c)	10S	0	60 S	10S	10MR	78	57	24	67	S	HS	S
120	BH959 (c)	30S	0	60 S	TMR	10MS	99	89	79	79	S	R	S
121	BHS352 (c)	20S	0	0	0	10MS	67	68	68	78	MR	HS	S
122	BHS380 (c)	TR	0	0	0	0	23	46	00	36	S	ND	S
123	BHS400 (c)	5MR	0	20 S	0	0	24	47	46	36	MR	HS	S
124	DWRB101 (c)	5S	0	0	TMS	0	67	89	36	67	S	HS	S
125	DWRB123 (c)	TMS	0	0	5MS	10S	99	47	36	47	S	HS	S
126	DWRB73 (c)	0	0	0	0	0	59	89	78	67	S	R	MR
127	DWRB91 (c)	0	0	0	5MS	0	24	89	24	57	S	R	S
128	DWRUB52 (c)	5MS	0	15 S	10MS	0	46	89	36	58	S	HS	S
129	DWRUB64 (c)	10S	0	0	5MS	5MS	56	47	57	68	S	R	S
130	HBL113 (c)	0	0	0	5MS	0	69	36	68	47	S	HS	S
131	HBL276 (c)	0	0	0	0	10S	78	46	68	68	S	HS	S
132	HUB113 (c)	0	0	0	0	0	78	89	36	57	S	HS	S
133	JYOTI (c)	80S	60S	80 S	10S	40S	45	78	36	46	S	HS	S
134	K508 (c)	60S	20S	20 S	10S	40S	67	47	47	67	S	HS	S
135	K560 (c)	80S	40S	80 S	60S	30S	67	89	24	67	S	HS	S
136	K603 (c)	100S	60S	80 S	60S	40S	45	47	47	47	S	HS	S
137	KARAN16 (c)	60S	5S	60 S	0	20S	89	68	68	67	S	HS	S
138	LAKHAN (c)	100S	60S	80 S	60S	60S	24	46	58	47	S	HS	S
139	NDB1173 (c)	15S	20S	0	10S	40S	68	46	68	46	S	NG	S
140	NDB1445 (c)	40S	60S	80 S	10S	60S	24	46	68	57	S	HS	S
141	NDB943 (c)	100S	60S	80 S	80S	80S	89	57	36	58	S	HS	S
142	PL751 (c)	5MS	0	0	5MS	5MS	89	58	79	58	S	R	S
143	RD2035 (c)	80S	60S	100 S	60S	80S	35	89	79	67	S	R	S
144	RD2552 (c)	5S	5S	0	10S	20S	89	89	48	57	S	HS	S
145	RD2715 (c)	5S	5S	0	10S	0	89	89	68	68	S	HS	S
146	RD2786 (c)	0	0	0	0	0	69	89	79	89	S	HS	HS
147	RD2794 (c)	0	0	0	0	0	34	47	00	47	S	ND	S
148	RD2849 (c)	5MS	5S	0	0	10S	56	57	46	46	S	HS	S
149	VLB118 (c)	5S	0	0	0	0	69	36	68	67	S	HS	S
150	Infector	100S	60S	100 S	80S	100S	79	89	89	78	S	ND	S

* Out of 176 entries, few check varieties were found place in many trials and only one check is retained in NBDSN thus resulting 149 entries under NBDSN.

*R = Resistant; MR = Moderately Resistant; S = Susceptible; HS=Highly Susceptible; ND =Reaction not determined, *NR = not recorded,*

Elite Barley Disease Screening Nursery (EBDSN, 2016-17)

This nursery was having resistant entries from NBDSN during 2015-16 crop season and also from the EBDSN 2015-16. During the crop season 2015-16, in total there were 49 entries screened in EBDSN. The screening of stripe rust was done at Durgapura, Ludhiana, Hisar, Almora, Bajaura, Dhaulakuan, Jammu and Karnal. The yellow rust severity remained very low at Hisar, Almora and Dhaulakhuan so these data are not included. Leaf rust screening was done at Ludhiana but due to poor rust development the entries could not be screened properly for leaf rust resistance. The leaf blight screening was done at Dharwad, Pantnagar, Varanasi, Kanpur and Faizabad. The data from the Dharwad are extraordinarily high, it may be that recordings were made very late in season, hence not included.

Confirmed sources of resistance

Out of 49 entries screened in EBDSN, the following entries were confirmed for resistance against the particular disease under AICW&BIP. Seven entries are found free from yellow rust, whereas 33 shown resistant reaction. Twelve entries also showed resistance against leaf blight.

Yellow rust, ACI = 0, Entries – 7,	DWRB 127, DWRB 152, HUB 247, DWRB 137, PL 874, RD 2903 and RD 2909
Yellow rust, ACI > 0 to 10, Entries – 33,	BK 1516, DWRB 101, DWRB 150, VLB 130, BK 1518, HBL 113, BH 981, DWRB 147, HBL 757, BH 1013, BH 1014, BCU 7746, BCU 7811, BCU 7819, RD 2900, BCU 7719, DWRB 149, BK 1525, BH 1009, BH 1011, RD 2913, RD 2914, BCU 7748, BK 1509, RD 2941, BHS 430, PL 890, RD 2907, RD 2930, RD 2944, HUB 246, RD 2917 and BCU 7621
Leaf blight, Avg. 13-35 with HS < 57, Entries - 12	DWRB 127, DWRB 147, DWRB 150, BH 1011, BH 995, HUB 246, BCU 7719, BCU 7748, BCU 7811, BH 981, BHS 430 and DWRB 101

Reactions of different entries of barley in Elite Barley Disease Screening Nursery (EBDSN), 2016-17

S. No.	EBDSN Entries (2016- 17)	Yellow Rust		Leaf Blight		CCN
		ACI	HS	Avg.	HS	HS
1	DWRB 127	0.00	0	35	47	S
2	DWRB 147	0.88	5MS	35	57	HS
3	DWRB 149	1.08	5S	35	68	HS
4	DWRB 150	0.16	TMS	35	48	HS
5	DWRB 152	0.00	0	56	89	HS
6	BK 1508	28.16	60S	56	79	S
7	BK 1509	2.16	10S	68	79	HS
8	BK 1516	0.04	TR	67	99	HS
9	BK 1518	0.80	10MR	46	79	S

10	BK 1525	1.60	10MS	56	89	HS
11	HBL 113	0.80	5MS	56	79	HS
12	HBL 757	1.00	5S	35	68	S
13	BH 1003	11.60	40S*	47	47	HS
14	BH 1009	1.60	5MS	46	57	HS
15	BH 1011	1.60	10MS	34	45	HS
16	BH 1013	1.00	5S	35	67	HS
17	BH 1014	1.00	5S	36	36	HS
18	BH 995	20.16	60S	34	35	HS
19	KB 1318	13.00	40S	46	67	HS
20	NDB 1639	26.00	40S	35	58	HS
20A	Infector	80.00	100S	89	89	S
21	HUB 246	7.20	20MS	35	56	HS
22	HUB 247	0.00	0	47	89	HS
23	BCU 7621	8.80	40S*	34	58	HS
24	BCU 7719	1.04	5S	24	36	HS
25	BCU 7746	1.00	5S	35	69	HS
26	BCU 7748	2.00	10S	35	47	HS
27	BCU 7811	1.00	5S	34	47	HS
28	BCU 7819	1.00	5 S	45	67	HS
29	BH 981	0.80	5MS	24	36	HS
30	BHS 430	2.80	10S	34	56	S
31	DWRB 101	0.04	TR	35	56	HS
32	DWRB 137	0.00	0	45	56	HS
33	PL 874	0.00	0	45	78	HS
34	RD 2900	1.00	5S	67	99	HS
35	RD 2903	0.00	0	78	99	S
36	RD 2909	0.00	0	78	99	HS
37	RD 2913	1.60	10MS	79	99	HS
38	RD 2914	1.80	5S	79	99	HS
39	VLB 130	0.40	5MR	36	69	S
40	RD 2907	4.00	15S	45	57	S
40A	Infector	76.00	100S	78	89	S
41	RD 2917	8.00	40S*	67	89	HS
42	RD 2912	28.00	40S	57	68	HS
43	RD 2930	5.00	20S	57	78	HS
44	RD 2935	34.00	80S	47	57	HS
45	RD 2937	18.40	40S	57	78	HS
46	RD 2941	2.60	10MS	78	99	HS
47	RD 2944	5.60	20MS	57	78	HS
48	PL 890	2.80	5S	46	56	HS
49	PL 891	14.60	60S*	36	46	HS

HS- Highest score, ACI- Average Coefficient of Infection; HS- Highly susceptible, S- Susceptible, MR- Moderately Resistant, R-Resistant,

Center wise reactions of different entries of barley in Elite Barley Disease Screening Nursery (EBDSN), 2016-17

S. No.	EBDSN Entries	Yellow Rust					Leaf Blight				CCN		
		Durgapura	Ludhiana	Bajaura	Jammu	Karnal	Pantnagar	Varanasi	Kanpur	Faizabad	Ludhiana	Hisar	Durgapura
1	DWRB 127	0	0	0	0	0	45	47	00	36	S	R	S
2	DWRB 147	TMR	0	0	0	5MS	35	46	00	57	S	HS	S
3	DWRB 149	TMR	0	0	5S	0	68	35	00	46	S	HS	S
4	DWRB 150	TMS	0	0	0	0	48	46	00	45	S	HS	S
5	DWRB 152	0	0	0	0	0	68	89	00	68	S	HS	S
6	BK 1508	60S	40S	0	TMS	40S	79	57	00	78	S	R	S
7	BK 1509	0	10S	0	TMS	0	79	68	36	78	S	HS	S
8	BK 1516	0	0	TR	0	0	99	89	00	68	S	HS	S
9	BK 1518	10MR	0	0	0	0	79	68	00	47	S	ND	S
10	BK 1525	10MS	0	0	0	0	78	89	00	58	S	HS	HS
11	HBL 113	0	0	0	5MS	0	79	NG	00	78	S	HS	S
12	HBL 757	0	5S	0	0	0	46	36	00	68	S	ND	S
13	BH 1003	40S	5S	5 S	0	10MS	46	47	36	47	S	HS	S
14	BH 1009	0	0	0	5MS	5MS	35	34	47	57	S	HS	S
15	BH 1011	10MS	0	0	0	0	45	35	00	36	S	HS	S
16	BH 1013	5S	0	0	0	0	67	36	00	46	S	HS	S
17	BH 1014	0	5S	0	0	0	35	36	36	36	S	HS	S
18	BH 995	60S	40S	0	TMS	0	35	34	24	24	S	HS	S
19	KB 1318	10S	5S	0	10S	40S	45	46	24	67	MR	HS	S
20	NDB 1639	10S	40S	40 S	0	40S	35	47	00	58	S	HS	S
20A	Infector	100S	60S	80 S	80S	80S	78	89	89	78	S	ND	S
21	HUB 246	20MS	0	0	0	20S	56	34	24	35	S	HS	S
22	HUB 247	0	0	0	0	0	89	36	36	36	S	HS	S
23	BCU 7621	0	40S	0	5MS	0	45	58	00	24	S	HS	S
24	BCU 7719	TR	0	0	5S	0	13	36	00	36	S	HS	S
25	BCU 7746	0	0	0	5S	0	14	69	00	35	MR	HS	S
26	BCU 7748	0	10S	0	0	0	24	34	47	46	S	HS	S
27	BCU 7811	0	5S	0	0	0	35	35	00	47	S	HS	S
28	BCU 7819	0	0	5 S	0	0	56	36	00	67	S	HS	HS
29	BH 981	0	5MS	0	0	0	24	24	00	36	S	HS	HS
30	BHS 430	0	5MS	0	10S	0	56	35	00	36	MR	ND	S
31	DWRB 101	0	0	TR	0	0	56	47	00	46	S	HS	S
32	DWRB 137	0	0	0	0	0	56	47	00	56	S	R	HS

33	PL 874	0	0	0	0	0	78	47	00	46	S	HS	S
34	RD 2900	0	0	0	5S	0	99	89	00	79	S	HS	S
35	RD 2903	0	0	0	0	0	99	69	57	78	S	ND	S
36	RD 2909	0	0	0	0	0	99	89	36	89	S	HS	S
37	RD 2913	10MS	0	0	0	0	99	89	47	89	S	HS	S
38	RD 2914	10MR	0	0	5S	0	99	89	57	79	S	HS	S
39	VLB 130	5MR	0	0	0	0	69	36	00	47	S	ND	S
40	RD 2907	15S	5S	0	0	0	56	47	00	57	S	ND	S
40A	Infector	100S	60S	80 S	60S	80S	67	89	78	68	S	ND	S
41	RD 2917	0	0	0	0	40S	89	89	00	69	S	HS	S
42	RD 2912	40S	10S	30 S	40S	20S	35	47	57	68	S	HS	MR
43	RD 2930	20S	0	0	5S	0	78	46	46	57	S	HS	S
44	RD 2935	80S	10S	0	40S	40S	57	46	36	57	S	HS	S
45	RD 2937	15MS	10S	30 S	40S	0	78	46	36	58	S	HS	S
46	RD 2941	10MS	5S	0	0	0	99	89	36	89	S	HS	S
47	RD 2944	20MS	5S	5 S	0	5MR	56	36	78	47	S	HS	S
48	PL 890	5MS	5S	0	5S	0	56	47	24	46	S	HS	S
49	PL 891	60S	5S	0	0	10MS	37	46	24	36	S	HS	S

*R = Resistant; MR = Moderately Resistant; S = Susceptible; HS=Highly Susceptible; ND =Reaction not determined, *NR = not recorded,*

Evaluation for seedling rust resistance against three rusts of barley

One hundred forty nine entries under NBDSN and Forty nine entries of EBDSN were screened for rust resistance at seedling stage against seven pathotypes of barley yellow rust (M, 24, Q, G, 57, 6S0 and 7S0) five pathotypes {79G31(11), 62G29(40A), 117-6 (37G19), 122 (7G11) and 295 (7G43)} of *P. graminis tritici*(Black/stem rust) and mixture of five isolates of *P. hordei* (Brown/leaf rust) under controlled conditions. One week old seedlings were inoculated and incubated in saturated humidity chambers for 48 hours. Subsequently these plants were transferred on to the greenhouse benches where sufficient day light (more than 10,000 Lux) and temperature of 16±2^{O}C (for yellow rust), 22±2^{o}C (for brown rust) 24±2^{0}C (for black rust) and relative humidity of 80-100% were maintained. Observations on rust scores were taken after a fortnight of inoculation. All the entries were characterized as resistant or susceptible based on the response of each accession to pathotypes of barley rusts. The results of these experiments are summarized below:-

Rust resistance in NBDSN lines

None of the NBDSN entry was found to have resistance to all the tested pathotypes of black, brown or yellow rust. Resistance to all the pathotypes of black and brown rust was observed only in VLB147. Eleven entries were resistant to all the pathotypes of brown and yellow rusts.

Table: Rust resistance in NBDSN lines

Resistant to	Number of lines	Detail of lines
Brown and yellow	11	JB328, PL891, RD2715, RD2786, RD2927, RD2954, RD2955, RD2956, RD2957, RD2958, RD2959
Black and brown	01	VLB147

Rust resistance in EBDSN lines

One EBDSN entry (BCU7746) was resistant to all the tested pathotypes of black, brown and yellow rusts. There were ten entries showing resistance to all the pathotypes of yellow and brown rust. Except these there was no EBDSN entry showing resistance to all the pathotypes of black and brown rust or black and yellow rust.

Table: Rust resistance in EBDSN lines

Resistant to	Number of lines	Detail of lines
All	01	BCU7746
Brown and yellow	10	DWRB127, HBL113, HBL757, RD2909, RD2913, RD2914, VLB130, RD2917, PL891, RD2941

Infection types (ITs) of rust resistance of NBDSN entries evaluated during 2016-17

S. No.	NBDSN Entries (2016-17)	Rusts												
		Brown	Black					Yellow						
		Mix	11	40A	117-6	122	295	M	24	Q	G	57	6S0	7S0
1	BH1017	S	MR	S	S	MS	S	R	R	R	R	R	R	R
2	BH1018	S	MR	S	MR	MS	R	S	R	MS	R	R	Mix	MS
3	BH1019	S	R	MS	-	S	MS	R	R	R	R	R	R	R
4	BHS447	R	MS	R	S	R	MS	R	R	R	R	R	R	R
5	BHS452	S	MS	MS	R	MR	MS	MS	MS	R	MR	R	MS	R
6	BHS453	MR	R	MS	R	R	MS	R	R	R	R	R	R	R
7	BHS454	R	MR	R	MR	R	S	R	R	R	R	R	R	R
8	BHS455	S	MS	R	R	MR	S	S	S	S	MS	MS	S	S
9	BHS457	S	MS	S	MS	MS	MR	MS	MS	S	MS	R	S	R
10	BHS458	R	R	MS	R	-	S	MS	R	MS	R	R	R	R
11	BHS459	R	MR	MR	R	R	S	MS	R	R	R	R	R	R
12	BHS460	MS	R	MR	R	MR	S	S	R	R	R	-	MR	MS
13	DWRB136	S	MR	S	MR	MS	MS	MS	MS	Mix	MS	S	R	R
14	DWRB137	S	S	S	R	S	S	R	R	R	R	R	R	R
15	DWRB150	S	MR	S	R	R	R	R	MR	R	MS	S	R	MS
16	DWRB160	MR	S	S	MR	MS	MS	S	MS	S	R	S	S	S
17	DWRB161	S	S	S	R	S	MR	S	MS	S	MS	S	MS	S
18	DWRB162	MS	MR	MS	MS	S	S	S	S	R	MS	MS	S	S
19	DWRB163	S	MS	S	R	S	MS	S	S	S	S	S	S	S
20	DWRB164	MS	S	MR	MR	S	S	R	R	R	R	R	Mix	Mix
21	DWRB165	R	MR	R	R	MS	MS	MS	R	S	R	R	R	R
22	DWRB166	R	MR	MR	MS	S	R	MS	R	R	R	R	MS	Mix
23	DWRB167	S	R	MS	MR	S	MS	S	S	S	S	S	Mix	R
24	DWRB168	R	S	S	MS	S	S	S	S	S	S	MS	MR	S
25	DWRB169	R	MS	MS	S	MS	MR	MS	S	S	MS	MR	Mix	Mix
26	DWRB170	MS	S	S	MR	S	S	R	R	R	R	R	R	R
27	HBL764	MS	R	-	R	R	MR	MS	R	R	R	R	R	R
28	HBL765	R	MR	R	S	MS	R	R	R	MR	R	R	Mix	-
29	HBL776	MS	MS	S	S	S	MR	MR	R	R	R	R	R	R
30	HBL777	S	R	R	MR	MS	MS	R	R	R	R	R	R	R
31	HBL778	R	MS	MS	R	S	S	S	MS	MS	R	MR	MR	R

32	HBL780	S	MS	MR	S	S	MS	S	S	S	S	MS	Mix	R
33	HUB250	S	MR	MS	MS	S	MR	MS	S	MS	R	R	MS	S
34	HUB252	S	MS	MS	MR	S	MR	MS	MS	R	R	MR	MS	MS
35	HUB253	MS	MS	MS	MR	S	MS	MS	S	MR	MS	R	S	MS
36	HUB258	S	S	-	MR	R	S	S	R	S	S	S	S	R
37	JB328	R	R	R	R	S	MR	R	R	R	R	R	R	R
38	JB346	S	MS	MS	MS	S	S	S	S	MS	S	MS	S	S
39	JB347	S	MS	S	S	S	R	S	S	S	S	S	S	MS
40	JB348	S	MS	R	R	R	MS	MS	MS	S	R	R	R	MR
41	JB349	S	MS	S	MS	S	MS	S	MS	MS	MS	MR	MS	S
42	JB350	R	S	MS	S	S	S	R	R	R	R	R	R	MR
43	KB1501	S	R	R	MR	MS	S	S	MS	MS	MS	MS	MS	MS
44	KB1506	S	R	MS	R	MS	MS	S	S	S	MS	MS	MS	S
45	KB1521	S	R	MR	R	R	S	R	R	R	R	R	R	R
46	KB1523	R	MR	MS	MR	S	R	S	R	S	R	MS	MS	S
47	KB1527	S	MR	MS	MR	R	R	S	S	S	S	S	S	S
48	KB1528	S	MS	MS	R	S	S	S	S	S	MS	S	S	S
49	KB1530	R	MS	S	MS	MR	S	MS	MS	R	R	R	R	R
50	KB1531	S	-	MS	R	S	MR	R	R	MS	R	R	MR	R
51	KB1535	S	MR	-	MR	MS	MS	S	S	R	S	MS	Mix	R
52	KB1541	S	MR	S	MS	R	S	S	S	S	MS	S	MS	S
53	KB1545	R	S	R	S	S	S	MS	Mix	MS	MR	R	MS	R
54	KB1546	R	R	MS	R	S	R	R	R	S	R	R	MR	R
55	KB1560	S	R	MR	R	S	R	S	MS	S	MS	MS	S	S
56	KWS Irina	MR	-	MS	R	-	MS	S	-	-	-	S	-	-
57	NDB1651	S	MS	MS	S	S	S	S	S	S	S	S	S	S
58	NDB1653	S	MR	MS	S	S	S	S	R	S	R	R	R	R
59	NDB1655	S	MS	MR	MS	S	MS	S	S	S	S	S	S	S
60	NDB1660	S	R	MS	MS	MS	S	S	S	S	S	S	S	S
61	NDB1665	S	MR	MR	MR	MS	S	S	S	S	S	S	S	MS
62	NDB1673	S	MS	R	R	S	S	S	R	S	S	S	S	S
63	PL891	R	R	-	-	MS	R	R	R	R	R	R	R	R
64	PL892	S	S	MS	MS	S	MS	R	R	R	R	R	R	R
65	PL893	S	MS	MS	MR	S	S	S	MS	MS	S	R	S	MS
66	PL894	MR	R	S	MR	S	S	S	S	S	MS	R	R	R
67	PL895	S	R	S	MR	MS	MS	R	R	R	R	R	Mix	MS
68	PL896	S	MS	S	MR	S	MS	S	R	R	MS	R	S	S
69	PL897	S	R	MR	MR	MS	MS	S	S	S	S	S	R	R
70	PL898	S	R	MR	R	MR	S	R	Mix	Mix	S	R	MS	R
71	PL899	R	MS	R	MR	MS	MR	R	R	MS	R	R	S	MS
72	RD2899	S	S	R	R	S	MS	R	R	R	R	R	R	R
73	RD2907	S	S	MS	MR	MS	S	R	R	R	R	R	R	R
74	RD2917	S	MS	R	MS	S	MS	MS	MR	S	MS	R	S	S
75	RD2921	S	MR	S	S	S	MS	R	R	R	R	R	R	R
76	RD2927	R	S	R	MR	S	S	R	R	R	R	R	R	R
77	RD2947	S	R	MR	R	S	S	R	R	R	R	R	R	R
78	RD2948	S	MR	MS	MR	S	MS	R	R	R	R	R	R	R
79	RD2949	R	MS	S	S	S	S	R	R	R	R	R	R	R
80	RD2950	S	MS	MS	MS	R	MR	S	S	-	MS	-	R	-
81	RD2951	S	MR	MR	MR	-	-	-	R	R	R	R	R	R
82	RD2952	S	MS	S	R	MS	MS	R	R	R	R	R	R	R
83	RD2953	S	MR	MS	MS	R	MR	S	S	S	R	R	R	Mix
84	RD2954	R	MR	MS	MR	S	S	R	R	R	R	R	R	R
85	RD2955	R	R	S	MR	MR	MS	R	R	R	R	R	R	R
86	RD2956	R	S	MS	MR	R	S	R	R	R	R	R	R	R
87	RD2957	R	MS	MS	R	R	S	R	R	R	R	R	R	R
88	RD2958	R	MS	S	MS	R	S	R	R	R	R	R	R	R
89	RD2959	R	R	R	MR	S	S	R	R	R	R	R	R	R
90	RD2960	S	MR	MR	R	MR	-	S	S	S	S	S	S	MS

91	RD2961	S	R	MR	R	MS	S	Mix	R	Mix	R	R	R	R
92	RD2962	MS	MS	MS	MR	MR	MR	S	S	S	S	S	MS	R
93	RD2963	S	R	S	R	S	MR	S	MS	S	MS	S	S	S
94	RD2964	MS	S	S	MS	S	S	MS	R	MS	R	R	MS	MS
95	RD2965	MR	MR	MR	R	MS	MR	R	R	R	R	MS	R	R
96	RD2966	S	R	MR	R	MS	MS	R	R	R	R	R	S	MS
97	RD2967	MS	MS	MS	MR	S	MS	MS	R	R	R	R	MS	R
98	RD2968	S	MS	S	MS	S	MS	MS	R	MR	R	R	R	R
99	RGT Planet	S	MS	MS	MR	MS	MS	S	S	S	MS	S	S	S
100	Traveller	R	MR	S	MS	S	R	S	Mix	S	R	Mix	MS	MS
101	UPB1061	R	MS	MR	R	-	S	MS	R	R	R	R	MR	R
102	UPB1062	MR	MS	MS	MR	R	MS	MS	R	R	R	R	R	R
103	UPB1063	R	MR	MS	R	MS	S	S	S	S	S	MS	S	S
104	UPB1064	S	MR	S	S	MS	MS	S	R	R	S	MS	R	R
105	UPB1065	S	R	MR	MS	MS	MS	S	R	MS	R	R	MS	MS
106	UPB1066	R	MS	MR	MS	S	S	R	R	R	R	R	R	R
107	VLB146	R	MR	MS	R	R	MR	S	R	R	R	R	S	R
108	VLB147	R	R	R	R	R	R	MS	R	R	R	R	R	R
109	VLB149	S	R	R	R	S	MR	S	R	MS	R	R	MR	R
110	VLB150	R	MR	R	MR	R	MS	MS	R	S	S	R	R	R
111	VLB151	R	MR	R	R	R	R	R	R	R	R	R	R	R
112	VLB152	R	-	S	MR	-	MR	S	R	S	-	R	MS	R
113	VLB153	R	MS	MR	MS	MR	MS	S	R	R	R	R	R	R
114	VLB154	R	MR	MS	MR	R	MR	MR	R	S	R	R	Mix	R
115	Xanadu	MR	S	MS	MS	MS	MR	S	S	MS	MS	Mix	MR	MS
116	Zhana	MR	S	S	MS	S	S	S	MS	S	MS	S	MR	MS
117	AZAD (c)	S	MR	R	MR	MS	MS	S	S	S	S	S	S	S
118	BH902 (c)	S	MS	S	MS	S	S	S	S	R	S	R	R	S
119	BH946 (c)	S	S	S	R	MR	MS	S	S	S	MS	MS	MS	MR
120	BH959 (c)	S	MR	S	MS	S	MS	S	S	S	S	S	S	S
121	BHS352 (c)	S	MR	MS	MR	MS	S	MS	MR	S	MS	MS	R	R
122	BHS380 (c)	MR	MS	MS	MS	R	MS	R	R	MS	R	R	MR	R
123	BHS400 (c)	R	S	-	S	MS	S	R	MR	R	R	R	MR	R
124	DWRB101 (c)	S	MR	S	MR	MS	R	S	R	MS	R	R	MR	R
125	DWRB123 (c)	S	MS	MR	MS	S	S	S	R	R	MR	R	R	MR
126	DWRB73 (c)	S	MS	MS	MS	MS	MR	R	R	R	R	R	R	R
127	DWRB91 (c)	S	MR	S	MS	S	MS	MS	R	MR	R	R	S	R
128	DWRUB52(c)	S	R	R	MR	S	S	R	R	R	R	R	MR	R
129	DWRUB64(c)	MS	S	S	R	S	S	S	S	S	S	S	S	R
130	HBL113 (c)	R	MR	MS	MR	S	S	R	MS	R	R	R	R	R
131	HBL276 (c)	S	MR	MS	MS	S	MR	S	R	Mix	MS	R	R	R
132	HUB113 (c)	S	R	R	R	S	MS	R	R	R	R	R	R	R
133	JYOTI (c)	S	R	MR	R	MS	MR	S	S	S	S	S	S	S
134	K508 (c)	S	MS	R	R	S	R	S	S	S	S	S	S	S
135	K560 (c)	S	MR	MR	R	S	MR	S	MS	S	MS	MS	S	S
136	K603 (c)	S	MR	MR	R	S	S	S	S	S	S	S	S	S
137	KARAN16 (c)	S	MS	-	-	R	MR	S	S	MS	R	-	R	-
138	Lakhan (c)	S	MS	MR	R	S	S	S	S	S	S	S	S	S
139	NDB1173 (c)	R	S	R	R	S	MS	R	S	S	S	R	MS	S
140	NDB1445 (c)	S	S	MS	MR	MR	MS	Mix	R	R	R	R	Mix	R
141	NDB943 (c)	S	MR	-	-	-	S	S	S	-	MS	MS	-	MS
142	PL751 (c)	S	MR	MR	R	MS	MS	S	S	S	S	S	S	S
143	RD2035 (c)	S	S	R	MS	S	S	S	S	S	S	S	S	S
144	RD2552 (c)	S	S	MS	MS	S	S	R	R	R	R	R	R	R
145	RD2715 (c)	R	MS	MS	MS	MS	S	R	R	R	R	R	R	R
146	RD2786 (c)	R	R	MR	R	S	S	R	R	R	R	R	R	R
147	RD2794 (c)	S	R	S	MR	R	MR	R	R	R	R	R	R	R
148	RD2849 (c)	S	MR	MR	MR	S	MR	S	R	MS	MS	MS	R	R
149	VLB118 (c)	R	MR	MS	MR	MS	MS	MS	MS	MS	R	R	R	MS

Infection types (ITs) of rust resistance of EBDSN entries evaluated during 2016-17

S. No.	EBDSN Entries (2016-17)	Rusts												
		Brown	Black					Yellow						
		Mix	11	40A	117-6	122	295	M	24	Q	G	57	6S0	7S0
1	DWRB127	R	R	MS	MS	R	MR	R	R	R	R	R	R	R
2	DWRB147	MS	R	MS	MR	MR	MR	S	MS	R	S	MS	MS	R
3	DWRB149	MS	R	R	R	R	MR	S	S	MS	S	MS	S	R
4	DWRB150	S	MS	MS	MR	S	R	S	S	S	R	MS	R	R
5	DWRB152	S	MR	MS	R	MS	MS	R	R	R	R	R	Mix	R
6	BK1508	S	S	S	R	S	S	S	S	S	S	S	S	S
7	BK1509	S	MS	MR	R	MS	S	MS	R	MR	R	R	MS	R
8	BK1516	S	MR	MS	MR	MS	S	R	R	R	R	R	R	R
9	BK1518	S	MR	MS	R	S	S	S	MS	S	MS	MR	S	MS
10	BK1525	S	R	S	MS	S	S	S	R	S	R	R	R	MS
11	HBL113	R	MS	MS	MR	MS	S	R	R	R	R	R	R	R
12	HBL757	R	MR	MS	NG	R	S	R	R	R	R	R	R	R
13	BH1003	S	R	MS	R	MS	S	S	R	S	MS	S	MS	Mix
14	BH1009	S	MR	S	R	R	S	R	R	R	R	R	R	R
15	BH1011	S	R	MS	R	R	S	S	R	R	R	R	MS	R
16	BH1013	S	MR	R	R	R	S	S	R	R	R	R	R	R
17	BH1014	S	R	MR	R	MR	S	MS	R	MS	R	R	MR	R
18	BH995	R	R	MS	R	S	S	S	MS	R	MS	MS	MS	R
19	KB1318	S	MR	MR	R	R	S	R	R	R	R	R	R	R
20	NDB1639	S	MS	MR	MS	S	S	S	S	R	MS	R	R	R
21	HUB246	R	NG	R	R	NG	S	S	R	S	R	NG	MS	R
22	HUB247	S	MR	S	R	R	S	R	R	R	R	R	R	R
23	BCU7621	R	MR	MS	R	R	MR	MS	R	R	R	R	R	R
24	BCU7719	MR	R	R	NG	MR	R	R	R	R	R	R	R	R
25	BCU7746	R	R	R	R	R	R	R	R	R	R	R	R	R
26	BCU7748	S	MS	S	MR	R	S	R	R	R	R	R	R	R
27	BCU7811	R	R	MR	MR	MS	S	R	R	MR	R	R	MS	MS
28	BCU7819	S	R	S	R	MS	S	MS	MS	MS	MS	R	R	MS
29	BH981	S	R	R	MR	R	S	R	R	R	R	R	R	R
30	BHS430	S	R	R	R	R	R	MS	R	MR	R	R	R	R
31	DWRB101	S	R	MR	R	R	MS	MS	R	R	R	R	R	S
32	DWRB137	S	R	MS	MS	S	S	R	R	R	R	R	R	R
33	PL874	S	NG	R	R	NG	MR	S	MS	R	R	R	R	NG
34	RD2900	S	MS	MS	R	MS	S	R	R	R	R	R	R	R
35	RD2903	S	MR	MS	MR	S	S	R	R	R	R	NG	R	R
36	RD2909	R	MS	MR	MR	S	R	R	R	R	R	R	R	R
37	RD2913	R	MS	S	R	S	MS	R	R	R	R	R	R	R
38	RD2914	R	MS	MS	R	R	S	R	R	R	R	R	R	R
39	VLB130	R	MS	R	R	R	MS	R	R	R	R	R	R	R
40	RD2907	R	MS	MR	MR	R	S	MS	R	R	R	R	NG	MS
41	RD2917	R	MS	MR	R	S	MR	R	R	R	R	R	R	R
42	RD2912	S	S	MR	S	S	S	R	S	R	Mix	R	R	R
43	RD2930	S	MR	R	R	MR	S	S	Mix	S	Mix	S	MS	S
44	RD2935	S	MR	MS	R	MS	S	S	MS	S	MS	MS	MS	MS
45	RD2937	S	S	MS	S	S	S	R	R	R	R	R	R	R
46	RD2941	R	S	S	S	S	S	R	R	R	R	R	R	R
47	RD2944	R	R	MR	MR	S	MS	S	S	S	S	S	S	R
48	PL890	S	R	MR	R	R	MS	S	R	R	R	R	R	R
49	PL891	R	R	R	R	R	MS	R	R	R	R	R	R	R

EXPERIMENT - CHEMICAL CONTROL OF BARLEY FOLIAR BLIGHT

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

Locations: Varanasi, Dharwar, Kanpur and Faizabad

Leaf blight susceptible variety was planted in a plot at row to row distance of 23 cm and recommended packages of practices were followed. Three replications were maintained for each treatment. The fungicides were sprayed after first appearance of blight and the blight observation was taken at various intervals. At all the centers both the treatments ST with Vitavax power + Propiconazole @ 0.1% spray and ST with Vitavax power + Tebuconazole (Folicur) @ 0.1% spray showed lowest disease severity and significantly superior over control.

CHEMICAL CONTROL OF LEAF BLIGHT (Varanasi)

Date of sowing:**30.11.2016**	**Variety: RD2503; Plot size: 2 x 2 m; Replications : 3**
Date of inoculum spray: Natural condition	Date of first appearance of blight in the field:**08.02.2017**
Date of fungicide application:**08.02.2017**	Date of harvest:**18.04.2017**

S. No.	Treatment	Germination (%) 20 DAS	Blight severity with date of observation			1000 grain weight (g)	Grain yield q/ha	Yield increase over check (q/ha)
			I 17/2/2017 GS:65-75	II 27/02/17 GS:79-83	III 09/03/17 GS:85-87			
1	ST with Carboxin+ Thiram (Vitavax power) @ 2.0 g/ kg	68±2.0	24	68	99	29.1	29.2	0.6
2	ST with Tebuconazole (Raxil) @ 2.0 g/ kg	70±2.7	24	67	99	28.5	29.1	0.5
3	ST with Vitavax power and Propiconazole @ 0.1% spray	67±3.1	01	12	23	38.2	34.1	5.5
4	ST with Vitavax power Tebuconazole (Folicur) @ 0.1% spray	63±4.5	01-02	12	24	39.8	34.4	5.8
5	ST with Tebuconazole (Raxil) and Propiconazole @ 0.1% spray	66±2.0	01-02	12	24	40.1	32.4	3.8
6	ST with Tebuconazole (Raxil) and Tebuconazole (Folicur) @ 0.1% spray	60±2.7	01-02	12	25	38.4	31.5	2.9
7	Propiconazole (Tilt) @0.1% spray	52±1.5	01	02	24	39.5	31.4	2.8
8	Tebuconazole (Folicur) @0.1% spray	52±1.8	01-02	02	36	39.2	30.7	2.1
9	Unsprayed control	52±1.0	24	78	99	28.8	28.6	

CHEMICAL CONTROL OF LEAF BLIGHT (Kanpur)

Variety: RD2503; Plot size: 2 x 2 m; Replications : 3								
Date of sowing: 19.11.2016								
Date of Inoculum spray: 11.01.17 & 18.01.17						Date of first appearance of blight:28.01.2017		
Date of fungicide application: 11.02.17 & 21.02.17						Date of harvest: 28.03.17		
S. No.	Treatment	Germination (%) 20 DAS	Blight severity with date of observation			1000 grain weight	Grain yield (q/ha)	Yield increase over check (q/ha)
			I 10.02.17	II 20.02.17	III 06.03.17			
1.	ST with Carboxin+ Thiram (Vitavax power) @ 2.0 g/ kg	92	57	57	46	36.0	33.8	6.5
2.	ST with Tebuconazole (Raxil) @ 2.0 g/ kg	94	48	48	46	36.2	32.8	3.6
3.	ST with Vitavax power and Propiconazole @ 0.1% spray	92	35	24	24	36.8	36.2	12.7
4.	ST with Vitavax power Tebuconazole (Folicur) @ 0.1% spray	90	36	35	24	36.6	35.6	11.2
5.	ST with Tebuconazole (Raxil) and Propiconazole @ 0.1% spray	95	46	35	35	36.2	35.2	10.2
6.	ST with Tebuconazole (Raxil) and Tebuconazole (Folicur) @ 0.1% spray	95	46	46	35	35.6	34.4	8.1
7.	Propiconazole (Tilt) @0.1% spray	85	48	46	46	34.6	33.7	6.2
8.	Tebuconazole (Folicur) @0.1% spray	85	57	46	45	34.6	33.9	6.7
9.	Unsprayed control	80	67	78	79	34.2	31.6	-

CHEMICAL CONTROL OF LEAF BLIGHT (Faizabad)

Variety: RD2503; Plot size: 2 x 2 m; Replications : 3								
Date of sowing: **27.11.2016**								
Date of Inoculum spray: **28.02.2017, 7.03.2017and 14.03.2017**						Date of first appearance of blight: **28.01.2017**		
Date of fungicide application: **21.02.2017 and 02.03.2017**						Date of harvest: **15.04.2017**		
S. No.	Treatment	Germination (%) 20 DAS	Blight severity with date of observation			1000 grain weight	Grain yield (q/ha)	Yield increase over check
			I	II	III			
1	ST with Carboxin+ Thiram (Vitavax power) @ 2.0 g/ kg	95	11	12	57	40.18	35.00	12%
2	ST with Tebuconazole (Raxil) @ 2.0 g/ kg	90	12	35	68	40.08	31.65	1.28%
3	ST with Vitavax power and Propiconazole @ 0.1% spray	90	12	24	35	44.28	38.32	22.62%
4	ST with Vitavax power Tebuconazole (Folicur) @ 0.1% spray	88	02	12	35	43.70	37.50	20.0%

5	ST with Tebuconazole (Raxil) and Propiconazole @ 0.1% spray	90	12	24	36	42.03	37.07	18.62%
6	ST with Tebuconazole (Raxil) and Tebuconazole (Folicur) @ 0.1% spray	85	01	23	47	42.50	35.00	12%
7	Propiconazole (Tilt) @0.1% spray	80	12	25	45	42.04	34.15	9.28%
8	Tebuconazole (Folicur) @0.1% spray	80	01	12	57	41.27	34.15	9.28%
9	Unsprayed control	80	12	35	79	39.65	31.25	---

CHEMICAL CONTROL OF LEAF BLIGHT OF BARLEY (Dharwad)

Location: MARS, UAS, Dharwad	Variety: Jyoti
Date of sowing: 14.12.2016	No. of replications: 3
Date of insecticide sprays:15.02.2017, 03.03.2017	No. of treatments: 12
Date of first appearance of leaf blight: 14.01.2017	Plot size: Gross plot: 2.7m X 2.0m Net plot: 2.0m X 2.0m
Date of harvest: 24.03.207	

S. No.	Treatments	Plant height (cm)	Disease severity	Grain yield (q/ha)	TGW (g)	Biomass (t/ha)
1	ST with Carboxin+ Thiram (Vitavax power) @ 2.0 g/ kg	82.00	40.36* (18.52)**	25.76	38.92	7.33
2	ST with Tebuconazole (Raxil) @ 2.0 g/ kg	81.60	40.36 (48.15)	23.08	39.30	6.67
3	ST with Vitavax power and Propiconazole @ 0.1% spray	82.60	35.67 (11.11)	28.85	39.57	7.00
4	ST with Vitavax power Tebuconazole (Folicur) @ 0.1% spray	80.53	40.36 (25.93)	21.26	39.98	8.00
5	ST with Tebuconazole (Raxil) and Propiconazole @ 0.1% spray	82.60	33.56 (10.70)	25.44	37.55	7.67
6	ST with Tebuconazole (Raxil) and Tebuconazole (Folicur) @ 0.1% spray	81.87	35.67 (11.11)	29.40	37.45	7.00
7	Propiconazole (Tilt) @0.1% spray	79.67	38.01 (11.11)	33.53	40.08	8.00
8	Tebuconazole (Folicur) @0.1% spray	84.27	33.56 (10.70)	32.44	36.85	7.67
9	Unsprayed control	80.60	46.53 (48.15)	20.23	40.85	7.33

**- Arc sine transformed values, **- Figures in parenthesis are original percentage values, TGW- Thousand grains weight, DD- Double Digit*

Field experiment on chemical control of leaf blight of barley was conducted at Main Agricultural Research Station, University of Agricultural Dharwad during the *rabi*, 2016-17 using the highly susceptible variety, Jyoti. Results clearly indicated that Propiconazole and Tebuconazole @ 0.1% recorded lowest disease severity with higher grain yield. There is no much difference in disease severity within these fungicides with or without seed treatment.

ENTOMOLOGY

During the cropping season of 2016-17, two experiments were allotted for entomology discipline. These are listed as below:-

Sr.No.	Experiment Title	Centres
1	Screening of NBDSN barley entries (2016-17) against foliar aphids	Ludhiana, Kanpur, Pantnagar, Karnal and Durgapura
2	Chemical control of foliage feeding barley aphids (*Rhopalosiphum maidis*)	Ludhiana, Vijapur, Kanpur, Karnal and Durgapura

Experiment 1: Screening of NBDSN barley entries (2016-17) against foliar aphids

A total of one hundred and seventy six barley entries were screened against aphids at five locations as per the planned programme of work during 2016-17. The seeds were supplied by IIWBR, Karnal. Aphid population per shoot was recorded at weekly interval from all theses 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	21and above	Highly susceptible (HS)

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

During cropping season 2016-17, data on screening of NBDN against aphids was only obtained from four centres. The aphid incidence was not recorded at Durgapura so the screening against aphid was not performed. At all the centres, none of entry was found to be resistant. Entries were found to be in grade 4 (Susceptible) or five (highly susceptible) also categorized as (grade 3). At Karnal centre, six entries were found to moderately resistant (grade 3). These were BH1019, BHS457, DWRB164, JB328, JB346 and JB347. The differential response of aphids to various entries can be due to availability of biotypes of foliar aphids in various locations in addition to weather factors that responsible for pest multiplication and development.

Screening of National Barley Disease Screening Nursery (NBDSN) entries against foliar aphids during season 2016-17

S.No.	NBDSN entries 2016-17	Average score of aphid infestation				
		Ludhiana	Kanpur	Karnal	Pantnagar	HS*
1	BH1017	5	4	5	5	5
2	BH1018	5	5	5	5	5
3	BH1019	4	4	3	5	5
4	BHS447	5	5	5	5	5

5	BHS452	5	5	5	5	5
6	BHS453	5	5	5	5	5
7	BHS454	5	5	5	5	5
8	BHS455	5	5	5	5	5
9	BHS457	4	4	3	5	5
10	BHS458	4	4	4	5	5
11	BHS459	5	5	5	5	5
12	BHS460	5	5	5	5	5
13	DWRB136	5	5	4	5	5
14	DWRB137	5	5	5	5	5
15	DWRB150	5	5	5	5	5
16	DWRB160	5	5	5	5	5
17	DWRB161	5	5	5	5	5
18	DWRB162	5	5	5	5	5
19	DWRB163	5	5	5	5	5
20	DWRB164	4	4	3	5	5
21	DWRB165	4	4	4	5	5
22	DWRB166	5	5	5	5	5
23	DWRB167	4	4	5	5	5
24	DWRB168	5	5	5	5	5
25	DWRB169	5	5	5	5	5
26	DWRB170	5	5	5	5	5
27	HBL764	5	5	5	5	5
28	HBL765	5	5	5	5	5
29	HBL776	5	5	5	5	5
30	HBL777	5	5	5	5	5
31	HBL778	5	5	5	5	5
32	HBL780	5	5	5	5	5
33	HUB250	5	5	5	5	5
34	HUB252	5	5	5	5	5
35	HUB253	4	4	5	5	5
36	HUB258	5	5	5	5	5
37	JB328	4	4	3	5	5
38	JB346	4	4	3	5	5
39	JB347	4	4	3	5	5
40	JB348	5	5	5	5	5
41	JB349	5	5	5	5	5
42	JB350	5	5	5	5	5
43	KB1501	5	5	5	5	5
44	KB1506	5	5	5	5	5
45	KB1521	5	5	5	5	5

46	KB1523	5	5	5	5	5
47	KB1527	5	5	5	5	5
48	KB1528	5	5	5	5	5
49	KB1530	5	5	5	5	5
50	KB1531	4	4	5	5	5
51	KB1535	5	5	5	5	5
52	KB1541	5	5	5	5	5
53	KB1545	5	5	5	5	5
54	KB1546	5	5	5	5	5
55	KB1560	5	5	5	5	5
56	KWS IRINA	5	5	5	5	5
57	NDB1651	5	5	5	5	5
58	NDB1653	4	4	5	5	5
59	NDB1655	5	5	5	5	5
60	NDB1660	5	5	5	5	5
61	NDB1665	5	5	4	5	5
62	NDB1673	5	5	5	5	5
63	PL891	5	5	5	5	5
64	PL892	4	4	5	5	5
65	PL893	5	5	5	5	5
66	PL894	4	4	5	5	5
67	PL895	5	5	5	5	5
68	PL896	5	5	5	5	5
69	PL897	5	5	5	5	5
70	PL898	5	5	5	5	5
71	PL899	5	5	5	5	5
72	RD2899	5	5	5	5	5
73	RD2907	5	5	5	5	5
74	RD2917	5	5	5	5	5
75	RD2921	5	5	5	5	5
76	RD2927	5	5	5	5	5
77	RD2947	5	5	5	5	5
78	RD2948	5	5	5	5	5
79	RD2949	5	5	5	5	5
80	RD2950	4	4	5	5	5
81	RD2951	5	5	5	5	5
82	RD2952	5	5	5	5	5
83	RD2953	5	5	5	5	5
84	RD2954	5	5	5	5	5
85	RD2955	5	5	5	5	5
86	RD2956	5	5	5	5	5

87	RD2957	5	5	5	5	5
88	RD2958	4	4	5	5	5
89	RD2959	4	4	5	5	5
90	RD2960	5	5	5	5	5
91	RD2961	5	5	5	5	5
92	RD2962	5	5	5	5	5
93	RD2963	5	5	4	5	5
94	RD2964	5	5	5	5	5
95	RD2965	5	5	5	5	5
96	RD2966	5	5	5	5	5
97	RD2967	5	5	5	5	5
98	RD2968	5	5	5	5	5
99	RGT PLANET	5	5	5	5	5
100	TRAVELLER	5	5	5	5	5
101	UPB1061	4	4	5	5	5
102	UPB1062	5	5	5	5	5
103	UPB1063	5	5	5	5	5
104	UPB1064	4	4	5	5	5
105	UPB1065	5	5	5	5	5
106	UPB1066	5	5	5	5	5
107	VLB146	4	4	3	5	5
108	VLB147	5	5	5	5	5
109	VLB149	5	5	5	5	5
110	VLB150	5	5	5	5	5
111	VLB151	5	5	5	5	5
112	VLB152	5	5	5	5	5
113	VLB153	5	5	5	5	5
114	VLB154	5	5	5	5	5
115	XANADU	5	5	5	5	5
116	ZHANA	5	5	5	5	5
117	AZAD (c)	5	4	4	5	5
118	BH902 (c)	5	5	5	5	5
119	BH946 (c)	4	4	5	5	5
120	BH959 (c)	5	5	4	5	5
121	BHS380 (c)	5	5	5	5	5
122	BHS352 (c)	5	5	5	5	5
123	BHS400 (c)	5	5	5	5	5
124	DWRB101 (c)	5	5	5	5	5
125	DWRB123 (c)	5	5	5	5	5
126	DWRB73 (c)	5	5	5	5	5
127	DWRB91 (c)	5	5	5	5	5

128	DWRUB52 (c)	5	5	5	5	5
129	DWRUB64 (c)	5	5	5	5	5
130	HBL113 (c)	5	5	5	5	5
131	HBL276 (c)	5	5	5	5	5
132	HUB113 (c)	4	4	4	5	5
133	JYOTI (c)	4	4	4	5	5
134	K508 (c)	5	5	5	5	5
135	K560 (c)	4	4	5	5	5
136	K603 (c)	5	5	5	5	5
137	KARAN16 (c)	4	4	5	5	5
138	LAKHAN (c)	5	5	5	5	5
139	NDB1173 (c)	4	4	5	5	5
140	NDB1445 (c)	5	5	5	5	5
141	NDB943 (c)	4	4	5	5	5
142	PL751 (c)	5	5	4	5	5
143	RD2035 (c)	5	5	5	5	5
144	RD2552 (c)	5	5	5	5	5
145	RD2715 (c)	5	5	5	5	5
146	RD2786 (c)	5	5	5	5	5
147	RD2794 (c)	5	5	5	5	5
148	RD2849 (c)	5	5	5	5	5
149	VLB118 (c)	5	5	5	5	5
150	Infector	5	5	5	5	5

*HS = Highest Score,

* Out of 176 entries, few check varieties were found place in many trials and only one check is retained in NBDSN thus resulting 149 entries under NBDSN.

Experiment 2: Chemical control of foliage feeding barley aphids (*Rhopalosiphum maidis*)

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. The experiment was conducted at five locations Durgapura, Ludhiana, Vijapur, Kanpur and Karnal during 2016-17 season with eight chemical treatments. The details of each treatment alongwith their dosages are given in Table. Five tillers were tagged from each plot and the experiment was replicated three times. The aphids were counted from these tagged plants before spray and after spray to know the efficacy of each treatment. The grain yield was recorded to know the amount preventable losses by these treatments.

Detail of chemical treatments used for the control of foliage feeding aphid (*Rhopalosiphum maidis*) during season 2016-17.

S. No.	Treatments	Dose ml or g / ha	Dosages (g a.i./ha)
1	Confidor (imidacloprid 200 SL)	100 ml	20
2	Dantotsu (Clothianidin 50 WDS)	30 gm	15
3	Fame (Flubendamide 480 SC)	250 ml	20
4	Pride (Acetamiprid 20SP)	100 gm	20
5	Actara (Thiamethoxam 25 WG)	50 gm	12.5
6	Coragen (Chlorantranilipride 18.5 SC)	100 ml	20
7	Rogor (Dimethoate 30 EC)	1000 ml	100
8	Control	-	-

Summary of Results:

A total of eight treatments were tested for their efficacy against foliar aphid in barley. No aphid incidence was recorded at Durgapura location therefore, chemical efficacy trial was not conducted. At all locations, it was found that treated plots harboured lower number of aphids as compared to control plots. At Ludhiana, chlorantranilipride (0.86 aphids/tiller) was found to be the best treatment fifteen days after treatment and it was at par with other insecticidal treatments. At Vijapur centre, observation taken after 15th day after spray revealed lowest aphid population in the plots treated with acetamiprid and it was at par with all the treatments except chlorantranilipride and control.

At Kanpur location, treatments of Fame (Flubendamide 480 SC) and Actara (Thiamethoxam 25 WG) were equally effective in managing aphid population. Treatments with four insecticides; flubendamide, clothianidin, thiamethoxam and imdacloprid gave similar results in curbing aphid population at Karnal. There were no significant differences between the yields obtained from treated and control plots at most of the tested locations.

Location: Ludhiana

It was observed that aphid population did not differ significantly among all treatments one day before treatment. When observed one day after spray, flubendamide (1.89 aphids/tiller) recorded minimum aphids/tiller and was at par with all other insecticidal treatments and significantly lower than untreated control (38.37 aphids/tiller). Similar results were recorded 2 days after treatment and all insecticides treated plot were at par with each other and better than untreated control (38.60 aphids/tiller). Seven days after treatment, all insecticidal treatments were at par with each other and better than untreated control (38.43 aphids/tiller). However, fifteen days after treatment chlorantranilipride (0.86 aphids/tiller) was the best treatment and it was at par with other insecticidal treatments.

Grain yield (q/ha) obtained was maximum (47.60) from thiamethoxam treated plots followed by acetamiprid (47.20) treated plots. However, all the foliar insecticidal treatments recorded significantly higher than grain yield than untreated check (41.33).

Location: Vijapur

All the treatments reduce the aphid's population significantly and increased the grain yield as compared to untreated check. When observed at 1st day after spray, acetamiprid noticed minimum aphids/shoot, which was at par with flubendiamide, clothianidin and imidacloprid treatments. Observation taken after 2nd day of spray revealed that the minimum aphid population was noticed in acetamiprid and at par with flubendiamide, dimethoate and imidacloprid. On 7th day, the aphid population was recorded minimum in flubendiamide and it was at par with rest of the insecticidal treatments except thiamethoxam, chlorantranilipride and control. Observation taken after 15th day after spray found that the lowest aphid population was observed in the plot treated with acetamiprid and it was at par with all the treatments except chlorantranilipride and control. The aphid population in all the insecticidal treatments was significantly lower than untreated check. The grain yield did not differ statistically among all the treatments. However, the maximum grain yield was recorded in dimethoate treatment (49.75 q/ha).

Location: Kanpur

It was observed that lowest population of 5.36 aphids/shoot was observed in flubendamide treatment followed by Actara (5.55 aphid/shoot) after 1 day of spraying. Aphid population reduction followed a similar trend as observed after one day of chemical application.

Grain yields of 50.33 q/ha and 50.13 q/ha were recorded fludendamide and Actara treatments, respectively. All the insecticidal treatment recorded significantly higher than untreated check.

Location: Karnal

It was observed that after 1 day of spraying, the plots treated with acetamiprid 20 SP @ 50g a.i./ha registered significantly lower(3.71 aphids/shoot) number of aphids/shoot followed by Clothianidin 50 WDG @ 15 g a.i./ha (4.32 aphids/shoot), and thiamethoxam 25 WG @ 12.5 g a.i./ha (4.31 aphids/shoot). After 2nd day of spray, treatment of Clothianidin 50 WDG @ 15 g a.i./ha recorded minimum aphid population of 3.00 aphids/shoot followed by Flubendamide 480 SC@ 20 g a.i./ha (3.41 aphids/shoot), and thiamethoxam 25 WG @ 12.5 g a.i./ha (3.91aphids/shoot).

The aphid population in all the insecicidal treatments were significantlly lower than untreated check.The grain yield did not differ statistically among all the treatments. Although, the maximum grain yield was recorded in Clothianidin 50 WDG @ 15 g a.i./ha treatment(45.62 qt/ha).

Chemical control of foliage feeding aphid (*Rhopalosiphum maidis*) during season 2016-17 (Location: Ludhiana)

S. No.	Treatments	Dose ml or g / ha	Dosages (g a.i./ha)	Aphid population per earhead					Overall Mean Aphids/ shoot	Grain Yield (q/ha)
				Before spray	After spray					
				1 day	1 day	2 days	7 days	15 days		
1	Confidor (Imidacloprid 17.8 SL)	100 ml	20	41.33	2.04 (1.74)	1.29 (1.51)	0.71 (1.30)	1.22 (1.49)	0.97	47.11
2	Dantotsu (Clothianidin 50 WDG)	30 g	15	39.60	1.97 (1.72)	1.23 (1.49)	0.63 (1.27)	1.12 (1.45)	0.88	47.42
3	Flubendamide (Fame 480 SC)	250 ml	20	40.06	1.89 (1.70)	1.08 (1.44)	0.64 (1.28)	1.03 (1.42)	0.84	47.06
4	Pride (Acetamiprid 20SP)	100 g	20	40.33	1.91 (1.70)	1.16 (1.45)	0.57 (1.25)	1.09 (1.44)	0.83	46.48
5	Actara (Thiamethoxam 25 WG)	50 g	12.5	40.00	2.05 (1.74)	1.12 (1.45)	0.60 (1.26)	1.04 (1.42)	0.82	47.60
6	Quinolphos 25%EC	1000ml	250	40.20	2.02 (1.73)	1.20 (1.48)	0.62 (1.27)	0.99 (1.40)	0.81	47.20
7	Chlorantranilipride 18.5 SC(Coragen)	100 ml	20	40.33	1.99 (1.72)	1.12 (1.45)	0.56 (1.24)	0.86 (1.36)	0.71	46.66
8	Untreated check	-	-	39.46	38.37 (6.80)	38.60 (6.29)	38.43 (6.27)	31.78 (5.72)	31.78	41.33
CD (p=0.05)				NS	(0.11)	(0.13)	(0.13)	(0.17)		3.54

- Figures within parentheses are transformed means
- Date of sowing : 22.11.2016 Plot size : 7.5 m^2
- Date of insecticidal application : 16.02.2017 Variety : PL 807
- Date of harvest : 17. 04.2017 Replications : Three

Table 4 Chemical control of foliage feeding aphid (*Rhopalosiphum maidis*) during season 2016-17 (Location: Vijapur)

Sr. No.	Treatment	Doses g.a.i./ha	Aphid population per shoot					Overall Mean Aphids/ shoot	Grain yield (q/ha)
			Before spray (days)	After spray (days)					
			1st	1st	2nd	7th	15th		
1.	Imidacloprid 200 SL	20	32.40	14.93ab	9.20ab	3.93ab	6.67abc	8.68	39.29
2.	Clothianidin 50 WDG	15	25.20	14.47ab	10.67bc	3.27a	6.47abc	8.72	43.00
3.	Flubendiamide	20	29.67	12.87a	6.73a	2.13a	5.60ab	6.68	44.25
4.	Acetamiprid 20 SP	50	34.13	11.60a	6.60a	3.07a	4.20a	6.37	46.17
5.	Thiamethoxam 25 WG	12.5	26.60	15.40b	12.33c	5.47bc	8.07bc	10.07	37.50
6.	Chlorantranilipride	20	27.87	19.40c	13.20c	6.27c	9.33c	12.05	34.83
7.	Dimethoate 30 EC	100	31.80	13.27ab	8.53ab	2.53a	5.93ab	7.57	49.75
8.	Untreated check	-	28.33	30.40d	33.67d	20.47d	24.07d	27.15	32.92
	S. Em ± C.D. at 5%) C.V. %		2.78 NS -	1.19 3.63 -	0.90 2.74 -	0.63 1.91 -	0.97 2.96 -		3.64 NS 15.42

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

Date of sowing : 25.11.2016
Date of insecticidal application : 12.01.2017
Date of harvest : 22.03.2017
Design : R.B.D
Plot size : 6.0m x 1.2m (6 rows)
Variety : RD 2052
Replications : Three
Condition : Irrigated

Chemical control of foliage feeding aphid (*Rhopalosiphum maidis*) during season 2016-17 (Location: Kanpur)

S. No.	Treatments	Actual dose ml/g/ha	Dosages (g a.i./ha)	Aphid population per main shoot					Overall Mean Aphids / shoot	Grain yield (q/ha)
				Before spray	After spray					
				1 day	1day	2 days	7 days	15 days		
1.	Confidor (Imidacloprid 17.8 SL)	100ml	20 ml	16.11	6.49 (14.65)	3.22 (10.31)	2.65 (9.26)	2.65 (9.28)	3.75	49.03
2.	Dantotsu (Clothianidin 50 WDS)	30 gm	15 gm	16.05	5.73 (13.81)	3.17 (10.14)	2.37 (8.72)	2.20 (8.53)	3.37	49.44
3.	Fame (Flubendamide 480 SC)	250 ml	20 ml	15.01	5.36 (13.56)	2.36 (8.72)	1.95 (7.92)	1.44 (6.80)	2.78	50.33
4.	Pride (Acetamiprid 20SP)	100 gm	20 gm	14.33	6.62 (14.89)	3.48 (10.63)	3.51 (10.78)	3.18 (10.14)	4.20	48.33
5.	Actara (Thiamethoxam 25 WG)	50 gm	12.5 gm	15.57	5.55 (13.56)	2.95 (9.81)	2.27 (8.53)	1.78 (7.49)	3.14	50.13
6.	Coragen(Chlorantranilipride 18.5SC)	100 ml	20 ml	15.24	7.45 (15.79)	4.31 (11.97)	3.62 (10.94)	3.43 (10.63)	4.70	48.05
7.	Rogor (Dimethoate 30 EC)	1000 ml	300 ml	14.11	7.47 (15.79)	4.37 (10.47)	4.13 (11.54)	3.59 (10.78)	4.89	47.58
8.	Control	-	-	14.28	20.22 (26.71)	28.44 (32.20)	46.44 (42.94)	37.72 (37.88)	33.21	43.75
S.Em +			-		0.443	0.510	1.218	0.686		0.406
CD 5%			-		1.357	1.561	3.731	2.102		1.244

*Figures within parentheses are transformed means

Date of sowing : 25.11.2016
Date of insecticidal application : 20.01.2017
Date of harvest : 13.04.2017
Design : R.B.D.
Plot size : 3 x 4m
Variety : K551
No. of rows/plot : 16
Replication : Three

Chemical control of foliage feeding aphid (*Rhopalosiphum maidis*) during season 2016-17 (Location-Karnal)

S. No.	Treatments	Actual dose ml/g/ha	Dosage g. a.i./ha	Aphid population per shoot					Overall Mean Aphids/ shoot	Grain yield (q/ha)
				Before spray	After Spray					
					1 Days	2 Days	7 Days	15 Days		
1	Confidor (Imidacloprid 17.8 SL)	100 ml	20 ml	42.32	4.41 (2.26)*	4.11 (2.26)	3.00 (2.00)	1.70 (1.64)	3.3	44.5
2	Dantotsu (Clothianidin 50 WDS)	30 gm	15 g	41.20	4.31 (2.30)	3.00 (2.00)	2.21 (1.79)	0.81 (1.35)	2.7	45.62
3	Fame (Flubendamide 480 SC)	250 ml	20 ml	40.00	4.65 (2.38)	3.41 (2.10)	1.89 (1.70)	0.54 (1.24)	2.5	43.17
4	Pride (Acetamiprid 20SP)	100 gm	50 gm	42.33	3.71 (2.17)	3.46 (2.11)	2.01 (1.73)	1.11 (1.45)	2.6	42.67
5	Actara (Thiamethoxam 25 WG)	50 gm	12.5 gm	41.23	5.51 (2.55)	3.91 (2.22)	2.32 (1.82)	0.72 (1.31)	3.1	41.33
6	Coragen(Chlorantranilipride 18.5SC)	100 ml	20 ml	40.82	5.99 (2.64)	4.06 (2.25)	3.02 (2.00)	0.96 (1.40)	3.5	40.85
7	Rogor (Dimethoate 30 EC)	1000 ml	100 ml	44.58	7.32 (2.88)	5.19 (2.50)	3.62 (2.15)	1.02 (1.16)	4.3	40.99
8	Control			43.23	41.20 (6.50)	36.20 (6.10)	32.01 (5.75)	29.09 (5.49)	34.6	40.91
	S.Em±			0.12	0.11	0.19	0.14	0.10		2.32
	CD at 5%			NS	0.41	0.53	0.22	0.21		5.14

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

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

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1	Dhaulakuan	Dr. V. K. Rathee
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4	Bajaura	Dr. Rakesh Devlash
5	Karnal	Dr. Sudheer Kumar
6	Hisar	Dr. S. S. Karwasra
7	Almora	Dr. K. K. Mishra
8	Jammu	Dr. M. K. Pandey
9	Pantnagar	Dr. Deepshikha
10	Kanpur	Dr. Javed Bahar
11	Faizabad	Dr. S.P. Singh
12	Varanasi	Dr. S.S. Vaish
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Entomology		
S N	**Centre**	**Cooperators**
1	Karnal	Dr. Poonam Jasrotia
2	Vijapur	Dr. A .A. Patel
3	Ludhiana	Dr. Beant Singh
4	Kanpur	Dr. J. Kumar
5	Pantnagar	Dr. R. S. Bisht
6	Durgapura	Dr. A. S. Baloda

Nematology		
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1	Durgapura	Dr. S. P Bishnoi
2	Hisar	Dr. R. S. Kanwar
3	Ludhiana	Dr. Ramanna Koulagi

RESOURCE MANAGEMENT

Updating of package and practices and varietal evaluation under different agro climatic conditions with resource efficient production technologies is of unremitting nature under resource management programme. Various centres of different zones in India are actively engaged for this purpose. Input management *ie* water, different source of nutrients under resource scarce conditions, fine-tuning of spacing and nutrient requirements of different varieties under changing climatic conditions, role of plant growth regulators, crop management on fertile/dry/marginal lands, limited water resource, late sowing conditions, saline-alkali soils are the 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 reflects the contribution of newly developed improved technologies. There is need to develop lodging resistant varieties as barley is prone to lodging under high input application. Input management for feed, fodder and malt barley for increased input use efficiency, lowering of cost of production and higher profitability is also an area of concern.

The barley resource management group is involved in the evaluation of advanced barley genotypes and updating the package of practices under the “All India Coordinated Wheat and Barley Improvement Project”. During 2016-17, the experiments were carried out at 16 locations covering the states of Himachal Pradesh, Uttarakhand, Punjab, Haryana, Rajasthan, Uttar Pradesh and Madhya Pradesh. Three centres in the Northern Hills zone (Almora, Bajaura and Malan), Five centres (Agra, Durgapura, Hisar, Ludhiana and Karnal) in the North Western Plains Zone, Five centres (Varanasi, Dilipnagr, Kanpur, Faizabad and Rewa) in the North Eastern Plains Zone and one centre in Central Zone (Udaipur, Rewa) were involved in the evaluation programme. The soils of Ludhiana and Durgapura were loamy sand and rest of centres were sandy loam except Bajaura and Malan (silty clay loam) and Karnal (clay loam). Soils of Ludhiana, Faizabad, Varanasi, Kanpur, Bajura and Karnal were medium in organic carbon content, whereas soil of Agra, Hisar and Durgapura were low in organic carbon. Soils of Durgapura, Hisar, Kanpur and Faizabad were slightly alkaline in nature.

A total of five trials with AVT second year entries were conducted, two trials each in North Western plain zone and North Eastern Plain Zone and one trial was conducted in Central Zone. Resource management group also made efforts to fine-tune the package of practices for barley and conducted seven special trials on conservation agriculture, standardization of seed rate of different varieties, effect of mulching and foliar sprays, integrated nutrient management, row spacing, plant growth regulators and different source of potash effects in different zones.

The details of the coordinated varietal and special trials (proposed and conducted) are reported in Table 1. All the proposed trials (16) for varietal evaluation were conducted and reported. In special trials, 54 trials were proposed, conducted and reported at different locations.

Table 1 Details of barley coordinated and special trials during 2016-17

Trial Name	Number of trials				
	Proposed locations	Not conducted	Data Received	Trial/data Rejected	Data Reported
Varietal Evaluation					
IR-TS-Malt-LON X Variety(NWPZ)	5	-	5	-	5
IR-TS-FB- DOS x Variety (NEPZ)	4	-	4	-	4
IR-TS-FB- DOS x Variety (CZ)	2	-	2	-	2
IR-TS-Feed-SAL -LON X Variety(NWPZ, NEPZ)	5	-	5	-	5
Total	16	-	16	-	16
Special trials					
Tillage x Varieties (NWPZ & NHZ)	7	-	7	-	7
Seed rate x Variety (NHZ)	2	-	2	-	2
DOS x Additives (NEPZ, NWPZ)	8	-	8	-	8
INM (NWPZ, NEPZ, CZ &NHZ)	11	-	11	-	11
Potash SourcesX Varieties(NWPZ)	5	-	5	-	5
N levels X PGRs (NEPZ, NWPZ)	9	-	9	-	9
SpacingX Varieties (NEPZ, NWPZ, NHZ ,CZ)	12	-	12	-	12
Total	54	-	54	-	54

EVALUATION OF NEW GENOTYPES

Timely sown irrigated malt barley- Varieties and N levels (NWPZ)

The performance of test entry RD 2917 was evaluated against four checks (DWRUB52, DWRB101, RD2849 and DWRB 123) at different nitrogen levels at five locations (Agra, Durgapura, Hisar, Ludhiana and Karnal). Sowing was done using seed 100 kg ha^{-1} keeping N levels in main plots and genotypes in sub plots. Irrigations and other cultural practices were applied as per recommendations. Full doses of P and K and half of nitrogen were applied as basal. The rest of nitrogen was applied after first irrigation as per treatments.

The test entry RD 2917 (5151 kg $^{ha-1}$) was statistically at par with best check DWRB 101(5163 kg $^{ha-1}$). Grain yield was significantly higher when N was applied @ 90 kg ha^{-1} as compared to N application @ 60 kg ha $^{-1}$ and it was at par with 120 kg N /ha (Table 2).

Table 2 NORTH WESTERN PLAINS ZONE POOLED 2016-17
IR-TS-Malt-N levels X Variety

Varieties	Nitrogen Levels, kg/ha							
	60		90		120		Mean	
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
			Yield, kg/ha					
RD2917	4825	1	5310	2	5318	2	5151	2
DWRUB52(c)	4523	4	5116	4	5171	3	4937	4
DWRB101(c)	4783	2	5335	1	5370	1	5163	1
RD2849(c)	4515	5	4851	5	5005	5	4790	5
DWRB123(I)	4650	3	5146	3	5109	4	4968	3
MEAN	4659		5151		5195		5002	
CD (0.05)	Nitrogen Levels(A)		Varieties (B)		B within A		A within B	
	123		123		NS		NS	
			Earhead/ m^2					
RD2917	397	1	407	1	409	1	404	1
DWRUB52(c)	386	5	406	2	408	3	400	4
DWRB101(c)	397	2	403	4	406	4	402	2
RD2849(c)	392	3	393	5	398	5	394	5
DWRB123(I)	386	4	405	3	409	2	400	3
MEAN	392		403		406		400	
CD (0.05)	Nitrogen Levels(A)		Varieties (B)		B within A		A within B	
	7		NS		NS		NS	

Grains/Earhead								
RD2917	29.1	4	30.1	3	30.0	3	29.7	4
DWRUB52(c)	30.1	1	30.5	2	30.7	1	30.4	1
DWRB101(c)	29.3	3	31.2	1	30.5	2	30.3	2
RD2849(c)	30.0	2	29.8	4	29.7	4	29.8	3
DWRB123(I)	28.8	5	29.5	5	29.6	5	29.3	5
MEAN	29.5		30.2		30.1		29.9	
CD (0.05)	Nitrogen Levels(A)		Varieties (B)		B within A		A within B	
	0.5		NS		NS		NS	
1000 Grain Weight, g								
RD2917	52.07	1	53.08	1	52.65	1	52.60	1
DWRUB52(c)	50.54	4	50.51	4	50.27	4	50.44	4
DWRB101(c)	51.23	2	51.91	3	51.59	3	51.58	3
RD2849(c)	48.31	5	48.24	5	49.57	5	48.71	5
DWRB123(I)	51.23	3	52.02	2	51.67	2	51.64	2
MEAN	50.68		51.15		51.15		50.99	
CD (0.05)	Nitrogen Levels(A)		Varieties (B)		B within A		A within B	
	NS		0.81		NS		NS	

Centres: Agra, Durgapura, Hisar, Ludhiana and Karnal

Irrigated feed barley- Varieties x Date of Sowing (NEPZ)

The performance of test entry DWRB137 was evaluated against three checks (HUB 113, K 508 and Jyoti) at four locations namely Varanasi, Kanpur, Faizabad and Rewa under normal and late sown conditions. Full doses of P and K and half of nitrogen were applied as basal. The rest of nitrogen was applied after first irrigation. Sowing was done using seed 100 kg ha^{-1}, keeping date of sowing in main plots and genotypes in sub plots. Other cultural practices were as per recommendations.

The data presented in Table-3 indicated that the test entry DWRB137 recorded significantly higher grain yield (4031 kg ha^{-1}) as compared to all the checks. Timely sowing also resulted in significantly higher grain yield as compared to late sown conditions and the grain yield reduced by 13.1 % under late sown condition. The test entry DWRB 137 was also superior in grains per ear head and 1000 grain weight as compared to checks.

Table 3 **NEPZ** **POOLED** **2016-17**

IR-TS-FB- DOSxVariety

	Sowing Time				Mean	
	Timely		Late			
Varieties	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
Yield, kg/ha						
DWRB-137	4319	1	3743	1	4031	1
HUB-113 (C)	4128	2	3601	2	3865	2
K-508 (C)	3904	3	3361	4	3632	4
Jyoti (C)	3887	4	3397	3	3642	3
MEAN	4059		3526		3793	
CD (0.05)	Sowing Time (A)		Varieties (B)		B within A	A within B
	54		132		NS	NS
Earhead/ m^2						
DWRB-137	316	2	311	2	313	2
HUB-113 (C)	336	1	315	1	325	1
K-508 (C)	309	4	305	3	307	3
Jyoti (C	310	3	292	4	301	4
MEAN	318		306		312	
CD (0.05)	Sowing Time (A)		Varieties (B)		B within A	A within B
	3		9		NS	NS

			Grains/Earhead			
DWRB-137	48.65	1	41.99	2	45.32	1
HUB-113 (C)	43.18	4	40.02	3	41.60	4
K-508 (C)	44.71	3	39.94	4	42.33	3
Jyoti (C	46.45	2	43.48	1	44.97	2
MEAN	45.75		41.36		43.55	
CD (0.05)	Sowing Time (A)		Varieties (B)		B within A	A within B
	0.58		1.59		NS	NS
			1000 Grain Weight, g			
DWRB-137	42.35	1	40.01	1	41.18	1
HUB-113 (C)	40.75	3	37.52	3	39.13	3
K-508 (C)	38.17	4	36.64	4	37.40	4
Jyoti (C	41.50	2	39.77	2	40.64	2
MEAN	40.69		38.49		39.59	
CD (0.05)	Sowing Time (A)		Varieties (B)		B within A	A within B
	0.44		0.94		NS	NS

Centres: Varanasi, Kanpur, Faizabad, Rewa

Irrigated feed barley- Varieties x Date of Sowing (CZ)

The performance of test entries DWRB137 and RD 2899 were evaluated against three checks (PL 751, RD 2786 and BH 959) at two locations namely Rewa and Udaipur under normal and late sown conditions. The data presented in Table-4 revealed that the test entries DWRB 137 (4051 kg/ha) and RD 2899 (4162 kg/ha) were at par with the best check RD 2786 (4189 kg/ha) in grain yield. Timely sowing also resulted in significantly higher grain yield (9.46 %) as compared to late sown conditions. Both the test entries and check RD 2786 were also above in ear head /m^2, grains per ear head and 1000 grain weight as compared to checks. All the yield attributing characters were superior under timely sown condition.

Table 4 **CZ** **POOLED** **2016-17**

IR-TS-FB- DOSx Variety

	Sowing Time				Mean	
	Timely		Late			
Varieties	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
			Yield, kg/ha			
DWRB137	4293	3	3808	3	4051	3
RD2899	4452	1	3872	2	4162	2
PL751 (C)	3910	5	3632	4	3771	5
RD2786(C)	4350	2	4028	1	4189	1
BH959(C)	3938	4	3617	5	3777	4
MEAN	4188		3792		3990	
CD (0.05)	Sowing Time (A)		Varieties (B)		B within A	A within B
	223		158		NS	NS
			Earhead/ m^2			
DWRB137	330	3	323	3	327	3
RD2899	345	1	338	1	342	1
PL751 (C)	313	5	316	4	315	5
RD2786(C)	343	2	328	2	336	2
BH959(C)	321	4	314	5	317	4
MEAN	331		324		327	
CD (0.05)	Sowing Time (A)		Varieties (B)		B within A	A within B
	NS		10		NS	NS
			Grains/Earhead			
DWRB137	49.8	2	48.1	3	49.0	3
RD2899	48.5	4	49.8	1	49.1	2
PL751 (C)	48.1	5	48.4	2	48.2	5
RD2786(C)	51.1	1	47.8	5	49.5	1
BH959(C)	49.8	3	48.0	4	48.9	4
MEAN	49.4		48.4		48.9	
CD (0.05)	Sowing Time (A)		Varieties (B)		B within A	A within B
	NS		NS		2.2	NS

1000 Grain Weight, g						
DWRB137	43.10	3	42.77	2	42.93	2
RD2899	43.65	2	42.20	3	42.92	3
PL751 (C)	40.58	5	41.78	4	41.18	5
RD2786(C)	43.98	1	43.42	1	43.70	1
BH959(C)	42.18	4	41.15	5	41.67	4
MEAN	42.70		42.26		42.48	
CD (0.05)	Sowing Time (A)		Varieties (B)		B within A	A within B
	NS		0.98		NS	NS

Centres: Rewa and Udaipur

Timely sown Irrigated feed barley under salinity conditions

Varieties and N levels (NWPZ and NEPZ)

The performance of test entry RD 2907 was evaluated against three checks (RD 2552, NDB 1173 and RD 2794) at different nitrogen levels at five locations namely Dalipnagar , Faizabad, Hisar, IIWBR-Hisar and Udaipur. The test entry RD 2907 (3841 kg/ha) was at par in grain yield with the best check RD 2552 (3719 kg/ha). The test entry also responded to N levels up to 90 kg ha^{-1}(Table 5). The test entry RD 2907 was also better in ear head /m^2 grains per ear head and 1000 grain weight as compared to checks.

Table 5 NWPZ and NEPZ POOLED 2016-17

IR-TS-Feed- SAL -N levels X Variety

Varieties	Nitrogen Levels, kg/ha							
	60		75		90		Mean	
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
Yield, kg/ha								
RD 2907	3383	1	3538	2	3841	1	3587	1
RD 2552 (c)	3088	2	3652	1	3719	2	3486	2
NDB 1173(c)	2885	4	3090	4	3546	3	3174	4
RD 2794 (c)	3088	3	3533	3	3497	4	3373	3
MEAN	3111		3453		3651		3405	
CD (0.05)	Nitrogen Levels(A)		Varieties (B)		B within A		A within B	
	65		109		190		176	
Earhead/ m^2								
RD 2907	308	2	328	1	350	1	329	1
RD 2552 (c)	306	3	328	3	343	2	326	2
NDB 1173(c)	298	4	315	4	325	4	313	4
RD 2794 (c)	316	1	328	2	328	3	324	3
MEAN	307		325		337		323	
CD (0.05)	Nitrogen Levels(A)		Varieties (B)		B within A		A within B	
	7		7		12		12	
Grains/Earhead								
RD 2907	49.6	1	48.9	2	51.2	1	49.9	1
RD 2552 (c)	47.3	2	49.1	1	49.6	2	48.7	2
NDB 1173(c)	45.0	3	46.5	4	47.8	3	46.4	3
RD 2794 (c)	44.8	4	47.0	3	46.7	4	46.2	4
MEAN	46.7		47.9		48.8		47.8	
CD (0.05)	Nitrogen Levels(A)		Varieties (B)		B within A		A within B	
	1.3		1.3		NS		NS	
1000 Grain Weight, g								
RD 2907	41.66	1	42.52	1	43.45	1	42.54	1
RD 2552 (c)	39.72	3	41.11	3	41.37	3	40.73	3
NDB 1173(c)	38.83	4	40.81	4	41.17	4	40.27	4
RD 2794 (c)	41.21	2	41.78	2	43.37	2	42.12	2
MEAN	40.35		41.56		42.34		41.42	
CD (0.05)	Nitrogen Levels(A)		Varieties (B)		B within A		A within B	
	0.37		0.45		NS		NS	

Centres: Dalipnagar , Faizabad, Hisar, IIWBR-Hisar, Udaipur

PRODUCTION TECHNOLOGIES

Seven special trials were conducted in different zones to fine tune the package of practices for enhancing production, productivity, income of the barley growing farmers. The results from these trials are presented below.

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

The trial was conducted with an objective to evaluate different barley varieties under conservation agriculture practices. Three tillage practices (ZT, CT and ZT+ Residue@ 6t/ha) with five varieties were undertaken in split plot design taking tillage practices in main plots and varieties in sub plots at five locations(Agra, Durgapura, Ludhiana, Hisar and Karnal) in NWPZ and two locations (Bajaura and Malan) in NHZ. Full doses of P and K and half of nitrogen were applied as basal. The rest of nitrogen was applied after/ before first irrigation depending on the treatments. Sowing was done using 100 kg seed ha^{-1}. Other cultural practices like irrigation and weed control were common to all the treatments.

Pooled data presented in Table 6 revealed that BH 902 recorded highest grain yield (5151 kg ha^{-1}) which was at par with all the other varieties except DWRB 101. All the tillage practices were at par in grain yield. Significantly more number of ear heads m^{-2}, grains per ear head and 1000 grain weight were recorded by DWRUB 52 and BH.

In NHZ, significantly higher grain yield (2906 kg ha^{-1}) and ear head m^{-2} were recorded under conventional tillage practice over conservation agricultural practices and BHS 400 registered significantly higher grain yield (3656 kg ha^{-1}) compared to all other varieties. BHS 400 also recorded significantly more grains per ear head under zero till condition with residue retention.

Table 6 NWPZ POOLED 2016-17

SPL-1 Tillagex Varieties

Varieties	Tillage Practices						Mean	
	ZT		CT		ZT+Residue@6 tha^{-1}			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
Yield, kg/ha								
BH902	5114	3	5041	4	5297	1	5151	1
BH946	5071	4	5069	3	5087	2	5076	4
RD2552	5200	1	5094	2	4961	4	5085	3
DWRB101	4830	5	4840	5	4688	5	4786	5
DWRUB52	5164	2	5134	1	5066	3	5122	2
MEAN	5076		5036		5020		5044	
CD (0.05)	Tillage(A)		Varieties (B)		B within A		A within B	
	NS		172		NS		NS	
Earhead/ m^2								
BH902	358	5	365	5	370	4	364	5
BH946	373	4	368	4	368	5	370	4
RD2552	381	3	387	2	375	3	381	3
DWRB101	385	2	384	3	382	2	384	2
DWRUB52	416	1	408	1	406	1	410	1
MEAN	382		382		380		382	
CD (0.05)	Tillage (A)		Varieties (B)		B within A		A within B	
	NS		11		NS		NS	
Grains/Earhead								
BH902	52.6	2	52.0	2	51.6	2	52.1	2
BH946	53.0	1	53.1	1	53.3	1	53.1	1
RD2552	38.4	4	38.4	4	37.7	4	38.2	4
DWRB101	37.7	5	37.8	5	37.6	5	37.7	5
DWRUB52	41.3	3	42.5	3	42.6	3	42.1	3
MEAN	44.6		44.7		44.6		44.6	
CD (0.05)	Tillage (A)		Varieties (B)		B within A		A within B	
	NS		1.3		NS		NS	

1000 Grain Weight, g								
BH902	43.27	4	43.94	4	44.21	3	43.81	4
BH946	44.27	3	44.83	3	44.02	4	44.37	3
RD2552	42.83	5	43.40	5	43.84	5	43.36	5
DWRB101	44.39	2	45.17	2	45.00	2	44.85	2
DWRUB52	44.93	1	45.36	1	45.63	1	45.31	1
MEAN	43.94		44.54		44.54		44.34	
CD (0.05)	Tillage (A)		Varieties (B)		B within A		A within B	
	NS		1.06		NS		NS	

Centres: Agra, Durgapura, Ludhiana, Hisar, Karnal

Table 6(a) **NHZ** **POOLED** **2016-17**

SPL-1 Tillagex Varieties

Varieties	Tillage Practices						Mean	
	ZT		CT		ZT+Residue@6 tha^{-1}			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
Yield, kg/ha								
VLB118	2718	2	3183	2	3216	2	3039	2
BHS 400	3220	1	4068	1	3682	1	3656	1
HBL 113	2647	3	2983	3	2818	3	2816	3
BHS 352	1786	4	2251	4	1990	4	2009	4
HBL 276	1648	5	2048	5	1774	5	1823	5
MEAN	2404		2906		2696		2669	
CD (0.05)	Tillage (A)		Varieties (B)		B within A		A within B	
	169		195		NS		NS	
Earhead/ m^2								
VLB118	272	3	288	4	274	3	278	3
BHS 400	297	2	321	2	288	2	302	2
HBL 113	312	1	328	1	342	1	327	1
BHS 352	271	4	293	3	231	5	265	4
HBL 276	245	5	261	5	242	4	249	5
MEAN	279		298		275		284	
CD (0.05)	Tillage (A)		Varieties (B)		B within A		A within B	
	18		21		NS		NS	
Grains/Earhead								
VLB118	22.9	2	25.4	2	26.7	2	25.0	2
BHS 400	26.1	1	30.2	1	30.4	1	28.9	1
HBL 113	22.0	3	23.4	3	21.6	4	22.3	3
BHS 352	17.4	5	20.3	5	22.0	3	19.9	4
HBL 276	18.4	4	21.4	4	19.4	5	19.7	5
MEAN	21.4		24.1		24.0		23.2	
CD (0.05)	Tillage (A)		Varieties (B)		B within A		A within B	
	1.0		1.3		2.2		2.2	
1000 Grain Weight, g								
VLB118	41.58	1	42.87	1	42.46	1	42.30	1
BHS 400	40.57	2	41.91	2	41.75	2	41.41	2
HBL 113	34.96	5	35.80	5	36.68	5	35.82	5
BHS 352	35.69	4	37.33	3	37.62	4	36.88	4
HBL 276	36.43	3	36.97	4	37.88	3	37.09	3
MEAN	37.85		38.98		39.28		38.70	
CD (0.05)	Tillage (A)		Varieties (B)		B within A		A within B	
	0.92		1.48		NS		NS	

Centres: Bajaura and Malan

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

The trial was conducted in NHZ with an objective to optimise the seed rate of different barley varieties to harvest higher productivity. Three seed rates (75,100 and 125 kg ha $^{-1}$) with four varieties were undertaken in split plot design taking seed rates in main plots and varieties in sub plots. Full doses of P, K and half of nitrogen were applied as basal. The rest of nitrogen was applied at 1st irrigation. Sowing was done using seed as per treatments. Other cultural practices like irrigation and weed control were common to all the treatments.

Grain yield was significantly more when varieties were sown using seed @ 75 and 100 kg ha^{-1} compared to seed @ 125 kg ha^{-1}. Barley variety VLB 118 registered significantly higher grain yield (3461 kg ha^{-1}) as compared to other varieties (Table 7). Variety BHS 400 and VLB 118 recorded significantly higher yield when they were sown using seed @ 100 kg ha^{-1}, whereas, HBL 113 and BHS 352 recorded significantly higher yield when they were sown using seed @ 75 kg ha^{-1}. Similar trend was observed in grains per ear head also.

Table 7 **NHZ** **POOLED** **2016-17**

SPL-2 Seed rate x Variety

Varieties	Seed rate (Kg ha^{-1}) 75 Yld.	75 Rk.	100 Yld.	100 Rk.	125 Yld.	125 Rk.	Mean Yld.	Mean Rk.
Yield, kg/ha								
VLB118	3152	4	3939	2	3292	1	3461	1
BHS 400	3536	2	4062	1	1979	4	3192	2
HBL 113	3808	1	2598	4	2214	3	2873	4
BHS 352	3476	3	3024	3	2357	2	2952	3
MEAN	3493		3406		2460		3120	
CD (0.05)	Seed rate (A) 180		Varieties (B) 159		B within A 276		A within B 295	
Earhead/ m^2								
VLB118	267	4	326	4	400	1	331	1
BHS 400	299	2	342	3	225	4	289	4
HBL 113	314	1	344	2	258	3	306	3
BHS 352	279	3	379	1	276	2	311	2
MEAN	290		348		290		309	
CD (0.05)	Seed rate (A) 22		Varieties (B) 14		B within A 24		A within B 30	
Grains/Earhead								
VLB118	27.92	4	29.97	1	22.81	4	26.90	2
BHS 400	28.02	3	29.74	2	23.64	1	27.13	1
HBL 113	28.62	2	19.74	4	23.33	3	23.90	4
BHS 352	31.16	1	20.84	3	23.40	2	25.13	3
MEAN	28.93		25.07		23.29		25.76	
CD (0.05)	Seed rate (A) 0.97		Varieties (B) 1.03		B within A 1.79		A within B 1.81	
1000 Grain Weight, g								
VLB118	41.67	1	40.62	1	34.42	4	38.90	2
BHS 400	41.19	2	39.78	2	36.28	1	39.09	1
HBL 113	41.05	3	36.68	3	35.81	2	37.85	3
BHS 352	40.27	4	36.19	4	35.14	3	37.20	4
MEAN	41.05		38.32		35.41		38.26	
CD (0.05)	Seed rate (A) 0.30		Varieties (B) 1.19		B within A 2.06		A within B 1.81	

Centres: Bajaura and Malan

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

The trial was conducted with an objective to study effect of manures, mulch and foliar spray of chemicals on the productivity of barley. Two date of sowing (Timely and late) with six additives were undertaken in split plot design taking sowing time in main plots and additives in sub plots at four locations (Durgapura, Ludhiana, Hisar and Karnal) in NWPZ and four locations (Kanpur, Varanasi, Faizabad and Rewa) in NEPZ. Full doses of P and K and half of nitrogen were applied as basal. The rest of nitrogen was applied after first irrigation. Sowing was done using 100 kg seed ha^{-1}.

Table 8 **NWPZ** **POOLED** **2016-17**

SPL 3 DOSx Additives

	Sowing Time				Mean	
	Timely		Late			
Treatments	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
			Yield, kg/ha			
Recommended dose of Fertilizer	5315	3	4150	5	4733	5
T1 + FYM @5 t/ha	5346	1	4140	6	4743	4
T1+Mulch@ 6 t/ha	5283	4	4214	3	4749	3
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	5240	5	4320	1	4780	1
T4+ spray of ZnSo4 @ 0.5 %	5099	6	4253	2	4676	6
T4 + Two spray of Kcl @ 0.5 %	5342	2	4204	4	4773	2
MEAN	5271		4214		4742	
CD (0.05)	Sowing Time (A)	Additives (B)	B within A		A within B	
	147	NS	NS		NS	
			Earhead/ m^2			
Recommended dose of Fertilizer	366	6	349	6	357	6
T1 + FYM @5 t/ha	372	4	358	5	365	5
T1+Mulch@ 6 t/ha	368	5	371	1	369	2
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	385	1	358	4	372	1
T4+ spray of ZnSo4 @ 0.5 %	374	2	362	2	368	3
T4 + Two spray of Kcl @ 0.5 %	374	3	359	3	366	4
MEAN	373		359		366	
CD(0.05)	Sowing Time (A)	Additives (B)	B within A		A within B	
	10	NS	NS		NS	
			Grains/Earhead			
Recommended dose of Fertilizer	50.09	1	43.88	4	46.98	1
T1 + FYM @5 t/ha	48.28	3	43.69	5	45.99	3
T1+Mulch@ 6 t/ha	48.34	2	45.46	1	46.90	2
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	44.28	6	43.89	3	44.08	6
T4+ spray of ZnSo4 @ 0.5 %	46.50	5	43.11	6	44.81	5
T4 + Two spray of Kcl @ 0.5 %	47.09	4	44.26	2	45.67	4
MEAN	47.43		44.05		45.74	
CD(0.05)	Sowing Time (A)	Additives (B)	B within A		A within B	
	1.36	N S	NS		NS	
			1000 Grain Weight, g			
Recommended dose of Fertilizer	47.22	6	43.18	6	45.20	6
T1 + FYM @5 t/ha	48.92	3	44.48	2	46.70	3
T1+Mulch@ 6 t/ha	47.51	5	43.86	5	45.69	5
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	48.97	2	44.68	1	46.82	1
T4+ spray of ZnSo4 @ 0.5 %	49.39	1	44.18	4	46.78	2
T4 + Two spray of Kcl @ 0.5 %	48.44	4	44.43	3	46.44	4
MEAN	48.41		44.13		46.27	
CD(0.05)	Sowing Time (A)	Additives (B)	B within A		A within B	
	0 .55	NS	NS		NS	

Centers: Durgapura, Hisar, Ludhiana and Karnal

Pooled data presented in Table 8 revealed that use of additives had no significant effect on grain yield, although application of recommended dose of fertilizers coupled with FYM application @ 5 ton and mulching @ 6 ton ha^{-1} recorded the highest grain yield, ear head m^{-2}, and 1000 grain weight in NWPZ. Grain yield reduced significantly due to delay in sowing.

In NEPZ use of additives had significant effect on grain yield as compared to application of recommended dose of fertilizer under timely and late sowing conditions. Application of recommended dose of fertilizers coupled with FYM application @ 5 ton ha^{-1}, mulching @ 6 ton ha^{-1} and foliar spray of ZnSo4@ 0.5% or two foliar sprays of KCl @ 0.5 % resulted in significantly higher grain yield as compared to other treatments under timely sown condition (Table 8a). Grains per ear head and 1000 grains weight were also better due to use of these additives.

Table 8(a) NEPZ POOLED 2016-17

SPL 3 DOSx Additives

	Sowing Time				Mean	
	Timely		Late			
Treatments	Yld.	Rk.	Yld.	Rk.	Yld.	Rk
	Yield, kg/ha					
Recommended dose of Fertilizer	3400	5	2957	6	3179	6
T1 + FYM @5 t/ha	3670	4	3240	4	3455	4
T1+Mulch@ 6 t/ha	3390	6	3022	5	3206	5
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	3758	3	3297	3	3528	3
T4+ spray of ZnSo4 @ 0.5 %	3955	2	3332	1	3644	2
T4 + Two spray of Kcl @ 0.5 %	4004	1	3332	2	3668	1
MEAN	3696		3197		3446	
CD (0.05)	Sowing Time (A)	Additives (B)	B within A		A within B	
	23	107	152		140	
	Earhead/ m^2					
Recommended dose of Fertilizer	330	5	305	4	317	5
T1 + FYM @5 t/ha	339	3	319	1	329	1
T1+Mulch@ 6 t/ha	316	6	306	3	311	6
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	332	4	303	6	317	4
T4+ spray of ZnSo4 @ 0.5 %	346	1	311	2	328	2
T4 + Two spray of Kcl @ 0.5 %	339	2	304	5	322	3
MEAN	333		308		321	
CD(0.05)	Sowing Time (A)	Additives (B)	B within A		A within B	
	7	11	NS		NS	
	Grains/Earhead					
Recommended dose of Fertilizer	42.56	5	37.00	6	39.78	6
T1 + FYM @5 t/ha	42.77	4	37.69	5	40.23	5
T1+Mulch@ 6 t/ha	42.52	6	39.72	3	41.12	4
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	45.24	2	39.89	2	42.57	2
T4+ spray of ZnSo4 @ 0.5 %	45.10	3	38.42	4	41.76	3
T4 + Two spray of Kcl @ 0.5 %	48.59	1	40.01	1	44.30	1
MEAN	44.46		38.79		41.63	
CD(0.05)	Sowing Time (A)	Additives (B)	B within A		A within B	
	1.30	1.64	2.32		2.44	
	1000 Grain Weight, g					
Recommended dose of Fertilizer	37.02	6	36.60	5	36.81	5
T1 + FYM @5 t/ha	38.26	4	37.30	3	37.78	4
T1+Mulch@ 6 t/ha	37.20	5	35.88	6	36.54	6
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	39.19	2	37.25	4	38.22	2
T4+ spray of ZnSo4 @ 0.5 %	38.31	3	37.72	1	38.01	3
T4 + Two spray of Kcl @ 0.5 %	39.19	1	37.66	2	38.43	1
MEAN	38.19		37.07		37.63	
CD(0.05)	Sowing Time (A)	Additives (B)	B within A		A within B	
	0 .50	0.93	NS		NS	

Centres: Kanpur, Varanasi, Faizabad and Rewa

SPL-4 Integrated Nutrient Management in Barley (NWPZ, NEPZ, CZ & NHZ)

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

Pooled data presented in Table 9 indicated that the significantly higher grain yield was obtained with the application of 100 % recommended dose of fertilizer. Use of bio-fertilizers also resulted in significantly higher grain yield as compare to control. Almost similar trends were observed in yield attributing characters. Highest grain yield (5266 kg ha^{-1}) was recorded when 100 % of the recommended dose of fertilizer was applied and seed was treated with *Azotobacter + Phosphosolublizing bacteria.* 100% RDF was significantly superior to 75 and 50 %RDF nutrient supply.

Table 9 NORTH WESTERN PLAINS ZONE POOLED 2016-17

SPL-4 Integrated Nutrient Management

Bio fertilizers	Recommended dose of Fertilizer(RDF)						Mean	
	50% RDF		75% RDF		100% RDF			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
Yield, kg/ha								
Azotobacter (AZO)	4202	1	4608	4	5073	3	4628	3
Phosphosolublizing bacteria(PSB)	4065	3	4637	3	5053	4	4585	4
AZO + PSB	4164	2	4961	1	5266	1	4797	1
Biomix	4001	5	4763	2	5121	2	4628	2
Control	4003	4	4351	5	4768	5	4374	5
MEAN	4087		4664		5056		4602	
CD (0.05)	Fertilizer Levels(A) 88		Bio fertilizer (B) 105		B within A 182		A within B 184	
Earhead/ m^2								
Azotobacter (AZO)	323	3	344	2	366	1	344	2
Phosphosolublizing bacteria(PSB)	321	4	341	3	360	4	341	4
AZO + PSB	329	1	357	1	365	2	350	1
Biomix	329	2	339	4	362	3	343	3
Control	312	5	329	5	347	5	330	5
MEAN	323		342		360		342	
CD (0.05)	Fertilizer Levels(A) 7		Bio fertilizer (B) 10		B within A NS		A within B NS	
Grains/Earhead								
Azotobacter (AZO)	45.68	5	43.51	5	46.90	4	45.37	5
Phosphosolublizing bacteria(PSB)	47.75	1	47.19	3	48.62	3	47.85	2
AZO + PSB	46.22	4	47.42	2	48.85	2	47.50	3
Biomix	47.69	2	48.68	1	49.43	1	48.60	1
Control	46.64	3	46.76	4	45.68	5	46.36	4
MEAN	46.80		46.71		47.90		47.14	
CD (0.05)	Fertilizer Levels(A) NS		Bio fertilizer (B) 1.66		B within A NS		A within B NS	
1000 Grain Weight, g								
Azotobacter (AZO)	44.12	2	44.90	3	45.15	4	44.72	4
Phosphosolublizing bacteria(PSB)	43.55	3	45.06	2	46.12	2	44.91	2
AZO + PSB	45.22	1	44.77	4	46.47	1	45.49	1
Biomix	43.31	4	45.38	1	45.76	3	44.82	3
Control	42.42	5	42.91	5	43.45	5	42.93	5
MEAN	43.72		44.61		45.39		44.57	
CD (0.05)	Fertilizer Levels(A) 0.66		Bio fertilizer (B) 1.04		B within A NS		A within B NS	

Centres: Agra, Durgapura, Hisar, Ludhiana and Karnal

In NHZ, the pooled data presented in Table 9(a) revealed that significantly higher grain yield was obtained with the application of 100 % recommended dose of fertilizer. Significantly highest grain yield (3394 kg ha^{-1}) was recorded when seed was treated with *Azotobacter* + *Phosphosolublizing bacteria* as compared to other treatments. Yield attributing characters were also better when seed was treated with *Azotobacter* + *Phosphosolublizing bacteria.* 100% RDF was at par with 75 %RDF nutrient supply. In NEPZ, a significantly more grain yield (4025 kg ha^{-1}) was recorded when seed was treated with *Azotobacter* + *Phosphosolublizing bacteria* as compared to other treatments. Similar trend was observed in yield attributing characters (Table 9b). 100% RDF was significantly superior to 75 and 50 %RDF nutrient supply.

Table 9(a) NORTH Hill ZONE POOLED 2016-17

SPL-4 Integrated Nutrient Management

Bio fertilizers	Recommended dose of Fertilizer(RDF)						Mean	
	50% RDF		75% RDF		100% RDF			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
Yield, kg/ha								
Azotobacter (AZO)	2954	2	3071	2	3170	2	3065	2
Phosphosolublizing bacteria(PSB)	2719	4	2882	4	3043	4	2882	4
AZO + PSB	3175	1	3434	1	3574	1	3394	1
Biomix	2768	3	2948	3	3144	3	2953	3
Control	2625	5	2808	5	2921	5	2785	5
MEAN	2848		3029		3170		3016	
CD (0.05)	Fertilizer Levels(A)		Bio fertilizer (B)		B within A		A within B	
	219		190		NS		NS	
Earhead/ m^2								
Azotobacter (AZO)	281	2	288	2	297	2	289	2
Phosphosolublizing bacteria(PSB)	271	4	283	4	288	4	281	4
AZO + PSB	296	1	301	1	312	1	303	1
Biomix	277	3	284	3	294	3	285	3
Control	259	5	279	5	284	5	274	5
MEAN	277		287		295		286	
CD (0.05)	Fertilizer Levels(A)		Bio fertilizer (B)		B within A		A within B	
	14		14		NS		NS	
Grains/Earhead								
Azotobacter (AZO)	26	1	26	2	27	3	26	2
Phosphosolublizing bacteria(PSB)	25	4	25	5	26	4	25	5
AZO + PSB	25	3	27	1	28	1	27	1
Biomix	24	5	26	3	27	2	26	4
Control	26	2	26	4	26	5	26	3
MEAN	25		26		27		26	
CD (0.05)	Fertilizer Levels(A)		Bio fertilizer (B)		B within A		A within B	
	NS		NS		NS		NS	
1000 Grain Weight, g								
Azotobacter (AZO)	40.57	4	40.73	2	40.03	3	40.44	2
Phosphosolublizing bacteria(PSB)	40.75	3	40.19	3	40.17	2	40.37	3
AZO + PSB	42.27	1	41.59	1	41.02	1	41.62	1
Biomix	40.83	2	39.94	4	39.42	4	40.06	4
Control	39.95	5	39.19	5	39.41	5	39.51	5
MEAN	40.87		40.33		40.01		40.40	
CD (0.05)	Fertilizer Levels(A)		Bio fertilizer (B)		B within A		A within B	
	NS		0.95		NS		NS	

Centres: Bajura, Malan

Table 9(b) **NORTH EASTERN PLAINS ZONE** **POOLED** **2016-17**

SPL-4 Integrated Nutrient Management

Bio fertilizers	Recommended dose of Fertilizer(RDF)						Mean	
	50% RDF		75% RDF		100% RDF			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
Yield, kg/ha								
Azotobacter (AZO)	3459	4	3696	4	3949	4	3702	4
Phosphosolublizing bacteria(PSB)	3607	2	3799	2	4094	3	3833	2
AZO + PSB	3773	1	3971	1	4330	1	4025	1
Biomix	3564	3	3783	3	4123	2	3823	3
Control	3207	5	3407	5	3723	5	3446	5
MEAN	3522		3731		4044		3766	
CD (0.05)	Fertilizer Levels(A)		Bio fertilizer (B)		B within A		A within B	
	97		101		NS		NS	
Earhead/ m^2								
Azotobacter (AZO)	375	4	383	4	389	4	382	4
Phosphosolublizing bacteria(PSB)	380	3	392	2	395	2	389	2
AZO + PSB	386	1	395	1	400	1	394	1
Biomix	381	2	390	3	394	3	388	3
Control	368	5	375	5	382	5	375	5
MEAN	378		387		392		385	
CD (0.05)	Fertilizer Levels(A)		Bio fertilizer (B)		B within A		A within B	
	2		7		NS		NS	
Grains/Earhead								
Azotobacter (AZO)	43.11	4	45.11	4	46.67	4	44.96	4
Phosphosolublizing bacteria(PSB)	43.33	3	46.00	2	47.00	2	45.44	2
AZO + PSB	45.44	1	47.67	1	49.22	1	47.44	1
Biomix	43.56	2	46.00	2	46.78	3	45.44	3
Control	42.00	5	42.67	5	44.56	5	43.07	5
MEAN	43.49		45.49		46.84		45.27	
CD (0.05)	Fertilizer Levels(A)		Bio fertilizer (B)		B within A		A within B	
	1.02		0.96		NS		NS	
1000 Grain Weight, g								
Azotobacter (AZO)	38.27	2	39.59	2	40.61	4	39.49	3
Phosphosolublizing bacteria(PSB)	38.19	3	39.48	3	40.92	2	39.53	2
AZO + PSB	39.58	1	40.95	1	42.31	1	40.95	1
Biomix	37.71	4	39.18	4	40.69	3	39.19	4
Control	36.64	5	37.85	5	38.56	5	37.68	5
MEAN	38.08		39.41		40.62		39.37	
CD (0.05)	Fertilizer Levels(A)		Bio fertilizer (B)		B within A		A within B	
	0.48		0.68		NS		NS	

Centres: Kanpur, Faizabad and Rewa

In Central zone, 100 % and 75 % recommended dose of fertilizer were at par in grain yield (Table 9c). Seed treatment with bio fertilizers resulted in significantly higher grain yield as compared to control. Maximum grain yield (5602 kg ha $^{-1}$) was recorded when seed was treated with Biomix and 100 % recommended dose of fertilizer was applied. Similar trend was observed in yield attributing characters.

Table 9(c) **CENTRAL ZONE** **2016-17**

SPL-4 Integrated Nutrient Management

Bio fertilizers	Recommended dose of Fertilizer(RDF)						Mean	
	50% RDF		75% RDF		100% RDF			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
Yield, kg/ha								
Azotobacter (AZO)	3813	3	4768	3	5078	3	4553	3
Phosphosolublizing bacteria(PSB)	3813	4	4649	4	4887	4	4450	4
AZO + PSB	3956	1	5068	2	5173	2	4732	2
Biomix	3956	1	5126	1	5602	1	4894	1
Control	2017	5	2901	5	3472	5	2797	5
MEAN	3511		4502		4843		4285	
CD (0.05)	Fertilizer Levels(A)		Bio fertilizer (B)		B within A		A within B	
	813		385		1224		1250	
Earhead/ m^2								
Azotobacter (AZO)	425	3	428	3	442	2	432	3
Phosphosolublizing bacteria(PSB)	412	4	416	4	440	4	423	4
AZO + PSB	429	2	437	2	442	2	436	2
Biomix	440	1	443	1	453	1	445	1
Control	405	5	407	5	412	5	408	5
MEAN	422		426		438		429	
CD (0.05)	Fertilizer Levels(A)		Bio fertilizer (B)		B within A		A within B	
	29		22		39		41	
Grains/Earhead								
Azotobacter (AZO)	45.0	3	47.6	3	47.7	3	46.8	3
Phosphosolublizing bacteria(PSB)	45.0	3	45.4	4	47.1	4	45.8	4
AZO + PSB	47.5	2	48.0	2	48.5	2	48.0	2
Biomix	47.7	1	48.7	1	49.7	1	48.7	1
Control	44.2	5	44.8	5	44.7	5	44.6	5
MEAN	45.9		46.9		47.5		46.8	
CD (0.05)	Fertilizer Levels(A)		Bio fertilizer (B)		B within A		A within B	
	1.8		1.1		1.9		2.1	
1000 Grain Weight, g								
Azotobacter (AZO)	37.2	4	40.0	3	40.5	3	39.2	4
Phosphosolublizing bacteria(PSB)	38.2	2	39.2	4	40.3	4	39.3	3
AZO + PSB	38.0	3	41.4	2	41.9	2	40.4	2
Biomix	39.3	1	42.3	1	43.7	1	41.8	1
Control	36.1	5	38.5	5	39.0	5	37.9	5
MEAN	37.8		40.3		41.1		39.7	
CD (0.05)	Fertilizer Levels(A)		Bio fertilizer (B)		B within A		A within B	
	2.6		2.5		4.3		4.3	

Centre: Udaipur

SPL-5 Source of potash x varieties (NWPZ)

The trial was conducted in NWPZ (Agra, Durgapura, Hisar, Ludhiana and Karnal) with an objective to observe the effect of different sources of potash on barley quality and productivity. Two sources of potash (murate of potash and sulphate of potash) with five varieties (DWRB101, RD 2849, DWRUB52, DWRB 92 and BH 902) were undertaken in split plot design taking sources of potash in main plots and varieties in sub plots. Pooled data presented in Table 10 revealed that significantly higher grain yield was recorded when potash was applied through murate of potash as compared to sulphate of potash. Variety BH 902 and RD 2849 recorded significantly higher yield as compared to other varieties. Sources of potash had no significant effect on yield attributing characters.

Table 10	NWPZ				POOLED	2016-17
	SPL-5 Source of potashXVarieties					
	Source of Potash				Mean	
	MOP		SOP			
Varieties	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, kg/ha					
DWRB101	4680	4	4573	4	4627	4
RD 2849	5113	2	5014	1	5063	2
DWRUB52	4776	3	4651	3	4714	3
DWRB92	4642	5	4502	5	4572	5
BH902	5309	1	4971	2	5140	1
MEAN	4904		4742		4823	
CD (0.05)	Source of Potash (A)		Varieties (B)		B within A	A within B
	64		202		NS	NS
	Earhead/ m^2					
DWRB101	421	2	404	4	413	2
RD 2849	423	1	409	2	416	1
DWRUB52	417	3	408	3	412	3
DWRB92	412	4	412	1	412	4
BH902	397	5	398	5	397	5
MEAN	414		406		410	
CD (0.05)	Source of Potash (A)		Varieties (B)		B within A	A within B
	NS		NS		NS	NS
	Grains/Earhead					
DWRB101	28.97	5	29.52	5	29.25	5
RD 2849	33.15	2	33.81	2	33.48	2
DWRUB52	30.58	3	30.76	3	30.67	3
DWRB92	29.94	4	29.95	4	29.94	4
BH902	50.62	1	50.19	1	50.41	1
MEAN	34.65		34.85		34.75	
CD (0.05)	Source of Potash (A)		Varieties (B)		B within A	A within B
	NS		1.51		NS	NS
	1000 Grain Weight, g					
DWRB101	47.84	3	46.06	4	46.95	3
RD 2849	47.92	2	47.46	2	47.69	2
DWRUB52	47.36	4	46.24	3	46.80	4
DWRB92	52.99	1	52.28	1	52.64	1
BH902	45.57	5	45.72	5	45.65	5
MEAN	48.34		47.55		47.94	
CD (0.05)	Source of Potash (A)		Varieties (B)		B within A	A within B
	NS		2.05		NS	NS

Centres: Agra, Durgapura, Hisar, Ludhiana and Karnal

SPL-6 Plant Growth Regulators X N levels (NWPZ, NEPZ)

The trial was conducted in NWPZ and NEPZ with an objective to observe the effect of different plant growth regulators on barley productivity. Three levels of nitrogen (100% recommended dose of nitrogen (RDN),125% RDN and 150% RDN) with three PGRs (Chlormequat-chlorid (CCC) @1.25 L ha^{-1} at GS_{30-31}, Ethephon(Cerone) @1.0 L ha^{-1} at GS_{39-40} , CCC + Ethephon) and one control treatment were undertaken in split plot design taking nitrozen dose in main plots and PGRs in sub plots.

Pooled data presented in Table 11 revealed that significantly higher grain yield (4965 kg ha^{-1}) was obtained with the application of chlormequat-chlorid (CCC) @1.25 L ha^{-1} at GS_{30-31} followed by ethephon(Cerone) @1.0 L ha^{-1} at $GS_{39-40.}$ Ear head m^{-2}

and grains per earhead were also more under this treatment. Grain yield increased significantly with increase in dose of nitrogen to 150% of RDN under PGR application.

Table 11 NORTH WESTERN PLAINS ZONE POOLED 2016-17
SPL-6 N levels X PGRs

PGRs	Recommended dose of Nitrogen(RDN)						Mean	
	100% RDN		125% RDN		150% RDN			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
Yield, kg/ha								
Chlormequat-chlorid (CCC)	4599	2	4732	3	4799	3	4710	3
Ethephon(Cerone)	4578	3	4904	2	4981	2	4821	2
CCC + Ethephon	4777	1	4990	1	5128	1	4965	1
Control	4165	4	4497	4	4678	4	4447	4
MEAN	4530		4780		4897		4736	
CD (0.05)	N Levels(A)		PGRs (B)		B within A		A within B	
	89		112		NS		NS	
Earhead/ m^2								
Chlormequat-chlorid (CCC)	320	3	333	3	337	4	330	3
Ethephon(Cerone)	322	2	346	1	360	2	342	2
CCC + Ethephon	329	1	343	2	365	1	346	1
Control	300	4	322	4	342	3	321	4
MEAN	318		336		351		335	
CD (0.05)	N Levels(A)		PGRs (B)		B within A		A within B	
	9		11		NS		NS	
Grains/Earhead								
Chlormequat-chlorid (CCC)	46.73	3	47.00	2	46.73	4	46.82	3
Ethephon(Cerone)	47.38	2	46.83	3	47.54	3	47.25	2
CCC + Ethephon	47.43	1	48.70	1	48.58	1	48.24	1
Control	44.97	4	46.00	4	47.64	2	46.20	4
MEAN	46.62		47.13		47.62		47.13	
CD (0.05)	N Levels(A)		PGRs (B)		B within A		A within B	
	NS		1.17		NS		NS	
1000 Grain Weight, g								
Chlormequat-chlorid (CCC)	46.90	3	47.39	3	46.63	3	46.97	3
Ethephon(Cerone)	47.54	1	47.43	2	47.37	2	47.44	1
CCC + Ethephon	47.01	2	47.69	1	47.63	1	47.44	2
Control	45.93	4	46.02	4	45.90	4	45.95	4
MEAN	46.85		47.13		46.88		46.95	
CD (0.05)	N Levels(A)		PGRs (B)		B within A		A within B	
	NS		0.99		NS		NS	

Centres: Durgapura, Agra, Hisar, Ludhiana and Karnal

Pooled data presented in Table 11(a) revealed that the significantly higher grain yield was obtained with the application of PGRs as compared to control in NEPZ also. Significantly higher grain yield (3714 kg ha $^{-1}$) was obtained with the application of chlormequat-chlorid (CCC) @1.25 L ha^{-1} at GS_{30-31} followed by ethephon(Cerone) @1.0 L ha^{-1} at $GS_{39-40.}$ Grain yield increased significantly with increase in dose of nitrogen to 150% of RDN under PGR application. The effect of nitrogen doses and different PGRs on yield attributing characters was non- significant.

Table 11(a) **NORTH EASTERN PLAINS ZONE** **POOLED** **2016-17**

SPL-6 N levels X PGRs

PGRs	Recommended dose of Nitrogen(RDN)						Mean	
	100% RDN		125% RDN		150% RDN			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
Yield, kg/ha								
Chlormequat-chlorid (CCC)	3431	2	3590	2	3737	2	3586	2
Ethephon(Cerone)	3357	3	3527	3	3597	3	3494	3
CCC + Ethephon	3551	1	3721	1	3870	1	3714	1
Control	3158	4	3310	4	3468	4	3312	4
MEAN	3374		3537		3668		3526	
CD (0.05)	N Levels(A)		PGRs (B)		B within A		A within B	
	71		85		NS		NS	
Earhead/ m^2								
Chlormequat-chlorid (CCC)	310	4	326	1	323	3	320	3
Ethephon(Cerone)	572	1	320	3	326	2	406	1
CCC + Ethephon	324	2	326	2	330	1	327	2
Control	310	3	319	4	300	4	310	4
MEAN	379		323		320		341	
CD (0.05)	N Levels(A)		PGRs (B)		B within A		A within B	
	NS		NS		NS		NS	
Grains/Earhead								
Chlormequat-chlorid (CCC)	42	1	42	3	44	3	42	3
Ethephon(Cerone)	41	2	42	2	42	4	42	4
CCC + Ethephon	41	3	43	1	44	2	42	2
Control	40	4	41	4	63	1	48	1
MEAN	41		42		48		44	
CD (0.05)	N Levels(A)		PGRs (B)		B within A		A within B	
	NS		NS		NS		NS	
1000 Grain Weight, g								
Chlormequat-chlorid (CCC)	39	4	39	3	38	4	39	4
Ethephon(Cerone)	39	3	39	2	39	1	39	2
CCC + Ethephon	40	1	40	1	39	2	40	1
Control	40	2	39	4	38	3	39	3
MEAN	39		39		39		39	
CD (0.05)	N Levels(A)		PGRs (B)		B within A		A within B	
	NS		NS		NS		NS	

Centres: Kanpur, Varanasi, Faizabad, Rewa

SPL-7 Row Spacing X Varieties(NWPZ, NEPZ, CZ & NHZ)

The trial was conducted in NWPZ, NEPZ, NHZ and CZ with an objective to observe the effect of different spacing on barley productivity. Three spacing (20 cm, 22.5 cm and 25 cm) with three varieties were undertaken in split plot design taking spacing in main plots and varieties in sub plots.

Pooled data of NWPZ presented in Table 12 revealed that spacing had non-significant effect on grain yield, ear head m^{-2} and grains per ear head. The maximum grain yield (4965 kg ha $^{-1}$) was obtained when barley crop was sown at a spacing of 22.5 cm. BH 946 recorded significantly higher grain yield (5144 kg ha $^{-1}$) as compared to other varieties.

Table 12 **NORTH WESTERN PLAINS ZONE** **POOLED** **2016-17**

SPL-7 Spacing X Varieties

Varieties	Spacing						Mean	
	20 cm		22.5 cm		25 cm			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk
			Yield, kg/ha					
BH 902	4924	2	4830	2	4795	2	4850	2
BH 946	5062	1	5234	1	5137	1	5144	1
RD 2552	4761	3	4830	3	4775	3	4788	3
MEAN	4916		4965		4903		4928	
CD (0.05)	Spacing(A)		Varieties (B)		B within A		A within B	
	NS		159		NS		262	
			Earhead/ m^2					
BH 902	365	3	358	3	358	3	360	3
BH 946	365	2	363	2	369	1	366	1
RD 2552	366	1	368	1	362	2	366	2
MEAN	366		363		363		364	
CD (0.05)	Spacing(A)		Varieties (B)		B within A		A within B	
	NS		NS		NS		18	
			Grains/Earhead					
BH 902	47.9	2	48.2	2	48.4	1	48.2	2
BH 946	48.3	1	48.9	1	47.9	2	48.4	1
RD 2552	46.0	3	46.4	3	45.9	3	46.1	3
MEAN	47.4		47.8		47.4		47.5	
CD (0.05)	Spacing(A)		Varieties (B)		B within A		A within B	
	NS		1.8		NS		3.2	
			1000 Grain Weight, g					
BH 902	45.99	1	45.90	1	46.86	1	46.25	1
BH 946	44.15	2	44.39	2	45.32	3	44.62	2
RD 2552	43.68	3	43.58	3	45.33	2	44.20	3
MEAN	44.61		44.62		45.84		45.02	
CD (0.05)	Spacing(A)		Varieties (B)		B within A		A within B	
	0.73		1.46		NS		2.18	

Centres: Durgapura, Agra, Hisar, Ludhiana and Karnal

Pooled data of NHZ revealed that significantly higher grain yield (3014 kg ha $^{-1}$) and grains per ear head were recorded at spacing of 20 cm (Table 12a) and variety VLB 130 recorded significantly higher grain yield (2925 kg ha $^{-1}$) compared to other varieties on mean basis. Ear heads m^{-2} were also more at spacing of 20 cm, whereas no effect of spacing was observed on 1000 grains weight.

Pooled data of NEPZ presented in Table 12(b) revealed that significantly higher grain yield (3928 kg ha $^{-1}$) and yield attributing characters were recorded at spacing of 22.5 cm and variety JB 1 recorded significantly higher grain yield (3890 kg ha $^{-1}$) compared to other varieties on mean basis. This variety was also superior in yield attributing characters.

Data of CZ presented in Table 12(c) revealed that grain yield and ear head m^{-2} were at par when sowing of barley was done at spacing of 20 cm and 22.5 cm. There was no effect of spacing on grains per ear head and 1000 grains weight. RD 2786 recorded significantly higher grain yield (4731 kg ha $^{-1}$) as compared to other varieties.

Table 12(a) **NORTH HILL ZONE** **POOLED** **2016-17**

SPL-7 Spacing X Varieties

Varieties	Spacing						Mean	
	20 cm		22.5 cm		25 cm			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk
Yield, kg/ha								
HBL 113	2934	2	2608	2	2446	2	2663	2
VLB 118	2919	3	2589	3	2394	3	2634	3
VLB 130	3189	1	2954	1	2634	1	2925	1
MEAN	3014		2717		2491		2741	
CD (0.05)	Spacing(A)		Varieties (B)		B within A		A within B	
	130		131		NS		NS	
Earhead/ m^2								
HBL 113	369	1	371	1	350	1	363	1
VLB 118	301	3	292	3	268	3	287	3
VLB 130	323	2	319	2	291	2	311	2
MEAN	331		327		303		321	
CD (0.05)	Spacing(A)		Varieties (B)		B within A		A within B	
	14		14		NS		NS	
Grains/Earhead								
HBL 113	21.39	3	19.89	3	19.70	3	20.33	3
VLB 118	27.12	2	25.69	2	25.94	2	26.25	2
VLB 130	29.26	1	27.83	1	27.24	1	28.11	1
MEAN	25.93		24.47		24.30		24.90	
CD (0.05)	Spacing(A)		Varieties (B)		B within A		A within B	
	1.15		1.08		NS		NS	
1000 Grain Weight, g								
HBL 113	39.01	3	38.90	3	39.81	3	39.24	3
VLB 118	42.78	1	43.91	1	44.36	1	43.68	1
VLB 130	41.60	2	42.42	2	42.95	2	42.33	2
MEAN	41.13		41.74		42.37		41.75	
CD (0.05)	Spacing(A)		Varieties (B)		B within A		A within B	
	NS		0.80		NS		NS	

Centres: Bajura, Malan, Almora

Table 12(b) **NORTH EASTERN PLAINS ZONE** **POOLED** **2016-17**

SPL-7 Spacing X Varieties

Varieties	Spacing						Mean	
	20 cm		22.5 cm		25 cm			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk
Yield, kg/ha								
JB 1	3852	1	4054	1	3765	1	3890	1
K 508	3596	3	3824	3	3442	3	3621	3
HUB 113	3658	2	3906	2	3507	2	3691	2
MEAN	3702		3928		3571		3734	
CD (0.05)	Spacing(A)		Varieties (B)		B within A		A within B	
	82		110		NS		175	
Earhead/ m^2								
JB 1	328.0	1	341.0	1	323.1	2	330.7	1
K 508	323.7	3	332.6	3	321.0	3	325.7	3
HUB 113	325.9	2	336.6	2	325.9	1	329.4	2
MEAN	325.9		336.7		323.3		328.6	
CD (0.05)	Spacing(A)		Varieties (B)		B within A		A within B	
	3.0		NS		NS		10.9	
Grains/Earhead								
JB 1	46.1	1	48.3	1	46.7	1	47.0	1
K 508	44.7	3	47.6	3	45.9	2	46.0	3
HUB 113	45.7	2	48.2	2	44.9	3	46.3	2
MEAN	45.5		48.0		45.8		46.4	
CD (0.05)	Spacing(A)		Varieties (B)		B within A		A within B	
	0.9		NS		NS		2.1	

1000 Grain Weight, g								
JB 1	39.50	1	40.91	1	39.94	1	40.12	1
K 508	38.03	3	39.63	3	39.12	3	38.93	3
HUB 113	39.04	2	39.69	2	39.34	2	39.36	2
MEAN	38.86		40.08		39.47		39.47	
CD (0.05)	Spacing(A)		Varieties (B)		B within A		A within B	
	0.41		0.74		NS		1.13	

Centres: Kanpur, Rewa and Faizabad

Table 12(c) **CENTRAL ZONE** **POOLED** **2016-17**

SPL-7 Spacing X Varieties

Varieties	Spacing						Mean	
	20 cm		22.5 cm		25 cm			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk
Yield, kg/ha								
BH 959	4678	2	4590	2	3905	2	4391	2
RD 2786	4805	1	4902	1	4487	1	4731	1
RD 2715	4572	3	4273	3	3884	3	4243	3
MEAN	4685		4588		4092		4455	
CD (0.05)	Spacing(A)		Varieties (B)		B within A		A within B	
	376		127		221		346	
Earhead/ m^2								
BH 959	420	2	403	3	389	2	404	2
RD 2786	430	1	414	1	397	1	413	1
RD 2715	412	3	412	2	387	3	403	3
MEAN	421		410		391		407	
CD (0.05)	Spacing(A)		Varieties (B)		B within A		A within B	
	12		8		NS		15	
Grains/Earhead								
BH 959	44.3	2	44.4	2	44.9	2	44.5	2
RD 2786	44.4	1	44.8	1	45.7	1	44.9	1
RD 2715	42.8	3	43.0	3	43.3	3	43.0	3
MEAN	43.8		44.0		44.6		44.2	
CD (0.05)	Spacing(A)		Varieties (B)		B within A		A within B	
	NS		0.7		NS		1.4	
1000 Grain Weight, g								
BH 959	38.22	3	39.87	2	39.85	2	39.31	2
RD 2786	40.08	1	40.42	1	41.06	1	40.52	1
RD 2715	38.58	2	39.49	3	39.31	3	39.13	3
MEAN	38.96		39.92		40.07		39.65	
CD (0.05)	Spacing(A)		Varieties (B)		B within A		A within B	
	NS		NS		NS		NS	

Centres:Udaipur

Annexure I

Centre wise Yield Tables

Table 2.1 **NORTH WESTERN PLAINS ZONE** **Agra** **2016-17**

IR-TS-Malt-N levels X Variety

Varieties	Nitrogen Levels, kg/ha						Mean	
	60		90		120			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield (q ha-1)							
RD2917	40.67	3	41.84	3	43.88	3	42.13	3
DWRUB52	45.51	1	47.50	1	48.24	1	47.08	1
DWRB101	42.76	2	44.76	2	46.88	2	44.80	2
RD2849	33.88	5	35.24	5	36.95	5	35.36	5
DWRB123	35.59	4	37.65	4	40.06	4	37.77	4
MEAN	39.68		41.40		43.20		41.43	

		F. Test	S.E.m	C.D.	C.V.(%)
N levels	(A)	**	0.29	1.12	2.67
Varieties	(B)	**	0.36	1.06	2.62
B within A		N.S.	0.63	1.83	
A within B			0.63	1.84	

Table 2.2 **NORTH WESTERN PLAINS ZONE** **Durgapura** **2016-17**

IR-TS-Malt-N levels X Variety

Varieties	Nitrogen Levels, kg/ha						Mean	
	60		90		120			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield (q ha-1)							
RD2917	54.84	1	60.95	1	62.91	1	59.57	1
DWRUB52	46.83	4	56.24	3	57.76	3	53.61	4
DWRB101	52.87	2	59.41	2	60.41	2	57.56	2
RD2849	51.62	3	55.16	4	56.58	4	54.45	3
DWRB123	46.41	5	53.12	5	54.08	5	51.20	5
MEAN	50.51		56.98		58.35		55.28	

		F. Test	S.E.m	C.D.	C.V.(%)
N levels	(A)	**	0.60	2.36	4.21
Varieties	(B)	**	1.60	4.67	8.69
B within A		N.S.	2.77	8.09	
A within B			2.55	7.45	

Table 2.3 **NORTH WESTERN PLAINS ZONE** **Hisar** **2016-17**

IR-TS-Malt-N levels X Variety

Varieties	Nitrogen Levels, kg/ha						Mean	
	60		90		120			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield (q ha-1)							
RD2917	53.71	2	64.03	2	65.57	3	61.11	2
DWRUB52	46.17	5	59.79	5	62.14	5	56.03	5
DWRB101	52.80	4	60.71	4	66.14	2	59.88	4
RD2849	54.77	1	63.90	3	64.36	4	61.01	3

DWRB123		53.50	3	67.52	1	68.01	1	63.01	1
MEAN		52.19		63.19		65.24		60.21	

		F. Test	S.E.m	C.D.	C.V.(%)
N levels	(A)	**	0.94	3.69	6.04
Varieties	(B)	**	0.85	2.49	4.24
B within A		N.S.	1.48	4.31	
A within B			1.62	4.73	

Table 2.4 **NORTH WESTERN PLAINS ZONE** **Ludhiana** **2016-17**

IR-TS-Malt-N levels X Variety

Varieties	Nitrogen Levels, kg/ha						Mean	
	60		90		120			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
			Yield (q ha-1)					
RD2917	48.72	1	49.00	2	45.73	1	47.82	1
DWRUB52	44.17	2	46.68	3	43.02	3	44.62	3
DWRB101	41.20	5	52.47	1	41.56	4	45.08	2
RD2849	41.67	4	37.81	5	40.51	5	39.99	5
DWRB123	42.63	3	45.14	4	43.21	2	43.66	4
MEAN	43.68		46.22		42.81		44.24	

		F. Test	S.E.m	C.D.	C.V.(%)
Nitrozen levels	(A)	N.S.	0.86	3.36	7.50
Varieties	(B)	**	0.78	2.26	5.26
B within A		**	1.34	3.92	
A within B			1.48	4.31	

Table 2.5 **NORTH WESTERN PLAINS ZONE** **Karnal** **2016-17**

IR-TS-Malt-N levels X Variety

Varieties	Nitrogen Levels, kg/ha						Mean	
	60		90		120			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
			Yield (q ha-1)					
RD2917	43.32	5	49.65	3	47.82	4	46.93	4
DWRUB52	43.48	4	45.57	5	47.38	5	45.48	5
DWRB101	49.52	2	49.38	4	53.52	1	50.80	2
RD2849	43.81	3	50.44	2	51.87	2	48.71	3
DWRB123	54.35	1	53.88	1	50.09	3	52.77	1
MEAN	46.89		49.78		50.14		48.94	

		F. Test	S.E.m	C.D.	C.V.(%)
Nitrozen levels	(A)	N.S.	1.51	5.94	11.97
Varieties	(B)	**	0.88	2.57	5.40
B within A		*	1.53	4.46	
A within B			2.04	5.95	

Table 3.1 **NEPZ** **Kanpur** **2016-17**

IR-TS-FB-DOSX VAR

	Sowing Time				Mean	
	Timely		Late			
Varieties	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield (q ha^{-1})					
DWRB-137	46.10	1	35.70	2	40.90	1
HUB-113 (C)	45.00	3	34.00	3	39.50	3
K-508 (C)	44.10	4	33.92	4	39.01	4
Jyoti (C)	45.73	2	36.05	1	40.89	2
MEAN	45.23		34.92		40.08	

		F. Test	S.E.m	C.D.	C.V.(%)
Date	(A)	**	0.14	0.64	1.22
Varieties	(B)	N.S.	0.69	2.06	4.21
B within A		N.S.	0.97	2.92	
A within B			0.85	2.56	

Table 3.2 **NEPZ** **Varanasi** **2016-17**

IR-TS-FB-DOSX VAR

	Sowing Time				Mean	
	Timely		Late			
Varieties	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield (q ha^{-1})					
DWRB-137	35.64	1	26.76	1	31.20	1
HUB-113 (C)	32.01	2	25.78	2	28.89	2
K-508 (C)	28.49	4	22.39	3	25.44	3
Jyoti (C)	29.05	3	20.41	4	24.73	4
MEAN	31.30		23.83		27.57	

		F. Test	S.E.m	C.D.	C.V.(%)
Date	(A)	*	0.62	2.80	7.83
Varieties	(B)	**	0.74	2.22	6.59
B within A		N.S.	1.05	3.15	
A within B			1.10	3.30	

Table 3.3 **NEPZ** **Faizabad** **2016-17**

IR-TS-FB-DOSX VAR

	Sowing Time				Mean	
	Timely		Late			
Varieties	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield (q ha^{-1})					
DWRB-137	52.37	1	46.27	1	49.32	1
HUB-113 (C)	51.07	2	45.40	2	48.23	2
K-508 (C)	45.47	3	40.27	3	42.87	3
Jyoti (C)	40.30	4	36.23	4	38.27	4
MEAN	47.30		42.04		44.67	

		F. Test	S.E.m	C.D.	C.V.(%)
Date	(A)	**	0.16	0.74	1.27
Varieties	(B)	**	1.40	4.19	7.66
B within A		N.S.	1.98	5.93	
A within B			1.72	5.16	

Table 3.4 **NEPZ** **Rewa** **2016-17**

IR-TS-FB-DOSX VAR

	Sowing Time				Mean	
	Timely		Late			
Varieties	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield (q ha^{-1})					
DWRB-137	38.63	2	41.00	2	39.82	2
HUB-113 (C)	37.07	4	38.87	3	37.97	4
K-508 (C)	38.10	3	37.87	4	37.98	3
Jyoti (C)	40.40	1	43.20	1	41.80	1
MEAN	38.55		40.23		39.39	

		F. Test	S.E.m	C.D.	C.V.(%)
Date	(A)	**	0.09	0.39	0.75
Varieties	(B)	**	0.68	2.05	4.26
B within A		N.S.	0.97	2.90	
A within B			0.84	2.53	

Table 4.1 **CZ** **Rewa** **2016-17**

IR-TS-FB-DOSX VAR

	Sowing Time				Mean	
	Timely		Late			
Varieties	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield (q ha^{-1})					
DWRB137	39.30	3	40.93	3	40.12	2
RD2899	39.53	1	38.80	5	39.17	4
PL751	38.37	5	39.87	4	39.12	5
RD2786	39.40	2	42.87	1	41.13	1
BH959	38.87	4	41.37	2	40.12	2
MEAN	39.09		40.77		39.93	

		F. Test	S.E.m	C.D.	C.V.(%)
Date	(A)	N.S.	0.668198	3.00691	6.481144
Varieties	(B)	N.S.	0.596343	1.787916	3.658242
B within A		N.S.	0.843356	2.528494	
A within B			1.007715	3.021262	

Table 4.2 **CZ** **Udaipur** **2016-17**

IR-TS-FB-DOSX VAR

	Sowing Time				Mean	
	Timely		Late			
Varieties	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield (q ha^{-1})					
DWRB137	46.56	3	35.23	3	40.90	3
RD2899	49.51	1	38.65	1	44.08	1
PL751	39.83	5	32.78	4	36.31	4
RD2786	47.59	2	37.70	2	42.65	2
BH959	39.89	4	30.97	5	35.43	5
MEAN	44.68		35.07		39.87	

		F. Test	S.E.m	C.D.	C.V.(%)
Date	(A)	*	0.92	4.13	8.91
Varieties	(B)	**	0.89	2.67	5.47
B within A		N.S.	1.26	3.77	
A within B			1.45	4.35	

Table 5.1 **IR-SAL-LON** Dalipnagar **2016-17**

		Nitrozen levels (kg ha^{-1})							
		60		75		90			
Varieties	Yield	Rank	Yield	Rank	Yield	Rank	Mean	Rank
				Yield (q ha^{-1})				
RD 2907	31.66	1	33.62	1	36.05333	2	33.77667	1
RD 2552	28.37	4	32.53	2	34.78	3	31.89222	3
NDB 1173	29.44	3	31.65	4	33.81	4	31.63333	4
RD 2794	29.76	2	31.84	3	36.10333	1	32.57111	2
MEAN	29.81		32.41		35.18667		32.46833	

		F. Test	S.E.m	C.D.	C.V.(%)
Nitrozen levels	(A)	**	0.179172	0.703406	1.911622
Varieties	(B)	N.S.	0.56434	1.676803	5.214375
B within A		N.S.	0.977466	2.904308	
A within B			0.865264	2.570928	

Table 5.2 **IR-SAL-LON** Faizabad **2016-17**

		Nitrozen levels (kg ha^{-1})							
		60		75		90			
Varieties	Yield	Rank	Yield	Rank	Yield	Rank	Mean	Rank
				Yield (q ha^{-1})				
RD 2907	25.18	1	28.48	1	31.48	1	28.38	1
RD 2552	24.55	2	28.16	2	30.96	2	27.89	2
NDB 1173	17.91	4	22.38	4	23.72	4	21.34	4
RD 2794	22.53	3	24.81	3	25.48	3	24.27	3
MEAN	22.54		25.96		27.91		25.47	

		F. Test	S.E.m	C.D.	C.V.(%)
N levels	(A)	**	0.282018	1.107161	3.835724
Varieties	(B)	**	0.879018	2.611794	10.3538
B within A		N.S.	1.522504	4.52376	
A within B			1.34835	4.006303	

Table 5.3 **IR-SAL-LON** Hisar **2016-17**

		Nitrozen levels (kg ha^{-1})							
		60		75		90			
Varieties	Yield	Rank	Yield	Rank	Yield	Rank	Mean	Rank
				Yield (q ha^{-1})				
RD 2907	54.18	1	57.77	1	58.11	1	56.69	1
RD 2552	46.68	3	51.39	3	54.28	2	50.78	3
NDB 1173	45.77	4	48.35	4	51.03	4	48.38	4
RD 2794	48.94	2	52.07	2	53.73	3	51.58	2
MEAN	48.89		52.39		54.29		51.86	

		F. Test	S.E.m	C.D.	C.V.(%)
N levels	(A)	**	0.55	2.16	3.68
Varieties	(B)	**	1.16	3.44	6.70
B within A		N.S.	2.01	5.96	
A within B			1.82	5.42	

Table 5.4 **IR-SAL-LON** Udaipur **2016-17**

	Nitrozen levels (kg ha^{-1})							
	60		75		90			
Varieties	Yield	Rank	Yield	Rank	Yield	Rank	Mean	Rank
	Yield (q ha^{-1})							
RD 2907	29.85	1	26.02	3	40.87	1	32.24	1
RD 2552	19.34	4	38.79	1	31.71	4	29.95	3
NDB 1173	22.85	3	23.38	4	32.77	3	26.33	4
RD 2794	25.35	2	30.79	2	34.52	2	30.22	2
MEAN	24.35		29.75		34.97		29.69	

		F. Test	S.E.m	C.D.	C.V.(%)
Nitrozen levels	(A)	**	0.53	2.10	6.24
Varieties	(B)	**	0.48	1.44	4.89
B within A		**	0.84	2.49	
A within B			0.90	2.68	

Table 5.5 **IR-SAL-LON** IIWBR-Hisar **2016-17**

	Nitrozen levels (kg ha^{-1})							
	60		75		90			
Varieties	Yield	Rank	Yield	Rank	Yield	Rank	Mean	Rank
	Yield (q ha^{-1})							
RD 2907	28.29	2	31.02	3	25.53	3	28.28	4
RD 2552	35.45	1	31.74	2	34.21	2	33.80	1
NDB 1173	28.26	3	28.74	4	35.97	1	30.99	2
RD 2794	27.80	4	37.15	1	25.01	4	29.99	3
MEAN	29.95		32.16		30.18		30.76	

		F. Test	S.E.m	C.D.	C.V.(%)
Nitrozen levels	(A)	N.S.	0.71	2.79	7.99
Varieties	(B)	*	1.06	3.16	10.37
B within A		**	1.84	5.47	
A within B			1.75	5.19	

Table 6.1 **NWPZ** Durgapura **2016-17**

SPL-1 Tillagex Varieties

Varieties	Tillage Practices						Mean	
	ZT		CT		ZT+Residue@6 tha^{-1}			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, Q/ha							
BH902	51.67	4.00	54.80	3.00	53.56	3.00	53.34	3.00
BH946	52.48	2.00	55.39	2.00	54.35	2.00	54.07	2.00
RD2552	53.23	1.00	58.48	1.00	54.79	1.00	55.50	1.00
DWRB101	50.55	5.00	52.13	5.00	51.28	5.00	51.32	5.00
DWRUB52	51.77	3.00	53.32	4.00	52.49	4.00	52.53	4.00
MEAN	51.94		54.83		53.29		53.35	

		F. Test	S.E.m	C.D.	C.V.(%)
Tillage	(A)	N.S.	0.728	2.859	5.286
Varieties	(B)	N.S.	1.079	3.149	6.066
B within A		N.S.	1.868	5.454	
A within B			1.823	5.321	

Table 6.2 **NWPZ** Ludhiana **2016-17**

SPL-1 Tillagex Varieties

Varieties	Tillage Practices						Mean	
	ZT		CT		ZT+Residue@6 tha^{-1}			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
				Yield, Q/ha				
BH902	60.1	5.0	60.1	5.0	59.0	5.0	59.8	5
BH946	66.0	3.0	67.9	1.0	68.2	2.0	67.3	2
RD2552	66.5	2.0	65.5	4.0	63.8	3.0	65.2	3
DWRB101	65.8	4.0	66.0	3.0	63.3	4.0	65.0	4
DWRUB52	66.6	1.0	66.4	2.0	69.3	1.0	67.4	1
MEAN	65.0		65.2		64.7		65.0	

		F. Test	S.E.m	C.D.	C.V.(%)
Tillage	(A)	0.61	2.39	3.63	0.61
Varieties	(B)	0.85	2.47	3.91	0.85
B within A		1.47	4.28		1.47
A within B		1.45	4.22		1.45

Table 6.3 **NWPZ** Karnal **2016-17**

SPL-1 Tillagex Varieties

Varieties	Tillage Practices						Mean	
	ZT		CT		ZT+Residue@6 tha^{-1}			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
				Yield, Q/ha				
BH902	48.74	2.00	40.67	2.00	37.48	3.00	42.29	3.00
BH946	46.32	4.00	37.91	3.00	43.82	1.00	42.68	2.00
RD2552	48.14	3.00	36.16	4.00	32.38	5.00	38.89	4.00
DWRB101	33.34	5.00	34.53	5.00	32.95	4.00	33.61	5.00
DWRUB52	50.50	1.00	45.25	1.00	39.86	2.00	45.20	1.00
MEAN	45.41		38.90		37.30		40.54	

		F. Test	S.E.m	C.D.	C.V.(%)
Tillage	(A)	**	0.33	1.29	3.13
Varieties	(B)	**	0.88	2.57	6.51
B within A		**	1.52	4.45	
A within B			1.40	4.09	

Table 6.4 **NWPZ** Hisar **2016-17**

SPL-1 Tillagex Varieties

Varieties	Tillage Practices						Mean	
	ZT		CT		ZT+Residue@6 tha^{-1}			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
				Yield, Q/ha				
BH902	47.7	1.0	47.8	1.0	50.2	2.0	48.6	1.0
BH946	39.3	5.0	41.1	5.0	38.4	5.0	39.6	5.0
RD2552	45.4	3.0	46.8	3.0	50.3	1.0	47.5	2.0
DWRB101	47.2	2.0	43.6	4.0	42.5	4.0	44.4	4.0
DWRUB52	45.3	4.0	46.8	2.0	47.1	3.0	46.4	3.0
MEAN	45.0		45.2		45.7		45.3	

		F. Test	S.E.m	C.D.	C.V.(%)
Tillage	(A)	N.S.	0.62	2.43	5.30
Varieties	(B)	**	0.75	2.19	4.97
B within A		*	1.30	3.79	
A within B			1.32	3.84	

Table 6.5 **NWPZ** Agra **2016-17**

SPL-1 Tillagex Varieties

Varieties	Tillage Practices						Mean	
	ZT		CT		ZT+Residue@6 tha^{-1}			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, Q/ha							
BH902	47.47	2.00	48.67	2.00	64.60	1.00	53.58	1.00
BH946	49.52	1.00	51.13	1.00	49.62	2.00	50.09	2.00
RD2552	46.71	3.00	47.83	3.00	46.83	3.00	47.12	3.00
DWRB101	44.70	4.00	45.75	4.00	44.40	5.00	44.95	4.00
DWRUB52	44.07	5.00	45.00	5.00	44.53	4.00	44.53	5.00
MEAN	46.49		47.68		49.99		48.05	

		F. Test	S.E.m	C.D.	C.V.(%)
Tillage	(A)	N.S.	1.94	7.62	15.65
Varieties	(B)	N.S.	2.49	7.26	15.53
B within A		N.S.	4.31	12.58	
A within B			4.32	12.60	

Table 6.6 **NHZ** **Bajaura** **2016-17**

SPL-1 Tillagex Varieties

Varieties	Tillage Practices						Mean	
	ZT		CT		ZT+Residue@6 tha^{-1}			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha							
VLB118	38.46	3.00	41.19	3.00	42.57	2.00	40.74	3.00
BHS 400	41.13	1.00	45.71	1.00	43.50	1.00	43.45	1.00
HBL 113	39.97	2.00	44.31	2.00	38.93	3.00	41.07	2.00
BHS 352	25.53	4.00	29.51	4.00	27.01	4.00	27.35	4.00
HBL 276	20.00	5.00	23.13	5.00	20.03	5.00	21.05	5.00
MEAN	33.02		36.77		34.41		34.73	

		F. Test	S.E.m	C.D.	C.V.(%)
Tillage	(A)	*	0.59	2.30	6.54
Varieties	(B)	**	1.15	3.35	9.92
B within A		N.S.	1.99	5.80	
A within B			1.87	5.47	

Table 6.7 **NHZ** **Malan** **2016-17**

SPL-1 Tillagex Varieties

Varieties	Tillage Practices						Mean	
	ZT		CT		ZT+Residue@6 tha^{-1}			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha							
VLB118	15.90	2.00	22.47	2.00	21.75	2.00	20.04	2.00
BHS 400	23.26	1.00	35.65	1.00	30.13	1.00	29.68	1.00
HBL 113	12.98	3.00	15.34	5.00	17.44	3.00	15.25	4.00
BHS 352	10.18	5.00	15.52	4.00	12.78	5.00	12.83	5.00
HBL 276	12.96	4.00	17.82	3.00	15.45	4.00	15.41	3.00
MEAN	15.06		21.36		19.51		18.64	

		F. Test	S.E.m	C.D.	C.V.(%)
Tillage	(A)	*	0.85	3.35	17.72
Varieties	(B)	**	0.76	2.20	12.15
B within A		*	1.31	3.82	
A within B			1.45	4.23	

Table 7.1 **NHZ** **Malan** **2016-17**

SPL-2 Seed rate x Variety

Varieties	Seed rate (Kg ha^{-1}) 75 Yld.	75 Rk.	100 Yld.	100 Rk.	125 Yld.	125 Rk.	Mean Yld.	Mean Rk.
			Yield, kg/ha					
VLB118	23.13	4.00	35.70	1.00	21.10	1.00	26.65	1.00
BHS 400	25.37	3.00	33.80	2.00	13.93	4.00	24.37	2.00
HBL 113	26.23	2.00	16.85	4.00	14.97	2.00	19.35	4.00
BHS 352	32.11	1.00	18.20	3.00	14.80	3.00	21.70	3.00
MEAN	26.71		26.14		16.20		23.02	

		F. Test	S.E.m	C.D.	C.V.(%)
Seed rate	(A)	**	0.39	1.52	5.84
Varieties	(B)	**	0.51	1.51	6.62
B within A		**	0.88	2.61	
A within B			0.86	2.54	

Table 7.2 **NHZ** **Bajoura** **2016-17**

SPL-2 Seed rate x Variety

Varieties	Seed rate (Kg ha^{-1}) 75 Yld.	75 Rk.	100 Yld.	100 Rk.	125 Yld.	125 Rk.	Mean Yld.	Mean Rk.
			Yield, kg/ha					
VLB118	39.90	3.00	43.08	2.00	44.74	1.00	42.57	1.00
BHS 400	45.34	2.00	47.43	1.00	25.65	4.00	39.47	2.00
HBL 113	49.93	1.00	35.11	4.00	29.31	3.00	38.12	3.00
BHS 352	37.41	4.00	42.28	3.00	32.33	2.00	37.34	4.00
MEAN	43.15		41.98		33.01		39.38	

		F. Test	S.E.m	C.D.	C.V.(%)
Seed rate	(A)	**	1.03	4.05	9.07
Varieties	(B)	**	0.99	2.93	7.52
B within A		**	1.71	5.08	
A within B			1.80	5.36	

Table 8.1 **NWPZ** **Durgapura 2016-17**

SPL 3 IR-TS-FB- DOSx Additives

Treatments	Sowing Time: Timely Yld.	Timely Rk.	Late Yld.	Late Rk.	Mean Yld.	Mean Rk.
			Yield, q/ha			
Recommended dose of Fertilizer	52.5	6.0	40.3	6.0	46.4	6.0
T1 + FYM @5 t/ha	55.5	4.0	42.3	4.0	48.9	4.0
T1+Mulch@ 6 t/ha	54.0	5.0	41.0	5.0	47.5	5.0
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	56.7	3.0	44.4	3.0	50.5	3.0
T4+ spray of ZnSo4 @ 0.5 %	58.2	1.0	46.5	1.0	52.4	1.0
T4 + Two spray of Kcl @ 0.5 %	57.3	2.0	44.6	2.0	51.0	2.0
MEAN	55.7		43.2		49.5	

		F. Test	S.E.m	C.D.	C.V.(%)
Sowing time	(A)	**	0.33	1.46	3.01
Additives	(B)	N.S.	1.28	3.82	6.86
B within A		N.S.	1.82	5.40	
A within B			1.69	5.12	

Table 8.2 **NWPZ** **Karnal** **2016-17**

SPL 3 IR-TS-FB- DOSx Additives

Treatments	Sowing Time: Timely Yld.	Timely Rk.	Late Yld.	Late Rk.	Mean Yld.	Mean Rk.
			Yield, q/ha			
Recommended dose of Fertilizer	49.6	1.0	36.6	6.0	43.1	1.0
T1 + FYM @5 t/ha	48.4	2.0	37.2	4.0	42.8	2.0
T1+Mulch@ 6 t/ha	47.1	4.0	37.7	3.0	42.4	3.0
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	42.4	6.0	39.6	1.0	41.0	5.0
T4+ spray of ZnSo4 @ 0.5 %	42.9	5.0	38.2	2.0	40.5	6.0
T4 + Two spray of Kcl @ 0.5 %	47.9	3.0	36.8	5.0	42.4	4.0
MEAN	46.4		37.7		42.0	

		F. Test	S.E.m	C.D.	C.V.(%)
Sowing time	(A)	**	0.1	0.5	1.1
Additives	(B)	N.S.	1.1	3.3	6.4
B within A		*	1.5	4.6	
A within B			1.4	4.2	

Table 8.3 **NWPZ** **Hisar** **2016-17**

SPL 3 IR-TS-FB- DOSx Additives

Treatments	Sowing Time: Timely Yld.	Timely Rk.	Late Yld.	Late Rk.	Mean Yld.	Mean Rk.
			Yield, q/ha			
Recommended dose of Fertilizer	60.1	3.0	48.6	2.0	54.4	2.0
T1 + FYM @5 t/ha	58.0	5.0	44.1	4.0	51.0	5.0
T1+Mulch@ 6 t/ha	60.8	1.0	48.7	1.0	54.7	1.0
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	60.7	2.0	46.6	3.0	53.7	3.0
T4+ spray of ZnSo4 @ 0.5 %	54.0	6.0	42.2	6.0	48.1	6.0
T4 + Two spray of Kcl @ 0.5 %	59.9	4.0	44.0	5.0	51.9	4.0
MEAN	58.9		45.7		52.3	

		F. Test	S.E.m	C.D.	C.V.(%)
Sowing time	(A)	*	1.75	7.86	14.17
Additives	(B)	*	1.19	3.54	5.57
B within A		N.S.	1.68	5.00	
A within B			2.33	8.92	

Table 8.4 **NWPZ** **Ludhiana** **2016-17**

SPL 3 IR-TS-FB- DOSx Additives

Treatments	Sowing Time: Timely Yld.	Timely Rk.	Late Yld.	Late Rk.	Mean Yld.	Mean Rk.
			Yield, q/ha			
Recommended dose of Fertilizer	50.5	2.0	40.5	6.0	45.5	5.0
T1 + FYM @5 t/ha	51.9	1.0	42.0	4.0	47.0	1.0
T1+Mulch@ 6 t/ha	49.4	4.0	41.1	5.0	45.3	6.0
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	49.8	3.0	42.3	3.0	46.0	2.0
T4+ spray of ZnSo4 @ 0.5 %	48.8	5.0	43.2	1.0	46.0	3.0
T4 + Two spray of Kcl @ 0.5 %	48.6	6.0	42.8	2.0	45.7	4.0
MEAN	49.8		42.0		45.9	

		F. Test	S.E.m	C.D.	C.V.(%)
Sowing time	(A)	**	0.33	1.46	3.01
Additives	(B)	N.S.	1.28	3.82	6.86
B within A		N.S.	1.82	5.40	
A within B			1.69	5.12	

Table 8.5 **NEPZ** **Kanpur** **2016-17**

SPL 3 IR-TS-FB- DOSx Additives

Treatments	Sowing Time: Timely Yld.	Timely Rk.	Late Yld.	Late Rk.	Mean Yld.	Mean Rk.
			Yield, q/ha			
Recommended dose of Fertilizer	43.5	5	33.3	6	38.4	5
T1 + FYM @5 t/ha	44.1	4	34.2	4	39	4
T1+Mulch@ 6 t/ha	43.1	6	33.5	5	38	6
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	45.12	3	35.7	2	40	2
T4+ spray of ZnSo4 @ 0.5 %	46.25	1	35.9	1	41	1
T4 + Two spray of Kcl @ 0.5 %	45.5	2	34.7	3	40	3
MEAN	45		35		40	

		F. Test	S.E.m	C.D.	C.V.(%)
Sowing time	(A)	**	0.14	0.62	1.47
Additives	(B)	N.S.	0.77	2.28	4.75
B within A		N.S.	1.08	3.22	
A within B			1.00	3.00	

Table 8.6 **NEPZ** **Varanasi** **2016-17**

SPL 3 IR-TS-FB- DOSx Additives

Treatments	Sowing Time: Timely Yld.	Timely Rk.	Late Yld.	Late Rk.	Mean Yld.	Mean Rk.
			Yield, q/ha			
Recommended dose of Fertilizer	27.4	6.0	24.8	6.0	26.1	6.0
T1 + FYM @5 t/ha	30.1	4.0	27.8	1.0	29.0	4.0
T1+Mulch@ 6 t/ha	28.4	5.0	27.3	3.0	27.9	5.0
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	31.6	3.0	27.5	2.0	29.6	3.0
T4+ spray of ZnSo4 @ 0.5 %	35.0	2.0	25.5	5.0	30.2	2.0
T4 + Two spray of Kcl @ 0.5 %	37.9	1.0	26.8	4.0	32.3	1.0
MEAN	31.8		26.6		29.2	

		F. Test	S.E.m	C.D.	C.V.(%)
Sowing time	(A)	**	0.18	0.80	2.57
Additives	(B)	**	0.62	1.83	5.16
B within A		**	0.87	2.59	
A within B			0.81	2.48	

Table 8.7 **NEPZ** **Faizabad** **2016-17**

SPL 3 IR-TS-FB- DOSx Additives

Treatments	Sowing Time: Timely Yld.	Timely Rk.	Late Yld.	Late Rk.	Mean Yld.	Mean Rk.
			Yield, q/ha			
Recommended dose of Fertilizer	28.2	5.0	24.2	5.0	26.2	5.0
T1 + FYM @5 t/ha	34.4	2.0	30.4	2.0	32.4	2.0
T1+Mulch@ 6 t/ha	25.3	6.0	22.3	6.0	23.8	6.0
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	34.3	3.0	30.3	4.0	32.3	4.0
T4+ spray of ZnSo4 @ 0.5 %	35.2	1.0	31.1	1.0	33.1	1.0
T4 + Two spray of Kcl @ 0.5 %	34.3	3.0	30.3	3.0	32.3	3.0
MEAN	31.9		28.1		30.0	

		F. Test	S.E.m	C.D.	C.V.(%)
Sowing time	(A)	**	0.1	0.3	1.0
Additives	(B)	**	1.0	3.0	8.3
B within A		N.S.	1.4	4.3	
A within B			1.3	3.9	

Table 8.8 **NEPZ** **Rewa** **2016-17**

SPL 3 IR-TS-FB- DOSx Additives

Treatments	Sowing Time: Timely Yld.	Timely Rk.	Late Yld.	Late Rk.	Mean Yld.	Mean Rk.
			Yield, q/ha			
Recommended dose of Fertilizer	36.9	6.0	35.9	6.0	36.4	6.0
T1 + FYM @5 t/ha	38.1	5.0	37.2	5.0	37.7	5.0
T1+Mulch@ 6 t/ha	38.8	4.0	37.9	4.0	38.3	4.0
T1+ FYM @5 t/ha + Mulch@ 6 t/ha	39.3	3.0	38.4	3.0	38.9	3.0
T4+ spray of ZnSo4 @ 0.5 %	41.8	2.0	40.8	2.0	41.3	2.0
T4 + Two spray of Kcl @ 0.5 %	42.4	1.0	41.5	1.0	42.0	1.0
MEAN	39.6		38.6		39.1	

		F. Test	S.E.m	C.D.	C.V.(%)
Sowing time	(A)	N.S.	0.2	0.7	1.8
Additives	(B)	**	0.6	1.7	3.6
B within A		N.S.	0.8	2.4	
A within B			0.8	2.3	

Table 9.1 **NORTH WESTERN PLAINS ZONE** Ludhiana **2016-17**

SPL-4 Integrated Nutrient Management

Bio fertilizers	Recommended dose of Fertilizer(RDF): 50% RDF Yld.	50% RDF Rk.	75% RDF Yld.	75% RDF Rk.	100% RDF Yld.	100% RDF Rk.	Mean Yld.	Mean Rk.
				Yield, q/ha				
Azotobacter (AZO)	40.32	2	40.51	5	49.19	1	43.34	2
Phosphosolublizing bacteria(PSB)	41.53	1	44.95	2	48.33	2	44.94	1
AZO+PSB	35.30	4	46.30	1	46.79	3	42.80	3
Biomix	35.11	5	44.56	3	46.16	4	41.94	4
Control	36.90	3	41.28	4	43.98	5	40.72	5
MEAN	37.83		43.52		46.89		42.75	

	F. Test	S.E.m	C.D.	C.V.(%)
Fertilizer dose (A)	**	0.78	3.08	7.11
Biofertilizer (B)	**	0.71	2.07	4.99
B within A	**	1.23	3.59	
A within B		1.35	3.95	

Table 9.2 **NORTH WESTERN PLAINS ZONE** Durgapura **2016-17**

SPL-4 Integrated Nutrient Management

Bio fertilizers	Recommended dose of Fertilizer(RDF): 50% RDF Yld.	50% RDF Rk.	75% RDF Yld.	75% RDF Rk.	100% RDF Yld.	100% RDF Rk.	Mean Yld.	Mean Rk.
				Yield, q/ha				
Azotobacter (AZO)	52.55	2	55.25	2	59.34	2	55.71	2
Phosphosolublizing bacteria(PSB)	51.41	3	53.46	3	58.18	3	54.35	3
AZO+PSB	54.20	1	57.84	1	63.28	1	58.44	1
Biomix	49.58	4	52.59	4	57.65	4	53.27	4
Control	46.41	5	49.70	5	54.68	5	50.26	5
MEAN	50.83		53.77		58.63		54.41	

	F. Test	S.E.m	C.D.	C.V.(%)
Fertilizer dose (A)	**	0.63	2.47	4.49
Biofertilizer (B)	**	1.35	3.94	7.44
B within A	N.S.	2.34	6.82	
A within B		2.18	6.37	

Table 9.3 **NORTH WESTERN PLAINS ZONE** Agra **2016-17**

SPL-4 Integrated Nutrient Management

Bio fertilizers	Recommended dose of Fertilizer(RDF)							
	50% RDF		75% RDF		100% RDF		Mean	
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha							
Azotobacter (AZO)	32.81	3	40.80	3	44.47	3	39.36	3
Phosphosolublizing bacteria(PSB)	30.88	4	38.79	4	42.20	4	37.29	4
AZO+PSB	36.17	1	44.26	1	48.66	1	43.03	1
Biomix	33.35	2	41.47	2	47.25	2	40.69	2
Control	30.74	5	36.75	5	41.04	5	36.18	5
MEAN	32.79		40.41		44.72		39.31	

	F. Test	S.E.m	C.D.	C.V.(%)
Fertilizer dose (A)	**	0.22	0.87	2.19
Biofertilizer (B)	**	0.21	0.61	1.60
B within A	**	0.36	1.06	
A within B		0.39	1.15	

Table 9.4 **NORTH WESTERN PLAINS ZONE** Karnal **2016-17**

SPL-4 Integrated Nutrient Management

Bio fertilizers	Recommended dose of Fertilizer(RDF)							
	50% RDF		75% RDF		100% RDF		Mean	
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha							
Azotobacter (AZO)	40.63	2	44.85	3	48.61	4	44.70	1
Phosphosolublizing bacteria(PSB)	36.85	4	44.56	4	51.17	1	44.19	3
AZO+PSB	37.19	3	46.49	2	49.51	2	44.40	2
Biomix	36.23	5	47.17	1	48.98	3	44.13	4
Control	43.07	1	42.77	5	46.24	5	44.03	5
MEAN	38.80		45.17		48.90		44.29	

	F. Test	S.E.m	C.D.	C.V.(%)
Fertilizer dose (A)	**	0.85	3.35	7.45
Biofertilizer (B)	N.S.	0.71	2.07	4.81
B within A	**	1.23	3.59	
A within B		1.39	4.06	

Table 9.5 **NORTH WESTERN PLAINS ZONE** Hisar **2016-17**

SPL-4 Integrated Nutrient Management

Bio fertilizers	Recommended dose of Fertilizer(RDF)							
	50% RDF		75% RDF		100% RDF		Mean	
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha							
Azotobacter (AZO)	43.79	3	49.01	4	52.07	5	48.29	4
Phosphosolublizing bacteria(PSB)	42.56	5	50.07	3	52.77	3	48.47	3
AZO+PSB	45.33	2	53.15	1	55.07	2	51.18	2
Biomix	45.78	1	52.36	2	56.01	1	51.39	1
Control	43.02	4	47.03	5	52.44	4	47.50	5
MEAN	44.10		50.33		53.67		49.36	

	F. Test	S.E.m	C.D.	C.V.(%)
Fertilizer dose (A)	**	0.67	2.62	5.24
Biofertilizer (B)	**	0.81	2.37	4.93
B within A	N.S.	1.41	4.10	
A within B		1.42	4.15	

Table 9.6 **NORTH Hill ZONE** Bajaura **2016-17**

SPL-4 Integrated Nutrient Management

Bio fertilizers	Recommended dose of Fertilizer(RDF)						Mean	
	50% RDF		75% RDF		100% RDF			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha							
Azotobacter (AZO)	32.91	2	34.40	2	35.72	2	34.34	2
Phosphosolublizing bacteria(PSB)	30.58	4	31.02	4	32.60	4	31.40	4
AZO+PSB	35.63	1	38.49	1	40.68	1	38.27	1
Biomix	31.41	3	32.95	3	35.41	3	33.26	3
Control	28.78	5	30.40	5	31.74	5	30.31	5
MEAN	31.86		33.45		35.23		33.51	

	F. Test	S.E.m	C.D.	C.V.(%)
Fertilizer dose (A)	N.S.	0.99	3.90	11.49
Biofertilizer (B)	**	1.06	3.10	9.49
B within A	N.S.	1.84	5.36	
A within B		1.92	5.61	

Table 9.7 **NORTH Hill ZONE** Malan **2016-17**

SPL-4 Integrated Nutrient Management

Bio fertilizers	Recommended dose of Fertilizer(RDF)						Mean	
	50% RDF		75% RDF		100% RDF			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha							
Azotobacter (AZO)	26.18	2	27.03	2	27.69	3	26.97	2
Phosphosolublizing bacteria(PSB)	23.81	4	26.63	3	28.26	2	26.23	3
AZO+PSB	27.87	1	30.19	1	30.79	1	29.62	1
Biomix	23.95	3	26.00	4	27.47	4	25.81	4
Control	23.72	5	25.75	5	26.68	5	25.38	5
MEAN	25.11		27.12		28.18		26.80	

	F. Test	S.E.m	C.D.	C.V.(%)
Fertilizer dose (A)	N.S.	0.90	3.53	12.99
Biofertilizer (B)	**	0.81	2.36	9.07
B within A	N.S.	1.40	4.09	
A within B		1.54	4.50	

Table 9.8 **Central ZONE** Udaipur **2016-17**

SPL-4 Integrated Nutrient Management

Bio fertilizers	Recommended dose of Fertilizer(RDF)						Mean	
	50% RDF		75% RDF		100% RDF			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha							
Azotobacter (AZO)	38.13	3	47.68	3	50.78	3	45.53	3
Phosphosolublizing bacteria(PSB)	38.13	4	46.49	4	48.87	4	44.50	4
AZO+PSB	39.56	1	50.68	2	51.73	2	47.32	2
Biomix	39.56	1	51.26	1	56.02	1	48.94	1
Control	20.17	5	29.01	5	34.72	5	27.97	5
MEAN	35.11		45.02		48.43		42.85	

	F. Test	S.E.m	C.D.	C.V.(%)
Fertilizer dose (A)	*	2.07	8.13	18.72
Biofertilizer (B)	**	2.42	7.07	16.95
B within A	N.S.	4.19	12.24	
A within B		4.28	12.50	

Table 9.9 **NEPZ** Kanpur **2016-17**

SPL-4 Integrated Nutrient Management

Bio fertilizers	Recommended dose of Fertilizer(RDF)						Mean	
	50% RDF		75% RDF		100% RDF			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha							
Azotobacter (AZO)	38.37	3	41.20	4	43.55	3	41.04	4
Phosphosolublizing bacteria(PSB)	41.79	2	43.93	2	45.25	2	43.66	2
AZO+PSB	42.23	1	45.14	1	47.03	1	44.80	1
Biomix	37.81	4	42.51	3	42.95	4	41.09	3
Control	34.96	5	37.64	5	41.83	5	38.15	5
MEAN	39.03		42.08		44.12		41.75	

	F. Test	S.E.m	C.D.	C.V.(%)
Fertilizer dose (A)	*	0.84	3.30	7.79
Biofertilizer (B)	**	0.63	1.83	4.51
B within A	N.S.	1.09	3.17	
A within B		1.28	3.75	

Table 9.10 **NEPZ** Faizabad **2016-17**

SPL-4 Integrated Nutrient Management

Bio fertilizers	Recommended dose of Fertilizer(RDF)						Mean	
	50% RDF		75% RDF		100% RDF			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha							
Azotobacter (AZO)	26.60	4	28.90	4	33.23	4	29.58	4
Phosphosolublizing bacteria(PSB)	27.47	3	29.17	3	35.00	3	30.54	3
AZO+PSB	31.93	1	33.10	1	40.23	1	35.09	1
Biomix	30.73	2	31.20	2	39.10	2	33.68	2
Control	22.80	5	25.13	5	28.90	5	25.61	5
MEAN	27.91		29.50		35.29		30.90	

	F. Test	S.E.m	C.D.	C.V.(%)
Fertilizer dose (A)	**	0.38	1.49	4.76
Biofertilizer (B)	**	0.81	2.38	7.90
B within A	N.S.	1.41	4.12	
A within B		1.32	3.84	

Table 9.11 **NEPZ** Rewa **2016-17**

SPL-4 Integrated Nutrient Management

Bio fertilizers	Recommended dose of Fertilizer(RDF)						Mean	
	50% RDF		75% RDF		100% RDF			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha							
Azotobacter (AZO)	38.81	3	40.78	3	41.70	3	40.43	3
Phosphosolublizing bacteria(PSB)	38.95	2	40.87	2	42.58	2	40.80	2
AZO+PSB	39.01	1	40.90	1	42.65	1	40.85	1
Biomix	38.39	5	39.79	4	41.63	4	39.93	4
Control	38.44	4	39.45	5	40.96	5	39.62	5
MEAN	38.72		40.36		41.90		40.33	

	F. Test	S.E.m	C.D.	C.V.(%)
Fertilizer dose (A)	**	0.23	0.91	2.21
Biofertilizer (B)	*	0.32	0.93	2.37
B within A	N.S.	0.55	1.61	
A within B		0.55	1.59	

Table 10.1 **NWPZ** Ludhiana **2016-17**

SPL-5 KXV

	Source of Potash				Mean	
	MOP		SOP			
Varieties	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
			Yield, q/ha			
DWRB101	51.31	1.00	54.01	2.00	52.66	2
RD 2849	49.77	3.00	51.31	3.00	50.54	3
DWRUB52	51.17	2.00	55.17	1.00	53.17	1
DWRB92	49.38	4.00	50.93	4.00	50.15	4
BH902	48.72	5.00	50.93	4.00	49.82	5
MEAN	50.07		52.47		51.27	

	F. Test	S.E.m	C.D.	C.V.(%)
Source of Potash (A)	*	0.39	1.76	2.95
Varieties (B)	N.S.	2.13	6.38	10.17
B within A	N.S.	3.01	9.03	
A within B		2.72	8.16	

Table 10.2 **NWPZ** Durgapura **2016-17**

SPL-5 KXV

	Source of Potash				Mean	
	MOP		SOP			
Varieties	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
			Yield, q/ha			
DWRB101	46.60	4	44.05	4	45.32	4
RD 2849	53.18	2	47.96	2	50.57	2
DWRUB52	52.76	3	46.87	3	49.82	3
DWRB92	45.32	5	42.95	5	44.14	5
BH902	57.33	1	53.28	1	55.31	1
MEAN	51.04		47.02		49.03	

	F. Test	S.E.m	C.D.	C.V.(%)
Source of Potash (A)	*	0.61	2.75	4.82
Varieties (B)	*	2.51	7.51	12.52
B within A	N.S.	3.54	10.62	
A within B		3.23	9.68	

Table 10.3 **NWPZ** Hisar **2016-17**

SPL-5 KXV

	Source of Potash				Mean	
	MOP		SOP			
Varieties	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
			Yield, q/ha			
DWRB101	52.28	1.00	52.97	2.00	52.63	1.00
RD 2849	51.89	2.00	53.24	1.00	52.56	2.00
DWRUB52	50.16	3.00	50.06	3.00	50.11	3.00
DWRB92	46.88	4.00	46.16	5.00	46.52	5.00
BH902	46.42	5.00	47.05	4.00	46.74	4.00
MEAN	49.53		49.90		49.71	

	F. Test	S.E.m	C.D.	C.V.(%)
Source of Potash (A)	N.S.	0.11	0.50	0.86
Varieties (B)	**	0.95	2.86	4.70
B within A	N.S.	1.35	4.05	
A within B		1.21	3.64	

Table 10.4 **NWPZ** Karnal **2016-17**
SPL-5 KXV

	Source of Potash				Mean	
	MOP		SOP			
Varieties	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha					
DWRB101	45.82	4	41.84	4	43.83	5
RD 2849	45.99	3	45.21	1	45.60	3
DWRUB52	45.42	5	42.44	3	43.93	4
DWRB92	48.64	2	44.94	2	46.79	2
BH902	55.11	1	41.60	5	48.35	1
MEAN	48.20		43.21		45.70	

	F. Test	S.E.m	C.D.	C.V.(%)
Source of Potash (A)	*	0.68	3.07	5.77
Varieties (B)	*	1.08	3.23	5.77
B within A	**	1.52	4.56	
A within B		1.52	4.57	

Table 10.5 **NWPZ** Agra **2016-17**
SPL-5 KXV

	Source of Potash				Mean	
	MOP		SOP			
Varieties	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha					
DWRB101	37.97	5.00	35.80	5.00	36.88	5.00
RD 2849	54.83	2.00	52.97	2.00	53.90	2.00
DWRUB52	39.30	4.00	38.00	4.00	38.65	4.00
DWRB92	41.87	3.00	40.10	3.00	40.98	3.00
BH902	57.87	1.00	55.70	1.00	56.78	1.00
MEAN	46.37		44.51		45.44	

	F. Test	S.E.m	C.D.	C.V.(%)
Source of Potash (A)	**	0.12	0.55	1.05
Varieties (B)	**	0.15	0.45	0.80
B within A	N.S.	0.21	0.63	
A within B		0.22	0.67	

Table 11.1 **NORTH WESTERN PLAINS ZONE** Ludhiana **2016-17**
SPL-6 N levels X PGRs

PGRs	Recommended dose of Nitrogen(RDN)						Mean	
	100% RDN		125% RDN		150% RDN			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha							
Chlormequat-chlorid (CCC)	43.40	2	43.07	3	43.40	4	43.29	3
Ethephon(Cerone)	43.35	3	49.35	2	48.63	3	47.11	2
CCC+Ethephon	44.37	1	52.08	1	51.47	1	49.31	1
Control	37.23	4	42.25	4	49.19	2	42.89	4
MEAN	42.09		46.69		48.17		45.65	

	F. Test	S.E.m	C.D.	C.V.(%)
Fertilizer dose (A)	*	0.77	3.02	5.84
PGRs (B)	**	0.86	2.56	5.67
B within A	*	1.49	4.44	
A within B		1.51	4.47	

Table 11.2 **NORTH WESTERN PLAINS ZONE** Durgapura **2016-17**

SPL-6 N levels X PGRs

PGRs	Recommended dose of Nitrogen(RDN)						Mean	
	100% RDN		125% RDN		150% RDN			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha							
Chlormequat-chlorid (CCC)	50.54	3	52.23	3	54.73	3	52.50	3
Ethephon(Cerone)	53.27	2	56.54	2	59.61	2	56.47	2
CCC+Ethephon	57.25	1	59.32	1	61.42	1	59.33	1
Control	46.00	4	49.80	4	51.47	4	49.09	4
MEAN	51.76		54.47		56.81		54.35	

	F. Test	S.E.m	C.D.	C.V.(%)
Fertilizer dose (A)	*	0.8	3.0	4.9
PGRs (B)	**	1.4	4.0	7.5
B within A	N.S.	2.4	7.0	
A within B		2.2	6.5	

Table 11.3 **NORTH WESTERN PLAINS ZONE** Karnal **2016-17**

SPL-6 N levels X PGRs

PGRs	Recommended dose of Nitrogen(RDN)						Mean	
	100% RDN		125% RDN		150% RDN			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha							
Chlormequat-chlorid (CCC)	46.58	1	47.83	1	44.49	1	46.30	1
Ethephon(Cerone)	40.64	4	45.90	3	41.74	4	42.76	3
CCC+Ethephon	44.16	2	41.06	4	42.70	3	42.64	4
Control	43.38	3	46.78	2	43.48	2	44.55	2
MEAN	43.69		45.39		43.10		44.06	

	F. Test	S.E.m	C.D.	C.V.(%)
Fertilizer dose (A)	N.S.	0.78	3.04	6.09
PGRs (B)	N.S.	0.99	2.95	6.75
B within A	N.S.	1.72	5.10	
A within B		1.68	4.98	

Table 11.4 **NORTH WESTERN PLAINS ZONE** Hisar **2016-17**

SPL-6 N levels X PGRs

PGRs	Recommended dose of Nitrogen(RDN)						Mean	
	100% RDN		125% RDN		150% RDN			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha							
Chlormequat-chlorid (CCC)	49.05	3	50.38	2	51.74	3	50.39	3
Ethephon(Cerone)	50.43	1	49.45	3	52.09	2	50.66	2
CCC+Ethephon	50.40	2	51.60	1	52.80	1	51.60	1
Control	47.85	4	47.58	4	46.88	4	47.44	4
MEAN	49.43		49.75		50.88		50.02	

	F. Test	S.E.m	C.D.	C.V.(%)
Fertilizer dose (A)	N.S.	0.68	2.67	4.71
PGRs (B)	**	0.58	1.73	3.49
B within A	N.S.	1.01	3.00	
A within B		1.11	3.29	

Table 11.5 **NORTH WESTERN PLAINS ZONE** **Agra** **2016-17**
SPL-6 N levels X PGRs

PGRs	Recommended dose of Nitrogen(RDN)						Mean	
	100% RDN		125% RDN		150% RDN			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha							
Chlormequat-chlorid (CCC)	40.37	3	43.07	3	45.61	3	43.02	3
Ethephon(Cerone)	41.23	2	43.94	2	47.01	2	44.06	2
CCC+Ethephon	42.69	1	45.42	1	48.01	1	45.37	1
Control	33.80	4	38.43	4	42.88	4	38.37	4
MEAN	39.52		42.72		45.88		42.70	

	F. Test	S.E.m	C.D.	C.V.(%)
Fertilizer dose (A)	**	0.20	0.80	1.65
PGRs (B)	**	0.28	0.83	1.97
B within A	*	0.48	1.44	
A within B		0.47	1.39	

Table 11.6 **NORTH EASTERN PLAINS ZONE** Kanpur **2016-17**
SPL-6 N levels X PGRs

PGRs	Recommended dose of Nitrogen(RDN)						Mean	
	100% RDN		125% RDN		150% RDN			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha							
Chlormequat-chlorid (CCC)	38.78	2	41.54	2	41.92	2	40.75	2
Ethephon(Cerone)	37.85	3	40.97	3	40.55	3	39.79	3
CCC+Ethephon	42.41	1	43.77	1	44.84	1	43.67	1
Control	35.22	4	36.07	4	37.66	4	36.32	4
MEAN	38.57		40.59		41.24		40.13	

	F. Test	S.E.m	C.D.	C.V.(%)
Fertilizer dose (A)	**	0.31	1.22	2.68
PGRs (B)	**	0.47	1.39	3.50
B within A	N.S.	0.81	2.41	
A within B		0.77	2.28	

Table 11.7 **NORTH EASTERN PLAINS ZONE** Varanasi **2016-17**
SPL-6 N levels X PGRs

PGRs	Recommended dose of Nitrogen(RDN)						Mean	
	100% RDN		125% RDN		150% RDN			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha							
Chlormequat-chlorid (CCC)	21.77	2	22.72	4	28.31	3	24.27	3
Ethephon(Cerone)	23.13	1	25.16	2	28.46	2	25.59	1
CCC+Ethephon	20.40	4	23.80	3	25.45	4	23.22	4
Control	21.45	3	25.45	1	29.39	1	25.43	2
MEAN	21.69		24.28		27.90		24.63	

	F. Test	S.E.m	C.D.	C.V.(%)
Fertilizer dose (A)	*	0.75	2.96	10.61
PGRs (B)	N.S.	0.62	1.86	7.61
B within A	N.S.	1.08	3.21	
A within B		1.20	3.57	

Table 11.8 **NORTH EASTERN PLAINS ZONE** Faizabad **2016-17**

SPL-6 N levels X PGRs

PGRs	Recommended dose of Nitrogen(RDN)						Mean	
	100% RDN		125% RDN		150% RDN			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha							
Chlormequat-chlorid (CCC)	34.17	2	37.57	2	38.10	2	36.61	2
Ethephon(Cerone)	30.20	3	32.57	3	33.23	3	32.00	3
CCC+Ethephon	36.27	1	39.23	1	43.13	1	39.54	1
Control	27.23	4	29.17	4	30.60	4	29.00	4
MEAN	31.97		34.63		36.27		34.29	

	F. Test	S.E.m	C.D.	C.V.(%)
Fertilizer dose (A)	**	0.45	1.77	4.55
PGRs (B)	**	0.92	2.72	8.01
B within A	N.S.	1.59	4.71	
A within B		1.45	4.30	

Table 11.9 **NORTH EASTERN PLAINS ZONE** Rewa **2016-17**

SPL-6 N levels X PGRs

PGRs	Recommended dose of Nitrogen(RDN)						Mean	
	100% RDN		125% RDN		150% RDN			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha							
Chlormequat-chlorid (CCC)	42.51	3	41.79	3	41.16	3	41.82	3
Ethephon(Cerone)	43.10	1	42.39	1	41.62	1	42.37	1
CCC+Ethephon	42.97	2	42.02	2	41.38	2	42.12	2
Control	42.43	4	41.72	4	41.08	4	41.74	4
MEAN	42.75		41.98		41.31		42.01	

	F. Test	S.E.m	C.D.	C.V.(%)
Fertilizer dose (A)	**	0.17	0.66	1.39
PGRs (B)	**	0.08	0.24	0.57
B within A	N.S.	0.14	0.41	
A within B		0.21	0.62	

Table 12.1 **NORTH WESTERN PLAINS ZONE** **Ludhiana** **2016-17**

SPL-7 Spacing X Varieties

Varieties	Spacing						Mean	
	20 cm		22.5 cm		25 cm			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha							
BH 902	56.39	2	56.13	2	55.36	2	55.96	2
BH 946	60.19	1	64.69	1	62.64	1	62.51	1
RD 2552	50.42	3	50.33	3	55.17	3	51.97	3
MEAN	55.67		57.05		57.72		56.81	

	F. Test	S.E.m	C.D.	C.V.(%)
Spacing (A)	N.S.	0.94	3.69	4.96
Varieties (B)	**	1.09	3.35	5.74
B within A	N.S.	1.88	5.80	
A within B		1.80	5.55	

Table 12.2 **NORTH WESTERN PLAINS ZONE** Durgapura **2016-17**
SPL-7 Spacing X Varieties

Varieties	Spacing						Mean	
	20 cm		22.5 cm		25 cm			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk
	Yield, q/ha							
BH 902	56.69	1	57.33	1	50.73	1	54.92	1
BH 946	53.33	2	55.02	2	49.87	2	52.74	2
RD 2552	51.60	3	54.25	3	48.73	3	51.53	3
MEAN	53.87		55.54		49.78		53.06	

	F. Test	S.E.m	C.D.	C.V.(%)
Spacing (A)	N.S.	1.14	4.47	6.44
Varieties (B)	N.S.	2.38	7.34	13.46
B within A	N.S.	4.12	12.71	
A within B		3.55	10.95	

Table 12.3 **NORTH WESTERN PLAINS ZONE** Karnal **2016-17**
SPL-7 Spacing X Varieties

Varieties	Spacing						Mean	
	20 cm		22.5 cm		25 cm			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha							
BH 902	45.71	2	42.97	3	50.64	3	46.44	3
BH 946	41.05	3	46.85	2	52.44	2	46.78	2
RD 2552	48.62	1	52.44	1	53.29	1	51.45	1
MEAN	45.13		47.42		52.12		48.22	

	F. Test	S.E.m	C.D.	C.V.(%)
Spacing (A)	N.S.	1.62	6.37	10.09
Varieties (B)	**	0.72	2.22	4.48
B within A	*	1.25	3.84	
A within B		1.91	5.90	

Table 12.4 **NORTH WESTERN PLAINS ZONE** Agra **2016-17**
SPL-7 Spacing X Varieties

Varieties	Spacing						Mean	
	20 cm		22.5 cm		25 cm			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha							
BH 902	40.68	2	39.80	2	38.97	2	39.82	2
BH 946	43.90	1	43.90	1	41.13	1	42.98	1
RD 2552	39.97	3	39.73	3	38.80	3	39.50	3
MEAN	41.52		41.14		39.63		40.76	

	F. Test	S.E.m	C.D.	C.V.(%)
Spacing (A)	**	0.14	0.56	1.05
Varieties (B)	**	0.09	0.29	0.69
B within A	**	0.16	0.50	
A within B		0.19	0.60	

Table 12.5 **NORTH WESTERN PLAINS ZONE** Hisar **2016-17**
SPL-7 Spacing X Varieties

Varieties	Spacing						Mean	
	20 cm		22.5 cm		25 cm			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha							
BH 902	46.72	3	45.28	2	44.07	2	45.36	2
BH 946	54.65	1	51.21	1	50.78	1	52.21	1
RD 2552	47.43	2	44.75	3	42.74	3	44.97	3
MEAN	49.60		47.08		45.87		47.51	

	F. Test	S.E.m	C.D.	C.V.(%)
Spacing (A)	*	0.66	2.58	4.15
Varieties (B)	**	0.72	2.22	4.54
B within A	N.S.	1.25	3.84	
A within B		1.21	3.73	

Table 12.6 **NORTH HILL ZONE** Almora **2016-17**
SPL-7 Spacing X Varieties

Varieties	Spacing						Mean	
	20 cm		22.5 cm		25 cm			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha							
HBL 113	21.07	1	18.50	1	17.23	1	18.93	1
VLB 118	17.33	2	15.97	3	15.37	2	16.22	3
VLB 130	17.33	2	17.17	2	15.10	3	16.53	2
MEAN	18.58		17.21		15.90		17.23	

	F. Test	S.E.m	C.D.	C.V.(%)
Spacing (A)	**	0.26	1.02	4.52
Varieties (B)	*	0.59	1.81	10.23
B within A	N.S.	1.02	3.14	
A within B		0.87	2.68	

Table 12.7 **NORTH HILL ZONE** **Bajaura** **2016-17**
SPL-7 Spacing X Varieties

Varieties	Spacing						Mean	
	20 cm		22.5 cm		25 cm			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha							
HBL 113	48.18	2	41.15	3	39.76	1	43.03	3
VLB 118	49.13	1	42.65	2	38.72	2	43.50	1
VLB 130	48.12	3	43.36	1	38.61	3	43.36	2
MEAN	48.48		42.39		39.03		43.30	

	F. Test	S.E.m	C.D.	C.V.(%)
Spacing (A)	**	1.11	4.35	7.67
Varieties (B)	N.S.	1.10	3.40	7.64
B within A	N.S.	1.91	5.89	
A within B		1.91	5.89	

Table 12.8 **NORTH HILL ZONE** **Malan** **2016-17**
SPL-7 Spacing X Varieties

Varieties	Spacing						Mean	
	20 cm		22.5 cm		25 cm			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha							
HBL 113	18.78	3	18.59	3	16.40	3	17.92	3
VLB 118	21.10	2	19.05	2	17.74	2	19.30	2
VLB 130	30.21	1	28.08	1	25.30	1	27.86	1
MEAN	23.36		21.91		19.81		21.69	

	F. Test	S.E.m	C.D.	C.V.(%)
Spacing (A)	*	0.55	2.17	7.65
Varieties (B)	**	0.56	1.71	7.68
B within A	N.S.	0.96	2.96	
A within B		0.96	2.96	

Table 12.9 **NORTH EASTERN PLAINS ZONE** Kanpur **2016-17**
SPL-7 Spacing X Varieties

Varieties	Spacing						Mean	
	20 cm		22.5 cm		25 cm			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha							
JB 1	38.49	3	41.58	3	36.82	3	38.96	3
K 508	40.66	1	43.72	2	38.82	2	41.06	2
HUB 113	39.52	2	44.48	1	40.65	1	41.55	1
MEAN	39.55		43.26		38.76		40.52	

	F. Test	S.E.m	C.D.	C.V.(%)
Spacing (A)	**	0.40	1.58	2.98
Varieties (B)	**	0.50	1.53	3.67
B within A	N.S.	0.86	2.65	
A within B		0.81	2.49	

Table 12.10 **NORTH EASTERN PLAINS ZONE** Rewa **2016-17**
SPL-7 Spacing X Varieties

Varieties	Spacing						Mean	
	20 cm		22.5 cm		25 cm			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha							
JB 1	40.13	1	40.80	1	40.87	1	40.60	1
K 508	35.93	3	37.70	2	35.23	2	36.29	2
HUB 113	37.17	2	36.50	3	34.40	3	36.02	3
MEAN	37.74		38.33		36.83		37.64	

	F. Test	S.E.m	C.D.	C.V.(%)
Spacing (A)	*	0.27	1.06	2.16
Varieties (B)	**	0.47	1.45	3.76
B within A	N.S.	0.82	2.52	
A within B		0.72	2.22	

Table 12.11 **NORTH EASTERN PLAINS ZONE** Faizabad **2016-17**

SPL-7 Spacing X Varieties

Varieties	Spacing						Mean	
	20 cm		22.5 cm		25 cm			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha							
JB 1	36.93	1	39.23	1	35.27	1	37.14	1
K 508	31.30	3	33.30	3	29.20	3	31.27	3
HUB 113	33.07	2	36.20	2	30.17	2	33.14	2
MEAN	33.77		36.24		31.54		33.85	

	F. Test	S.E.m	C.D.	C.V.(%)
Spacing (A)	*	0.64	2.49	5.63
Varieties (B)	**	0.93	2.85	8.20
B within A	N.S.	1.60	4.94	
A within B		1.45	4.48	

Table 12.12 **CENTRAL ZONE** Udaipur **2016-17**

SPL-7 Spacing X Varieties

Varieties	Spacing						Mean	
	20 cm		22.5 cm		25 cm			
	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.	Yld.	Rk.
	Yield, q/ha							
BH 959	46.78	2	45.90	2	39.05	2	43.91	2
RD 2786	48.05	1	49.02	1	44.87	1	47.31	1
RD 2715	45.72	3	42.73	3	38.84	3	42.43	3
MEAN	46.85		45.88		40.92		44.55	

	F. Test	S.E.m	C.D.	C.V.(%)
Spacing (A)	*	0.96	3.76	6.45
Varieties (B)	**	0.41	1.27	2.79
B within A	*	0.72	2.21	
A within B		1.12	3.46	

AICW&BIP CENTRES AND COOPERATING SCIENTISTS

Sr No.	AICW&BIP Centre	Cooperating Scientist Address
NORTHERN HILL ZONE		
1.	Almora	Dr, Dibakar Mahanta, Scientist Agronomy, VPKAS, Almora-263 601 (Uttarakhand).
2.	Palampur/ Malan	Dr Sandeep Manuja, Scientist (Agronomy), CSK HPKV Rice-wheat Research Centre, , Malan, District Kangra, HP.
3.	Bajaura	Dr Gurudev Singh, Assitsnt Agronomist, CSKHPKV, HAREC, Bajaura-175 125 (HP).
4.	Shimla	Dr D P Walia, Principal Scientist, IARI RS, Tutikandi, Shimla-171 004, Himachal Pradesh.
NORTH WESTERN PLAIN ZONE		
5.	Karnal	Dr Ajit Singh Kharub, Principal Scientist, PB NO. 158, DWR, Karnal -132 001 Dr. Anil Khippal, Senior Scientist, PB NO. 158, DWR, Karnal - 132 001
6.	Ludhiana	Dr Hari Ram Saharan, Sr. Agronomist, Deptt. of Agronomy, PAU Ludhiana - 141 004
7.	Agra	Dr BP Singh, Head, Department of Agronomy, RBS College, Bichpuri, Agra, UP-283105.
8.	Hisar	Dr. Bhagat Singh, Barley Agronomist, Department of Plant Breeding, CCS HAU, Hisar (Haryana)-125 004
9.	Durgapura	Dr Sudesh Kumar, Sr. Agronomist (Barley), Govt. Agril. Res. Station, Durgapura, Jaipur (Rajasthan)
NORTH EASTERN PLAINS ZONE		
10.	Kanpur	Dr Rajvir Singh, Asstt. Agronomist, Section of EB (Rabi Cereals), CSAUA&T, Kanpur (UP)- 208 002
11.	Varanasi	Dr RK Singh, Sr. agronomist (AICWIP), Institute of Agricultural Sciences, BHU, Varanasi (UP)- 221 005
12.	Faizabad	Dr Rajesh Kumar, Wheat & barley Agronomist, Department of Agronomy, NDUA&T, Kumarganj, Faizabad (UP)- 224 229
13.	Rewa	Dr AK Singh, Sr. Barley Breeder, College of Agriculture, Rewa, Madhya Pradesh – 486 001
CENTRAL ZONE		
14.	Udaipur	Dr Jagdish Choudhary, Assitt. Professor (Agronomy), Department of Agronomy, College of Agriculture, Udaipur, Rajasthan-313 001.
15.	Gwalior	Dr SPS Tomar, Agronomist, Wheat Improvement Project, College of Agriculture, RVRSUA&T, Gwalior, 474002 (M.P.)

SOIL PHYSICO-CHEMICAL PROPERTIES

SOIL PROPERTY	**Locations**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**		
	Malan	**Bajaura**	**Durgapura**	**Hisar**	**Ludhiana**	**Karnal**	**Kanpur**	**Varanasi**	**Agra**	**Udaipur**	**Faizabad**	**Dalipnagar**
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	Sandy Loam
SAND, (%)	-	28.2	86.15	72	84.55	-	56	51.2	60.68	38.75	56.6	61
SILT, (%)	-	53.4	5.2	18.5	7.38	-	30	22.9	20.08	26.78	29.3	26
CLAY , (%)	-	18.4	6.82	9.5	7.97	-	14	25.9	18.89	34.47	14.7	13
BULK DENSITY, Mg m^{-3}	1.52	1.54	1.45	1.4	1.45	-	-	1.38	1.643	1.45	1.4	-
FIELD CAPACITY,(%)	31	-	10.4	-	-	-	-	19.5	18.50	-	23	-
PERMANENT WILTING POINT, (%)	14	-	3.15	-	-	-	-	5.6	9.50	-	8	-
ORGANIC CARBON, (%)	0.6	0.6	0.21	0.38	0.47	0.46	0.6	0.38	0.35	0.62	0.47	0-18
AVAILABLE N, Kg ha^{-1}	454	343	160	126		-	-	181.3	188.40	287.52	119	-
AVAILABLE P_2O_5,kg ha^{-1}	44	26	53.39	21	32.51	20.0	26	21.8	28.90	23.67	23	8.5
AVAILABLE K_2O,kg ha^{-1}	226	158	251	308	134.4	239	180	210.4	310.00	366.15	264	171
PH (1:2)	5.3	6.2	7.9	7.8	8.38	8.2	7.5	7.4	8.40	7.85	7.6	9
EC(1:2)	-	-	-	0.22	0.095	0.28	0.15	0.18	1.64	0.9	0.48	0.6

Meteorological Information

Bajaura Lattitude 31° 08' N Longitude 77° 00' E Height above MSL 1090 m **Almora Latitude 29°36' N Longitude 79° 40' E Height above MSL1250 m**

Julian weeks	Temperature		RH %		Rainfall	BSS.	Sun Shine	Julian weeks	Temperature		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.)								40 (01-07 Oct.)	29.6	18.1	85.3	64.7	3.5	2.9	5.14
41 (08-14 Oct.)								41 (08-14 Oct.)	29.7	11	78.9	59.6	0	3.3	8.5
42 (15-21 Oct.)								42 (15-21 Oct.)	28.6	8.86	79.1	44	0	3.13	8.75
43 (22-28 Oct)								43 (22-28 Oct)	27.3	6.1	91.2	37.9	0	2.47	8.79
44 (29-04 Nov.)	26.3	3.9	93	27	0	6.9		44 (29-04 Nov.)	26.7	5.1	84.9	45.3	0	2.2	8.11
45 (05-11 Nov.)	26.0	1.4	93	20	0	6.9		45 (05-11 Nov.)	26	3	73.9	40.1	0	1.9	9
46 (12-18 Nov.)	24.6	1.0	92	23	0	6.7		46 (12-18 Nov.)	24.9	1.3	79.1	36	0	1.8	8.43
47 (19-25 Nov.)	24.1	1.7	90	24	0	5.4		47 (19-25 Nov.)	25.9	2.4	79.6	40.7	0	2	9.21
48 (26-02 Dec.)	23.5	1.3	94	26	0	5.0		48 (26-02 Dec.)	24.6	2.14	88	38.3	0	1.7	7.6
49 (03-09 Dec.)	21.3	-1.0	93	27	0	5.3		49 (03-09 Dec.)	24.4	1.5	89.7	35.3	0	1.6	8.25
50 (10-16 Dec.)	20.6	-0.2	95	32	0.2	5.2		50 (10-16 Dec.)	22.6	-0.9	84.6	49.6	0	1.5	8.21
51 (17-23 Dec)	18.2	-2.3	95	28	0	3.9		51 (17-23 Dec)	23.2	-1	82.3	30.1	0	1.4	7.89
52 (24-31 Dec)	19.0	-0.4	93	36	0	4.3		52 (24-31 Dec)	20.8	0.4	90.9	37.9	0	1.3	6.16
1 (01-07 Jan)	16.8	1.0	92	52	32.2	3.2		1 (01-07 Jan)	19.2	-0.4	94.3	56.9	13	1.2	5.46
2 (8-14 Jan)	12.8	-1.2	96	53	18	4.7		2 (8-14 Jan)	15.8	-1.6	92.3	41.7	0	1.2	6.61
3 (15-21 Jan)	13.8	-0.4	94	48	11.1	3.1		3 (15-21 Jan)	18.7	0.7	85.5	39	0	1.1	6.32
4 (22-28 Jan)	14.4	3.2	92	65	56.6	2.6		4 (22-28 Jan)	20.3	0.9	83.8	45.7	12	1.1	6.12
5 (29-04 Feb.)	18.1	3.0	94	46	3	3.5		5 (29-04 Feb.)	21.6	2	88.5	38.7	0	1.3	6.5
6 (05-11 Feb.)	17.7	3.3	90	41	15	3.9		6 (05-11 Feb.)	21.2	1.6	85.9	46.5	0	1.3	6.96
7 (12-18 Feb.)	23.7	3.9	91	21	0	6.5		7 (12-18 Feb.)	23.8	2.9	88.7	41.6	0	1.1	8.25
8 (19-25 Feb.)	19.7	4.6	92	45	43.4	5.3		8 (19-25 Feb.)	22.9	3.5	90.4	49	1.5	19.3	6.93
9 (26-04 Mar.)	20.5	2.8	95	40	3.8	5.7		9 (26-04 Mar.)	24.7	3	82.3	41.7	3	2.4	8.82
10 (05-11 Mar.)	16.3	3.9	90	60	45.4	4.1		10 (05-11 Mar.)	19.5	4.3	81.3	55.1	16.4	1.8	5.64
11 (12-18 Mar.)	18.7	3.2	91	40	22	6.2		11 (12-18 Mar.)	22.1	2	85.9	51.3	9.3	2.31	8.71
12 (19-25 Mar.)	25.5	6.5	92	28	0.4	7.4		12 (19-25 Mar.)	27.4	5.1	77.7	26.9	0	2.96	8.86
13 (26-01 Apr.)	30.2	8.8	92	22	0	8.2		13 (26-01 Apr.)	31.2	10	65.6	24.7	0	3.8	9.71
14 (02-08 Apr.)	26.5	9.4	94	38	60.4	6.3		14 (02-08 Apr.)	26.9	9.8	74	54.9	17.3	3	8.64
15 (09-15 Apr.)	27.9	7.0	93	26	1	9.5		15 (09-15 Apr.)	30.6	8.4	79.1	22	0	3.9	9.64
16 (16-22 Apr.)	32.7	11.6	93	35	14	8.6		16 (16-22 Apr.)	32.1	13.6	69.7	38	0	5	9
17 (23-29 Apr.)	27.4	10.3	92	37	9.6	7.3		17 (23-29 Apr.)	31.1	11.6	49.4	30	0	4.8	8.82
18 (30-06 May)	27.2	10.1	91	44	16.1	5.9		18 (30-06 May)	31.1	10.9	48.9	32.9	2	4.9	8.14
19 (07-13 May)	32.0	13.1	93	35	14.0	8.4		19 (7-13 May)							

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

Julian weeks	Temperature,C		RH %		Rainfall	Pan Evap.	Sun Shine
	Max.	Min.	Max.	Min.	mm	mm	hrs/day
40 (01-07 Oct.)							
41 (08-14 Oct.)							
42 (15-21 Oct.)							
43 (22-28 Oct)							
44 (29-04 Nov.)							
45 (05-11 Nov.)							
46 (12-18 Nov.)	28.5	8.8	51.1	47.1	0.0		
47 (19-25 Nov.)	28.4	7.8	55.7	50.9	0.0		
48 (26-02 Dec.)	28.2	7.7	51.4	46.0	0.0		
49 (03-09 Dec.)	28.0	7.8	48.6	44.9	0.0		
50 (10-16 Dec.)	27.5	7.6	53.6	50.3	0.0		
51 (17-23 Dec)	28.1	7.8	52.6	49.4	0.0		
52 (24-31 Dec)	27.8	7.6	56.5	52.8	10.2		
1 (01-07 Jan)	27.2	6.8	68.9	66.3	51.6		
2 (8-14 Jan)	24.7	5.5	64.1	61.1	0.0		
3 (15-21 Jan)	24.9	5.4	67.4	64.3	22.0		
4 (22-28 Jan)	26.4	5.4	68.6	66.6	45.6		
5 (29-04 Feb.)	26.8	6.7	65.4	61.7	2.2		
6 (05-11 Feb.)	27.4	6.9	61.3	58.3	14.0		
7 (12-18 Feb.)	28.7	8.1	57.7	53.8	0.0		
8 (19-25 Feb.)	28.3	7.3	63.4	60.0	14.6		
9 (26-04 Mar.)	29.1	7.9	57.9	53.6	0.0		
10 (05-11 Mar.)	28.8	6.8	72.7	69.1	27.0		
11 (12-18 Mar.)	28.3	7.1	75.7	72.7	1.8		
12 (19-25 Mar.)	30.3	9.6	65.4	60.0	0.0		
13 (26-01 Apr.)	31.3	11.2	60.3	55.3	0.0		
14 (02-08 Apr.)	30.2	10.4	63.1	60.0	33.8		
15 (09-15 Apr.)	31.1	11.3	59.6	54.4	0.0		
16 (16-22Apr.)	33.5	13.9	59.0	53.0	4.2		
17 (23-29Apr.)	32.1	13.5	62.1	57.4	5.7		
18 (30-06 May)	33.3	14.9	62.3	57.7	3.4		
19 (07-13 May)	34.6	14.1	62.7	58.3	6.8		
20 (14-20 May)	33.4	14.1	65.3	61.7	14.6		

Varanasi Latitude 25 °20 ' N Longitude 83 ° 03' E Height above MSL 75.7m

Julian weeks	Temperature ,C		RH %		Rainfal l	Pan Evap.	Sun Shine hrs/day
	Max.	Min.	Max.	Min.	mm	mm	
40 (01-07 Oct.)	32.4	26.3	88	74	2.6	2.9	5.8
41 (08-14 Oct.)	32	23.4	87	61	1.5	3.2	6.5
42 (15-21 Oct.)	32.4	18.4	74	43	0.0	3.0	8.7
43 (22-28 Oct)	32.4	17.9	74	43	0.0	2.9	7.7
44 (29-04 Nov.)	31.4	16.6	77	43	0.0	2.2	8.0
45 (05-11 Nov.)	29.2	15.3	80	45	0.0	1.9	3.9
46 (12-18 Nov.)	29	13.8	77	42	0.0	2.2	6.6
47 (19-25 Nov.)	27.3	11.7	72	42	0.0	1.9	4.7
48 (26-02 Dec.)	25.4	13.2	79	56	0.0	1.3	3.7
49 (03-09 Dec.)	20.3	16.3	94	78	0.0	0.8	0.2
50 (10-16 Dec.)	20.2	10	94	73	0.0	1.1	1.2
51 (17-23 Dec)	23.3	9.8	89	50	0.0	1.5	3.2
52 (24-31 Dec)	20.5	10.9	94	69	0.0	0.85	0.2
1 (01-07 Jan)	20.1	11.6	95	76	0.0	0.8	0.2
2 (8-14 Jan)	20.7	8.2	91	44	0.0	1.6	3.2
3 (15-21 Jan)	23	8.8	90	49	0.0	1.6	1.0
4 (22-28 Jan)	24.4	10.9	90	58	1.0	2.4	1.8
5 (29-04 Feb.)	23.8	14.1	94	57	0.0	1.5	4.1
6 (05-11 Feb.)	25.4	10.8	91	47	0.0	2.3	7.1
7 (12-18 Feb.)	26.2	12.3	87	53	0.0	2.3	4.6
8 (19-25 Feb.)	27.7	13	81	41	0.0	3.3	6.4
9 (26-04 Mar.)	29.7	13.1	83	43	0.0	3.3	7.4
10 (05-11 Mar.)	29.6	14.6	71	38	0.0	3.8	5.7
11 (12-18 Mar.)	28.7	12.3	81	39	0.0	4	7.6
12 (19-25 Mar.)	33.2	17.6	81	36	0.0	4.3	6.2
13 (26-01 Apr.)	38.5	20.1	64	30	0.0	6.6	7.1
14 (02-08 Apr.)	38.8	22.4	70	37	0.0	7.7	6.7
15 (09-15 Apr.)	39.4	20.2	48	26	0.0	7.7	6.7
16 (16-22Apr.)	37.3	24.8	74	49	0	7.2	9
17 (23-29Apr.)	40.1	23.5	51	26	0	8.5	9.8
18 (30-06 May)							
19 (07-13 May)							
20 (14-20 May)							

Kanpur Latitude 26^0 29' N Longitude 80^o 18' E Height above MSL 125.9 m **Faizabad Latitude 26^o 47' N Longitude 82^o 12' E Height above MSL 113 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.)	34.9	21.0	84.4	59.0	20.0	4.0	6.7	40 (01-07 Oct.)	34	25.7	89.8	63.4	9.8		5.1
41 (08-14 Oct.)	33.5	22.1	84.1	50.8	14.0	4.0	6.6	41 (08-14 Oct.)	32.7	21.8	92.2	56.8	25.3		5.1
42 (15-21 Oct.)	33.6	16.5	83.5	37.5	00	3.8	6.0	42 (15-21 Oct.)	32.8	17.9	93.1	43.7	0		5.9
43 (22-28 Oct)	33.4	17.0	86.5	35.1	00	3.7	8.5	43 (22-28 Oct)	32.4	16.3	92	37.8	0		3
44 (29-04 Nov.)	31.4	13.9	89.0	38.1	00	3.3	7.5	44 (29-04 Nov.)	31	14.1	96.4	34.5	0		2.6
45 (05-11 Nov.)	30.2	13.3	83.2	41.7	00	3.1	4.0	45 (05-11 Nov.)	29.7	12.7	95.1	39.4	0		1.5
46 (12-18 Nov.)	28.4	12.0	86.0	42.4	00	2.7	6.8	46 (12-18 Nov.)	29	11.8	94.8	40.1	0		1.8
47 (19-25 Nov.)	28.8	11.8	81.0	42.2	00	2.4	6.6	47 (19-25 Nov.)	27.3	11.1	92.4	42.4	0		2.4
48 (26-02 Dec.)	25.6	13.1	87.4	59.2	00	2.5	3.8	48 (26-02 Dec.)	25.8	12.2	96.4	63.5	0		1.1
49 (03-09 Dec.)	19.7	10.7	99.0	73.7	00	2.0	0.4	49 (03-09 Dec.)	19.2	11.7	96.2	77.1	0		1.7
50 (10-16 Dec.)	25.1	9.2	96.2	49.7	00	1.4	4.5	50 (10-16 Dec.)	19.5	9	99.1	74.2	0		1.5
51 (17-23 Dec)	24.5	8.0	89.5	47.1	00	1.4	6.2	51 (17-23 Dec)	23.2	7.5	95.1	53	0		2.3
52 (24-31 Dec)	21.2	9.0	96.1	65.5	00	1.2	0.6	52 (24-31 Dec)	20.1	10.6	96.2	72	0		1.5
1 (01-07 Jan)	20.0	9.1	83.2	76.7	0.4	1.0	1.3	1 (01-07 Jan)	18	10.2	98.4	78	0		1
2 (8-14 Jan)	19.0	5.9	88.1	52.1	00	1.1	4.4	2 (8-14 Jan)	20.1	4.9	89.1	43.5	0		2.2
3 (15-21 Jan)	21.1	6.4	91.2	52.1	00	1.2	4.8	3 (15-21 Jan)	22.4	5.9	93.5	42.5	0		2.5
4 (22-28 Jan)	24.2	9.5	94.2	57.5	27.8	1.5	5.0	4 (22-28 Jan)	23.7	9.1	95	57	16		2
5 (29-04 Feb.)	22.6	8.9	96.5	61.8	00	1.6	6.2	5 (29-04 Feb.)	21.9	8.2	98.5	62	0		2.7
6 (05-11 Feb.)	24.0	9.6	89.4	53.1	00	1.8	8.1	6 (05-11 Feb.)	24.5	8.4	93.4	45.2	0		5.2
7 (12-18 Feb.)	25.8	10.2	91.1	51.2	00	2.0	7.5	7 (12-18 Feb.)	25.7	9.9	94.4	46.2	0		5.5
8 (19-25 Feb.)	27.7	12.2	79.7	43.1	00	2.4	7.8	8 (19-25 Feb.)	27.9	11.1	90.8	37.1	0		5.3
9 (26-04 Mar.)	29.1	13.0	78.1	40.0	00	2.6	7.7	9 (26-04 Mar.)	28.8	11.5	82.1	33.5	0		6.4
10 (05-11 Mar.)	26.9	13.2	75.0	49.0	0.6	2.8	6.5	10 (05-11 Mar.)	27.8	12.3	82.4	42.5	0		4.4
11 (12-18 Mar.)	28.2	10.9	73.7	45.7	00	3.2	8.8	11 (12-18 Mar.)	29.4	10	79.5	34.1	0.7		7.9
12 (19-25 Mar.)	34.1	16.6	75.2	47.4	00	3.5	7.6	12 (19-25 Mar.)	33.4	15.5	73.2	28.2	0		8.4
13 (26-01 Apr.)	39.0	19.3	69.2	44.8	00	3.8	9.0	13 (26-01 Apr.)	37.8	18.8	74.5	29.5	0		9.5
14 (02-08 Apr.)	38.7	21.8	69.4	45.5	4.0	4.0	7.9	14 (02-08 Apr.)	37.7	20	72	38	0		8.4
15 (09-15 Apr.)	38.1	19.6	60.8	34.8	00	4.1	8.2	15 (09-15 Apr.)	15	36.3	19.5	39.7	0.0		7.7
16 (16-22 Apr.)	39.8	24.3	63.3	27.3	00	4.5	7.9	16 (16-22 Apr.)	16	36.6	21.0	42.4	0.0		5.3
17 (23-29 April)	39.4	24.2	52.8	23.7	2.6	5.2	8.5	17 (23-29 April)							

Hisar Latitude 29°10' N Longitude 75° 46' E Height above MSL 215.2 m **Durgapura** Lattitude 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.)	35.2	24.7	90	57	12.0	3.6	5.3	40 (01-07 Oct.)							
41 (08-14 Oct.)	35.1	20.4	83	37	0.0	4.2	8.7	41 (08-14 Oct.)							
42 (15-21 Oct.)	35.1	16.1	79	33	0.0	3.9	9.4	42 (15-21 Oct.)							
43 (22-28 Oct)	34.1	16.4	85	40	0.0	4.7	8.5	43 (22-28 Oct)	33.9	19.6	51	22	0.0	5.0	9.0
44 (29-04 Nov.)	31.2	13.1	92	49	0.0	2.2	4.4	44 (29-04 Nov.)	32.2	15.5	68	20	0.0	3.3	6.0
45 (05-11 Nov.)	29.8	11.0	95	46	0.0	1.7	2.5	45 (05-11 Nov.)	31.4	13.9	55	16	0.0	3.8	8.1
46 (12-18 Nov.)	29.4	11.3	91	47	0.0	2.3	6.3	46 (12-18 Nov.)	29.5	12.8	65	20	0.0	3.1	9.0
47 (19-25 Nov.)	29.0	10.0	89	48	0.0	1.9	8.2	47 (19-25 Nov.)	30.9	13.2	67	20	0.0	3.3	9.2
48 (26-02 Dec.)	28.8	9.0	89	46	0.0	1.9	8.1	48 (26-02 Dec.)	29.9	13.7	64	23	0.0	3.4	9.4
49 (03-09 Dec.)	26.1	7.6	95	51	0.0	1.5	7.0	49 (03-09 Dec.)	27.8	10.8	80	29	0.0	2.6	8.9
50 (10-16 Dec.)	24.9	9.6	98	54	0.0	1.3	5.5	50 (10-16 Dec.)	27.6	13.4	72	34	0.0	3.4	7.9
51 (17-23 Dec)	23.5	5.3	97	49	0.0	1.4	7.3	51 (17-23 Dec)	25.4	8.9	73	19	0.0	2.6	9.2
52 (24-31 Dec)	22.8	7.1	99	67	0.0	1.1	5.5	52 (24-31 Dec)	25.9	10.2	87	31	0.0	2.3	8.7
1 (01-07 Jan)	20.1	9.9	100	80	5.8	0.8	2.9	1 (01-07 Jan)	23.2	10.4	89	45	0.0	1.9	8.2
2 (8-14 Jan)	17.6	3.2	99	60	0.0	1.2	6.0	2 (8-14 Jan)	19.3	5.7	82	29	0.0	2.0	8.0
3 (15-21 Jan)	16.9	3.9	96	66	0.8	1.1	4.3	3 (15-21 Jan)	20.6	7.4	70	28	0.0	2.7	8.4
4 (22-28 Jan)	20.0	10.4	99	81	34.6	1.4	3.1	4 (22-28 Jan)	23.1	12.2	77	49	22.4	2.4	6.5
5 (29-04 Feb.)	20.6	7.8	98	64	0.0	1.1	5.6	5 (29-04 Feb.)	24.2	12.2	82	45	0.0	2.4	8.8
6 (05-11 Feb.)	21.6	7.0	93	53	0.0	1.7	6.9	6 (05-11 Feb.)	24.0	10.4	82	58	0.0	3.6	8.6
7 (12-18 Feb.)	24.5	7.4	90	45	0.0	2.0	7.8	7 (12-18 Feb.)	27.2	10.6	77	36	0.0	3.2	9.1
8 (19-25 Feb.)	26.8	9.1	90	37	0.0	2.7	8.4	8 (19-25 Feb.)	28.7	12.2	72	24	0.0	4.8	9.8
9 (26-04 Mar.)	26.9	8.3	92	37	0.0	2.7	8.6	9 (26-04 Mar.)	29.9	15.2	54	21	6.4	5.3	8.7
10 (05-11 Mar.)	25.6	9.7	89	45	7.5	3.5	7.6	10 (05-11 Mar.)	27.7	13.8	61	29	3.8	4.9	8.6
11 (12-18 Mar.)	25.1	7.4	90	40	0.0	2.6	8.3	11 (12-18 Mar.)	27.9	14.2	47	15	0.0	5.4	9.0
12 (19-25 Mar.)	32.0	13.6	90	34	0.0	3.9	9.2	12 (19-25 Mar.)	33.6	18.2	56	17	0.0	6.1	9.0
13 (26-01 Apr.)	36.3	16.7	85	30	0.0	4.9	9.6	13 (26-01 Apr.)	38.6	21.2	39	11	0.0	8.7	10.1
14 (02-08 Apr.)	35.7	17.5	68	27	0.0	6.5	6.9	14 (02-08 Apr.)							
15(09-15 Apr.)	37.2	14.0	59	16	0.0	6.7	10.3	15(09-15 Apr.)							
16(16-22 Apr.)	42.9	22.8	45	19	0.0	8.4	9.9	16(16-22 Apr.)							
17(23-29 Apr.)	38.5	20.7	54	24	1.0	7.4	7.9	17(23-29 Apr.)							

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			Max.	Min.	Max.	Min.	mm	mm	hrs/day
40 (01-07 Oct.)								40 (01-07 Oct.)	33.1	20.5	93	47	0	29	10.1
41 (08-14 Oct.)	33.81	18.17	84.29	38.43	0.00	2.71	7.33	41 (08-14 Oct.)	32.7	22	87	52	7	27	6.5
42 (15-21 Oct.)	33.36	15.37	83.43	29.71	0.00	2.97	7.80	42 (15-21 Oct.)	31.5	19.2	94	46	0	20.6	7.4
43 (22-28 Oct)	32.21	14.81	87.57	34.71	0.00	2.97	7.83	43 (22-28 Oct)	29.5	16.4	84	39	9	25	6.8
44 (29-04 Nov.)	30.13	13.56	93.86	40.43	0.00	2.21	5.43	44 (29-04 Nov.)	27.8	14.4	94	43	0	15.5	3.8
45 (05-11 Nov.)	29.40	11.43	94.43	32.14	0.00	2.41	5.66	45 (05-11 Nov.)	26.8	14.8	88	42	0	15.1	3.1
46 (12-18 Nov.)	28.10	10.51	85.00	42.29	0.00	2.57	7.33	46 (12-18 Nov.)	28	12.5	89	30	0	13.0	7.1
47 (19-25 Nov.)	28.01	10.14	86.86	32.14	0.00	2.33	7.47	47 (19-25 Nov.)	27	9.9	94	29	0	17.4	7.4
48 (26-02 Dec.)	27.53	11.59	83.71	42.14	0.00	3.21	5.60	48 (26-02 Dec.)	24.7	11.4	93	48	0	11.7	1.4
49 (03-09 Dec.)	22.56	8.30	98.71	63.00	0.00	1.34	3.67	49 (03-09 Dec.)	23.8	10	96	47	0	10.9	3.7
50 (10-16 Dec.)	21.67	9.47	99.29	63.43	0.00	1.06	4.27	50 (10-16 Dec.)	20	7.9	91	44	1.7	11.5	5.2
51 (17-23 Dec)	22.20	6.54	95.43	49.43	0.00	1.24	6.76	51 (17-23 Dec)	20	4.9	95	38	0	8.2	6.0
52 (24-31 Dec)	20.66	7.79	94.63	59.25	0.00	0.85	4.59	52 (24-31 Dec)	20.4	5.3	94	37	0	9.3	7.5
1 (01-07 Jan)	22.17	8.33	99.14	62.71	8.00	1.00	5.76	1 (01-07 Jan)	21.2	7.3	95.0	49.0	0.0	8.4	2.9
2 (8-14 Jan)	16.20	3.41	99.57	61.29	19.00	0.80	6.69	2 (8-14 Jan)	19.1	7.9	94.0	59.0	16.0	9.6	3.4
3 (15-21 Jan)	17.47	4.96	98.71	63.29	3.60	0.70	4.41	3 (15-21 Jan)	13.0	8.0	94.0	77.0	0.0	5.3	0.2
4 (22-28 Jan)	20.49	9.67	98.00	70.29	55.20	1.11	4.06	4 (22-28 Jan)	14.1	5.2	97.0	69.0	0.4	4.8	2.9
5 (29-04 Feb.)	20.49	7.97	98.57	62.14	0.00	1.19	5.03	5 (29-04 Feb.)	20.5	7.6	93.0	52.0	3.0	11.0	6.4
6 (05-11 Feb.)	20.64	7.33	94.29	56.14	0.00	1.37	6.47	6 (05-11 Feb.)	21.4	8.2	89.0	48.0	0.8	17.8	6.5
7 (12-18 Feb.)	23.77	8.36	91.86	53.86	0.00	2.00	7.49	7 (12-18 Feb.)	22.1	7.5	89.0	41.0	0.6	17.0	7.8
8 (19-25 Feb.)	25.04	9.93	87.00	47.86	0.00	2.74	8.14	8 (19-25 Feb.)	24.2	11.7	94.0	53.0	7.4	19.0	8.1
9 (26-04 Mar.)	26.31	9.31	85.57	39.00	0.30	2.67	8.83	9 (26-04 Mar.)	28.1	12.9	94.0	42.0	0.0	22.7	7.9
10 (05-11 Mar.)	24.79	10.11	78.43	49.43	7.50	2.56	8.37	10 (05-11 Mar.)	26.7	14.5	90.0	47.0	23.0	24.8	7.8
11 (12-18 Mar.)	23.43	7.59	86.86	42.29	0.00	2.41	9.23	11 (12-18 Mar.)	24.2	14.2	91.0	56.0	14.9	22.8	6.5
12 (19-25 Mar.)	30.27	13.66	83.00	38.71	0.00	3.00	10.01	12 (19-25 Mar.)	29.8	14.5	84.0	36.0	3.2	32.2	8.8
13 (26-01 Apr.)	35.20	16.60	77.71	25.43	0.00	3.93	10.46	13 (26-01 Apr.)	33.0	17.6	83.0	35.0	0.0	38.3	9.5
14 (02-08 Apr.)	35.80	18.16	60.43	29.86	2.00	4.50	9.53	14 (02-08 Apr.)	34.3	20.1	70.0	30.0	0.0	42.9	6.3
15 (09-15 Apr.)	35.94	14.53	50.57	12.57	0.00	5.69	10.94	15 (09-15 Apr.)	35.1	18.0	65.0	22.0	0.4	57.4	10.2
16 (16-22 Apr.)	40.43	21.94	65.14	23.43	0.00	6.04	10.89	16 (16-22 Apr.)	38.9	22.3	59.0	21.0	2.6	65.6	10.2
17 (23-29 April)	38.01	21.01	48.14	19.57	0.00	6.87	10.46	17 (23-29 April)	37.8	18.1	52.0	13.0	0.0	68.5	12.1
18(30-06 May)	37.76	20.16	53.00	19.00	1.40	4.96	10.50	18(30-06 May)	39.2	22.4	49.0	23.0	2.4	65.4	6.6

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

Julian weeks	Temperature,C		RH %		Rainfall	Pan Evap.	Sun Shine
	Max.	Min.	Max.	Min.	mm	mm	hrs/day
40 (01-07 Oct.)	40.00	35.37	17.74	62.57	0.00	5.07	8.26
41 (08-14 Oct.)	41.00	35.10	17.43	64.71	0.00	5.00	9.10
42 (15-21 Oct.)	42.00	35.93	18.89	63.00	0.00	4.61	7.94
43 (22-28 Oct)	43.00	34.31	16.59	64.71	0.00	4.70	8.10
44 (29-04 Nov.)	44.00	29.09	16.10	75.57	0.00	4.43	8.21
45 (05-11 Nov.)	45.00	32.14	15.09	61.86	0.00	3.91	7.96
46 (12-18 Nov.)	46.00	32.20	14.37	60.71	0.00	4.11	8.51
47 (19-25 Nov.)	47.00	29.53	11.93	70.57	0.00	2.93	8.36
48 (26-02 Dec.)	48.00	28.34	11.73	64.57	0.00	3.43	5.94
49 (03-09 Dec.)	49.00	29.30	8.60	70.29	0.00	3.04	8.40
50 (10-16 Dec.)	50.00	24.96	6.80	69.57	0.00	2.07	7.99
51 (17-23 Dec)	51.00	23.91	4.02	77.29	0.00	2.21	7.44
52 (24-31 Dec)	52.00	28.33	7.41	77.00	0.00	2.59	7.63
1 (01-07 Jan)	1.00	28.74	9.67	83.57	0.00	2.93	7.17
2 (8-14 Jan)	2.00	27.26	8.27	83.00	0.00	2.89	7.49
3 (15-21 Jan)	3.00	23.71	8.03	83.14	0.00	2.36	4.86
4 (22-28 Jan)	4.00	25.93	5.96	80.14	0.00	2.96	8.91
5 (29-04 Feb.)	5.00	27.69	9.96	72.00	0.00	3.57	8.24
6 (05-11 Feb.)	6.00	26.59	7.30	78.00	0.00	3.91	9.07
7 (12-18 Feb.)	7.00	25.96	12.19	68.14	0.00	4.47	8.19
8 (19-25 Feb.)	8.00	30.50	11.91	66.86	0.00	4.36	7.59
9 (26-04 Mar.)	9.00	31.56	11.59	67.50	0.00	4.86	8.93
10 (05-11 Mar.)	10.00	31.67	14.11	67.57	0.00	5.57	8.51
11 (12-18 Mar.)	11.00	30.94	15.10	70.00	0.00	6.16	6.71
12 (19-25 Mar.)	12.00	34.11	15.66	51.71	0.00	7.40	8.37
13 (26-01 Apr.)	13.00	35.87	17.86	52.57	0.00	6.66	6.09
14 (02-08 Apr.)	14.00	36.63	19.96	50.57	0.00	8.87	6.31
15 (09-15 Apr.)	15.00	36.33	19.46	39.71	0.00	9.44	7.67
16 (16-22 Apr.)	16.00	36.56	21.02	42.40	0.00	9.36	5.30

MALTING QUALITY EVALUATION

The Barley Network Unit took up the evaluation of grain samples of Advanced Varietal Trial (AVT) and Initial Varietal Trial (IVT) on malt barley received from various test sites at its central facility for malting quality evaluation. The malt barley varietal trials were conducted in NWPZ during Rabi 2016-17, in two sowing dates as separate sets. The trial conducting centers were requested to provide about 500 gm grain sample of each genotype. The grain samples were received from seven locations (Hisar, Karnal, Bawal, Ludhiana, Bathinda, Durgapura and Pantnagar) in timely sown and from six locations (Hisar, Karnal, Bathinda, Ludhiana, Pantnagar and Durgapura,) in late sown conditions. This year a total of 262 samples were received. There were 16 test entries in IVT (TS) which were analyzed with five checks, while 8 test entries in IVT (LS) were evaluated with three checks. In case of AVT (TS), two entries (DWRB 150 and RD 2917) 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	28
	Karnal	AVT/IVT	28
	Bawal	AVT/IVT	28
Punjab	Ludhiana	AVT/IVT	28
	Bathinda	AVT/ IVT	28
Rajasthan	Durgapura	AVT/IVT	28
Uttrakhand	Pantnagar	AVT/IVT	28
Late Sown			
Haryana	Hisar	IVT	11
	Karnal	IVT	11
Punjab	Ludhiana	IVT	11
	Bathinda		11
Uttrakhand	Pantnagar	IVT	11
Rajasthan	Durgapura	IVT	11
Total			**262**

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

Table 2. Malting quality traits analyzed

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

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

The processed grain samples (thin grains removed) were subjected to micro-malting on the "Joe White Micro-malting System" taking 100 gm sample from each variety. Micro-malting was done in three phases, which included steeping, germinarion and kilning. Steeping was done in four stages (wet stage for 8 hours at 25^{o}C; air rest for 12 hours at 18^{o}C; wet stage for 6 hours at 25^{o}C and air rest for 10 hours at 18^{o}C) in a total duration of 36 hours. Germination was done in three stages (24 hours at 18^{o}C, 24 hours at 17^{o}C and 12 hours at 16^{o}C) in total of 60 hours. Kilning was done in a total of 8 stages for 24 hours starting from 45^{o}C and increasing 5^{o}C incrementally after each duration of 3 hours with final temperature of 80^{o}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 ºLinter value.

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

Protein content and Kolbach index has been estimated using NIR system on dry weight basis.

Husk content analysis was done by Sodium hypo-chlorite method (dry basis) as per EBC procedure.

The steeping temperature during wet stages has been kept at 25^{o}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.

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, 2b and 3 for timely and late sown trials, respectively. The mean values were taken for identifying promising lines based on minimum standards determined by the 'NCGMBD' for malt barley in the country.

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

1000 grain weight (g)

AVT: Under timely sown conditions, highest value was obtained for DWRB 150 and RD 2917 (51.5 g) and lowest for BH 902 © (43.9 g).

IVT: The overall mean 1000 grain weight varied from minimum of 36.8 g (UPB1065) to the maximum of 57.1 g (DWRB160). Among centres maximum mean value was obtained at Karnal (51.1) and lowest at Bathinda (43.8). In late sown trials, minimum value of 42.0 g was obtained in DWRB 73 © and maximum value of 56.5 g in DWRB 160. Among the centers, the lowest 1000 gw was noticed at Hisar (40.6 g), while highest at Karnal (57.4 g).

Test weight (Kg/hl)

AVT: Under timely sown conditions, the average zonal test weight varied from 61.2 (BH 902 ©) to 66.6 Kg/hl (DWRUB 123 ©).

IVT: Under timely sown conditions, the average zonal test weight varied from 59.2 (UPB1065) to 66.4 Kg/hl (DWRB123 (c)) and under late sown conditions it varied from 59.3 (DWRB 160) to 65.6 Kg/hl (DWRB 163). Centre wise average hectoliter weight was highest at Karnal (66.4 Kg/hl) and lowest at Bathinda (59.0 kg/hl) in timely sown and in case of late sown, it was highest at Karnal (66.9 kg/hl) and lowest at Hisar (57.5 kg/hl).

Grain Plumpness

Barley grain used for malting should be uniform and plump to allow for consistent processing and for high yields of malt extract. Percentage of bold and thin grains determines the overall

grain plumpness. The maximum limit for thin grains is 3% and minimum for bold grains is 90% and 80% for two rowed and six rowed barley, respectively.

AVT: In timely sown AVT trial highest bold grain percentage was obtained in DWRB 123 (91.8 %) and lowest in RD 2849 (85.5 %). The thin grain percentage was lowest in DWRB 123 (1 %) and highest in BH 902 © (2.8 %) in timely sown trial.

IVT: The data indicated that in timely sown trials the bold grain percentage was maximum in DWRB 162 (96.8 %) and minimum in UPB 1065 (63.4 %). Centre-wise it was lowest in Bathinda (82.9 %) and highest at Pantnagar (94.3 %). In case of late sown trials, the highest bold grain percentage was recorded by DWRB 91 © (96.2%) and lowest in DWRB 164 (76.3 %). Among the centers maximum value of this parameter was achieved at Karnal (97.1 %) and minimum at Hisar (53.2 %).

Thin grains proportion varied from 0.5 % (DWRB 162) to maximum of 7.8 % (UPB 1065) in timely sown trials. In case of late sown trials, minimum thin grain percentage was obtained in DWRB 91 © (0.6 %) and highest in DWRB 164 (6.5 %). Among locations, values in late sown varied from 0.5 % in Karnal to 9.8 % in Hisar.

Germinative Energy

One of the key qualities of malting barley is its ability to germinate rapidly and synchronously. Germination check was done by petri plate test in an incubator at 18^{o}C for 72 hrs.

AVT: In timely sown trials the germination values ranged from 94.9 % (BH 902 ©) to 97.4 % (RD 2917).

IVT: The values of this trait were from 93 % (DWRB 160) to 97.9 (RD 2965) in timely sown samples, while in late sown ones, it was from 94.8 % (DWRUB 160) to 97.8 (RD 2966).

Husk content

Adhering husk is one of the key attributes which makes barley suitable for malting as it protects the growing acrospires from mechanical damage during malting operations. However lower values of husk are desirable to get better modification and higher product recovery.

AVT: Lowest husk content was obtained in DWRB 123 (9.5 %) and highest in BH 902 © (12.1%) in timely sown trials.

IVT: In timely sown trial lowest value of 9.1 % was obtained in PL 895 and BH 1017 and highest value of 12.2 % in KB 1535. Centre wise minimum value was obtained at Durgapura (8.7 %) and highest at Pantnagar (11.2 %). In late sown trials minimum value for this trait was obtained for DWRB 163 (9.9 %) and highest for RD 2967 (12.1 %). Mean value for Karnal location was 9.9 %, being lowest and highest at Hisar with value of 12.5%.

Protein content

Protein content is one of the important parameters in selecting malting barley. It is affected by genotype, cultural practices and growing environments. Malt barley with high protein content usually results in lower extracts. Crude protein content was predicted using NIR system.

AVT: Protein content was lowest in the six row control genotype BH 902 (9.2 %) and highest in DWRB 101 © (10.8 %) in case of timely sown trials.

IVT: The protein content ranged from 8.8 % in BH 902 © to 11.6 % (RD 2963) in timely sown conditions. Pantnagar had the lowest mean protein content (9.2 %) and Bathinda the highest (11.7 %). In late sown trial the range was from 10.6 % (DWRB 73 ©) to 14.4 % (RD 2967). Mean values were lowest at Karnal (10.8 %) and highest at Durgapura (14.8 %).

β- glucan content

The major constituent of barley endosperm cell walls are β-D-(1-3), (1-4) glucans (75%). The level of β-glucan has been shown to have a relationship with other malt quality traits such as viscosity, speed of filtration and Kolbach index and may affect extract value. Entries from Karnal and Durgapura centers only were screened for beta glucan content.

AVT: In timely sown trial, DWRB 101 © had lowest value (4.3%) for this trait, while BH 902 © had highest value of 6.6%.
IVT: Under timely sown conditions, UPB 1065 had the lowest value of 3.3 % and highest in DWRB 136 (6.7 %). Values of 5.3 % (DWRB 161) to 7.7 % (DWRB 170) were obtained in late sown grain samples.

Malt Yield (%)

In case of the malt yield, the absolute value is not an indicator, and the malt yield with acceptable ranges of malt friability and hot water extract should be taken into consideration. Since lower germination may also result in higher values of this trait.
AVT: Overall percent malt yield varied from 84.9 % to 87.4 % under timely sown condition.
IVT: The malt yield ranged from 84.0 % to 87.8 % in timely sown conditions and in late sown conditions the values ranged from 81.8 % to 87.7 %.

Malt Friability (%)

The physical quality of malt is measured by malt friability.
AVT: Under timely sown conditions, the values ranged from 64.4 % (BH 902 ©) to 75.8 (DWRUB 52 ©).
IVT: The friability values ranged from 63.2 (RD 2963) to 79.2 (PL 895) in timely sown entries. In late sown trial, values ranged from 46.5 (DWRB 73 ©) to 76.6 % (DWRUB 64 ©).

Hot Water Extract (HWE)

Hot water extract is one of the most important malting quality traits for the industry. Malt extract may be the most complex malting quality trait in terms of biochemistry and genetics. It is a comparable trait to grain yield in that they are both mega-traits influenced by a number of sub-traits. Further the time of micromalting (in relation to grain dormancy) and micromalting regime/conditions also affect all malt related traits. Therefore results should be interpreted under this light.
AVT: Under timely sown conditions, HWE values ranged from 79.8 % (RD 2917) to 82.3 % (DWRB 150).
IVT: HWE values for timely sown genotypes varied from 78.7 (UPB 1065) to 83.4 (DWRB 161) with values of 79.1 % in Ludhiana to 82.0 % in Durgapura. In case of late sown entries range of HWE was from 77.4 (DWRB 73 ©) to 81.8 (DWRB 164). Location was mean was from 76.0 (Hisar) to 83.0 (Pantnagar).

Diastatic Power (^{0}L)

The diastatic power (DP) of barley malt represents the collective activity of several starch degrading enzymes that accumulate or activated during malting. The enzyme activities of β-amylase, α-amylase, limit dextrinase and α-glucosidase have been identified as being active during malting and mashing. The Diastatic Power (DP) was analyzed by IOB method and expressed in ^{0}L values. There are different standards/ preferences for the value of DP in different countries as per the end product requirements. In India the desirable limit has been fixed as > 90.0 ^{O}L.
AVT: In timely sown conditions all the entries had desirable values of DP > 90 ^{o}L with highest value of 102.5 in RD 2849 ©.
IVT: In IVT timely sown entries the values ranged from 92.1 to 102.5 ^{o}L having desirable values for all the entries. In case of late sown trials the values ranged from 93.8 to 106.4 ^{o}L.

Wort Filtration (ml/hr)

AVT: The wort filtration rate ranged from 209.3 ml/hr (DWRB 150) to 251 ml/hr (DWRUB 52 ©) in timely sown crop.
IVT: In timely sown samples values of varied from 205.7 ml/hr (DWRB 136) to 263.6 ml/hr (UPB 1065). In late sown trials values ranged from 199.2 (DWRUB 64 ©) to 264.2 ml/hr (DWRB 161).

Kolbach Index (%)

The Kolbach Index (KI) is an important parameter that provides information on the level of protein modification (breakdown) that has occurred during the malting process and is a ratio of soluble nitrogen in wort to total nitrogen in malt. This was analyzed using NIR system.
AVT: A mean highest value of 40.5 was obtained in RD 2917 in timely sown samples. **IVT: I**n timey sown conditions, a highest value of 41.7 was obtained in KB 1523. In late sown trials the range was from 38 to 41.

Other traits & overall better entries
Apart from the above traits, the other malt quality traits like wort colour, pH and Sachharification rate were also analyzed. The results are given in Annexure 2 & 3.
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, 6b and 7). Thus based on the ten important traits (a maximum possible score of 30), entries PL 895 and DWRB 162 were having better overall malting quality score under timely sown conditions. In late sown trial none of the entry was better than the best control.

Table 3. Promising entries* for individual malting quality trait

Traits	Promising entries	
	Timely sown	**Late sown**
Test Weight	-	DWRB 163
Bold Grains (%)	DWRB 162, DWRB 160, RD 2963, RD 2964, PL 896, DWRB 161, RD 2962, RD 2965	-
Thousand grain weight	DWRB 150, RD 2917, DWRB 160, RD 2964, RD 2965, BH 1017, RD 2963, DWRB 162, DWRB 136, RD 2962	DWRB 160
Husk Content	PL 895, BH 1017, PL 896, DWRB 136, KB 1523, DWRB 162, RD 2962, RD 2965, BH 1018, PL 899	DWRB 163
Beta glucan	UPB 1065, BH 1018, KB 1535	DWRB 161
Malt Friability	PL 895, PL 899, DWRB 161	-
Hot water extract	DWRB 150, DWRB 161, RD 2964	DWRB164, DWRB163, RD2966, DWRB161
Filtration Rate	UPB 1065, KB 1523, RD 2963, BH 1017, PL 899	DWRB 161, RD 2966, DWRB 163, DWRB 170, DWRB 164, RD 2968
Diastatic Power	DWRB 162	-
Kolbach Index	RD 2917, KB 1523, DWRB 161, UPB 1065, DWRB 162, KB 1535	-
Over all MQ	PL 895, DWRB 162	-

**Superior to best check*

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

S. No.	Genotype	Test wt (kg/hl)	Bold (%)#	Thin (%)	1000GW (g)	GE (%)	Protein (%)	Husk (%)	Beta glu (%)
1	DWRB150	66.1 (58.2-69.7)	88.9 (74.3-94.8)	2.0 (0.8-4.2)	51.5 (40.0-57.6)	96.4 (90.0-99.0)	10.6 (9.6-12.7)	10.8 (8.6-14.4)	5.0 (4.2-5.8)
2	RD2917	65.1 (60.1-68.8)	89.7 (70.4-96.7)	1.8 (0.5-4.5)	51.5 (45.4-56.9)	97.4 (95.0-99.0)	9.3 (8.6-10.8)	10.1 (7.9-12.2)	6.0 (5.8-6.1)
3	BH902 (c)*	61.2(57.9-68.8)	89.2 (81.4-94.5)	2.8 (1.1-5.5)	43.9 (40.8-47.0)	94.9 (78.0-99.0)	9.2 (7.9-10.9)	12.1 (8.9-14.3)	6.6 (6.3-6.9)
4	DWRB123 (c)	66.6 (61.8-69.7)	91.8 (79.0-97.3)	1.0 (0.5-1.8)	51.1 (46.4-53.9)	96.6 (90.0-99.0)	10.3 (8.9-11.9)	9.5 (7.1-12.4)	5.0 (4.2-5.9)
5	DWRB101 (c)	66.1 (60.1-69.4)	85.6 (68.4-95.8)	2.2 (0.6-5.6)	45.4 (40.1-48.9)	96.7 (93.0-99.0)	10.8 (8.4-14.7)	10.1 (9.6-10.8)	4.3 (4.1-4.5)
6	DWRUB52 (c)	64.4 (60.6-67.4)	90.6 (79.8-97.0)	1.4 (0.3-3.4)	49.2 (45.1-54.1)	96.0 (93.0-98.0)	10.2 (8.7-12.1)	10.5 (8.4-12.2)	5.1 (4.9-5.4)
7	RD2849 (c)	66.3 (62.9-70.0)	85.5 (77.2-90.6)	2.3 (0.7-4.1)	44.6 (42.6-47.5)	96.3 (88.0-99.0)	10.4 (8.6-12.9)	9.6 (7.7-11.0)	4.8 (4.5-5.0)

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

S. No.	Genotype	MY (%)#	Frib (%)	FR (ml/hr)	HWE (%fgdb)	DP (^{0}L)	KI (%)
1	DWRB150	87.4 (84.5-90.4)	65.5 (28.2-79.2)	209.3 (180-240)	82.3 (78.7-85.4)	101.0 (88.9-111.1)	38.9 (37.1-41.6)
2	RD2917	86.4 (81.9-89.5)	74.6 (45.7-93.2)	215.0 (150-280)	79.8 (78.3-82.1)	95.7 (90.9-100.0)	40.5 (36.4-42.6)
3	BH902 (c)*	86.0 (84.4-87.9)	64.4 (47.7-86.0)	216.4 (120-270)	81.1 (78.0-83.9)	94.2 (85.1-108.1)	40.1 (37.4-41.7)
4	DWRB123 (c)	86.2 (83.1-90.2)	68.1 (60.9-82.6)	244.3 (175-295)	81.6 (76.9-84.2)	94.7 (87.0-100.0)	39.5 (37.2-41.3)
5	DWRB101 (c)	85.0 (79.2-88.9)	72.9 (60.1-85.7)	216.4 (170-275)	81.8 (78.4-84.8)	96.7 (88.9-111.1)	40.3 (39.1-41.7)
6	DWRUB52 (c)	86.1 (83.2-88.9)	75.8 (53.4-92.2)	251.0 (120-307)	81.1 (77.9-85.2)	94.4 (88.9-100.0)	39.6 (36.0-43.7)
7	RD2849 (c)	84.9 (78.9-88.1)	74.7 (46.9-93.5)	242.9 (175-310)	82.1 (79.0-84.5)	102.5 (83.3-114.3)	40.2 (36.1-42.6)

* = 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)	GE (%)	Protein (%)	Husk (%)	Beta glu (%)
1	BH1017	65.1 (60.0-67.6)	90.2 (79.5-98.8)	1.9 (0.2-4.0)	52.6 (40.9-64.2)	96.0 (91-99)	9.9 (8.7-11.3)	9.1 (7.6-10.5)	4.3 (3.5-5.1)
2	BH1018	65.7 (59.8-69.8)	85.8 (77.0-95.3)	2.2 (0.6-5.1)	45.9 (39.1-52.3)	97.1 (95-99)	10.3 (8.2-12.2)	9.8 (7.1-12.4)	3.7 (3.3-4.0)
3	DWRB136	65.5 (62.0-69.4)	89.7 (82.1-96.1)	1.4 (0.5-4.0)	51.5 (45.5-58.0)	96.3 (95-98)	10.7 (9.6-12.1)	9.3 (7.4-11.2)	6.7 (6.3-7.2)
4	DWRB160	64.3 (57.5-67.1)	96.6 (88.1-99.4)	0.7 (0.1-1.8)	57.1 (42.4-71.3)	93.0 (82-98)	9.9 (8.0-13.1)	10.0 (7.7-12.2)	6.0 (5.7-6.3)
5	DWRB161	63.7 (58.5-66.9)	94.6 (85.5-98.3)	1.0 (0.3-2.1)	44.5 (38.3-48.6)	95.1 (90-98)	11.4 (10.3-12.8)	10.2 (8.5-11.1)	5.7 (5.3-6.2)
6	DWRB162	64.0 (59.5-67.0)	96.8 (94.3-99.1)	0.5 (0.2-1.1)	52.2 (47.6-57.3)	95.6 (85-98)	10.8 (9.7-12.0)	9.6 (7.5-11.4)	6.2 (5.8-6.6)
7	KB1523	63.7 (56.7-70.5)	84.5 (70.4-94.1)	2.7 (0.8-6.0)	40.8 (35.8-46.2)	94.6 (80-99)	9.5 (6.2-12.2)	9.5 (6.9-11.9)	5.7 (4.5-6.8)
8	KB1535	61.1 (56.9-64.2)	79.0 (67.5-91.8)	4.0 (1.6-9.3)	41.9 (36.3-46.4)	94.9 (80-99)	9.8 (8.0-11.6)	12.2 (10.6-14.2)	3.7 (3.6-3.8)
9	PL895	65.2 (61.3-68.1)	92.1 (88.8-95.2)	1.6 (0.7-3.8)	47.5 (43.1-52.2)	97.0 (95-98)	10.1 (8.4-11.7)	9.1 (7.6-11.0)	3.9 (3.7-4.1)
10	PL896	65.4 (59.6-69.4)	94.7 (90.9-97.5)	0.9 (0.4-1.5)	46.5 (41.9-50.0)	97.7 (95-99)	11.5 (10.4-13.3)	9.3 (7.0-13.2)	4.0 (3.6-4.3)
11	PL899	65.4 (57.8-69.3)	84.6 (58.3-96.2)	3.1 (0.8-7.7)	43.2 (36.0-47.7)	95.6 (85-99)	9.8 (7.5-12.7)	9.8 (7.7-12.8)	5.1 (4.2-6.0)
12	RD2962	64.3 (58.7-68.2)	93.7 (79.8-98.2)	1.1 (0.4-2.4)	50.2 (37.3-54.6)	95.7 (91-98)	11.5 (9.2-12.6)	9.5 (7.5-11.9)	6.5 (6.0-7.1)
13	RD2963	61.8 (55.2-67.5)	95.9 (89.6-98.6)	0.7 (0.3-1.9)	52.4 (34.2-60.5)	96.0 (92-98)	11.6 (9.7-12.9)	10.5 (8.4-13.9)	6.3 (5.5-7.2)
14	RD2964	63.0 (59.2-67.0)	95.1 (92.6-99.0)	0.9 (0.3-1.3)	54.8 (50.2-60.9)	95.7 (88-99)	10.8 (9.2-12.4)	10.9 (8.2-12.2)	4.0 (3.8-4.2)
15	RD2965	64.0 (60.4-68.9)	93.4 (87.6-97.5)	1.1 (0.5-2.1)	52.6 (44.8-59.3)	97.9 (96-99)	11.1 (9.7-13.0)	9.7 (8.3-10.6)	5.7 (5.1-6.3)
16	UPB1065	59.2 (54.2-62.9)	63.4 (40.4-84.2)	7.8 (3.3-16.4)	36.8 (33.3-42.4)	95.7 (88-98)	10.6 (9.1-11.6)	11.7 (10.2-13.2)	3.3 (3.1-3.4)
17	BH902 (c)*	60.8 (54.9-64.2)	92.1 (90.0-94.6)	1.5 (0.7-2.2)	45.5 (43.5-46.8)	95.3 (80-99)	8.8 (8.1-9.6)	11.4 (10.2-12.9)	5.6 (5.5-5.8)
18	DWRUB52 (c)	65.4 (61.5-69.1)	85.5 (73.3-93.9)	1.9 (0.6-4.4)	45.2 (39.2-49.2)	95.7 (93-98)	10.4 (8.4-12.0)	10.5 (8.5-14.9)	4.6 (4.1-5.0)
19	DWRB101 (c)	66.3 (62.6-69.2)	87.2 (80.7-94.4)	1.8 (0.6-3.5)	47.2 (44.3-50.0)	95.3 (80-99)	11.1 (9.9-12.2)	9.9 (7.9-11.3)	3.8 (3.8-3.8)
20	DWRB123 (c)	66.4 (60.6-70.6)	93.2 (84.5-97.3)	1.1 (0.4-2.5)	49.8 (44.0-53.2)	93.9 (86-98)	10.3 (9.3-11.6)	10.4 (8.0-11.7)	5.5 (5.2-5.8)
21	RD2849 (c)	66.2 (60.9-70.8)	85.6 (71.9-94.1)	2.0 (0.8-3.7)	46.3 (40.5-49.9)	95.9 (85-99)	10.3 (9.2-11.6)	10.0 (8.4-12.3)	4.7 (4.5-4.9)

* = six- row barleys # = range in brackets

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

S.No.	Genotype	MY (%)#	Frib (%)	FR (ml/hr)	HWE (%fgdb)	DP (^{0}L)	KI (%)
1	BH1017	87.4 (84.0-89.8)	70.5 (58.9-92.3)	254.3 (195-310)	81.2 (78.8-84.7)	96.0 (88.9-111.1)	38.8 (30.8-42.6)
2	BH1018	87.8 (84.3-89.2)	67.4 (51.1-83.4)	234.3 (100-310)	79.1 (69.8-82.3)	96.6 (87.0-105.3)	38.8 (36.0-39.8)
3	DWRB136	87.3 (84.4-89.2)	69.4 (51.6-84.9)	205.7 (150-250)	79.7 (77.7-85.2)	98.9 (87.0-111.1)	39.2 (37.9-40.0)
4	DWRB160	86.8 (80.4-89.9)	66.5 (52.8-88.4)	239.3 (180-300)	80.6 (74.5-85.1)	95.4 (87.0-108.1)	37.8 (36.0-41.0)
5	DWRB161	85.9 (84.0-88.2)	79.0 (60.4-90.1)	242.1 (170-310)	83.4 (80.7-85.0)	97.4 (90.9-105.3)	40.6 (37.6-44.7)
6	DWRB162	86.0 (80.5-89.1)	71.7 (47.0-91.0)	237.1 (175-280)	80.9 (76.7-85.8)	102.5 (95.2-111.1)	40.4 (38.0-43.4)
7	KB1523	86.8 (82.6-89.7)	72.3 (61.1-84.9)	261.4 (175-320)	79.3 (72.3-83.9)	92.1 (81.6-97.6)	41.7 (39.0-43.3)
8	KB1535	86.8 (76.6-89.9)	67.4 (31.4-86.2)	250.0 (180-305)	81.7 (77.5-84.8)	96.7 (90.9-105.3)	40.3 (38.2-42.2)
9	PL895	86.0 (81.2-89.6)	79.2 (49.3-90.8)	235.7 (190-305)	81.7 (80.3-83.9)	98.1 (81.6-111.1)	39.7 (36.5-45.4)
10	PL896	86.1 (80.3-89.2)	77.1 (59.4-88.1)	223.6 (140-310)	80.0 (70.8-84.8)	97.1 (83.3-111.1)	38.9 (37.4-44.2)
11	PL899	86.0 (83.8-87.5)	79.2 (62.2-89.7)	254.2 (205-305)	82.3 (81.1-84.7)	99.0 (88.9-111.1)	39.8 (38.1-42.1)
12	RD2962	84.3 (78.4-88.0)	70.4 (52.1-82.5)	221.4 (170-295)	81.1 (77.3-82.9)	95.7 (88.9-100.0)	39.9 (36.7-41.0)
13	RD2963	87.7 (84.0-89.5)	63.2 (42.3-87.4)	257.9 (200-300)	80.9 (77.6-82.8)	92.8 (81.6-111.1)	38.8 (37.0-42.1)
14	RD2964	86.0 (81.5-88.7)	72.7 (44.7-88.2)	222.9 (165-275)	82.8 (79.9-84.0)	97.3 (87.0-105.3)	39.5 (34.7-42.9)
15	RD2965	86.5 (83.9-89.3)	74.1 (52.5-87.5)	221.4 (180-285)	82.0 (79.2-84.8)	97.1 (90.9-111.1)	39.8 (38.7-42.1)
16	UPB1065	84.0 (80.1-87.0)	73.4 (52.4-90.1)	263.6 (170-300)	78.7 (76.1-81.5)	96.2 (88.9-108.1)	40.5 (37.4-42.9)
17	BH902 (c)*	87.0 (83.7-89.7)	69.9 (55.2-89.4)	247.9 (205-290)	81.2 (79.9-84.7)	98.6 (88.9-108.1)	40.1 (37.5-42.9)
18	DWRUB52 (c)	86.0 (81.8-88.7)	77.0 (70.2-91.6)	231.4 (210-285)	82.6 (70.8-85.8)	92.6 (87.0-100.0)	39.9 (36.0-42.1)
19	DWRB101 (c)	87.0 (83.2-89.4)	67.4 (50.0-74.9)	250.7 (200-310)	81.9 (79.2-85.0)	99.4 (88.9-114.3)	39.0 (35.8-43.3)
20	DWRB123 (c)	87.7 (84.0-89.8)	69.2 (35.6-86.7)	244.3 (170-300)	79.1 (75.3-82.8)	97.9 (87.0-111.1)	39.7 (35.5-42.4)
21	RD2849 (c)	87.1 (83.4-89.3)	78.9 (62.5-91.9)	217.9 (180-300)	81.6 (73.8-84.2)	97.9 (85.1-111.1)	39.8 (38.3-42.1)

*= six- row barley # = range

Table 5 a. Grain quality of IVT (Late sown) malt barley entries in NWPZ

No	Genotype	Test wt (kg/hl)	Bold (%)#	Thin (%)	1000GW (g)	GE (%)	Protein (%)	Husk (%)	Beta glu (%)
1	DWRB160	59.3 (53.8-65.8)	93.2 (78.8-98.5)	0.8 (0.1-2.1)	56.5 (47.3-67.0)	94.8 (80.0-99.0)	11.6 (9.2-14.0)	11.9 (9.2-14.5)	7.5 (7.4-7.5)
2	DWRB161	62.9 (57.0-67.8)	85.2 (52.2-98.1)	1.9 (0.3-5.8)	42.2 (35.0-49.4)	97.7 (96.0-99.0)	12.4 (10.8-14.4)	11.5 (10.8-12.0)	5.3 (5.1-5.4)
3	DWRB163	65.6 (61.3-69.4)	77.7 (22.6-97.6)	3.7 (0.3-12.9)	47.9 (38.1-54.7)	97.8 (96.0-99.0)	13.4 (12.1-16.2)	9.9 (8.2-13.0)	6.7 (6.5-6.9)
4	DWRB164	61.8 (55.5-68.4)	76.3 (23.5-96.1)	6.5 (0.9-27.0)	49.4 (33.1-56.3)	97.3 (96.0-99.0)	12.6 (10.5-14.5)	11.6 (9.6-13.9)	7.2 (6.8-7.5)
5	DWRB170	61.1 (56.4-67.6)	77.3 (42.8-97.2)	5.0 (0.5-13.6)	49.6 (38.8-59.3)	97.3 (96.0-99.0)	13.0 (10.3-15.1)	10.5 (8.1-12.8)	7.7 (7.6-7.7)
6	RD2966	61.5 (57.4-66.4)	86.4 (59.5-97.8)	2.7 (0.1-8.3)	50.2 (41.9-56.7)	97.8 (95.0-99.0)	13.1 (11.0-16.9)	11.2 (9.7-14.1)	7.2 (7.1-7.3)
7	RD2967	59.9 (53.4-67.0)	83.9 (46.2-97.6)	3.7 (0.2-15.2)	51.1 (36.9-63.7)	97.7 (95.0-99.0)	14.4 (12.0-17.5)	12.1 (10.2-14.8)	7.6 (7.1-8.2)
8	RD2968	62.4 (58.0-66.7)	83.9 (56.1-96.0)	2.0 (0.7-4.6)	51.9 (45.6-57.9)	96.3 (93.0-99.0)	14.3 (11.5-16.7)	11.4 (10.0-12.3)	6.1 (5.4-6.8)
9	DWRB73 (c)	60.2 (56.5-65.6)	83.7 (58.7-95.6)	3.3 (0.7-8.4)	42.0 (33.9-48.9)	96.7 (94.0-99.0)	10.6 (8.6-13.1)	10.3 (9.3-11.8)	5.3 (5.1-5.5)
10	DWRB91 (c)	59.4 (52.9-66.8)	96.2 (88.5-98.3)	0.6 (0.2-1.7)	55.6 (44.9-65.9)	97.5 (96.0-99.0)	12.4 (10.2-14.9)	11.2 (9.0-14.7)	7.4 (7.0-7.9)
11	DWRUB64 (c)	63.2 (58.2-68.3)	88.7 (56.1-97.6)	2.0 (0.4-8.1)	55.3 (42.1-63.9)	97.0 (93.0-99.0)	11.7 (9.5-14.0)	11.1 (9.3-12.1)	6.9 (6.2-7.6)

* = six- row barley # = range in brackets

Table 5 b. Malt quality of IVT (Late sown) malt barley entries in NWPZ

No	Genotype	MY (%)#	Frib (%)	FR (ml/hr)	HWE (%fgdb)	DP (^{0}L)	KI (%)
1	DWRB160	86.0 (82.1-89.3)	68.3 (44.5-87.6)	230.8 (170-290)	78.9 (74.0-83.9)	98.2 (88.9-105.3)	39.0 (35.8-41.6)
2	DWRB161	85.5 (80.9-89.6)	74.4 (49.3-87.1)	264.2 (190-305)	79.4 (74.0-83.1)	99.7 (88.9-108.1)	40.8 (38.1-42.6)
3	DWRB163	85.8 (83.5-87.9)	74.0 (55.4-89.1)	245.8 (120-300)	80.8 (78.9-82.5)	99.9 (85.1-111.1)	39.5 (37.7-43.3)
4	DWRB164	86.3 (82.4-89.9)	72.2 (31.4-87.0)	235.8 (170-315)	81.8 (78.6-84.8)	98.6 (90.9-102.6)	38.9 (34.4-43.0)
5	DWRB170	85.7 (81.4-88.1)	70.8 (47.6-87.5)	243.3 (180-300)	79.3 (76.2-82.7)	93.8 (81.6-111.1)	38.1 (36.3-40.6)
6	RD2966	86.1 (80.8-87.9)	71.7 (50.6-84.1)	249.2 (165-305)	80.5 (78.1-83.4)	105.4 (100.0-111.1)	38.7 (36.9-41.8)
7	RD2967	85.3 (80.4-87.9)	71.3 (58.1-87.6)	224.2 (135-290)	78.9 (74.1-83.6)	98.1 (88.9-108.1)	39.2 (38.1-40.0)
8	RD2968	85.0 (80.5-87.0)	68.0 (42.0-81.4)	235.8 (140-310)	77.5 (74.0-82.6)	101.9 (95.2-108.1)	40.4 (38.5-43.3)
9	DWRB73 (c)	87.7 (80.1-89.9)	46.5 (28.5-64.0)	232.5 (120-300)	77.4 (70.9-82.5)	100.7 (93.0-108.1)	40.4 (38.1-43.6)
10	DWRB91 (c)	86.4 (82.9-89.2)	67.3 (36.3-83.9)	225.8 (130-305)	78.7 (72.7-84.7)	106.4 (100.0-111.1)	41.2 (37.8-45.0)
11	DWRUB64 (c)	81.8 (68.8-86.6)	76.6 (62.8-87.4)	199.2 (170-220)	79.4 (73.2-83.2)	97.5 (88.9-108.1)	40.2 (38.5-44.4)

*= six- row barley # = range

Table 6 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	DWRB150	3	2	2	3	0	2	3	2	3	2	**22**
2	RD2917	3	2	3	3	0	3	2	2	3	3	**24**
3	BH902 (c)*	1	3	1	3	0	1	3	2	3	3	**20**
4	DWRB123 (c)	3	2	3	3	0	2	3	2	3	2	**23**
5	DWRB101 (c)	3	1	3	3	1	3	3	2	3	3	**25**
6	DWRUB52 (c)	2	2	3	3	0	3	3	3	3	2	**24**
7	RD2849 (c)	3	1	3	3	0	3	3	2	3	3	**24**

Table 6 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	BH1017	2	2	3	3	1	2	3	3	3	2	**24**
2	BH1018	3	1	3	3	2	2	2	2	3	2	**23**
3	DWRB136	3	2	3	3	0	2	2	2	3	2	**22**
4	DWRB160	2	3	3	3	0	2	3	2	3	2	**23**
5	DWRB161	2	3	3	2	0	3	3	2	3	3	**24**
6	DWRB162	2	3	3	3	0	3	3	2	3	3	**25**
7	KB1523	2	1	3	3	0	3	2	3	3	3	**23**
8	KB1535	1	0	1	3	2	2	3	2	3	3	**20**
9	PL895	2	2	3	3	2	3	3	2	3	3	**26**
10	PL896	2	3	3	2	2	3	2	2	3	2	**24**
11	PL899	2	1	3	3	0	3	3	3	3	3	**24**
12	RD2962	2	3	3	2	0	2	3	2	3	3	**23**
13	RD2963	1	3	3	2	0	1	3	3	3	2	**21**
14	RD2964	1	3	2	3	2	3	3	2	3	2	**24**
15	RD2965	2	3	3	2	0	3	3	2	3	3	**24**
16	UPB1065	0	0	1	3	3	3	2	3	3	3	**21**
17	BH902 (c)*	1	3	2	3	0	2	3	2	3	3	**22**
18	DWRUB52 (c)	2	1	3	3	0	3	3	2	3	3	**23**
19	DWRB101 (c)	3	1	3	2	2	2	3	3	3	2	**24**
20	DWRB123 (c)	3	3	3	3	0	2	2	2	3	3	**24**
21	RD2849 (c)	3	1	3	3	0	3	3	2	3	3	**24**

*= 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 (^{0}L), B Glucan= Beta glucan, KI= Kolbach index (%)

Table 7. Weighted performances of IVT entries for malting quality (Late sown)

No	Genotype	TW	Bol	Hus	Pro	BG	Fria	HW	FR	DP	KI	Total (30)
1	DWRB160	0	3	1	2	0	2	2	2	3	2	**17**
2	DWRB161	1	1	2	1	0	3	2	3	3	3	**19**
3	DWRB163	3	0	3	0	0	3	3	2	3	2	**19**
4	DWRB164	1	0	1	0	0	3	3	2	3	2	**15**
5	DWRB170	1	0	3	0	0	3	2	2	3	2	**16**
6	RD2966	1	1	2	0	0	3	2	2	3	2	**16**
7	RD2967	1	1	1	0	0	3	2	2	3	2	**15**
8	RD2968	1	1	2	0	0	2	1	2	3	3	**15**
9	DWRB73 (c)	1	1	3	3	0	0	1	2	3	3	**17**
10	DWRB91 (c)	0	3	2	1	0	2	2	2	3	3	**18**
11	DWRUB64 (c)	1	3	2	2	0	3	2	1	3	3	**20**

*= 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 (^{0}L), B Glucan= Beta glucan, KI= Kolbach index (%)

Annexure - 1

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

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

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

Abbreviations used in different tables

MY=% Malt Yield, FB= % malt friability, HG= % malt Homogeneity, DP= malt diastatic power (^{o} 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	Bawal	Durgapura	Ludhiana	Pantnagar	Mean
1	**DWRB150**	55.6	49.4	40.0	52.5	52.3	57.6	53.3	**51.5**
2	**RD2917**	56.2	47.0	45.4	48.9	55.9	49.9	56.9	**51.5**
3	**BH902 (c)***	43.7	47.0	43.4	46.2	42.6	40.8	43.8	**43.9**
4	**DWRB123 (c)**	53.9	53.6	47.2	51.7	51.7	46.4	52.9	**51.1**
5	**DWRB101 (c)**	48.4	48.9	43.5	47.0	41.4	40.1	48.3	**45.4**
6	**DWRUB52 (c)**	54.1	46.9	45.1	46.9	50.7	50.2	50.3	**49.2**
7	**RD2849 (c)**	47.5	42.6	45.3	44.7	44.2	43.5	44.3	**44.6**
	Mean	**51.3**	**47.9**	**44.3**	**48.3**	**48.4**	**46.9**	**50.0**	

*= 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	Bawal	Durgapura	Ludhiana	Pantnagar	Mean
1	**DWRB150**	69.7	66.7	58.2	66.0	68.8	67.4	65.7	**66.1**
2	**RD2917**	66.6	65.5	60.1	63.7	68.8	66.5	64.7	**65.1**
3	**BH902 (c)***	61.7	62.9	58.9	60.1	68.8	58.1	57.9	**61.2**
4	**DWRB123 (c)**	69.7	67.8	61.8	66.8	69.1	67.0	63.8	**66.6**
5	**DWRB101 (c)**	68.9	67.6	60.1	67.2	69.4	63.1	66.7	**66.1**
6	**DWRUB52 (c)**	66.6	67.4	60.6	67.2	64.9	61.5	62.9	**64.4**
7	**RD2849 (c)**	70.0	66.6	62.9	65.3	69.1	66.1	64.2	**66.3**
	Mean	**67.6**	**66.4**	**60.4**	**65.2**	**68.4**	**64.2**	**63.7**	

*= 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	Bawal	Durgapura	Ludhiana	Pantnagar	Mean
1	**DWRB150**	94.8	87.2	74.3	89.8	88.9	92.3	94.8	**88.9**
2	**RD2917**	95.9	89.9	70.4	87.2	96.7	91.5	96.2	**89.7**
3	**BH902 (c)***	81.4	94.5	93.9	90.2	91.5	81.8	91.0	**89.2**
4	**DWRB123 (c)**	96.0	95.8	89.8	95.6	79.0	88.9	97.3	**91.8**
5	**DWRB101 (c)**	87.9	95.8	82.9	92.8	75.8	68.4	95.4	**85.6**
6	**DWRUB52 (c)**	97.0	89.5	79.8	90.4	93.0	90.5	94.2	**90.6**
7	**RD2849 (c)**	90.4	88.0	86.5	83.1	77.2	82.9	90.6	**85.5**
	Mean	**91.9**	**91.5**	**82.5**	**89.9**	**86.0**	**85.2**	**94.2**	

*= 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	Bawal	Durgapura	Ludhiana	Pantnagar	Mean
1	**DWRB150**	0.8	2.9	4.2	2.7	1.6	1.0	0.9	**2.0**
2	**RD2917**	0.6	1.9	4.5	2.6	0.5	1.2	1.4	**1.8**
3	**BH902 (c)***	5.5	1.1	1.2	3.5	1.6	3.6	2.9	**2.8**
4	**DWRB123 (c)**	0.6	0.5	1.8	0.7	1.5	1.2	0.7	**1.0**
5	**DWRB101 (c)**	0.6	0.7	2.3	1.6	3.8	5.6	0.8	**2.2**
6	**DWRUB52 (c)**	0.3	0.7	3.4	2.0	1.1	1.2	1.0	**1.4**
7	**RD2849 (c)**	0.7	2.9	1.5	4.1	3.6	1.7	1.5	**2.3**
	Mean	**1.3**	**1.5**	**2.7**	**2.5**	**1.9**	**2.2**	**1.3**	

*= 6 row barley

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

S.No	Genotype	Karnal	Hisar	Bathinda	Bawal	Durgapura	Ludhiana	Pantnagar	Mean
1	**DWRB150**	90.0	96.0	99.0	96.0	98.0	98.0	98.0	**96.4**
2	**RD2917**	98.0	98.0	95.0	98.0	98.0	99.0	96.0	**97.4**
3	**BH902 (c)***	78.0	98.0	99.0	98.0	98.0	98.0	95.0	**94.9**
4	**DWRB123 (c)**	90.0	98.0	99.0	97.0	98.0	98.0	96.0	**96.6**
5	**DWRB101 (c)**	95.0	93.0	98.0	99.0	98.0	96.0	98.0	**96.7**
6	**DWRUB52 (c)**	94.0	95.0	98.0	98.0	93.0	98.0	96.0	**96.0**
7	**RD2849 (c)**	88.0	99.0	99.0	96.0	96.0	98.0	98.0	**96.3**
	Mean	**90.4**	**96.7**	**98.1**	**97.4**	**97.0**	**97.9**	**96.7**	

*= 6 row barley

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

S.No	Genotype	Karnal	Hisar	Bathinda	Bawal	Durgapura	Ludhiana	Pantnagar	Mean
1	**DWRB150**	10.2	11.1	10.6	10.3	12.7	9.6	9.7	**10.6**
2	**RD2917**	8.9	8.6	8.6	9.0	10.8	9.2	9.7	**9.3**
3	**BH902 (c)***	10.4	7.9	9.3	8.7	10.9	8.4	9.0	**9.2**
4	**DWRB123 (c)**	11.2	10.2	10.4	9.2	11.9	10.3	8.9	**10.3**
5	**DWRB101 (c)**	8.4	9.9	10.5	10.3	14.7	11.8	10.0	**10.8**
6	**DWRUB52 (c)**	9.2	8.7	10.4	9.9	12.1	11.5	9.7	**10.2**
7	**RD2849 (c)**	8.6	12.9	9.8	9.9	12.0	10.3	9.0	**10.4**
	Mean	**9.6**	**9.9**	**9.9**	**9.6**	**12.2**	**10.2**	**9.4**	

*= 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	Bawal	Durgapura	Ludhiana	Pantnagar	Mean
1	**DWRB150**	10.8	11.5	10.3	8.6	14.4	10.3	9.5	**10.8**
2	**RD2917**	9.6	12.2	7.9	8.9	11.5	10.1	10.4	**10.1**
3	**BH902 (c)***	13.1	11.4	12.7	12.4	8.9	11.5	14.3	**12.1**
4	**DWRB123 (c)**	10.9	7.1	7.7	9.6	9.1	9.7	12.4	**9.5**
5	**DWRB101 (c)**	10.8	9.8	10.7	10.0	9.8	9.9	9.6	**10.1**
6	**DWRUB52 (c)**	10.7	11.7	11.1	8.5	8.4	12.2	11.2	**10.5**
7	**RD2849 (c)**	9.5	10.9	7.7	10.2	8.9	9.1	11.0	**9.6**
	Mean	**10.8**	**10.7**	**9.7**	**9.7**	**10.2**	**10.4**	**11.2**	

*= 6 row barley

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

S.No	Genotype	Karnal	Durgapura	Mean
1	**DWRB150**	4.2	5.8	**5.0**
2	**RD2917**	6.1	5.8	**6.0**
3	**BH902 (c)***	6.3	6.9	**6.6**
4	**DWRB123 (c)**	4.2	5.9	**5.0**
5	**DWRB101 (c)**	4.5	4.1	**4.3**
6	**DWRUB52 (c)**	5.4	4.9	**5.1**
7	**RD2849 (c)**	4.5	5.0	**4.8**
	Mean	**5.0**	**5.5**	

*= 6 row barley

MALT PARAMETERS

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

S.No	Genotype	Karnal	Hisar	Bathinda	Bawal	Durgapura	Ludhiana	Pantnagar	Mean
1	**DWRB150**	88.1	90.4	89.4	87.3	85.9	84.5	86.3	**87.4**
2	**RD2917**	87.4	89.5	88.0	87.2	82.9	81.9	87.7	**86.4**
3	**BH902 (c)***	87.6	84.5	87.9	87.0	84.4	85.3	85.2	**86.0**
4	**DWRB123 (c)**	87.5	83.6	89.0	90.2	84.8	83.1	85.2	**86.2**
5	**DWRB101 (c)**	86.7	82.7	87.3	88.9	83.2	79.2	87.2	**85.0**
6	**DWRUB52 (c)**	86.1	86.3	88.9	88.9	84.3	83.2	85.2	**86.1**
7	**RD2849 (c)**	83.7	84.9	88.1	87.7	84.0	78.9	87.2	**84.9**
	Mean	**86.7**	**86.0**	**88.4**	**88.2**	**84.2**	**82.3**	**86.2**	

*= 6 row barley

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

S.No	Genotype	Karnal	Hisar	Bathinda	Bawal	Durgapura	Ludhiana	Pantnagar	Mean
1	**DWRB150**	57.5	77.8	79.2	60.2	76.4	78.9	28.2	**65.5**
2	**RD2917**	93.2	88.6	73.2	76.3	71.3	73.8	45.7	**74.6**
3	**BH902 (c)***	61.9	57.5	86.0	72.1	69.4	56.6	47.7	**64.4**
4	**DWRB123 (c)**	67.8	62.4	82.6	65.0	64.6	73.1	60.9	**68.1**
5	**DWRB101 (c)**	66.3	84.2	74.3	85.7	72.7	67.1	60.1	**72.9**
6	**DWRUB52 (c)**	92.2	79.1	87.1	82.9	67.0	68.6	53.4	**75.8**
7	**RD2849 (c)**	93.5	73.7	73.7	86.8	73.4	74.6	46.9	**74.7**
	Mean	**76.1**	**74.8**	**79.4**	**75.6**	**70.7**	**70.4**	**49.0**	

*= 6 row barley

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

S.No	Genotype	Karnal	Hisar	Bathinda	Bawal	Durgapura	Ludhiana	Pantnagar	Mean
1	**DWRB150**	85.4	83.4	78.7	82.9	80.2	85.1	80.5	**82.3**
2	**RD2917**	81.1	79.5	82.1	78.7	78.6	80.5	78.3	**79.8**
3	**BH902 (c)***	79.6	79.2	81.6	83.9	83.4	78.0	82.2	**81.1**
4	**DWRB123 (c)**	76.9	82.0	83.6	84.2	82.5	82.3	80.0	**81.6**
5	**DWRB101 (c)**	81.4	84.5	81.0	80.5	84.8	82.1	78.4	**81.8**
6	**DWRUB52 (c)**	80.4	85.2	79.4	81.6	78.6	84.9	77.9	**81.1**
7	**RD2849 (c)**	83.3	82.1	81.0	84.5	82.1	82.5	79.0	**82.1**
	Mean	**81.1**	**82.3**	**81.1**	**82.3**	**81.4**	**82.2**	**79.5**	

*= 6 row barley

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

S.No	Genotype	Karnal	Hisar	Bathinda	Bawal	Durgapura	Ludhiana	Pantnagar	Mean
1	**DWRB150**	225.0	225.0	240.0	180.0	180.0	190.0	225.0	**209.3**
2	**RD2917**	280.0	250.0	230.0	165.0	250.0	150.0	180.0	**215.0**
3	**BH902 (c)***	220.0	270.0	250.0	145.0	240.0	120.0	270.0	**216.4**
4	**DWRB123 (c)**	220.0	285.0	230.0	290.0	215.0	175.0	295.0	**244.3**
5	**DWRB101 (c)**	200.0	220.0	275.0	170.0	250.0	200.0	200.0	**216.4**
6	**DWRUB52 (c)**	285.0	240.0	235.0	280.0	290.0	120.0	307.0	**251.0**
7	**RD2849 (c)**	270.0	240.0	225.0	220.0	260.0	175.0	310.0	**242.9**
	Mean	**242.9**	**247.1**	**240.7**	**207.1**	**240.7**	**161.4**	**255.3**	

*= 6 row barley

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

S.No	Genotype	Karnal	Hisar	Bathinda	Bawal	Durgapura	Ludhiana	Pantnagar	Mean
1	**DWRB150**	5	5	5	5	5	5	10	**5.7**
2	**RD2917**	5	5	5	5	10	10	10	**7.1**
3	**BH902 (c)***	5	5	10	10	10	5	5	**7.1**
4	**DWRB123 (c)**	5	5	5	5	5	5	5	**5.0**
5	**DWRB101 (c)**	5	5	5	5	5	5	5	**5.0**
6	**DWRUB52 (c)**	5	5	5	5	5	5	5	**5.0**
7	**RD2849 (c)**	5	10	5	10	5	5	10	**7.1**
	Mean	**5.0**	**5.7**	**5.7**	**6.4**	**6.4**	**5.7**	**7.1**	

*= 6 row barley

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

S.No	Genotype	Karnal	Hisar	Bathinda	Bawal	Durgapura	Ludhiana	Pantnagar	Mean
1	**DWRB150**	6.7	6.4	5.5	6.2	6.6	6.0	6.0	**6.2**
2	**RD2917**	7.4	6.6	5.7	6.5	6.5	6.0	6.4	**6.4**
3	**BH902 (c)***	6.4	6.4	5.9	6.3	6.0	5.9	6.4	**6.2**
4	**DWRB123 (c)**	6.8	6.3	5.4	6.4	6.1	5.5	6.3	**6.1**
5	**DWRB101 (c)**	6.8	6.4	5.7	6.6	6.5	6.0	6.2	**6.3**
6	**DWRUB52 (c)**	6.5	6.3	5.6	6.2	6.7	6.0	6.1	**6.2**
7	**RD2849 (c)**	5.3	6.3	5.6	6.1	6.1	5.6	5.9	**5.8**
	Mean	**6.6**	**6.4**	**5.6**	**6.3**	**6.4**	**5.8**	**6.2**	

*= 6 row barley

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

S.No	Genotype	Karnal	Hisar	Bathinda	Bawal	Durgapura	Ludhiana	Pantnagar	Mean
1	**DWRB150**	2.0	2.0	2.0	2.0	2.0	2.0	2.0	**2.0**
2	**RD2917**	2.0	2.0	2.0	2.0	2.5	2.0	2.5	**2.1**
3	**BH902 (c)***	2.0	2.0	2.0	2.5	2.0	2.5	2.5	**2.2**
4	**DWRB123 (c)**	2.0	2.0	2.0	2.0	2.0	2.0	2.0	**2.0**
5	**DWRB101 (c)**	2.0	2.0	2.0	2.0	2.0	2.0	2.0	**2.0**
6	**DWRUB52 (c)**	2.0	2.0	2.0	2.0	2.0	2.0	2.0	**2.0**
7	**RD2849 (c)**	2.0	2.0	2.0	2.0	2.0	2.0	2.0	**2.0**
	Mean	**2.0**	**2.0**	**2.0**	**2.1**	**2.1**	**2.1**	**2.1**	

*= 6 row barley

Table 2.16 a : Diastatic power (0L) of AVT (TS-MB) entries from different locations

S.No	Genotype	Karnal	Hisar	Bathinda	Bawal	Durgapura	Ludhiana	Pantnagar	Mean
1	**DWRB150**	100.0	97.6	108.1	93.0	111.1	88.9	108.1	**101.0**
2	**RD2917**	95.2	100.0	100.0	90.9	93.0	90.9	100.0	**95.7**
3	**BH902 (c)***	88.9	85.1	108.1	85.1	95.2	88.9	108.1	**94.2**
4	**DWRB123 (c)**	99.0	95.2	95.2	100.0	90.9	87.0	95.2	**94.7**
5	**DWRB101 (c)**	88.9	88.9	108.1	100.0	111.1	90.9	88.9	**96.7**
6	**DWRUB52 (c)**	100.0	88.9	95.2	95.2	93.0	93.0	95.2	**94.4**
7	**RD2849 (c)**	108.1	95.2	111.1	97.6	114.3	83.3	108.1	**102.5**
	Mean	**97.2**	**93.0**	**103.7**	**94.5**	**101.2**	**89.0**	**100.5**	

*= 6 row barley

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

S.No	Genotype	Karnal	Hisar	Bathinda	Bawal	Durgapura	Ludhiana	Pantnagar	Mean
1	**DWRB150**	39.4	37.3	40.0	41.6	37.1	37.6	39.6	**38.9**
2	**RD2917**	41.2	36.4	40.2	40.0	42.1	42.6	40.7	**40.5**
3	**BH902 (c)***	37.4	41.7	41.6	39.3	39.6	41.0	40.5	**40.1**
4	**DWRB123 (c)**	39.8	37.2	38.6	38.7	40.7	40.4	41.3	**39.5**
5	**DWRB101 (c)**	41.1	41.7	39.3	41.0	39.2	40.6	39.1	**40.3**
6	**DWRUB52 (c)**	40.2	36.0	37.5	38.9	40.2	43.7	40.7	**39.6**
7	**RD2849 (c)**	42.0	36.1	39.3	39.7	41.4	42.6	40.0	**40.2**
	Mean	**40.2**	**38.0**	**39.5**	**39.9**	**40.0**	**41.2**	**40.3**	

*= 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	Bawal	Durgapura	Ludhiana	Pantnagar	Mean
1	BH1017	64.2	58.8	48.8	52.1	40.9	48.6	54.6	**52.6**
2	BH1018	52.3	39.1	45.4	43.7	48.2	44.5	48.5	**45.9**
3	DWRB136	58.0	45.5	51.7	48.9	54.1	46.9	55.4	**51.5**
4	DWRB160	71.3	67.3	48.8	42.4	47.3	60.0	62.9	**57.1**
5	DWRB161	38.3	47.7	44.1	44.7	48.6	42.5	45.6	**44.5**
6	DWRB162	53.8	54.0	47.6	47.6	57.3	50.3	54.5	**52.2**
7	KB1523	39.5	46.2	41.4	41.3	35.8	38.9	42.2	**40.8**
8	KB1535	36.3	42.4	40.8	45.2	46.4	41.8	40.4	**41.9**
9	PL895	49.3	43.1	46.0	46.2	52.2	46.3	49.6	**47.5**
10	PL896	50.0	46.7	44.7	46.5	46.9	41.9	49.2	**46.5**
11	PL899	46.0	44.5	36.0	40.3	47.7	42.1	45.9	**43.2**
12	RD2962	50.5	53.9	37.3	54.2	54.6	50.2	50.5	**50.2**
13	RD2963	60.5	53.2	34.2	53.5	58.3	53.7	53.5	**52.4**
14	RD2964	60.9	53.2	50.2	52.0	58.5	51.7	57.0	**54.8**
15	RD2965	58.6	52.3	46.4	44.8	59.3	49.6	57.2	**52.6**
16	UPB1065	38.2	42.4	34.1	41.4	35.1	33.4	33.3	**36.8**
17	BH902 (c)*	46.3	46.7	44.3	46.8	44.5	43.5	46.8	**45.5**
18	DWRUB52 (c)	49.2	39.2	45.4	43.3	49.2	45.0	45.0	**45.2**
19	DWRB101 (c)	48.8	45.3	45.3	44.3	49.4	47.6	50.0	**47.2**
20	DWRB123 (c)	53.2	52.4	46.5	49.4	44.0	49.9	53.2	**49.8**
21	RD2849 (c)	48.5	46.4	40.5	46.6	48.6	43.8	49.9	**46.3**
	Mean	**51.1**	**48.6**	**43.8**	**46.4**	**48.9**	**46.3**	**49.8**	

*= 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	Bawal	Durgapura	Ludhiana	Pantnagar	Mean
1	BH1017	67.6	65.2	60.0	66.0	66.8	66.1	63.8	**65.1**
2	BH1018	69.8	62.8	59.8	66.9	68.3	66.7	66.0	**65.7**
3	DWRB136	64.3	65.4	62.0	66.0	69.4	66.0	65.7	**65.5**
4	DWRB160	67.0	66.3	57.5	64.5	67.1	64.3	63.1	**64.3**
5	DWRB161	63.9	63.3	58.5	64.7	66.9	65.4	63.3	**63.7**
6	DWRB162	67.0	63.7	59.5	62.9	65.6	64.6	64.5	**64.0**
7	KB1523	70.5	63.6	56.7	64.3	62.1	64.3	64.5	**63.7**
8	KB1535	61.6	61.0	56.9	64.1	64.2	61.9	58.1	**61.1**
9	PL895	68.1	64.4	61.3	64.8	68.1	66.5	63.2	**65.2**
10	PL896	67.3	63.5	59.6	66.0	69.4	65.9	65.8	**65.4**
11	PL899	68.6	66.8	57.8	62.3	69.3	65.8	67.0	**65.4**
12	RD2962	67.1	63.5	58.7	63.9	68.2	66.8	61.8	**64.3**
13	RD2963	60.3	61.1	55.2	64.0	67.5	63.7	60.9	**61.8**
14	RD2964	67.0	60.5	59.7	64.2	66.2	64.0	59.2	**63.0**
15	RD2965	68.9	62.4	60.4	63.8	66.5	62.2	64.1	**64.0**
16	UPB1065	61.3	57.3	54.2	61.4	62.9	58.4	59.2	**59.2**
17	BH902 (c)*	63.6	61.0	54.9	61.9	64.2	60.4	59.8	**60.8**
18	DWRUB52 (c)	68.0	64.2	61.5	65.8	69.1	65.9	63.7	**65.4**
19	DWRB101 (c)	69.2	64.6	62.6	66.5	68.4	66.6	66.7	**66.3**
20	DWRB123 (c)	70.3	66.1	60.6	65.9	70.6	66.6	64.9	**66.4**
21	RD2849 (c)	66.2	66.1	60.9	67.3	70.8	66.7	65.1	**66.2**
	Mean	**66.5**	**63.5**	**59.0**	**64.6**	**67.2**	**64.7**	**63.3**	

*= 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	Bawal	Durgapura	Ludhiana	Pantnagar	Mean
1	BH1017	98.8	94.6	79.5	88.9	84.7	87.5	97.0	**90.2**
2	BH1018	94.7	84.0	77.0	84.8	77.1	87.5	95.3	**85.8**
3	DWRB136	95.4	91.1	85.0	86.6	91.6	82.1	96.1	**89.7**
4	DWRB160	99.4	99.0	88.1	94.9	98.2	97.6	99.0	**96.6**
5	DWRB161	98.3	96.2	85.5	92.8	96.8	95.6	96.9	**94.6**
6	DWRB162	97.6	96.8	96.3	94.3	99.1	95.0	98.7	**96.8**
7	KB1523	82.9	82.9	80.1	92.5	70.4	88.5	94.1	**84.5**
8	KB1535	67.5	82.5	74.5	91.8	71.4	82.1	83.3	**79.0**
9	PL895	94.3	89.6	90.4	88.8	94.4	92.0	95.2	**92.1**
10	PL896	94.9	95.6	90.9	93.9	95.6	94.5	97.5	**94.7**
11	PL899	93.7	86.0	58.3	74.7	91.4	96.2	91.8	**84.6**
12	RD2962	97.7	95.9	79.8	92.5	96.7	95.4	98.2	**93.7**
13	RD2963	98.6	96.5	92.7	89.6	98.0	97.8	98.1	**95.9**
14	RD2964	97.2	92.6	92.9	93.1	99.0	92.9	98.3	**95.1**
15	RD2965	96.6	94.5	87.6	89.0	97.5	91.5	97.0	**93.4**
16	UPB1065	60.3	40.4	66.2	84.2	56.9	64.8	71.1	**63.4**
17	BH902 (c)*	94.6	91.8	93.1	90.0	90.8	91.4	92.9	**92.1**
18	DWRUB52 (c)	90.6	73.3	86.2	81.4	88.7	84.3	93.9	**85.5**
19	DWRB101 (c)	84.7	83.8	80.7	82.3	93.2	91.4	94.4	**87.2**
20	DWRB123 (c)	94.5	96.3	84.5	90.5	96.5	92.8	97.3	**93.2**
21	RD2849 (c)	89.4	79.7	71.9	89.9	86.2	88.1	94.1	**85.6**
	Mean	**91.5**	**87.8**	**82.9**	**88.9**	**89.2**	**90.0**	**94.3**	

*= 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	Bawal	Durgapura	Ludhiana	Pantnagar	Mean
1	BH1017	0.2	0.9	4.0	2.5	2.0	2.8	0.6	**1.9**
2	BH1018	0.6	2.2	2.8	5.1	2.8	1.4	0.8	**2.2**
3	DWRB136	0.7	0.9	1.1	4.0	0.6	2.4	0.5	**1.4**
4	DWRB160	0.1	0.2	1.8	1.0	0.6	0.7	0.5	**0.7**
5	DWRB161	0.3	0.5	1.7	2.1	0.6	1.0	0.7	**1.0**
6	DWRB162	0.4	0.2	0.5	1.0	0.2	1.1	0.3	**0.5**
7	KB1523	3.0	2.2	3.2	1.7	6.0	1.9	0.8	**2.7**
8	KB1535	9.3	1.8	5.3	1.6	4.6	3.1	2.4	**4.0**
9	PL895	0.9	1.0	2.3	3.8	0.7	1.8	1.0	**1.6**
10	PL896	0.4	0.5	1.2	1.4	0.7	1.5	0.5	**0.9**
11	PL899	0.8	1.4	6.6	7.7	0.9	3.1	1.1	**3.1**
12	RD2962	0.5	0.4	2.3	2.4	0.7	0.8	0.5	**1.1**
13	RD2963	0.3	0.4	1.0	1.9	0.3	0.6	0.4	**0.7**
14	RD2964	0.3	1.2	0.8	1.3	0.8	1.3	0.6	**0.9**
15	RD2965	0.5	0.9	2.1	1.6	0.5	1.8	0.6	**1.1**
16	UPB1065	8.9	16.4	5.2	3.3	9.6	5.6	5.4	**7.8**
17	BH902 (c)*	1.0	1.5	0.7	2.1	1.5	1.8	2.2	**1.5**
18	DWRUB52 (c)	0.6	2.4	1.8	4.4	1.0	2.2	0.7	**1.9**
19	DWRB101 (c)	3.1	1.2	1.7	3.5	0.6	1.6	1.0	**1.8**
20	DWRB123 (c)	0.8	0.4	2.4	2.5	0.4	1.1	0.4	**1.1**
21	RD2849 (c)	1.5	2.3	3.7	2.3	1.6	1.5	0.8	**2.0**
	Mean	**1.6**	**1.9**	**2.5**	**2.7**	**1.7**	**1.8**	**1.0**	

*= 6 row barley

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

S.No.	Genotype	Karnal	Hisar	Bathinda	Bawal	Durgapura	Ludhiana	Pantnagar	Mean
1	BH1017	93.0	91.0	99.0	96.0	98.0	99.0	96.0	**96.0**
2	BH1018	99.0	95.0	98.0	96.0	97.0	97.0	98.0	**97.1**
3	DWRB136	97.0	96.0	97.0	95.0	96.0	98.0	95.0	**96.3**
4	DWRB160	82.0	86.0	98.0	97.0	94.0	98.0	96.0	**93.0**
5	DWRB161	90.0	95.0	92.0	97.0	98.0	96.0	98.0	**95.1**
6	DWRB162	85.0	98.0	98.0	96.0	98.0	96.0	98.0	**95.6**
7	KB1523	80.0	91.0	99.0	98.0	99.0	97.0	98.0	**94.6**
8	KB1535	80.0	98.0	94.0	98.0	99.0	98.0	97.0	**94.9**
9	PL895	95.0	98.0	98.0	96.0	98.0	98.0	96.0	**97.0**
10	PL896	99.0	99.0	98.0	98.0	98.0	97.0	95.0	**97.7**
11	PL899	85.0	94.0	99.0	97.0	98.0	98.0	98.0	**95.6**
12	RD2962	93.0	97.0	91.0	98.0	98.0	97.0	96.0	**95.7**
13	RD2963	98.0	95.0	92.0	96.0	98.0	97.0	96.0	**96.0**
14	RD2964	88.0	93.0	99.0	98.0	98.0	97.0	97.0	**95.7**
15	RD2965	98.0	98.0	98.0	96.0	98.0	98.0	99.0	**97.9**
16	UPB1065	88.0	93.0	98.0	97.0	98.0	98.0	98.0	**95.7**
17	BH902 (c)*	80.0	96.0	99.0	97.0	98.0	98.0	99.0	**95.3**
18	DWRUB52 (c)	96.0	93.0	94.0	98.0	94.0	98.0	97.0	**95.7**
19	DWRB101 (c)	80.0	97.0	98.0	99.0	97.0	98.0	98.0	**95.3**
20	DWRB123 (c)	90.0	86.0	95.0	96.0	98.0	98.0	94.0	**93.9**
21	RD2849 (c)	85.0	98.0	97.0	98.0	99.0	98.0	96.0	**95.9**
	Mean	**89.6**	**94.6**	**96.7**	**97.0**	**97.6**	**97.6**	**96.9**	

*= 6 row barley

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

S.No.	Genotype	Karnal	Hisar	Bathinda	Bawal	Durgapura	Ludhiana	Pantnagar	Mean
1	BH1017	10.7	8.7	10.2	9.4	11.3	10.3	8.9	**9.9**
2	BH1018	11.0	8.2	12.2	10.6	11.4	10.3	8.4	**10.3**
3	DWRB136	9.8	9.6	12.1	11.0	11.9	10.8	9.6	**10.7**
4	DWRB160	9.7	8.6	13.1	10.6	10.9	8.0	8.1	**9.9**
5	DWRB161	11.5	10.8	12.8	11.1	12.3	11.2	10.3	**11.4**
6	DWRB162	9.8	11.1	11.5	11.2	12.0	10.1	9.7	**10.8**
7	KB1523	9.7	8.6	12.2	9.6	11.2	6.2	8.7	**9.5**
8	KB1535	11.6	8.0	11.4	9.7	11.1	8.9	8.2	**9.8**
9	PL895	10.0	9.9	11.1	9.8	11.7	10.1	8.4	**10.1**
10	PL896	10.7	11.5	12.4	10.4	11.7	13.3	10.5	**11.5**
11	PL899	9.8	8.3	12.7	10.5	11.0	8.8	7.5	**9.8**
12	RD2962	11.7	9.2	11.6	12.6	12.0	12.3	11.4	**11.5**
13	RD2963	11.9	9.7	12.9	12.9	12.3	11.3	10.4	**11.6**
14	RD2964	9.6	10.9	11.9	11.5	12.4	10.2	9.2	**10.8**
15	RD2965	9.7	9.9	13.0	12.0	12.7	10.3	10.0	**11.1**
16	UPB1065	11.3	11.4	10.9	10.5	11.6	9.1	9.1	**10.6**
17	BH902 (c)*	8.4	8.1	9.5	9.6	9.3	8.3	8.1	**8.8**
18	DWRUB52 (c)	10.3	10.2	12.0	11.1	11.5	9.5	8.4	**10.4**
19	DWRB101 (c)	10.7	11.4	10.1	12.2	11.9	11.5	9.9	**11.1**
20	DWRB123 (c)	10.5	9.3	10.5	11.2	11.6	9.7	9.5	**10.3**
21	RD2849 (c)	9.9	11.4	11.0	9.7	11.6	9.2	9.2	**10.3**
	Mean	**10.4**	**9.8**	**11.7**	**10.8**	**11.6**	**10.0**	**9.2**	

*= 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	Bawal	Durgapura	Ludhiana	Pantnagar	Mean
1	BH1017	8.6	10.5	9.1	9.3	7.6	9.3	9.3	**9.1**
2	BH1018	7.1	10.3	10.8	9.9	8.7	9.6	12.4	**9.8**
3	DWRB136	7.4	9.4	9.9	9.8	7.9	11.2	9.8	**9.3**
4	DWRB160	9.2	11.3	9.6	8.2	7.7	12.2	11.8	**10.0**
5	DWRB161	10.2	11.0	10.6	11.1	8.5	9.2	10.9	**10.2**
6	DWRB162	8.9	10.5	7.5	8.7	9.0	11.4	10.9	**9.6**
7	KB1523	11.0	7.5	11.9	6.9	8.6	9.7	10.9	**9.5**
8	KB1535	12.8	11.5	12.1	10.6	12.1	12.0	14.2	**12.2**
9	PL895	7.6	9.7	9.8	8.9	7.8	8.7	11.0	**9.1**
10	PL896	10.0	9.3	7.2	7.0	7.6	13.2	10.9	**9.3**
11	PL899	8.2	8.0	11.7	9.7	7.7	10.7	12.8	**9.8**
12	RD2962	9.2	11.9	9.9	8.9	7.5	10.4	10.1	**9.7**
13	RD2963	10.4	9.9	13.9	8.4	8.4	10.0	12.4	**10.5**
14	RD2964	10.4	12.2	12.1	8.2	11.2	10.8	11.4	**10.9**
15	RD2965	9.7	9.3	10.6	9.2	8.3	10.4	10.6	**9.7**
16	UPB1065	12.5	12.7	13.2	10.7	10.2	11.3	11.2	**11.7**
17	BH902 (c)*	12.9	11.3	12.3	10.8	11.0	10.2	11.0	**11.4**
18	DWRUB52 (c)	9.8	10.5	14.9	9.3	8.5	9.8	10.4	**10.5**
19	DWRB101 (c)	10.6	10.2	10.1	11.3	7.9	8.8	10.6	**9.9**
20	DWRB123 (c)	11.2	11.5	11.7	8.9	8.0	10.9	10.6	**10.4**
21	RD2849 (c)	9.2	8.8	12.3	9.8	8.4	10.4	11.4	**10.0**
	Mean	**9.9**	**10.3**	**11.0**	**9.3**	**8.7**	**10.5**	**11.2**	

*= 6 row barley

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

S.No.	Genotype	Karnal	Durgapura	Mean
1	BH1017	5.1	3.5	**4.3**
2	BH1018	4.0	3.3	**3.7**
3	DWRB136	6.3	7.2	**6.7**
4	DWRB160	5.7	6.3	**6.0**
5	DWRB161	5.3	6.2	**5.7**
6	DWRB162	5.8	6.6	**6.2**
7	KB1523	4.5	6.8	**5.7**
8	KB1535	3.8	3.6	**3.7**
9	PL895	3.7	4.1	**3.9**
10	PL896	4.3	3.6	**4.0**
11	PL899	4.2	6.0	**5.1**
12	RD2962	6.0	7.1	**6.5**
13	RD2963	5.5	7.2	**6.3**
14	RD2964	4.2	3.8	**4.0**
15	RD2965	6.3	5.1	**5.7**
16	UPB1065	3.4	3.1	**3.3**
17	BH902 (c)*	5.8	5.5	**5.6**
18	DWRUB52 (c)	4.1	5.0	**4.6**
19	DWRB101 (c)	3.8	3.8	**3.8**
20	DWRB123 (c)	5.8	5.2	**5.5**
21	RD2849 (c)	4.5	4.9	**4.7**
	Mean	**4.9**	**5.1**	

**six row barley*

MALT PARAMETERS

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

S.No.	Genotype	Karnal	Hisar	Bathinda	Bawal	Durgapura	Ludhiana	Pantnagar	Mean
1	BH1017	89.2	89.0	89.8	88.4	84.0	84.4	87.2	**87.4**
2	BH1018	88.4	89.2	88.7	88.9	84.3	85.9	89.0	**87.8**
3	DWRB136	87.7	89.2	88.3	88.0	84.4	85.5	87.7	**87.3**
4	DWRB160	89.1	89.6	87.6	89.9	80.4	81.5	89.3	**86.8**
5	DWRB161	85.0	88.2	86.3	86.7	84.9	84.0	86.4	**85.9**
6	DWRB162	87.4	88.7	87.9	87.3	80.9	80.5	89.1	**86.0**
7	KB1523	88.1	89.7	88.8	88.5	83.6	82.6	86.5	**86.8**
8	KB1535	89.9	89.1	89.7	88.6	85.4	76.6	88.4	**86.8**
9	PL895	88.0	89.6	81.2	87.9	83.3	85.1	87.0	**86.0**
10	PL896	84.7	89.2	88.1	88.2	80.3	85.5	86.8	**86.1**
11	PL899	87.5	86.9	86.2	86.8	83.9	83.8	86.8	**86.0**
12	RD2962	87.2	83.9	85.1	88.0	78.4	79.8	87.6	**84.3**
13	RD2963	89.5	87.0	87.9	89.3	87.1	84.0	89.0	**87.7**
14	RD2964	86.6	88.7	87.6	87.6	81.5	82.1	87.9	**86.0**
15	RD2965	85.5	89.3	89.0	88.1	83.9	84.0	85.7	**86.5**
16	UPB1065	82.2	87.0	85.0	86.3	80.1	82.4	85.1	**84.0**
17	BH902 (c)*	88.3	89.7	87.5	87.6	84.2	83.7	87.9	**87.0**
18	DWRUB52 (c)	87.5	88.7	86.3	86.3	83.7	81.8	88.1	**86.0**
19	DWRB101 (c)	87.5	88.8	89.1	89.4	83.2	84.9	85.8	**87.0**
20	DWRB123 (c)	88.4	89.8	88.8	89.2	84.4	84.0	89.4	**87.7**
21	RD2849 (c)	88.1	89.3	88.8	88.2	83.4	84.4	87.6	**87.1**
	Mean	**87.4**	**88.6**	**87.5**	**88.0**	**83.1**	**83.2**	**87.5**	

*= 6 row barley

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

S.No.	Genotype	Karnal	Hisar	Bathinda	Bawal	Durgapura	Ludhiana	Pantnagar	Mean
1	BH1017	58.9	61.6	71.4	66.0	78.9	64.3	92.3	**70.5**
2	BH1018	63.3	63.4	83.4	78.4	73.2	59.2	51.1	**67.4**
3	DWRB136	70.3	81.4	79.1	65.1	84.9	53.5	51.6	**69.4**
4	DWRB160	52.8	54.4	85.6	62.6	88.4	67.2	54.6	**66.5**
5	DWRB161	80.6	82.0	85.2	70.5	83.9	90.1	60.4	**79.0**
6	DWRB162	90.3	80.7	86.5	58.0	91.0	47.0	48.3	**71.7**
7	KB1523	61.1	72.4	84.9	61.4	83.3	72.8	70.3	**72.3**
8	KB1535	31.4	76.0	75.4	59.1	86.2	76.2	67.6	**67.4**
9	PL895	90.8	89.3	77.6	88.2	76.6	49.3	82.5	**79.2**
10	PL896	85.5	77.5	88.1	85.5	76.5	59.4	67.1	**77.1**
11	PL899	89.7	80.9	78.2	75.3	79.0	62.2	88.9	**79.2**
12	RD2962	73.6	82.5	79.0	69.1	77.0	59.5	52.1	**70.4**
13	RD2963	53.1	42.3	70.2	57.4	87.4	84.1	47.8	**63.2**
14	RD2964	77.1	73.2	74.6	72.6	78.7	88.2	44.7	**72.7**
15	RD2965	87.5	80.8	86.5	68.4	70.9	72.3	52.5	**74.1**
16	UPB1065	80.8	78.0	87.6	69.5	55.6	90.1	52.4	**73.4**
17	BH902 (c)*	67.8	55.2	82.8	57.5	89.4	69.5	67.1	**69.9**
18	DWRUB52 (c)	70.9	74.7	73.1	84.6	73.7	91.6	70.2	**77.0**
19	DWRB101 (c)	72.9	74.6	74.0	73.1	74.9	50.0	52.7	**67.4**
20	DWRB123 (c)	64.2	69.8	86.7	79.9	86.4	61.8	35.6	**69.2**
21	RD2849 (c)	80.8	91.7	91.9	85.0	74.7	62.5	65.7	**78.9**
	Mean	**71.6**	**73.4**	**81.0**	**70.8**	**79.5**	**68.1**	**60.7**	

*= 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	Bawal	Durgapura	Ludhiana	Pantnagar	Mean
1	BH1017	78.8	81.0	80.7	81.1	84.7	82.3	80.1	**81.2**
2	BH1018	69.8	82.3	79.6	79.9	80.1	80.8	80.9	**79.1**
3	DWRB136	85.2	78.9	79.6	77.9	77.9	80.6	77.7	**79.7**
4	DWRB160	75.7	79.5	84.3	83.8	85.1	74.5	81.0	**80.6**
5	DWRB161	83.9	85.0	82.3	84.2	84.3	83.6	80.7	**83.4**
6	DWRB162	78.2	85.8	81.7	82.3	84.6	76.9	76.7	**80.9**
7	KB1523	80.9	83.9	81.6	81.9	81.9	72.9	72.3	**79.3**
8	KB1535	77.5	81.0	84.8	79.8	84.0	81.1	83.4	**81.7**
9	PL895	81.9	83.9	80.7	82.3	82.3	80.3	80.6	**81.7**
10	PL896	77.8	80.7	83.5	81.5	80.8	70.8	84.8	**80.0**
11	PL899	81.8	83.1	83.2	81.1	81.1	81.1	84.7	**82.3**
12	RD2962	79.9	82.9	81.6	81.8	81.8	77.3	82.1	**81.1**
13	RD2963	81.5	82.5	81.0	82.8	82.8	78.0	77.6	**80.9**
14	RD2964	82.6	83.9	79.9	84.0	81.6	83.9	83.4	**82.8**
15	RD2965	84.8	79.6	79.3	83.6	83.6	79.2	84.2	**82.0**
16	UPB1065	77.3	77.3	79.4	81.5	76.1	78.1	81.3	**78.7**
17	BH902 (c)*	80.3	79.9	80.2	81.3	84.7	79.9	82.3	**81.2**
18	DWRUB52 (c)	85.8	85.0	84.0	84.3	84.3	84.4	70.8	**82.6**
19	DWRB101 (c)	82.3	81.3	85.0	79.2	79.2	83.6	82.5	**81.9**
20	DWRB123 (c)	75.3	79.5	82.8	80.7	76.6	77.7	81.1	**79.1**
21	RD2849 (c)	83.7	79.8	83.9	84.2	84.2	73.8	81.3	**81.6**
	Mean	**80.2**	**81.8**	**81.9**	**81.9**	**82.0**	**79.1**	**80.5**	

*= 6 row barley

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

S.No.	Genotype	Karnal	Hisar	Bathinda	Bawal	Durgapura	Ludhiana	Pantnagar	Mean
1	BH1017	220.0	220.0	225.0	195.0	310.0	300.0	310.0	**254.3**
2	BH1018	285.0	310.0	230.0	275.0	210.0	100.0	230.0	**234.3**
3	DWRB136	250.0	235.0	240.0	190.0	190.0	150.0	185.0	**205.7**
4	DWRB160	300.0	275.0	245.0	240.0	180.0	250.0	185.0	**239.3**
5	DWRB161	300.0	250.0	310.0	170.0	170.0	290.0	205.0	**242.1**
6	DWRB162	175.0	240.0	245.0	255.0	280.0	200.0	265.0	**237.1**
7	KB1523	320.0	310.0	265.0	270.0	270.0	175.0	220.0	**261.4**
8	KB1535	180.0	260.0	305.0	300.0	250.0	245.0	210.0	**250.0**
9	PL895	290.0	280.0	305.0	190.0	190.0	195.0	200.0	**235.7**
10	PL896	230.0	245.0	260.0	175.0	205.0	140.0	310.0	**223.6**
11	PL899	270.0	285.0	265.0	230.0	230.0	205.0	305.0	**255.7**
12	RD2962	280.0	220.0	295.0	200.0	200.0	185.0	170.0	**221.4**
13	RD2963	300.0	260.0	200.0	240.0	240.0	275.0	290.0	**257.9**
14	RD2964	220.0	230.0	220.0	165.0	275.0	240.0	210.0	**222.9**
15	RD2965	285.0	265.0	210.0	200.0	200.0	210.0	180.0	**221.4**
16	UPB1065	275.0	250.0	300.0	170.0	290.0	260.0	300.0	**263.6**
17	BH902 (c)*	260.0	255.0	260.0	215.0	290.0	205.0	250.0	**247.9**
18	DWRUB52 (c)	285.0	220.0	240.0	210.0	210.0	235.0	220.0	**231.4**
19	DWRB101 (c)	275.0	250.0	310.0	200.0	200.0	250.0	270.0	**250.7**
20	DWRB123 (c)	245.0	260.0	265.0	275.0	170.0	195.0	300.0	**244.3**
21	RD2849 (c)	260.0	300.0	200.0	200.0	200.0	180.0	185.0	**217.9**
	Mean	**262.1**	**258.1**	**256.9**	**217.4**	**226.7**	**213.6**	**238.1**	

*= 6 row barley

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

S.No.	Genotype	Karnal	Hisar	Bathinda	Bawal	Durgapura	Ludhiana	Pantnagar	Mean
1	BH1017	5	5	5	5	5	5	5	**5.0**
2	BH1018	5	5	5	5	5	5	5	**5.0**
3	DWRB136	5	5	5	5	5	5	5	**5.0**
4	DWRB160	5	5	5	5	10	5	5	**5.7**
5	DWRB161	5	5	10	5	5	10	5	**6.4**
6	DWRB162	5	5	5	5	5	5	5	**5.0**
7	KB1523	5	5	5	10	10	5	5	**6.4**
8	KB1535	10	5	5	5	5	5	10	**6.4**
9	PL895	5	5	5	5	5	5	10	**5.7**
10	PL896	5	5	10	5	5	5	5	**5.7**
11	PL899	5	5	5	5	5	5	5	**5.0**
12	RD2962	5	5	5	10	10	5	5	**6.4**
13	RD2963	10	5	5	5	5	5	5	**5.7**
14	RD2964	5	5	5	5	5	5	5	**5.0**
15	RD2965	10	5	5	5	5	5	5	**5.7**
16	UPB1065	5	5	5	5	5	5	5	**5.0**
17	BH902 (c)*	10	10	10	5	5	5	10	**7.9**
18	DWRUB52 (c)	5	5	5	5	5	5	5	**5.0**
19	DWRB101 (c)	5	10	5	5	5	10	5	**6.4**
20	DWRB123 (c)	5	5	5	5	5	5	10	**5.7**
21	RD2849 (c)	5	5	5	5	5	5	5	**5.0**
	Mean	**6.0**	**5.5**	**5.7**	**5.5**	**5.7**	**5.5**	**6.0**	

*= 6 row barley

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

S.No.	Genotype	Karnal	Hisar	Bathinda	Bawal	Durgapura	Ludhiana	Pantnagar	Mean
1	BH1017	6.5	7.1	6.0	6.5	6.2	5.9	6.3	**6.3**
2	BH1018	6.2	6.9	6.7	6.2	6.3	5.9	6.2	**6.3**
3	DWRB136	6.9	6.7	6.3	6.4	6.4	5.7	5.7	**6.3**
4	DWRB160	6.0	7.0	6.5	6.1	6.1	6.1	6.2	**6.3**
5	DWRB161	6.5	6.1	6.3	6.0	6.0	6.1	5.9	**6.1**
6	DWRB162	5.3	6.4	5.6	6.0	6.5	6.1	5.9	**6.0**
7	KB1523	6.0	6.1	6.4	6.1	6.1	5.8	6.1	**6.1**
8	KB1535	6.4	6.3	6.5	6.4	6.5	6.0	6.0	**6.3**
9	PL895	6.5	6.1	6.3	6.4	6.4	5.8	5.9	**6.2**
10	PL896	5.4	6.0	6.6	6.0	6.1	6.2	6.0	**6.0**
11	PL899	6.0	6.0	5.9	6.1	6.1	6.5	5.9	**6.1**
12	RD2962	6.4	7.0	6.1	5.9	5.9	6.2	5.8	**6.2**
13	RD2963	6.6	6.2	6.4	6.5	6.5	6.6	6.0	**6.4**
14	RD2964	5.4	6.4	6.7	6.3	6.1	6.2	5.9	**6.1**
15	RD2965	5.9	6.4	6.0	6.0	6.0	6.3	5.6	**6.0**
16	UPB1065	5.9	6.1	6.6	6.1	6.4	6.2	6.1	**6.2**
17	BH902 (c)*	6.5	6.2	6.6	6.4	6.5	6.0	6.1	**6.3**
18	DWRUB52 (c)	6.7	6.7	6.1	6.4	6.4	5.7	6.0	**6.3**
19	DWRB101 (c)	6.5	6.0	6.1	5.9	5.9	6.4	5.7	**6.1**
20	DWRB123 (c)	5.8	6.1	6.8	6.5	6.2	5.9	6.2	**6.2**
21	RD2849 (c)	6.4	6.2	6.4	6.3	6.3	6.0	6.1	**6.2**
	Mean	**6.2**	**6.4**	**6.3**	**6.2**	**6.2**	**6.1**	**6.0**	

*= 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	Bawal	Durgapura	Ludhiana	Pantnagar	Mean
1	BH1017	2.0	2.0	2.0	2.0	2.0	4.5	4.0	**2.6**
2	BH1018	2.0	2.0	2.5	2.0	2.0	2.5	3.0	**2.3**
3	DWRB136	2.0	2.0	2.5	2.0	2.0	3.0	2.0	**2.2**
4	DWRB160	2.0	2.0	2.5	2.0	2.0	3.0	3.0	**2.4**
5	DWRB161	2.0	2.0	2.0	2.0	2.5	5.0	2.5	**2.6**
6	DWRB162	2.0	2.0	2.0	2.0	2.5	2.5	2.5	**2.2**
7	KB1523	2.0	2.0	2.0	2.0	2.0	2.0	2.0	**2.0**
8	KB1535	2.0	2.0	2.5	2.0	2.0	3.0	3.0	**2.4**
9	PL895	2.0	2.0	2.0	2.0	2.0	2.0	2.0	**2.0**
10	PL896	2.0	2.0	2.0	2.0	2.0	2.0	2.5	**2.1**
11	PL899	2.0	2.0	2.5	2.5	2.5	3.0	2.5	**2.4**
12	RD2962	2.0	2.0	2.5	2.0	2.0	3.0	2.5	**2.3**
13	RD2963	2.0	2.0	2.0	2.0	2.0	3.0	3.0	**2.3**
14	RD2964	2.0	2.0	2.0	2.0	2.0	2.0	2.5	**2.1**
15	RD2965	2.5	2.5	2.5	2.0	2.0	3.0	3.0	**2.5**
16	UPB1065	2.0	2.0	2.5	2.0	2.0	3.5	2.5	**2.4**
17	BH902 (c)*	2.0	2.0	2.0	2.0	2.5	3.0	2.5	**2.3**
18	DWRUB52 (c)	2.0	2.0	2.0	2.0	2.0	2.0	2.5	**2.1**
19	DWRB101 (c)	2.0	2.0	2.0	2.0	2.0	3.0	2.5	**2.2**
20	DWRB123 (c)	2.0	2.0	2.0	2.0	2.0	2.0	3.0	**2.1**
21	RD2849 (c)	2.0	2.0	2.0	2.0	2.0	2.0	2.5	**2.1**
	Mean	**2.0**	**2.0**	**2.2**	**2.0**	**2.1**	**2.8**	**2.6**	

*= 6 row barley

Table 2.16 b : Diastatic power (^{o}L) of IVT (TS-MB) entries from different locations

S.No.	Genotype	Karnal	Hisar	Bathinda	Bawal	Durgapura	Ludhiana	Pantnagar	Mean
1	BH1017	90.9	100.0	95.2	93.0	93.0	88.9	111.1	**96.0**
2	BH1018	97.6	87.0	105.3	90.9	93.0	100.0	102.6	**96.6**
3	DWRB136	111.1	100.0	87.0	90.9	108.1	95.2	100.0	**98.9**
4	DWRB160	95.2	87.0	108.1	93.0	102.6	87.0	95.2	**95.4**
5	DWRB161	100.0	100.0	95.2	90.9	95.2	105.3	95.2	**97.4**
6	DWRB162	95.2	97.6	108.1	97.6	108.1	100.0	111.1	**102.5**
7	KB1523	95.2	90.9	95.2	97.6	93.0	90.9	81.6	**92.1**
8	KB1535	95.2	95.2	90.9	97.6	97.6	95.2	105.3	**96.7**
9	PL895	111.1	108.1	88.9	88.9	105.3	81.6	102.6	**98.1**
10	PL896	100.0	88.9	105.3	90.9	100.0	83.3	111.1	**97.1**
11	PL899	100.0	111.1	100.0	97.6	100.0	88.9	95.2	**99.0**
12	RD2962	95.2	90.9	100.0	88.9	97.6	97.6	100.0	**95.7**
13	RD2963	88.9	93.0	81.6	95.2	111.1	87.0	93.0	**92.8**
14	RD2964	100.0	90.9	105.3	87.0	102.6	97.6	97.6	**97.3**
15	RD2965	90.9	111.1	93.0	93.0	105.3	95.2	90.9	**97.1**
16	UPB1065	88.9	97.6	108.1	95.2	93.0	90.9	100.0	**96.2**
17	BH902 (c)*	102.6	95.2	108.1	88.9	98.5	88.9	108.1	**98.6**
18	DWRUB52 (c)	90.9	93.0	95.2	95.2	100.0	87.0	87.0	**92.6**
19	DWRB101 (c)	97.6	97.6	102.6	95.2	100.0	88.9	114.3	**99.4**
20	DWRB123 (c)	88.9	87.0	100.0	100.0	111.1	93.0	105.3	**97.9**
21	RD2849 (c)	102.6	85.1	100.0	88.9	111.1	97.6	100.0	**97.9**
	Mean	**97.1**	**95.6**	**98.7**	**93.2**	**101.2**	**92.4**	**100.3**	

*= 6 row barley

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

S.No.	Genotype	Karnal	Hisar	Bathinda	Bawal	Durgapura	Ludhiana	Pantnagar	Mean
1	BH1017	38.0	41.5	37.8	30.8	42.6	39.8	41.2	**38.8**
2	BH1018	36.0	39.3	38.2	39.8	39.1	39.8	39.3	**38.8**
3	DWRB136	39.8	38.9	37.9	38.7	39.1	39.6	40.0	**39.2**
4	DWRB160	36.8	36.0	36.4	38.1	36.8	39.8	41.0	**37.8**
5	DWRB161	40.9	40.7	37.6	39.6	41.8	44.7	38.7	**40.6**
6	DWRB162	38.8	40.0	39.6	38.0	43.4	41.9	40.9	**40.4**
7	KB1523	39.0	42.7	42.9	39.8	43.3	42.5	41.6	**41.7**
8	KB1535	40.9	39.3	38.2	38.8	42.1	42.2	40.6	**40.3**
9	PL895	39.6	36.5	37.4	38.4	41.8	38.9	45.4	**39.7**
10	PL896	37.7	37.4	38.9	37.7	44.2	37.4	39.2	**38.9**
11	PL899	41.0	38.1	39.4	39.0	40.4	38.4	42.1	**39.8**
12	RD2962	39.4	41.0	41.0	36.7	39.6	40.4	41.0	**39.9**
13	RD2963	38.9	39.4	37.0	37.1	39.5	42.1	37.7	**38.8**
14	RD2964	41.2	38.5	37.9	39.1	42.0	42.9	34.7	**39.5**
15	RD2965	38.7	38.9	39.1	39.8	40.9	39.3	42.1	**39.8**
16	UPB1065	38.7	42.5	37.4	40.0	42.0	42.9	40.0	**40.5**
17	BH902 (c)*	42.9	41.7	37.5	38.7	39.6	41.0	39.1	**40.1**
18	DWRUB52 (c)	36.0	38.9	38.0	41.4	42.1	41.9	41.2	**39.9**
19	DWRB101 (c)	37.0	38.2	35.8	37.7	43.3	40.5	40.2	**39.0**
20	DWRB123 (c)	35.5	42.4	36.9	37.7	42.2	41.8	41.5	**39.7**
21	RD2849 (c)	40.6	40.0	38.3	38.3	39.6	39.8	42.1	**39.8**
	Mean	**38.9**	**39.6**	**38.3**	**38.4**	**41.2**	**40.8**	**40.4**	

*= 6 row barley

Annexure 3: IVT-LS-MALT BARLEY

GRAIN PARAMETERS

Table 3.1: Thousand grain weight (g) of IVT (LS-MB) entries from different locations

S. No.	Genotype	Karnal	Hisar	Bathinda	Durgapura	Ludhiana	Pantnagar	Mean
1	DWRB160	63.6	47.3	53.7	57.1	49.9	67.0	**56.5**
2	DWRB161	49.4	35.0	41.3	41.7	39.5	46.6	**42.2**
3	DWRB163	54.7	38.1	49.2	48.4	45.8	51.1	**47.9**
4	DWRB164	56.3	33.1	53.3	55.7	44.2	53.6	**49.4**
5	DWRB170	59.3	38.8	50.6	53.4	43.2	52.5	**49.6**
6	RD2966	48.9	41.9	54.3	55.2	44.0	56.7	**50.2**
7	RD2967	63.7	36.9	46.9	54.8	46.1	58.4	**51.1**
8	RD2968	57.9	49.8	48.0	56.1	45.6	53.7	**51.9**
9	DWRB73 (c)	48.9	33.9	44.9	44.5	34.7	45.3	**42.0**
10	DWRB91 (c)	65.9	49.7	46.5	61.9	44.9	64.8	**55.6**
11	DWRUB64 (c)*	63.3	42.1	53.3	60.4	48.7	63.9	**55.3**
	Mean	**57.4**	**40.6**	**49.3**	**53.6**	**44.2**	**55.8**	

*= 6 row barley

Table 3.2: Test weight (kg/hl) of IVT (LS-MB) entries from different locations

S. No.	Genotype	Karnal	Hisar	Bathinda	Durgapura	Ludhiana	Pantnagar	Mean
1	DWRB160	65.4	56.4	53.8	65.8	55.7	58.9	**59.3**
2	DWRB161	67.8	61.3	57.0	67.1	62.1	61.8	**62.9**
3	DWRB163	69.4	61.3	64.6	68.3	65.0	64.8	**65.6**
4	DWRB164	66.1	55.5	60.3	68.4	58.9	61.8	**61.8**
5	DWRB170	67.6	56.4	57.1	66.8	58.2	60.8	**61.1**
6	RD2966	66.4	57.4	57.8	66.3	59.9	61.5	**61.5**
7	RD2967	67.0	53.4	56.1	64.9	57.0	61.2	**59.9**
8	RD2968	66.7	61.2	58.0	65.6	60.8	61.9	**62.4**
9	DWRB73 (c)	65.3	56.5	59.3	65.6	57.0	57.5	**60.2**
10	DWRB91 (c)	66.6	54.5	56.5	66.8	52.9	58.9	**59.4**
11	DWRUB64 (c)*	67.9	58.2	60.2	68.3	61.4	63.2	**63.2**
	Mean	**66.9**	**57.5**	**58.2**	**66.7**	**59.0**	**61.1**	

*= 6 row barley

Table 3.3: Proportion of bold grains (%) of IVT (LS-MB) entries from different locations

S. No.	Genotype	Karnal	Hisar	Bathinda	Durgapura	Ludhiana	Pantnagar	Mean
1	DWRB160	98.5	78.8	94.0	95.0	95.1	98.0	**93.2**
2	DWRB161	98.1	52.2	89.3	88.9	91.3	91.3	**85.2**
3	DWRB163	97.6	22.6	90.6	83.3	86.0	86.1	**77.7**
4	DWRB164	96.1	23.5	89.7	85.1	78.7	84.9	**76.3**
5	DWRB170	97.2	42.8	75.6	86.4	76.5	85.1	**77.3**
6	RD2966	97.8	59.5	92.7	82.8	91.6	93.7	**86.4**
7	RD2967	97.6	46.2	89.1	88.3	89.3	92.7	**83.9**
8	RD2968	96.0	56.1	90.3	89.6	80.8	90.7	**83.9**
9	DWRB73 (c)	93.7	58.7	95.6	84.0	79.2	91.0	**83.7**
10	DWRB91 (c)	98.0	88.5	98.3	97.0	97.5	97.8	**96.2**
11	DWRUB64 (c)*	97.6	56.1	95.3	93.9	92.5	97.1	**88.7**
	Mean	**97.1**	**53.2**	**90.9**	**88.6**	**87.1**	**91.7**	

*= 6 row barley

Table 3.4: Proportion of thin grains (%) of IVT (LS-MB)entries from different locations

S. No.	Genotype	Karnal	Hisar	Bathinda	Durgapura	Ludhiana	Pantnagar	Mean
1	DWRB160	0.1	2.1	0.8	1.1	0.8	0.2	**0.8**
2	DWRB161	0.3	5.8	1.1	1.4	1.2	1.3	**1.9**
3	DWRB163	0.3	12.9	1.2	3.9	1.6	2.1	**3.7**
4	DWRB164	0.9	27.0	1.7	3.2	3.8	2.5	**6.5**
5	DWRB170	0.5	13.6	4.7	2.8	4.3	4.0	**5.0**
6	RD2966	0.1	8.3	1.7	3.3	1.4	1.1	**2.7**
7	RD2967	0.2	15.2	1.5	1.8	1.7	1.6	**3.7**
8	RD2968	1.1	4.6	0.9	1.2	3.7	0.7	**2.0**
9	DWRB73 (c)	1.9	8.4	0.7	2.9	4.2	1.7	**3.3**
10	DWRB91 (c)	0.2	1.7	0.3	0.4	0.6	0.3	**0.6**
11	DWRUB64 (c)*	0.4	8.1	0.9	1.1	1.1	0.4	**2.0**
	Mean	**0.5**	**9.8**	**1.4**	**2.1**	**2.2**	**1.4**	

*= 6 row barley

Table 3.5 : Germinative energy (% 72hs) of IVT (LS-MB) entries from different locations

S. No.	Genotype	Karnal	Hisar	Bathinda	Durgapura	Ludhiana	Pantnagar	Mean
1	DWRB160	80.0	97.0	98.0	97.0	99.0	98.0	**94.8**
2	DWRB161	99.0	97.0	98.0	98.0	96.0	98.0	**97.7**
3	DWRB163	98.0	99.0	98.0	96.0	98.0	98.0	**97.8**
4	DWRB164	97.0	96.0	99.0	98.0	98.0	96.0	**97.3**
5	DWRB170	96.0	99.0	96.0	98.0	97.0	98.0	**97.3**
6	RD2966	99.0	99.0	97.0	99.0	98.0	95.0	**97.8**
7	RD2967	98.0	98.0	98.0	99.0	98.0	95.0	**97.7**
8	RD2968	97.0	97.0	99.0	93.0	95.0	97.0	**96.3**
9	DWRB73 (c)	94.0	99.0	98.0	97.0	97.0	95.0	**96.7**
10	DWRB91 (c)	96.0	98.0	99.0	98.0	96.0	98.0	**97.5**
11	DWRUB64 (c)*	98.0	98.0	93.0	98.0	99.0	96.0	**97.0**
	Mean	**95.6**	**97.9**	**97.5**	**97.4**	**97.4**	**96.7**	

*= 6 row barley

Table 3.6 : Husk content (%) of IVT (LS-MB) entries from different locations

S. No.	Genotype	Karnal	Hisar	Bathinda	Durgapura	Ludhiana	Pantnagar	Mean
1	DWRB160	9.2	14.5	12.1	11.5	11.9	12.4	**11.9**
2	DWRB161	10.8	11.7	12.0	10.9	11.6	11.8	**11.5**
3	DWRB163	9.1	9.0	8.2	9.8	10.4	13.0	**9.9**
4	DWRB164	10.2	13.9	11.4	9.6	13.2	11.0	**11.6**
5	DWRB170	9.4	12.8	10.8	10.2	8.1	11.6	**10.5**
6	RD2966	10.6	14.1	9.7	10.4	11.6	11.0	**11.2**
7	RD2967	10.5	14.8	12.7	10.2	13.0	11.6	**12.1**
8	RD2968	10.0	12.0	11.7	11.2	12.3	11.5	**11.4**
9	DWRB73 (c)	9.3	11.6	9.5	9.5	10.4	11.8	**10.3**
10	DWRB91 (c)	10.0	12.3	9.0	9.8	14.7	11.4	**11.2**
11	DWRUB64 (c)*	9.3	11.4	11.1	11.6	12.1	11.3	**11.1**
	Mean	**9.9**	**12.5**	**10.7**	**10.4**	**11.8**	**11.7**	

*= 6 row barley

Table 3.7 : Grain protein content (%) of IVT (LS-MB) entries from different locations

S. No.	Genotype	Karnal	Hisar	Bathinda	Durgapura	Ludhiana	Pantnagar	Mean
1	DWRB160	9.2	13.3	12.8	14.0	10.7	9.6	**11.6**
2	DWRB161	11.4	14.4	14.4	11.1	10.8	12.1	**12.4**
3	DWRB163	12.3	14.0	13.7	16.2	12.3	12.1	**13.4**
4	DWRB164	10.5	14.5	13.9	14.0	10.5	12.2	**12.6**
5	DWRB170	10.3	15.1	14.5	14.8	11.1	11.9	**13.0**
6	RD2966	11.7	14.1	13.6	16.9	11.0	11.1	**13.1**
7	RD2967	12.0	16.6	15.1	17.5	12.5	12.9	**14.4**
8	RD2968	12.8	16.2	15.5	16.7	11.5	13.3	**14.3**
9	DWRB73 (c)	8.6	11.9	11.8	13.1	9.3	8.8	**10.6**
10	DWRB91 (c)	10.5	14.6	13.1	14.9	10.2	11.1	**12.4**
11	DWRUB64 (c)*	9.9	12.6	13.3	14.0	9.5	10.6	**11.7**
	Mean	**10.8**	**14.3**	**13.8**	**14.8**	**10.9**	**11.4**	

*= 6 row barley

Table 3.8: β-Glucan content (%dwb) of IVT (LS-MB) entries from two locations

S. No.	Genotype	Karnal	Durgapura	Mean
1	DWRB160	7.5	7.4	**7.5**
2	DWRB161	5.1	5.4	**5.3**
3	DWRB163	6.9	6.5	**6.7**
4	DWRB164	6.8	7.5	**7.2**
5	DWRB170	7.6	7.7	**7.7**
6	RD2966	7.1	7.3	**7.2**
7	RD2967	7.1	8.2	**7.6**
8	RD2968	5.4	6.8	**6.1**
9	DWRB73 (c)	5.1	5.5	**5.3**
10	DWRB91 (c)	7.0	7.9	**7.4**
11	DWRUB64 (c)*	6.2	7.6	**6.9**
	Mean	**6.5**	**7.1**	

*= 6 row barley

MALT PARAMETERS

Table 3.9 : Malt yield (%) of IVT (LS-MB) entries from different locations

S. No.	Genotype	Karnal	Hisar	Bathinda	Durgapura	Ludhiana	Pantnagar	Mean
1	DWRB160	88.9	89.3	83.2	82.1	84.6	87.8	**86.0**
2	DWRB161	83.6	89.6	83.8	80.9	86.5	88.8	**85.5**
3	DWRB163	85.6	87.3	84.9	83.5	85.6	87.9	**85.8**
4	DWRB164	86.3	86.3	86.1	82.4	89.9	86.9	**86.3**
5	DWRB170	86.7	87.9	85.5	81.4	84.8	88.1	**85.7**
6	RD2966	86.1	87.0	87.5	80.8	87.3	87.9	**86.1**
7	RD2967	85.7	85.4	87.9	80.4	86.9	85.8	**85.3**
8	RD2968	86.5	86.8	82.8	80.5	86.6	87.0	**85.0**
9	DWRB73 (c)	89.9	89.7	88.6	89.8	88.3	80.1	**87.7**
10	DWRB91 (c)	86.6	89.2	85.2	82.9	87.7	86.7	**86.4**
11	DWRUB64 (c)*	86.6	68.8	86.4	81.0	83.9	84.4	**81.8**
	Mean	88.9	89.3	83.2	82.1	84.6	87.8	**86.0**

*= 6 row barley

Table 3.10 : Malt friability (%) of IVT (LS-MB) entries from different locations

S. No.	Genotype	Karnal	Hisar	Bathinda	Durgapura	Ludhiana	Pantnagar	Mean
1	DWRB160	73.3	54.9	79.3	70.1	44.5	87.6	**68.3**
2	DWRB161	87.1	83.9	69.8	85.9	70.3	49.3	**74.4**
3	DWRB163	89.1	86.5	71.4	72.5	55.4	69.1	**74.0**
4	DWRB164	87.0	74.5	81.1	85.4	31.4	73.6	**72.2**
5	DWRB170	87.5	70.4	80.7	74.7	47.6	63.9	**70.8**
6	RD2966	75.5	77.6	81.5	84.1	50.6	60.8	**71.7**
7	RD2967	80.0	63.3	77.9	87.6	58.1	60.8	**71.3**
8	RD2968	68.4	70.7	79.7	81.4	42.0	65.8	**68.0**
9	DWRB73 (c)	44.8	39.5	57.0	28.5	64.0	44.9	**46.5**
10	DWRB91 (c)	83.9	70.1	83.1	67.0	36.3	63.7	**67.3**
11	DWRUB64 (c)*	75.9	73.1	87.4	82.3	78.0	62.8	**76.6**
	Mean	**77.5**	**69.5**	**77.2**	**74.5**	**52.6**	**63.8**	

*= 6 row barley

Table 3.11 : Hot water extract (% fgdb) of IVT (LS-MB) entries from different locations

S. No.	Genotype	Karnal	Hisar	Bathinda	Durgapura	Ludhiana	Pantnagar	Mean
1	DWRB160	81.0	74.0	80.6	76.5	77.7	83.9	**78.9**
2	DWRB161	82.7	75.7	80.5	74.0	80.7	83.1	**79.4**
3	DWRB163	82.4	80.2	79.5	78.9	82.5	81.4	**80.8**
4	DWRB164	84.8	78.6	81.7	82.4	78.8	84.7	**81.8**
5	DWRB170	81.3	76.2	77.5	79.7	78.1	82.7	**79.3**
6	RD2966	83.4	78.1	79.4	81.0	79.8	81.1	**80.5**
7	RD2967	81.8	74.1	75.7	76.9	81.4	83.6	**78.9**
8	RD2968	79.3	74.0	78.2	76.5	74.6	82.6	**77.5**
9	DWRB73 (c)	78.9	75.0	79.2	70.9	78.0	82.5	**77.4**
10	DWRB91 (c)	82.6	72.7	82.6	75.3	73.9	84.7	**78.7**
11	DWRUB64 (c)*	81.5	77.0	82.2	73.2	79.5	83.2	**79.4**
	Mean	**81.8**	**76.0**	**79.7**	**76.8**	**78.6**	**83.0**	

*= 6 row barley

Table 3.12 : Wort filtration rate (ml/hr) of IVT (LS-MB) entries from different locations

S. No.	Genotype	Karnal	Hisar	Bathinda	Durgapura	Ludhiana	Pantnagar	Mean
1	DWRB160	270	210	170	175	270	290	**230.8**
2	DWRB161	265	305	290	190	270	265	**264.2**
3	DWRB163	260	280	280	120	300	235	**245.8**
4	DWRB164	265	315	230	170	235	200	**235.8**
5	DWRB170	260	290	205	180	300	225	**243.3**
6	RD2966	245	290	200	305	290	165	**249.2**
7	RD2967	280	280	180	135	290	180	**224.2**
8	RD2968	210	280	260	140	310	215	**235.8**
9	DWRB73 (c)	245	255	240	120	235	300	**232.5**
10	DWRB91 (c)	290	215	235	130	305	180	**225.8**
11	DWRUB64 (c)*	220	220	200	170	175	210	**199.2**
	Mean	**255.5**	**267.3**	**226.4**	**166.8**	**270.9**	**224.1**	

*= 6 row barley

Table 3.13: Wort colour (EBC units) of IVT (LS-MB) entries from different locations

S. No.	Genotype	Karnal	Hisar	Bathinda	Durgapura	Ludhiana	Pantnagar	Mean
1	DWRB160	2.0	2.0	2.5	2.5	2.0	2.0	2.2
2	DWRB161	2.0	2.0	2.0	2.0	2.0	2.0	2.0
3	DWRB163	2.0	2.5	2.0	2.0	2.0	2.0	2.1
4	DWRB164	2.0	2.0	2.0	2.0	2.0	2.0	2.0
5	DWRB170	2.0	2.0	2.0	2.0	2.0	2.5	2.1
6	RD2966	2.0	2.0	2.5	2.5	3.0	2.0	2.3
7	RD2967	2.0	2.0	2.0	2.0	4.0	2.0	2.3
8	RD2968	2.0	2.5	2.0	2.0	2.0	2.0	2.1
9	DWRB73 (c)	2.0	2.0	2.5	2.0	2.0	2.0	2.1
10	DWRB91 (c)	2.0	2.0	2.0	2.0	2.0	2.5	2.1
11	DWRUB64 (c)*	2.0	2.0	2.5	2.5	4.0	2.0	2.5
	Mean	**2.0**	**2.1**	**2.2**	**2.1**	**2.5**	**2.1**	

*= 6 row barley

Table 3.14 : Sachharification rate (minutes) of IVT (LS-MB) entries from different locations

S. No.	Genotype	Karnal	Hisar	Bathinda	Durgapura	Ludhiana	Pantnagar	Mean
1	DWRB160	5.0	5.0	5.0	5.0	5.0	5.0	5.0
2	DWRB161	5.0	5.0	5.0	5.0	10.0	5.0	5.8
3	DWRB163	5.0	5.0	10.0	5.0	5.0	5.0	5.8
4	DWRB164	5.0	10.0	5.0	5.0	5.0	5.0	5.8
5	DWRB170	5.0	5.0	5.0	5.0	5.0	10.0	5.8
6	RD2966	5.0	5.0	5.0	5.0	5.0	5.0	5.0
7	RD2967	5.0	5.0	5.0	5.0	5.0	5.0	5.0
8	RD2968	5.0	5.0	5.0	5.0	5.0	5.0	5.0
9	DWRB73 (c)	10.0	5.0	10.0	10.0	10.0	10.0	9.2
10	DWRB91 (c)	10.0	5.0	5.0	10.0	5.0	5.0	6.7
11	DWRUB64 (c)*	5.0	5.0	5.0	5.0	5.0	5.0	5.0
	Mean	**5.9**	**5.5**	**5.9**	**5.9**	**5.9**	**5.9**	

*= 6 row barley

Table 3.15 : Diastatic power (^{0}L) of IVT (LS-MB) entries from different locations

S. No.	Genotype	Karnal	Hisar	Bathinda	Durgapura	Ludhiana	Pantnagar	Mean
1	DWRB160	97.6	102.6	88.9	97.6	97.6	105.3	**98.2**
2	DWRB161	95.2	108.1	88.9	95.2	102.6	108.1	**99.7**
3	DWRB163	105.3	87.0	111.1	100.0	111.1	85.1	**99.9**
4	DWRB164	90.9	95.2	97.6	102.6	102.6	102.6	**98.6**
5	DWRB170	93.0	93.0	90.9	93.0	111.1	81.6	**93.8**
6	RD2966	108.1	100.0	100.0	108.1	111.1	105.3	**105.4**
7	RD2967	88.9	105.3	100.0	97.6	88.9	108.1	**98.1**
8	RD2968	95.2	102.6	102.6	105.3	97.6	108.1	**101.9**
9	DWRB73 (c)	105.3	108.1	95.2	105.3	97.6	93.0	**100.7**
10	DWRB91 (c)	100.0	105.3	111.1	111.1	111.1	100.0	**106.4**
11	DWRUB64 (c)*	97.6	108.1	97.6	95.2	97.6	88.9	**97.5**
	Mean	**97.9**	**101.4**	**98.5**	**101.0**	**102.6**	**98.7**	

*= 6 row barley

Table 3.16 : Wort pH of IVT (LS-MB) entries from different locations

S. No.	Genotype	Karnal	Hisar	Bathinda	Durgapura	Ludhiana	Pantnagar	Mean
1	DWRB160	6.4	5.8	6.4	6.6	6.2	6.2	**6.2**
2	DWRB161	5.9	6.5	6.1	6.0	5.9	6.0	**6.1**
3	DWRB163	6.4	6.1	6.4	6.0	6.0	5.7	**6.1**
4	DWRB164	6.5	6.5	6.1	5.8	6.1	6.0	**6.2**
5	DWRB170	6.4	5.9	6.0	6.1	6.1	6.0	**6.1**
6	RD2966	6.8	5.9	6.4	6.2	6.2	6.2	**6.3**
7	RD2967	6.4	5.6	6.3	6.5	6.0	6.0	**6.1**
8	RD2968	6.4	6.0	6.6	5.7	6.1	6.0	**6.1**
9	DWRB73 (c)	6.8	5.9	6.2	5.9	6.1	6.2	**6.2**
10	DWRB91 (c)	6.9	5.9	6.5	5.9	6.2	5.9	**6.2**
11	DWRUB64 (c)*	6.5	6.0	6.2	6.1	6.0	5.8	**6.1**
	Mean	**6.5**	**6.0**	**6.3**	**6.1**	**6.1**	**6.0**	

*= 6 row barley

Table 3.17 : Kolbach Index# (KI) of IVT (LS-MB) entries from different locations

S. No.	Genotype	Karnal	Hisar	Bathinda	Durgapura	Ludhiana	Pantnagar	Mean
1	DWRB160	38.1	35.8	39.3	41.1	41.6	38.2	**39.0**
2	DWRB161	42.6	40.2	42.0	40.6	38.1	41.5	**40.8**
3	DWRB163	38.5	37.7	38.0	38.2	41.2	43.3	**39.5**
4	DWRB164	37.9	36.4	43.0	34.4	41.0	40.4	**38.9**
5	DWRB170	38.0	37.3	39.7	36.3	36.5	40.6	**38.1**
6	RD2966	37.8	37.8	36.9	38.2	39.8	41.8	**38.7**
7	RD2967	38.1	39.3	39.5	38.3	40.0	40.0	**39.2**
8	RD2968	40.0	38.5	39.8	39.5	41.3	43.3	**40.4**
9	DWRB73 (c)	41.3	38.1	38.2	38.5	43.6	42.9	**40.4**
10	DWRB91 (c)	41.7	37.8	45.0	40.5	38.7	43.8	**41.2**
11	DWRUB64 (c)*	40.2	38.5	38.7	40.0	39.3	44.4	**40.2**
	Mean	**39.5**	**37.9**	**40.0**	**38.7**	**40.1**	**41.8**	

*= 6 row barley #Predicted values through NIR

BARLEY QUALITY SCREENING NURSERY

This year (2016-17 season) genotypes of INBON (2014-15) and INBYT-HI (2014-15) tested last year were again grown for verification of traits at Karnal, Ludhiana, Durgapura and Pantnagar, with respect to grain physical quality traits. The traits analysed were hectoloitre weight (kg/hl), grain plumpness, thousand grain weight (g) and protein content (% dry weight). In case of INBON (2014-15) the genotype 68,71 and 43 were found promising taking thousand grain weight and bold grain percentage in consideration. In case of INBYT-HI (2014-15), two genotypes E 18 and E 8 were found promising taking into consideration the bold grain percentage.

Table 1: Grain quality of BQSN genotypes

A. Test weight (kg/hl)

S.No.	Entry No. *INBON (2014-15)*	Durgapura	Karnal	Ludhiana	Pantnagar	Mean
1	3	76.2	77.5	74.0	71.9	**74.9**
2	4	76.9	78.0	74.6	74.1	**75.9**
3	5	76.1	78.5	75.1	75.3	**76.2**
4	6	76.2	77.0	75.7	74.6	**75.9**
5	8	76.7	77.4	74.5	75.2	**75.9**
6	11	76.9	77.5	75.7	75.9	**76.5**
7	12	76.6	78.7	75.1	76.0	**76.6**
8	13	77.1	78.4	75.4	74.5	**76.3**
9	14	76.2	78.0	74.3	75.0	**75.9**
10	24	76.7	78.6	72.1	76.3	**75.9**
11	28	76.5	78.1	70.4	73.7	**74.7**
12	29	76.5	75.1	70.3	69.9	**73.0**
13	36	76.5	71.3	66.3	72.1	**71.5**
14	39	75.2	78.4	69.2	72.5	**73.8**
15	43	77.2	79.0	75.2	75.9	**76.8**
16	47	76.2	76.1	69.9	66.3	**72.1**
17	49	78.0	78.3	74.9	76.7	**77.0**
18	68	78.7	78.2	76.4	76.9	**77.5**
19	71	78.2	75.9	71.2	76.1	**75.3**
20	ATAHULAPA (c)	75.7	75.8	71.0	70.5	**73.2**
21	BHS 352 (c)	76.2	77.5	72.5	73.4	**74.9**
22	Geetanjali (c)	78.4	79.1	75.7	79.6	**78.2**
23	Karan 16 (c)	77.5	78.6	67.6	68.6	**73.1**
24	NDB 943 (c)	78.8	79.7	71.7	76.1	**76.6**
	Mean	**76.9**	**77.5**	**72.9**	**74.0**	

S.No.	Entry No. *INBYT-HI-15*	Durgapura	Karnal	Ludhiana	Pantnagar	Mean
1	E 8	77.0	74.0	71.3	74.9	**74.3**
2	E 11	76.7	74.5	69.6	68.8	**72.4**
3	E 13	77.0	74.6	72.9	74.1	**74.7**
4	E 14	76.7	70.7	67.6	70.8	**71.4**
5	E 18	78.1	76.7	69.1	66.8	**72.7**
6	E 22	NA	76.1	NA	67.2	**71.6**
7	ATAHULAPA (c)	75.9	76.5	62.4	70.2	**71.3**
8	BHS 352 (c)	76.7	76.9	71.7	70.9	**74.1**
9	DOLMA (c)	77.1	76.2	NA	75.1	**76.1**
10	Geetanjali (c)	78.9	79.8	72.4	75.8	**76.7**
11	Karan 16 (c)	77.2	76.5	68.0	74.4	**74.0**
12	NDB 943 (c)	78.9	78.4	71.1	72.8	**75.3**
	Mean	**77.3**	**75.9**	**69.6**	**71.8**	

*

B. Thousand grain weight (kg)

S.No.	Entry No. *INBON (2014-15)*	Durgapura	Karnal	Ludhiana	Pantnagar	Mean
1	3	44.0	47.7	36.6	34.2	**40.6**
2	4	44.0	47.2	41.2	36.3	**42.2**
3	5	43.0	47.2	39.6	40.0	**42.5**
4	6	40.8	46.1	39.2	39.2	**41.3**
5	8	47.9	45.2	38.2	38.2	**42.4**
6	11	40.5	46.8	38.0	42.3	**41.9**
7	12	39.9	47.2	37.6	41.0	**41.4**
8	13	41.9	46.0	35.3	44.8	**42.0**
9	14	40.7	47.2	37.0	40.8	**41.5**
10	24	36.0	46.9	38.1	42.6	**40.9**
11	28	36.9	43.2	40.6	40.6	**40.3**
12	29	40.1	40.2	37.7	36.1	**38.5**
13	36	42.5	46.5	37.3	42.9	**42.3**
14	39	35.6	46.1	40.3	43.6	**41.4**
15	43	44.7	49.7	41.4	47.5	**45.8**
16	47	47.8	54.6	43.6	51.0	**49.3**
17	49	43.2	47.3	39.9	46.4	**44.2**
18	68	51.6	50.8	42.8	48.9	**48.5**
19	71	47.8	47.0	42.1	46.3	**45.8**
20	ATAHULAPA (c)	46.7	49.7	39.6	46.8	**45.7**
21	BHS 352 (c)	35.1	39.2	31.4	32.9	**34.7**
22	Geetanjali (c)	34.7	38.2	31.4	36.6	**35.2**
23	Karan 16 (c)	35.4	40.4	30.6	34.5	**35.2**
24	NDB 943 (c)	34.5	38.7	33.4	37.6	**36.1**
	Mean	**41.5**	**45.8**	**38.0**	**41.3**	

S.No.	Entry No. *INBYT-HI-15*	Durgapura	Karnal	Ludhiana	Pantnagar	Mean
1	E 8	48.7	49.7	40.7	43.5	**45.7**
2	E 11	35.9	39.1	31.1	30.5	**34.1**
3	E 13	39.2	45.5	35.9	38.8	**39.9**
4	E 14	34.6	32.8	33.0	29.9	**32.6**
5	E 18	47.2	50.6	38.1	47.0	**45.7**
6	E 22	36.3	32.9	34.7	33.7	**34.4**
7	ATAHULAPA (c)	47.3	48.6	39.2	48.4	**45.9**
8	BHS 352 (c)	36.4	40.9	32.5	35.0	**36.2**
9	DOLMA (c)	30.3	34.4	28.7	30.9	**31.1**
10	Geetanjali (c)	37.0	38.3	34.7	33.5	**35.9**
11	Karan 16 (c)	36.3	38.7	31.4	35.6	**35.5**
12	NDB 943 (c)	35.4	38.4	30.8	36.6	**35.3**
	Mean	**38.7**	**40.8**	**34.2**	**37.0**	

C. Bold grains (%)

S.No.	Entry No. *INBON (2014-15)*	Durgapura	Karnal	Ludhiana	Pantnagar	Mean
1	3	57.1	64.2	54.6	17.9	**48.4**
2	4	52.6	65.1	60.5	45.3	**55.9**
3	5	56.3	63.3	61.7	44.0	**56.3**
4	6	51.7	62.6	57.2	41.3	**53.2**
5	8	55.5	61.1	55.9	41.8	**53.6**
6	11	54.5	67.7	56.8	53.0	**58.0**
7	12	56.6	64.8	55.4	43.6	**55.1**
8	13	57.0	64.9	59.4	58.8	**60.0**
9	14	51.9	67.2	58.0	41.7	**54.7**
10	24	43.9	81.4	69.7	67.7	**65.7**
11	28	40.3	60.1	66.4	57.6	**56.1**
12	29	42.6	48.5	40.2	29.9	**40.3**
13	36	53.2	68.8	50.2	48.6	**55.2**
14	39	16.9	71.7	55.2	59.6	**50.9**
15	43	61.1	84.0	69.6	75.5	**72.5**
16	47	48.2	66.8	66.9	62.6	**61.1**
17	49	44.1	74.9	49.2	60.8	**57.2**
18	68	91.0	92.0	86.8	88.8	**89.6**
19	71	79.8	69.3	71.9	72.2	**73.3**
20	ATAHULAPA (c)	64.0	69.0	45.4	52.2	**57.7**
21	BHS 352 (c)	14.7	27.2	13.8	8.6	**16.1**
22	Geetanjali (c)	28.6	57.6	40.0	37.7	**41.0**
23	Karan 16 (c)	30.7	50.4	39.4	37.4	**39.5**
24	NDB 943 (c)	27.1	50.9	39.1	42.0	**39.8**
		49.1	**64.7**	**55.1**	**49.5**	

S.No.	Entry No. *INBYT-HI-15*	Durgapura	Karnal	Ludhiana	Pantnagar	Mean
1	E 8	67.2	50.8	50.0	60.9	**57.2**
2	E 11	17.6	37.2	25.1	22.5	**25.6**
3	E 13	45.4	62.6	58.7	50.9	**54.4**
4	E 14	33.0	28.6	50.6	23.3	**33.9**
5	E 18	60.0	71.5	64.9	81.5	**69.5**
6	E 22	NA	36.7	NA	44.9	**40.8**
7	ATAHULAPA (c)	57.2	65.9	44.7	60.5	**57.0**
8	BHS 352 (c)	13.5	29.3	17.0	7.9	**17.0**
9	DOLMA (c)	2.7	10.7	NA	7.2	**6.9**
10	Geetanjali (c)	37.4	57.6	30.0	30.5	**38.9**
11	Karan 16 (c)	25.0	30.8	36.1	36.3	**32.1**
12	NDB 943 (c)	30.2	52.0	39.1	46.5	**41.9**
		35.4	**44.5**	**41.6**	**39.4**	

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D. Thin grains (%)

S.No.	Entry No. INBON (2014-15)	Durgapura	Karnal	Ludhiana	Pantnagar	Mean
1	3	8.1	5.6	6.6	7.1	**6.9**
2	4	5.9	6.2	6.2	9.9	**7.1**
3	5	6.8	6.8	5.3	9.8	**7.2**
4	6	9.3	6.3	5.1	12.2	**8.2**
5	8	9.2	6.7	6.2	9.6	**7.9**
6	11	9.3	5.5	3.6	7.7	**6.5**
7	12	9.0	5.8	10.9	8.3	**8.5**
8	13	8.9	6.7	7.3	6.5	**7.3**
9	14	10.5	4.9	5.1	8.8	**7.3**
10	24	11.5	3.4	5.0	7.1	**6.8**
11	28	16.0	7.6	5.4	9.9	**9.7**
12	29	11.6	10.2	13.0	17.2	**13.0**
13	36	12.9	4.3	9.9	8.6	**9.0**
14	39	35.5	3.0	11.0	8.1	**14.4**
15	43	7.9	3.5	8.0	3.5	**5.7**
16	47	10.3	4.2	6.4	8.7	**7.4**
17	49	8.5	2.3	7.1	7.2	**6.3**
18	68	1.1	1.5	3.0	2.0	**1.9**
19	71	2.5	4.5	5.3	3.8	**4.0**
20	ATAHULAPA (c)	4.2	3.6	8.5	7.5	**5.9**
21	BHS 352 (c)	43.8	24.8	47.3	51.7	**41.9**
22	Geetanjali (c)	21.8	5.2	8.7	12.3	**12.0**
23	Karan 16 (c)	19.2	10.5	18.5	16.0	**16.1**
24	NDB 943 (c)	16.9	8.3	9.4	11.4	**11.5**
	Mean	**12.5**	**6.3**	**9.3**	**10.6**	

S.No.	Entry No. *INBYT-HI-15*	Durgapura	Karnal	Ludhiana	Pantnagar	Mean
1	E 8	11.8	4.9	6.9	6.2	**7.4**
2	E 11	23.3	18.6	22.2	34.0	**24.5**
3	E 13	13.6	12.8	7.2	16.0	**12.4**
4	E 14	20.2	21.6	13.7	31.3	**21.7**
5	E 18	11.2	1.9	5.1	2.9	**5.3**
6	E 22	NA	21.2	NA	13.1	**17.2**
7	ATAHULAPA (c)	11.0	4.8	4.9	6.1	**6.7**
8	BHS 352 (c)	32.2	22.6	35.3	51.3	**35.4**
9	DOLMA (c)	42.2	43.0	NA	49.0	**44.7**
10	Geetanjali (c)	14.8	5.0	20.7	21.1	**15.4**
11	Karan 16 (c)	24.4	20.3	18.0	20.2	**20.7**
12	NDB 943 (c)	15.6	7.8	8.1	10.4	**10.5**
	Mean	**20.0**	**15.4**	**14.2**	**21.8**	

E. Protein (% dry weight basis)

S.No.	Entry No. *INBON (2014-15)*	Durgapura	Karnal	Ludhiana	Pantnagar	Mean
1	3	14.5	11.5	12.9	14.6	**13.4**
2	4	13.6	12.0	13.8	13.2	**13.2**
3	5	14.0	11.5	13.9	13.3	**13.2**
4	6	14.1	11.9	14.0	12.6	**13.2**
5	8	12.9	11.3	13.3	13.6	**12.8**
6	11	13.1	11.1	13.1	13.3	**12.6**
7	12	13.1	11.5	12.6	12.8	**12.5**
8	13	13.5	11.1	13.1	13.2	**12.7**
9	14	13.3	10.8	12.2	13.0	**12.3**
10	24	11.9	10.8	13.3	11.5	**11.9**
11	28	11.8	9.2	11.2	9.8	**10.5**
12	29	15.6	11.3	13.1	10.8	**12.7**
13	36	15.4	10.7	12.4	10.2	**12.2**
14	39	14.3	10.9	12.3	10.2	**11.9**
15	43	14.4	10.2	11.7	11.1	**11.9**
16	47	13.3	11.1	12.2	11.4	**12.0**
17	49	14.1	12.0	11.8	13.3	**12.8**
18	68	13.7	12.7	13.3	12.6	**13.1**
19	71	12.8	11.3	12.4	10.7	**11.8**
20	ATAHULAPA (c)	13.2	11.4	12.9	10.9	**12.1**
21	BHS 352 (c)	11.5	10.1	12.1	11.0	**11.2**
22	Geetanjali (c)	13.4	9.9	12.1	10.3	**11.4**
23	Karan 16 (c)	12.4	9.4	9.9	9.9	**10.4**
24	NDB 943 (c)	13.1	11.1	12.0	11.4	**11.9**
	Mean	**13.5**	**11.0**	**12.6**	**11.9**	

S.No.	Entry No. *INBYT-HI-15*	Durgapura	Karnal	Ludhiana	Pantnagar	Mean
1	E 8	12.4	10.5	10.6	12.3	**11.5**
2	E 11	11.1	10.1	11.3	10.5	**10.7**
3	E 13	11.0	11.7	11.1	11.7	**11.4**
4	E 14	10.4	9.7	11.2	10.3	**10.4**
5	E 18	12.1	10.6	10.6	12.1	**11.4**
6	E 22	11.2	11.4	11.0	12.5	**11.5**
7	ATAHULAPA (c)	13.2	10.7	11.9	11.7	**11.9**
8	BHS 352 (c)	11.5	10.3	11.1	10.4	**10.8**
9	DOLMA (c)	11.1	10.0	11.0	10.1	**10.6**
10	Geetanjali (c)	11.7	9.4	12.7	12.8	**11.6**
11	Karan 16 (c)	11.8	9.6	10.0	10.9	**10.6**
12	NDB 943 (c)	12.4	10.7	11.1	11.7	**11.5**
	Mean	**11.7**	**10.4**	**11.1**	**11.4**	

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FEED BARLEY QUALITY EVALUATION

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

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

Trial	Zone	Locations	Total No. of Samples
AVT (RF)	NHZ	Almora, Bajaura, Malan, Shimla	84
AVT (IR)	NEPZ	Bhagalpur, Faizabad, Varansi, Kanpur, Rewa	35
AVT (IR)	Central Zone	Kota, Udaipur	8
AVT (RF)	NEPZ	Bhagalpur, Faizabad, Kanpur, Saini Farm, Rewa	20
IVT (IR-FB)	NWPZ/NEPZ/CZ	Durgapura, Ludhiana, Hisar, Pant Nagar, Bhagalpur, Faizabad, Kanpur, Rewa, Varansi, Udaipur	280
IVT (Rainfed)	NEPZ	Bhagalpur, Faizabad, Varansi, Kanpur, Kanpur, Saini, Rewa	102
AVT (SAL/ALK)	NWPZ/NEPZ	Hisar, Bawal, Faizabad-1, Faizabad-2, Kanpur (Dalipnagar)	76
IVT (DPB)	NWPZ/NEPZ/CEN	Durgapura, Hisar, Ludhiana, Udaipur, Anand, Kota, Faizabad, Kanpur, Rewa, Varansi	150
AVT (DPB)	NHZ	Almora, Bajaura, Shimla	51
		Total	**816**

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

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

No.	Trial	Zone	Test weight	Thousand grain weight	Bold grain (%)	Thin grain (%)
1	AVT (RF)	NHZ	BHS 352 ©	UPB1063	UPB1063	UPB1063
2	AVT (IR)	NEPZ	RD 2921	Jyoti ©	HUB 113 ©	RD 2921
3	AVT (IR)	Central Zone	DWRB 137	DWRB 137	DWRB 137	DWRB 137
4	IVT (IR-FB)	NWPZ/NEPZ/CZ	KARAN16 (c)	BH902 (c)	RD2948	RD2948
5	AVT (RF)	NEPZ	K 560 ©	JB 328	K 603 (c)	Lakhan ©
6	IVT (RF)	NEPZ	DWRB 166	RD 2961	RD 2961	RD 2961
7	AVT (SAL/ALK)	NWPZ/NEPZ	DWRB165	BH 1017	RD 2957	RD 2957
8	IVT (DPB)	NWPZ/NEPZ/CEN	KB 1530	RD 2952	RD 2954	RD 2952
9	AVT (GB)	NHZ	BHS 352 ©	UPB 1063	UPB 1063	UPB 1063
10	AVT (DPB)	NHZ	HBL276 (c)	BHS447	BHS454	BHS454

Annexure -1

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

S.No.	Genotype	Almora	Bajaura	Malan	Shimla	Mean
1	BHS457	54.0	50.6	55.5	62.1	**55.5**
2	BHS458	60.2	59.1	57.9	65.6	**60.7**
3	BHS459	59.8	51.4	60.2	65.1	**59.1**
4	BHS460	62.7	60.4	60.3	65.9	**62.3**
5	UPB1061	55.8	54.0	54.5	61.0	**56.3**
6	UPB1062	69.3	49.5	59.9	67.6	**61.6**
7	UPB1063	58.8	55.2	57.5	61.0	**58.1**
8	VLB146	63.1	55.9	57.0	65.2	**60.3**
9	VLB149	64.6	59.6	63.2	71.3	**64.7**
10	VLB150	65.8	63.4	65.1	70.3	**66.2**
11	VLB151	59.3	58.6	61.1	64.4	**60.9**
12	VLB152	60.1	52.1	56.5	63.7	**58.1**
13	VLB154	51.1	47.9	50.4	58.4	**51.9**
14	HBL764	70.7	55.7	67.1	76.8	**67.6**
15	HBL765	7.6	64.5	63.4	75.6	**52.8**
16	HBL778	53.9	54.4	57.6	62.0	**57.0**
17	HBL780	59.2	56.4	61.1	66.0	**60.7**
18	HBL113 (c)	63.7	61.1	59.5	69.5	**63.5**
19	BHS352 (c)	72.3	71.8	70.6	77.2	**73.0**
20	VLB118 (c)	55.2	52.1	53.7	58.4	**54.8**
21	BHS400 (c)	57.3	54.8	60.6	60.6	**58.3**
	Mean	**58.3**	**56.6**	**59.6**	**66.1**	

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

S.No.	Genotype	Almora	Bajaura	Malan	Shimla	Mean
1	BHS457	35.6	39.2	36.0	38.3	**37.3**
2	BHS458	44.7	44.7	40.3	43.2	**43.3**
3	BHS459	39.1	41.5	34.2	40.6	**38.8**
4	BHS460	40.8	42.1	38.2	47.2	**42.1**
5	UPB1061	38.2	40.6	35.2	42.1	**39.0**
6	UPB1062	35.7	35.1	34.6	36.0	**35.4**
7	UPB1063	48.3	53.5	45.1	53.9	**50.2**
8	VLB146	25.8	32.3	29.2	32.8	**30.0**
9	VLB149	43.0	39.7	40.0	43.3	**41.5**
10	VLB150	41.9	40.2	37.1	42.9	**40.5**
11	VLB151	51.3	45.9	45.2	45.1	**46.9**
12	VLB152	40.2	31.0	33.2	39.7	**36.0**
13	VLB154	37.0	38.4	32.7	42.3	**37.6**
14	HBL764	37.0	35.9	28.8	40.7	**35.6**
15	HBL765	39.6	40.3	35.6	41.8	**39.3**
16	HBL778	36.9	44.4	38.2	42.1	**40.4**
17	HBL780	41.4	47.6	40.9	48.5	**44.6**
18	HBL113 (c)	35.7	37.5	31.2	40.0	**36.1**
19	BHS352 (c)	32.5	39.7	47.3	37.9	**39.3**
20	VLB118 (c)	42.3	43.9	57.4	46.7	**47.6**
21	BHS400 (c)	39.9	42.9	55.6	51.4	**47.4**
	Mean	**39.4**	**40.8**	**38.9**	**42.7**	

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

S.No.	Genotype	Almora	Bajaura	Malan	Shimla	Mean
1	BHS457	56.4	88.4	52.7	70.3	**66.9**
2	BHS458	84.7	92.3	73.4	83.3	**83.4**
3	BHS459	81.1	88.7	59.9	83.4	**78.2**
4	BHS460	61.4	61.0	44.5	87.9	**63.7**
5	UPB1061	62.2	84.4	56.6	78.0	**70.3**
6	UPB1062	49.1	66.4	62.8	72.0	**62.6**
7	UPB1063	79.6	97.0	80.3	91.0	**87.0**
8	VLB146	34.0	62.2	40.9	56.6	**48.4**
9	VLB149	77.8	91.1	81.3	92.7	**85.7**
10	VLB150	79.3	87.5	64.6	81.6	**78.3**
11	VLB151	88.1	96.2	88.6	41.5	**78.6**
12	VLB152	68.5	34.0	29.4	48.7	**45.1**
13	VLB154	45.6	75.3	39.5	64.8	**56.3**
14	HBL764	42.5	57.0	36.4	72.4	**52.1**
15	HBL765	49.5	66.5	50.6	66.2	**58.2**
16	HBL778	57.9	81.1	78.3	84.0	**75.3**
17	HBL780	61.4	95.4	70.9	92.3	**80.0**
18	HBL113 (c)	44.9	77.7	46.4	81.2	**62.5**
19	BHS352 (c)	7.0	29.8	4.0	27.6	**17.1**
20	VLB118 (c)	60.7	76.9	42.9	77.7	**64.5**
21	BHS400 (c)	60.1	91.2	49.1	75.7	**69.0**
	Mean	**59.6**	**76.2**	**54.9**	**72.8**	

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

S.No.	Genotype	Almora	Bajaura	Malan	Shimla	Mean
1	BHS457	14.0	3.3	11.9	5.1	**8.5**
2	BHS458	3.0	1.5	6.3	4.4	**3.8**
3	BHS459	2.8	2.2	7.1	3.5	**3.9**
4	BHS460	7.2	5.2	13.9	2.3	**7.2**
5	UPB1061	9.7	2.4	11.7	4.7	**7.1**
6	UPB1062	11.8	6.1	8.8	5.9	**8.2**
7	UPB1063	2.9	0.6	0.7	0.8	**1.3**
8	VLB146	36.3	14.2	28.9	19.0	**24.6**
9	VLB149	5.7	3.0	2.0	1.6	**3.1**
10	VLB150	2.7	1.9	6.3	2.1	**3.3**
11	VLB151	3.6	1.1	1.7	2.0	**2.1**
12	VLB152	8.2	19.0	26.3	9.7	**15.8**
13	VLB154	18.0	5.5	23.2	5.5	**13.0**
14	HBL764	14.3	10.7	22.6	7.1	**13.7**
15	HBL765	9.2	4.1	13.7	6.1	**8.3**
16	HBL778	12.0	3.1	3.1	3.3	**5.4**
17	HBL780	6.8	1.0	5.5	2.6	**4.0**
18	HBL113 (c)	11.8	4.1	13.6	3.3	**8.2**
19	BHS352 (c)	53.8	23.6	68.2	31.8	**44.3**
20	VLB118 (c)	10.9	5.2	20.1	6.9	**10.8**
21	BHS400 (c)	9.4	1.6	10.6	7.2	**7.2**
	Mean	**12.1**	**5.7**	**14.6**	**6.4**	

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

S.No.	Genotype	Almora	Bajaura	Malan	Shimla	Mean
1	BHS457	17.3	11.2	11.9	11.3	**12.9**
2	BHS458	17.7	9.5	12.1	11.4	**12.7**
3	BHS459	16.0	10.4	10.9	11.4	**12.2**
4	BHS460	17.2	8.4	12.2	10.6	**12.1**
5	UPB1061	14.6	12.5	10.9	10.3	**12.1**
6	UPB1062	19.2	11.0	14.4	12.7	**14.3**
7	UPB1063	17.1	12.6	14.4	12.8	**14.2**
8	VLB146	15.7	9.1	12.6	10.0	**11.9**
9	VLB149	15.9	8.3	10.4	9.7	**11.1**
10	VLB150	16.1	10.3	12.4	11.3	**12.5**
11	VLB151	18.9	10.0	13.7	12.1	**13.7**
12	VLB152	16.3	11.0	11.9	10.3	**12.4**
13	VLB154	15.4	9.5	10.3	9.4	**11.2**
14	HBL764	17.2	9.9	13.7	11.2	**13.0**
15	HBL765	17.2	9.5	12.2	11.2	**12.5**
16	HBL778	17.1	8.6	13.6	13.3	**13.2**
17	HBL780	18.0	10.5	10.4	11.4	**12.6**
18	HBL113 (c)	17.1	9.5	11.0	10.7	**12.1**
19	BHS352 (c)	18.1	9.0	14.2	10.4	**12.9**
20	VLB118 (c)	16.9	9.6	12.1	12.0	**12.7**
21	BHS400 (c)	15.4	10.4	11.8	11.6	**12.3**
	Mean	**16.9**	**10.0**	**12.2**	**11.2**	

Table 6. Test weight (kg/hl) of entries from AVT (Irrigated)- Feed Barley (North Eastern Plain Zone)

S.No.	Varieties	Rewa	Kanpur	Faizabad	Bhagalpur	Varanasi	Mean
1	DWRB137	56.9	58.9	51.2	50.1	59.5	**55.3**
2	HWB250	59.9	57.9	55.1	50.7	58.7	**56.4**
3	RD2921	60.4	61.6	57.5	48.3	55.4	**56.6**
4	RD2552 (c)	56.6	56.3	53.7	46.1	54.9	**53.5**
5	HUB113 (c)	59.6	61.6	57.0	49.1	54.7	**56.4**
6	JYOTI (c)	58.6	57.1	55.6	50.2	58.2	**55.9**
7	K508 (c)	61.7	60.1	50.2	39.2	59.1	**54.1**
	Mean	**59.1**	**59.1**	**54.3**	**47.7**	**57.2**	

Table 7. Thousand grain weight (g) of entries from AVT (Irrigated)- Feed Barley (NEPZ)

S.No.	Varieties	Rewa	Kanpur	Faizabad	Bhagalpur	Varanasi	Mean
1	DWRB137	33.2	39.7	48.1	33.5	46.8	**40.3**
2	HWB250	33.3	34.6	41.8	38.2	43.0	**38.2**
3	RD2921	35.9	39.2	31.8	39.9	47.6	**38.9**
4	RD2552 (c)	38.0	39.2	38.6	29.3	41.2	**37.2**
5	HUB113 (c)	47.3	44.1	40.1	32.3	35.6	**39.9**
6	JYOTI (c)	38.9	39.1	41.2	38.0	45.9	**40.6**
7	K508 (c)	45.4	35.2	40.2	26.2	35.9	**36.6**
	Mean	**38.8**	**38.7**	**40.2**	**33.9**	**42.3**	

Table 8. Bold grains percentage (>2.5 mm)of entries from AVT (Irrigated)- Feed Barley (NEPZ)

S.No.	Varieties	Rewa	Kanpur	Faizabad	Bhagalpur	Varanasi	Mean
1	DWRB137	26.7	77.4	91.0	68.0	90.6	**70.7**
2	HWB250	42.6	51.5	79.4	61.4	79.8	**63.0**
3	RD2921	45.3	69.4	71.4	65.1	92.2	**68.7**
4	RD2552 (c)	71.8	53.6	82.0	28.0	69.5	**61.0**
5	HUB113 (c)	83.3	87.5	89.6	38.1	66.8	**73.1**
6	JYOTI (c)	52.0	38.7	75.4	32.3	66.0	**52.9**
7	K508 (c)	86.8	62.6	74.0	30.7	64.6	**63.7**
	Mean	**58.3**	**63.0**	**80.4**	**46.2**	**75.6**	

Table 9. Thin grains percentage (< 2.2 mm) of entries from AVT (Irrigated)- Feed Barley (NEPZ)

S.No.	Varieties	Rewa	Kanpur	Faizabad	Bhagalpur	Varanasi	Mean
1	DWRB137	24.7	5.0	2.5	8.9	2.7	**8.7**
2	HWB250	15.2	11.5	5.0	10.7	2.8	**9.1**
3	RD2921	11.3	7.0	6.3	11.5	1.7	**7.5**
4	RD2552 (c)	4.2	16.8	3.7	37.1	7.8	**13.9**
5	HUB113 (c)	3.3	2.3	1.9	28.9	9.3	**9.1**
6	JYOTI (c)	9.8	14.2	5.0	24.4	5.1	**11.7**
7	K508 (c)	0.1	7.8	7.5	29.0	7.1	**10.3**
	Mean	**9.8**	**9.2**	**4.5**	**21.5**	**5.2**	

Table 10. Grain crude protein (percent dry weight basis) of entries from AVT (Irrigated)- Feed Barley (NEPZ)

S.No.	Varieties	Rewa	Kanpur	Faizabad	Bhagalpur	Varanasi	Mean
1	DWRB137	12.1	11.4	9.7	13.6	8.1	**11.0**
2	HWB250	11.0	11.4	8.7	14.6	9.5	**11.0**
3	RD2921	10.8	13.3	10.8	12.8	8.2	**11.2**
4	RD2552 (c)	10.2	9.1	9.6	13.5	8.2	**10.1**
5	HUB113 (c)	11.0	8.1	10.1	12.5	8.4	**10.0**
6	JYOTI (c)	12.9	11.8	9.0	13.7	8.9	**11.3**
7	K508 (c)	10.3	9.4	7.5	11.7	8.4	**9.5**
	Mean	**11.2**	**10.6**	**9.3**	**13.2**	**8.5**	

Table 11. Test weight (kg/hl) of entries from AVT (IRRIGATED) in Central Zone

S.No.	Genotype	Udaipur	Kota	Mean
1	DWRB137	65.0	67.1	**66.0**
2	RD2899	63.6	60.1	**61.9**
3	BH959 (c)	55.9	57.7	**56.8**
4	PL751 (c)	59.6	60.5	**60.0**
5	RD2786 (c)	61.1	62.2	**61.7**
	Mean	**61.0**	**61.5**	

Table 12. Thousand grain weight (g) of entries from AVT (IRRIGATED) in Central Zone)

S.No.	Genotype	Udaipur	Kota	Mean
1	DWRB137	65.0	67.1	**66.0**
2	RD2899	63.6	60.1	**61.9**
3	BH959 (c)	55.9	57.7	**56.8**
4	PL751 (c)	59.6	60.5	**60.0**
5	RD2786 (c)	61.1	62.2	**61.7**
	Mean	**61.0**	**61.5**	

Table 13. Bold grain (%) of entries from AVT (IRRIGATED) in Central Zone

S.No.	Genotype	Udaipur	Kota	Mean
1	DWRB137	65.0	67.1	**66.0**
2	RD2899	63.6	60.1	**61.9**
3	BH959 (c)	55.9	57.7	**56.8**
4	PL751 (c)	59.6	60.5	**60.0**
5	RD2786 (c)	61.1	62.2	**61.7**
	Mean	**61.0**	**61.5**	

Table 14. Thin grain (%) of entries from AVT (IRRIGATED) in Central Zone

S.No.	Genotype	Udaipur	Kota	Mean
1	DWRB137	65.0	67.1	**66.0**
2	RD2899	63.6	60.1	**61.9**
3	BH959 (c)	55.9	57.7	**56.8**
4	PL751 (c)	59.6	60.5	**60.0**
5	RD2786 (c)	61.1	62.2	**61.7**
	Mean	**61.0**	**61.5**	

Table 15 . Grain crude protein (% d wt) of entries from AVT (IRRIGATED) in Central Zone

S.No.	Genotype	Udaipur	Kota	Mean
1	DWRB137	65.0	67.1	**66.0**
2	RD2899	63.6	60.1	**61.9**
3	BH959 (c)	55.9	57.7	**56.8**
4	PL751 (c)	59.6	60.5	**60.0**
5	RD2786 (c)	61.1	62.2	**61.7**
	Mean	**61.0**	**61.5**	

Table 16. Test weight (kg/hl) of entries from AVT (RAINFED) in NEP Zone

S.No.	Varieties	Rewa	Saini	Kanpur	Faizabad	Bhagalpur	Mean
1	JB328	57.1	58.1	62.2	54.5	48.8	**56.1**
2	K 560 (c)	57.7	59.4	61.5	57.8	47.1	**56.7**
3	K 603 (c)	59.3	58.0	61.5	50.8	49.1	**55.7**
4	LAKHAN (c)	60.5	57.5	61.1	54.9	48.1	**56.4**
	Mean	**58.7**	**58.2**	**61.6**	**54.5**	**48.3**	

Table 17. Thousand grain weight (g) of entries from AVT (RAINFED) in NEP Zone

S.No.	Varieties	Rewa	Saini	Kanpur	Faizabad	Bhagalpur	Mean
1	JB328	39.1	40.4	53.2	38.5	33.6	**41.0**
2	K 560 (c)	31.7	44.4	51.8	38.4	35.1	**40.3**
3	K 603 (c)	42.5	42.1	50.0	33.1	33.1	**40.2**
4	LAKHAN (c)	39.0	40.8	50.9	28.4	36.5	**39.1**
	Mean	**38.1**	**41.9**	**51.5**	**34.6**	**34.6**	

Table 18. Bold grain (%) of entries from AVT (RAINFED) in NEP Zone

S.No.	Varieties	Rewa	Saini	Kanpur	Faizabad	Bhagalpur	Mean
1	JB328	20.6	51.3	97.2	58.9	38.9	**53.4**
2	K 560 (c)	39.6	70.0	90.1	61.7	34.3	**59.1**
3	K 603 (c)	63.6	57.0	91.2	56.6	35.4	**60.8**
4	LAKHAN (c)	62.0	82.9	89.6	40.4	25.3	**60.0**
	Mean	**46.4**	**65.3**	**92.0**	**54.4**	**33.5**	

Table 19. Thin grain (%) of entries from AVT (RAINFED) in NEP Zone

S.No.	Varieties	Rewa	Saini	Kanpur	Faizabad	Bhagalpur	Mean
1	JB328	16.7	12.7	1.1	10.4	25.0	**13.2**
2	K 560 (c)	16.2	8.2	1.8	9.8	30.6	**13.3**
3	K 603 (c)	8.1	11.6	1.5	14.4	25.4	**12.2**
4	LAKHAN (c)	10.2	4.2	1.3	13.1	31.3	**12.0**
	Mean	**12.8**	**9.2**	**1.4**	**11.9**	**28.1**	

Table 20. Grain crude protein (% d wt) of entries from AVT (RAINFED) in NEP Zone

S.No.	Varieties	Rewa	Saini	Kanpur	Faizabad	Bhagalpur	Mean
1	JB328	11.1	7.1	10.8	11.4	12.9	**10.7**
2	K 560 (c)	12.1	8.5	11.1	11	12.5	**11.0**
3	K 603 (c)	11	7.4	10.5	11.5	11	**10.3**
4	LAKHAN (c)	12.6	7.9	10.7	10.6	11.7	**10.7**
	Mean	**11.7**	**7.7**	**10.8**	**11.1**	**12.0**	

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

S.No	Genotype	Durgapura	Hisar	Ludhiana	Pantnagar	Mean (NWPZ)	Bhagalpur	Faizabad	Kanpur	Rewa	Varansi	Mean (NEPZ)	Udaipur	Mean (O)
1	**BH1019**	61.1	58.4	53.2	58.9	**57.9**	49.0	52.5	59.6	60.9	53.1	**55.0**	66.1	**59.7**
2	**DWRB167**	58.3	60.5	61.7	59.8	**60.1**	48.9	54.3	56.7	51.0	56.2	**53.4**	51.1	**54.9**
3	**DWRB169**	65.9	64.1	65.5	65.5	**65.3**	49.8	59.6	56.2	61.4	61.6	**57.7**	63.6	**62.2**
4	**HUB252**	66.0	57.5	61.0	57.2	**60.4**	52.6	53.5	57.0	61.0	56.1	**56.0**	57.4	**57.9**
5	**JB346**	66.9	62.9	62.9	62.5	**63.8**	49.4	59.9	61.7	62.3	58.8	**58.4**	62.8	**61.7**
6	**JB347**	62.0	61.1	48.5	59.2	**57.7**	58.2	55.5	59.4	57.5	65.1	**59.1**	59.5	**58.8**
7	**KB1501**	59.8	58.0	53.3	53.8	**56.2**	46.5	51.0	57.6	59.7	50.4	**53.0**	62.3	**57.2**
8	**KB1528**	67.1	62.3	62.5	64.4	**64.1**	50.6	55.2	62.5	63.8	59.9	**58.4**	63.5	**62.0**
9	**KB1531**	70.6	65.8	68.2	66.7	**67.8**	46.3	56.8	64.4	66.6	67.1	**60.2**	67.1	**65.1**
10	**NDB1653**	63.9	59.4	49.9	55.2	**57.1**	46.7	55.1	57.9	62.5	68.8	**58.2**	57.0	**57.4**
11	**PL891**	76.8	69.9	73.8	64.2	**71.2**	46.2	55.5	58.9	66.6	65.9	**58.6**	68.3	**66.0**
12	**PL892**	64.1	60.5	58.2	58.6	**60.3**	53.7	56.3	62.3	60.5	50.5	**56.6**	64.7	**60.6**
13	**PL894**	57.0	57.9	56.9	58.2	**57.5**	50.8	56.2	58.4	58.8	55.0	**55.8**	59.8	**57.7**
14	**PL898**	64.4	57.8	56.4	61.4	**60.0**	49.2	54.4	60.9	58.6	55.9	**55.8**	56.1	**57.3**
15	**RD2947**	63.7	58.8	56.6	59.5	**59.7**	44.3	49.7	59.2	57.3	66.1	**55.3**	62.0	**59.0**
16	**RD2948**	64.8	63.6	62.1	64.6	**63.8**	49.2	56.7	63.5	64.5	60.9	**59.0**	62.5	**61.8**
17	**RD2949**	60.9	58.7	55.5	50.6	**56.4**	39.0	43.1	56.2	56.5	42.9	**47.6**	62.0	**55.3**
18	**RD2950**	75.4	66.7	69.6	65.4	**69.3**	54.6	54.5	64.2	66.8	52.9	**58.6**	67.6	**65.2**
19	**UPB1064**	62.5	60.7	51.1	57.2	**57.9**	46.7	55.0	58.1	61.6	54.3	**55.1**	48.9	**54.0**
20	**UPB1066**	59.7	60.4	59.8	60.3	**60.0**	46.2	56.9	58.1	52.3	55.8	**53.9**	49.8	**54.6**
21	**BH902 (c)**	64.5	61.5	54.6	61.2	**60.5**	49.7	56.9	59.7	61.3	58.5	**57.2**	51.4	**56.3**
22	**BH946 (c)**	63.9	59.7	57.7	58.5	**60.0**	51.2	53.3	60.5	57.8	52.8	**55.1**	54.3	**56.5**
23	**BH959 (c)**	60.4	52.7	50.3	53.9	**54.3**	53.0	49.3	54.5	50.5	48.6	**51.2**	47.7	**51.1**
24	**HUB113 (c)**	65.6	60.1	55.9	58.1	**59.9**	51.1	53.7	60.6	60.7	53.4	**55.9**	63.0	**59.6**
25	**KARAN16 (c)**	74.6	69.3	72.1	58.2	**68.5**	53.6	56.9	67.4	65.4	60.6	**60.8**	69.3	**66.2**
26	**NDB943 (c)**	75.8	72.2	52.5	68.1	**67.1**	48.6	50.1	62.8	58.5	69.3	**57.9**	70.3	**65.1**
27	**RD2552 (c)**	59.6	60.4	55.5	58.9	**58.6**	34.9	55.4	59.0	60.5	55.1	**53.0**	60.9	**57.5**
28	**RD2786 (c)**	64.3	61.5	60.0	60.5	**61.6**	40.8	52.9	59.4	58.2	50.5	**52.4**	62.2	**58.7**
	Mean	**65.0**	**61.5**	**58.8**	**60.0**		**48.6**	**54.3**	**59.9**	**60.1**	**57.4**		**60.4**	

Table 22. Thousand grain weight of entries from IVT (Irrigated Feed Barley) in NWPZ/NEPZ/CZ

S.No	Genotype	Durgapura	Hisar	Ludhiana	Pantnagar	Mean (NWPZ)	Bhagalpur	Faizabad	Kanpur	Rewa	Varansi	Mean (NEPZ)	Udaipur	Mean (O)
1	**BH1019**	39.6	4.9	37.1	46.2	**31.9**	39.0	42.6	41.8	45.7	43.2	**42.5**	36.0	**36.8**
2	**DWRB167**	29.9	36.5	36.5	37.3	**35.1**	35.6	34.0	30.0	25.0	36.1	**32.1**	26.2	**31.1**
3	**DWRB169**	39.8	41.3	38.4	41.8	**40.3**	42.5	39.7	28.8	36.1	39.8	**37.4**	31.3	**36.3**
4	**HUB252**	43.8	42.4	42.3	43.2	**42.9**	39.8	43.5	37.9	41.6	41.5	**40.9**	28.7	**37.5**
5	**JB346**	38.9	37.3	35.2	37.0	**37.1**	28.0	39.4	31.4	36.1	36.8	**34.3**	43.9	**38.4**
6	**JB347**	41.5	39.0	24.9	35.9	**35.3**	27.1	36.2	30.9	35.1	35.8	**33.0**	28.6	**32.3**
7	**KB1501**	41.8	45.0	40.2	43.1	**42.5**	33.2	34.6	37.5	44.2	36.9	**37.3**	34.5	**38.1**
8	**KB1528**	56.1	55.1	54.5	56.1	**55.5**	46.2	45.9	49.3	53.2	54.4	**49.8**	21.3	**42.2**
9	**KB1531**	48.8	49.1	47.7	51.1	**49.2**	43.3	41.7	42.9	43.0	46.2	**43.4**	35.6	**42.7**
10	**NDB1653**	42.1	41.3	31.1	42.6	**39.3**	31.4	37.1	37.8	43.2	40.1	**37.9**	27.9	**35.0**
11	**PL891**	41.8	47.5	44.7	45.8	**44.9**	28.2	39.0	41.2	30.7	43.2	**36.5**	32.0	**37.8**
12	**PL892**	42.8	46.5	41.3	46.0	**44.1**	37.6	43.3	45.0	44.7	36.5	**41.4**	23.5	**36.4**
13	**PL894**	36.5	39.7	36.4	38.8	**37.9**	38.9	41.9	38.9	34.4	44.2	**39.7**	51.1	**42.9**
14	**PL898**	48.9	43.1	40.9	48.1	**45.2**	38.4	37.6	44.0	49.0	41.3	**42.1**	32.0	**39.8**
15	**RD2947**	40.8	39.6	38.1	36.6	**38.8**	28.4	28.8	36.1	36.9	46.8	**35.4**	32.8	**35.6**
16	**RD2948**	47.2	45.8	45.9	46.8	**46.4**	39.5	36.7	46.8	49.3	45.4	**43.5**	39.2	**43.1**
17	**RD2949**	44.3	45.7	43.8	35.7	**42.4**	24.6	31.2	35.7	41.4	25.5	**31.7**	34.3	**36.1**
18	**RD2950**	40.7	40.2	38.3	39.5	**39.7**	39.7	40.7	29.6	36.7	32.1	**35.7**	28.1	**34.5**
19	**UPB1064**	40.1	43.9	31.1	41.7	**39.2**	33.8	37.1	42.7	41.8	37.5	**38.6**	22.7	**33.5**
20	**UPB1066**	34.8	41.7	38.7	44.5	**39.9**	33.6	35.0	52.2	28.5	39.6	**37.8**	23.5	**33.7**
21	**BH902 (c)**	44.5	49.7	37.5	52.0	**45.9**	38.9	45.5	48.8	48.9	45.8	**45.6**	43.3	**44.9**
22	**BH946 (c)**	42.3	42.9	36.8	43.7	**41.4**	29.1	40.3	43.4	36.5	34.9	**36.8**	26.8	**35.0**
23	**BH959 (c)**	41.0	39.6	35.4	41.1	**39.3**	27.6	37.0	36.1	36.1	35.7	**34.5**	22.8	**32.2**
24	**HUB113 (c)**	43.4	40.7	38.0	38.5	**40.2**	32.1	46.8	43.4	45.1	40.1	**41.5**	51.5	**44.4**
25	**KARAN16 (c)**	36.2	32.7	30.7	36.5	**34.1**	29.6	34.6	35.8	31.7	32.1	**32.7**	26.1	**31.0**
26	**NDB943 (c)**	36.9	37.5	23.1	37.8	**33.8**	36.5	31.3	36.1	32.9	34.9	**34.3**	25.9	**31.3**
27	**RD2552 (c)**	35.8	40.6	28.5	44.2	**37.3**	25.2	37.4	40.9	43.9	36.7	**36.8**	32.3	**35.5**
28	**RD2786 (c)**	43.7	42.1	44.3	44.9	**43.8**	22.7	36.0	37.4	40.9	33.2	**34.0**	37.6	**38.5**
	Mean	**41.6**	**41.1**	**37.9**	**42.7**		**33.9**	**38.4**	**39.4**	**39.7**	**39.1**		**32.1**	

Table 23. Bold grain (%) of entries from IVT (Irrigated Feed Barley) in NWPZ/NEPZ/CZ

S.No	Genotype	Durgapura	Hisar	Ludhiana	Pantnagar	Mean (NWPZ)	Bhagalpur	Faizabad	Kanpur	Rewa	Varansi	Mean (NEPZ)	Udaipur	Mean (O)
1	**BH1019**	77.1	94.0	86.8	96.3	**88.5**	60.8	84.3	83.1	89.0	89.0	**81.2**	67.7	**79.1**
2	**DWRB167**	43.9	74.8	80.9	79.3	**69.7**	63.2	69.8	46.2	29.2	79.3	**57.5**	23.3	**50.2**
3	**DWRB169**	84.6	91.1	87.6	97.3	**90.1**	34.4	86.7	65.9	69.3	86.9	**68.7**	36.4	**65.1**
4	**HUB252**	87.4	84.0	88.8	86.2	**86.6**	64.5	83.1	71.4	66.9	77.9	**72.8**	18.7	**59.4**
5	**JB346**	83.6	78.9	76.8	87.3	**81.6**	41.6	72.5	56.6	55.8	72.1	**59.7**	29.0	**56.8**
6	**JB347**	78.7	70.5	28.4	61.1	**59.7**	72.6	59.5	42.0	36.3	56.9	**53.5**	27.1	**46.7**
7	**KB1501**	82.5	90.5	91.7	94.3	**89.7**	41.2	73.7	69.1	84.5	68.9	**67.5**	41.4	**66.2**
8	**KB1528**	86.2	86.7	92.4	94.8	**90.0**	61.2	83.3	59.5	71.7	86.0	**72.4**	34.9	**65.8**
9	**KB1531**	83.9	86.7	85.2	94.1	**87.4**	50.4	74.1	66.9	57.3	82.6	**66.3**	29.0	**60.9**
10	**NDB1653**	71.4	75.1	48.8	76.2	**67.8**	29.6	64.5	49.9	65.1	79.8	**57.8**	20.1	**48.6**
11	**PL891**	31.2	51.5	64.5	61.8	**52.2**	39.0	62.4	49.8	22.5	43.8	**43.5**	17.2	**37.6**
12	**PL892**	81.6	95.8	86.9	95.2	**89.9**	59.6	86.4	84.9	85.0	50.3	**73.2**	49.0	**70.7**
13	**PL894**	47.8	65.4	73.3	81.2	**66.9**	62.1	78.1	55.5	34.6	80.0	**62.1**	37.4	**55.5**
14	**PL898**	85.9	90.2	70.3	95.2	**85.4**	59.3	74.5	81.9	86.9	83.2	**77.2**	35.4	**66.0**
15	**RD2947**	90.0	92.6	89.4	73.8	**86.5**	43.2	59.7	78.3	80.5	85.7	**69.5**	72.8	**76.2**
16	**RD2948**	91.7	94.2	92.6	93.4	**93.0**	68.1	86.3	81.7	92.8	88.0	**83.4**	70.1	**82.2**
17	**RD2949**	86.6	90.0	87.9	74.4	**84.7**	15.9	51.3	65.7	68.1	24.1	**45.0**	63.0	**64.2**
18	**RD2950**	73.2	71.4	71.5	78.2	**73.6**	74.6	91.4	66.6	60.7	39.7	**66.6**	13.4	**51.2**
19	**UPB1064**	68.6	86.1	53.6	86.4	**73.7**	34.7	64.9	52.2	64.6	62.3	**55.7**	11.0	**46.8**
20	**UPB1066**	36.6	70.3	69.6	79.2	**63.9**	27.2	47.8	54.7	17.5	78.0	**45.0**	6.8	**38.6**
21	**BH902 (c)**	83.8	92.6	73.5	96.8	**86.7**	55.4	85.5	74.4	86.0	86.3	**77.5**	11.4	**58.5**
22	**BH946 (c)**	87.5	92.3	76.8	94.2	**87.7**	60.5	87.9	83.8	59.5	72.9	**72.9**	22.1	**60.9**
23	**BH959 (c)**	49.3	74.4	63.3	81.2	**67.0**	79.8	65.8	57.6	38.2	48.8	**58.0**	16.9	**47.3**
24	**HUB113 (c)**	80.2	80.8	85.3	92.2	**84.6**	44.6	85.0	70.1	79.4	64.5	**68.7**	49.6	**67.6**
25	**KARAN16 (c)**	24.7	26.1	33.1	54.7	**34.6**	21.4	57.7	31.0	32.0	30.8	**34.6**	15.3	**28.2**
26	**NDB943 (c)**	34.4	39.7	22.6	48.8	**36.4**	60.2	69.8	50.2	57.3	40.3	**55.5**	25.7	**39.2**
27	**RD2552 (c)**	54.4	83.4	59.8	91.0	**72.1**	13.2	77.9	66.3	69.1	66.3	**58.6**	41.1	**57.2**
28	**RD2786 (c)**	85.7	87.3	88.8	92.1	**88.5**	10.7	72.8	77.7	66.4	47.0	**54.9**	69.7	**71.0**
	Mean	**70.4**	**79.1**	**72.5**	**83.4**		**48.2**	**73.4**	**64.0**	**61.6**	**66.8**		**34.1**	

Table 24. Thin grain (%) of entries from IVT (Irrigated Feed Barley) in NWPZ/NEPZ/CZ

S.No.	Genotype	Durgapura	Hisar	Ludhiana	Pantnagar	Mean (NWPZ)	Bhagalpur	Faizabad	Kanpur	Rewa	Varansi	Mean (NEPZ)	Udaipur	Mean (O)
1	**BH1019**	5.6	1.0	3.6	1.3	**2.9**	12.2	21.3	4.1	1.0	3.6	**8.4**	7.1	**6.1**
2	**DWRB167**	17.1	4.0	4.3	3.8	**7.3**	9.9	17.0	19.8	31.3	3.6	**16.3**	40.3	**21.3**
3	**DWRB169**	2.6	1.2	2.4	0.5	**1.7**	24.6	19.9	9.4	5.0	1.9	**12.2**	24.1	**12.6**
4	**HUB252**	1.6	2.1	2.0	1.8	**1.9**	9.4	21.8	9.0	5.3	4.5	**10.0**	35.6	**15.8**
5	**JB346**	3.7	3.6	5.6	1.5	**3.6**	19.1	14.7	10.7	5.7	6.4	**11.3**	33.3	**16.1**
6	**JB347**	3.9	5.7	34.9	7.0	**12.9**	5.1	18.1	19.5	18.1	6.9	**13.5**	35.3	**20.5**
7	**KB1501**	3.9	1.3	1.9	1.2	**2.1**	17.6	17.3	7.6	1.5	5.3	**9.9**	17.3	**9.7**
8	**KB1528**	2.4	0.5	0.9	2.0	**1.4**	12.9	23.0	3.9	1.3	1.0	**8.4**	15.5	**8.5**
9	**KB1531**	1.6	1.1	2.0	0.8	**1.3**	13.6	20.9	4.7	5.8	1.9	**9.4**	18.4	**9.7**
10	**NDB1653**	6.6	5.1	24.5	4.8	**10.2**	35.3	18.6	18.0	7.1	2.6	**16.3**	45.4	**24.0**
11	**PL891**	12.9	4.4	5.5	3.6	**6.6**	28.0	19.5	12.8	32.1	7.4	**20.0**	49.2	**25.3**
12	**PL892**	5.2	0.7	2.8	1.4	**2.5**	9.9	21.6	4.0	1.2	17.9	**10.9**	15.7	**9.7**
13	**PL894**	18.9	6.3	7.2	3.5	**9.0**	11.1	20.4	14.1	20.4	3.0	**13.8**	18.5	**13.8**
14	**PL898**	2.9	1.3	8.0	1.0	**3.3**	12.8	18.8	3.4	1.7	3.9	**8.1**	26.0	**12.5**
15	**RD2947**	2.0	1.3	3.0	8.1	**3.6**	31.0	14.4	5.6	3.2	1.7	**11.2**	7.3	**7.4**
16	**RD2948**	1.5	0.8	1.7	1.6	**1.4**	9.2	18.3	2.8	1.0	2.6	**6.8**	9.1	**5.7**
17	**RD2949**	2.9	2.3	2.7	8.3	**4.0**	47.4	15.6	10.1	6.0	45.7	**25.0**	13.0	**14.0**
18	**RD2950**	2.9	2.6	3.0	2.8	**2.8**	5.2	20.3	7.1	5.8	15.1	**10.7**	55.8	**23.1**
19	**UPB1064**	9.1	1.7	19.4	2.8	**8.2**	30.0	18.5	14.8	6.6	9.2	**15.8**	65.4	**29.8**
20	**UPB1066**	19.3	4.1	5.9	3.2	**8.1**	26.9	17.5	12.9	37.8	5.3	**20.1**	71.1	**33.1**
21	**BH902 (c)**	3.8	1.5	7.2	0.8	**3.3**	16.7	22.7	6.9	2.2	2.7	**10.2**	63.2	**25.6**
22	**BH946 (c)**	2.4	1.0	5.8	1.1	**2.5**	12.7	20.2	2.4	6.4	5.0	**9.3**	40.0	**17.3**
23	**BH959 (c)**	3.8	2.6	10.0	2.7	**4.8**	3.2	18.5	12.2	20.9	11.8	**13.3**	49.9	**22.7**
24	**HUB113 (c)**	3.9	3.0	2.7	1.7	**2.8**	22.8	23.4	7.1	4.9	9.6	**13.6**	19.4	**11.9**
25	**KARAN16 (c)**	34.6	38.6	23.4	13.3	**27.5**	50.0	17.3	29.3	30.2	25.5	**30.4**	49.6	**35.8**
26	**NDB943 (c)**	12.0	9.3	38.0	8.7	**17.0**	10.4	15.7	13.5	8.3	12.3	**12.0**	42.0	**23.7**
27	**RD2552 (c)**	18.7	3.4	15.9	1.8	**10.0**	59.3	18.7	7.4	5.5	9.1	**20.0**	25.5	**18.5**
28	**RD2786 (c)**	2.5	2.3	3.1	1.8	**2.4**	62.8	18.0	5.2	6.1	15.3	**21.5**	7.0	**10.3**
	Mean	**7.4**	**4.0**	**8.8**	**3.3**		**21.8**	**19.0**	**9.9**	**10.1**	**8.6**		**32.1**	

Table 25. Grain crude protein content (% dwt) of entries from IVT (Irrigated Feed Barley) in NWPZ/NEPZ/CZ

S.No.	Genotype	Durgapura	Hisar	Ludhiana	Pantnagar	Mean (NWPZ)	Bhagalpur	Faizabad	Kanpur	Rewa	Varansi	Mean (NEPZ)	Udaipur	Mean (O)
1	**BH1019**	10.6	8.6	8.4	8.2	**9.0**	10.6	9.3	9.1	9.1	8.6	**9.3**	13.3	**10.5**
2	**DWRB167**	10.1	10.1	10.7	7.8	**9.7**	11.3	7.2	11.9	11.6	8.9	**10.2**	16.0	**12.0**
3	**DWRB169**	11.2	9.1	11.9	8.6	**10.2**	11.7	8.6	11.6	10.1	9.9	**10.4**	14.7	**11.8**
4	**HUB252**	11.3	8.6	10.5	7.9	**9.6**	11.7	7.5	9.9	10.6	8.6	**9.7**	14.3	**11.2**
5	**JB346**	11.2	9.5	12.6	9.1	**10.6**	12.1	10.1	9.5	10.1	9.8	**10.3**	16.3	**12.4**
6	**JB347**	11.8	9.1	8.6	7.7	**9.3**	11.4	8.0	10.9	8.3	9.4	**9.6**	13.8	**10.9**
7	**KB1501**	9.9	8.8	8.7	7.2	**8.7**	9.8	7.6	9.6	9.2	8.2	**8.9**	13.0	**10.2**
8	**KB1528**	10.6	9.4	10.2	8.0	**9.6**	10.7	9.8	11.9	8.5	10.2	**10.2**	14.9	**11.6**
9	**KB1531**	13.9	8.7	12.2	9.6	**11.1**	11.7	8.5	10.9	9.7	10.4	**10.2**	17.1	**12.8**
10	**NDB1653**	11.7	9.9	11.4	9.9	**10.7**	10.7	11.6	10.3	11.4	9.5	**10.7**	16.1	**12.5**
11	**PL891**	9.2	8.0	11.7	7.9	**9.2**	10.7	7.6	10.0	8.1	10.2	**9.3**	16.1	**11.5**
12	**PL892**	13.3	10.3	12.6	9.1	**11.3**	10.5	9.4	12.0	12.9	10.4	**11.0**	17.3	**13.2**
13	**PL894**	10.3	8.2	10.0	7.4	**9.0**	10.6	8.1	9.4	8.8	9.0	**9.2**	14.8	**11.0**
14	**PL898**	10.6	9.0	10.4	8.5	**9.6**	12.2	9.0	10.8	9.6	9.1	**10.1**	15.1	**11.6**
15	**RD2947**	9.7	8.3	13.5	7.7	**9.8**	10.7	8.3	10.2	8.8	8.4	**9.3**	12.8	**10.6**
16	**RD2948**	11.8	10.3	12.8	8.2	**10.8**	15.6	12.0	13.3	11.3	9.1	**12.3**	16.1	**13.0**
17	**RD2949**	10.8	8.9	10.7	8.0	**9.6**	10.5	7.9	9.4	9.4	8.9	**9.2**	13.2	**10.7**
18	**RD2950**	9.2	8.2	12.1	9.0	**9.6**	13.7	10.8	11.9	10.5	12.0	**11.8**	16.7	**12.7**
19	**UPB1064**	11.3	11.6	12.0	9.0	**11.0**	11.4	9.9	12.6	11.3	9.3	**10.9**	16.8	**12.9**
20	**UPB1066**	9.8	8.7	12.3	7.5	**9.6**	11.0	8.5	10.0	8.4	8.2	**9.2**	16.1	**11.6**
21	**BH902 (c)**	10.9	8.2	10.4	7.2	**9.2**	12.5	8.3	11.5	11.6	8.7	**10.5**	16.4	**12.0**
22	**BH946 (c)**	9.9	8.8	11.3	7.5	**9.4**	10.8	7.9	9.3	9.8	8.3	**9.2**	16.8	**11.8**
23	**BH959 (c)**	11.5	7.8	11.6	7.9	**9.7**	11.0	8.3	10.2	9.8	8.6	**9.6**	15.4	**11.6**
24	**HUB113 (c)**	9.7	7.4	10.0	8.5	**8.9**	11.9	7.8	8.9	10.0	9.2	**9.6**	13.2	**10.6**
25	**KARAN16 (c)**	12.2	9.3	12.0	9.2	**10.7**	13.7	9.5	12.9	9.5	11.4	**11.4**	15.8	**12.6**
26	**NDB943 (c)**	14.6	13.7	14.1	11.4	**13.5**	12.9	11.2	13.1	9.5	11.1	**11.6**	17.4	**14.1**
27	**RD2552 (c)**	10.3	7.9	10.4	9.2	**9.5**	10.3	7.3	11.5	8.6	7.7	**9.1**	14.4	**11.0**
28	**RD2786 (c)**	11.4	9.5	12.5	8.5	**10.5**	13.7	8.7	12.3	11.4	10.1	**11.2**	16.4	**12.7**
	Mean	11.0	9.1	11.3	8.4		11.6	8.9	10.9	9.9	9.4		15.4	

Table 26. Test weight (kg/hl) of entries from IVT (Rainfed) NEPZ

S.No.	Genotype	Rewa	Saini	Kanpur	Faizabad	Bhagalpur	Varanasi	Mean
1	DWRB166	59.7	61.1	65.7	53.2	56.5	51.7	**58.0**
2	HUB252	56.9	58.0	59.8	49.6	51.6	58.9	**55.8**
3	HUB253	60.2	57.9	60.8	46.3	52.0	47.2	**54.1**
4	JB349	58.5	58.8	63.2	54.1	47.9	58.5	**56.8**
5	JB350	60.3	60.5	61.3	49.2	50.9	54.8	**56.2**
6	KB1506	57.4	53.6	58.3	54.8	46.9	56.7	**54.6**
7	KB1521	57.9	54.5	59.7	52.0	45.0	52.5	**53.6**
8	KB1541	52.1	56.1	62.0	49.1	44.0	53.8	**52.9**
9	KB1545	57.2	59.7	65.1	53.9	54.2	49.8	**56.6**
10	NDB1651	59.6	61.5	59.9	54.8	50.8	54.8	**56.9**
11	PL893	58.5	57.6	60.3	51.6	52.8	46.3	**54.5**
12	PL897	56.1	55.9	59.7	48.9	47.4	48.7	**52.8**
13	RD2959	58.1	58.1	60.2	53.2	43.4	52.7	**54.3**
14	RD2960	58.6	62.2	61.8	54.2	48.0	53.0	**56.3**
15	RD2961	58.4	57.5	60.7	52.3	52.1	49.2	**55.0**
16	K603 (c)	58.4	58.6	58.7	52.9	51.6	60.0	**56.7**
17	LAKHAN (c)	56.2	57.9	59.7	53.3	51.2	53.8	**55.4**
	Mean	**57.9**	**58.2**	**61.0**	**52.0**	**49.8**	**53.1**	

Table 27. Thousand grain weight (g) of entries from IVT (Rainfed) NEPZ

S.No.	Genotype	Rewa	Saini	Kanpur	Faizabad	Bhagalpur	Varanasi	Mean
1	DWRB166	35.6	40.9	48.1	39.4	40.2	45.0	**41.5**
2	HUB252	40.4	40.2	46.5	38.4	37.0	44.5	**41.2**
3	HUB253	40.7	41.2	48.4	33.6	41.2	36.1	**40.2**
4	JB349	36.3	41.6	39.5	39.3	36.6	41.5	**39.1**
5	JB350	40.0	40.7	48.8	35.7	43.2	38.8	**41.2**
6	KB1506	39.4	42.7	45.9	40.2	32.5	33.8	**39.1**
7	KB1521	40.3	44.2	45.9	37.4	29.0	45.3	**40.3**
8	KB1541	33.5	38.4	50.1	33.3	28.4	43.5	**37.9**
9	KB1545	36.6	45.8	46.1	47.5	43.7	37.9	**42.9**
10	NDB1651	31.0	36.5	43.2	33.7	27.5	48.1	**36.7**
11	PL893	34.3	43.4	47.2	44.7	41.9	37.7	**41.5**
12	PL897	36.8	42.8	43.0	30.4	33.0	41.2	**37.9**
13	RD2959	40.7	50.3	56.3	40.3	30.4	53.0	**45.2**
14	RD2960	32.5	36.1	51.8	38.7	39.9	43.8	**40.5**
15	RD2961	48.3	38.9	56.5	44.9	45.4	40.7	**45.8**
16	K603 (c)	43.6	38.6	57.0	39.5	38.7	48.1	**44.2**
17	LAKHAN (c)	41.4	40.2	44.2	42.5	38.2	44.5	**41.8**
	Mean	**38.3**	**41.3**	**48.1**	**38.8**	**36.9**	**42.6**	

Table 28. Bold grain (%) of entries from IVT (Rainfed) NEPZ

S.No.	Genotype	Rewa	Saini	Kanpur	Faizabad	Bhagalpur	Varanasi	Mean
1	DWRB166	45.7	69.9	92.0	85.6	68.1	79.8	**73.5**
2	HUB252	53.1	71.5	92.9	72.2	70.0	89.7	**74.9**
3	HUB253	63.0	67.4	92.6	68.0	73.8	26.2	**65.1**
4	JB349	54.4	80.3	85.1	74.3	70.3	93.5	**76.3**
5	JB350	58.1	85.2	91.6	67.3	83.7	69.1	**75.8**
6	KB1506	68.5	73.7	87.7	83.4	50.3	68.1	**71.9**
7	KB1521	74.8	69.7	93.6	83.7	34.6	89.3	**74.3**
8	KB1541	13.1	23.5	95.1	32.4	17.2	92.2	**45.6**
9	KB1545	71.3	79.3	93.3	95.1	82.7	82.6	**84.1**
10	NDB1651	37.1	71.2	93.0	89.3	42.2	92.6	**70.9**
11	PL893	38.1	84.4	90.9	90.4	70.8	52.0	**71.1**
12	PL897	56.2	68.8	85.2	78.6	53.8	84.4	**71.2**
13	RD2959	85.8	96.4	98.7	85.5	51.0	93.8	**85.2**
14	RD2960	26.9	82.3	88.4	72.9	53.9	54.2	**63.1**
15	RD2961	90.3	90.5	94.1	89.1	83.1	79.2	**87.7**
16	K603 (c)	37.5	70.1	86.9	38.9	46.1	93.3	**62.1**
17	LAKHAN (c)	13.1	55.2	66.9	59.4	39.6	62.9	**49.5**
	Mean	**52.2**	**72.9**	**89.9**	**74.5**	**58.3**	**76.6**	

Table 29. Thin grain (%) of entries from IVT (Rainfed) NEPZ

S.No.	Genotype	Rewa	Saini	Kanpur	Faizabad	Bhagalpur	Varanasi	Mean
1	DWRB166	12.0	7.6	1.6	3.8	8.5	3.5	**6.2**
2	HUB252	6.5	6.7	1.5	6.1	8.1	2.3	**5.2**
3	HUB253	5.2	9.0	1.5	7.2	6.5	31.1	**10.1**
4	JB349	7.6	3.9	3.3	5.1	8.9	1.5	**5.1**
5	JB350	6.3	3.1	2.0	9.2	4.0	6.1	**5.1**
6	KB1506	2.5	6.4	2.6	3.5	15.7	6.0	**6.1**
7	KB1521	3.3	9.1	1.2	4.3	31.5	1.8	**8.5**
8	KB1541	45.4	7.0	1.5	26.3	49.8	1.1	**21.9**
9	KB1545	5.7	4.6	1.2	1.7	4.7	4.6	**3.7**
10	NDB1651	13.0	5.3	1.1	1.7	22.2	1.0	**7.4**
11	PL893	15.9	3.0	1.8	3.0	7.0	13.0	**7.3**
12	PL897	10.6	11.2	4.0	7.1	18.0	2.5	**8.9**
13	RD2959	2.0	1.1	0.4	3.1	17.9	1.2	**4.3**
14	RD2960	23.2	4.2	2.1	7.5	19.1	8.7	**10.8**
15	RD2961	1.6	1.5	2.0	2.6	4.7	4.6	**2.8**
16	K603 (c)	12.0	5.3	2.7	19.5	18.5	1.4	**9.9**
17	LAKHAN (c)	19.3	12.7	2.8	8.4	22.2	7.5	**12.1**
	Mean	**11.3**	**6.0**	**1.9**	**7.1**	**15.7**	**5.7**	

Table 30. Grain crude protein content (% d wt) of entries from IVT (Rainfed) NEPZ

S.No.	Genotype	Rewa	Saini	Kanpur	Faizabad	Bhagalpur	Varanasi	Mean
1	DWRB166	12.4	8.1	11.7	11.4	13.9	9.4	**11.2**
2	HUB252	10.7	7.7	13.6	14.0	13.1	8.4	**11.3**
3	HUB253	10.9	8.1	12.6	10.2	12.9	9.6	**10.7**
4	JB349	10.8	7.8	12.1	9.9	12.1	11.3	**10.7**
5	JB350	8.6	7.9	10.4	10.0	13.1	8.4	**9.7**
6	KB1506	9.9	7.7	10.4	9.7	14.7	8.6	**10.2**
7	KB1521	9.2	7.2	11.0	11.2	13.5	11.1	**10.5**
8	KB1541	12.2	8.2	10.4	10.7	15.9	10.5	**11.3**
9	KB1545	12.0	7.1	11.4	14.5	15.0	10.2	**11.7**
10	NDB1651	10.6	7.2	12.1	9.7	11.9	10.4	**10.3**
11	PL893	10.2	7.8	13.4	13.0	13.8	9.5	**11.3**
12	PL897	9.4	7.6	11.5	9.3	12.9	10.4	**10.2**
13	RD2959	11.6	7.8	11.8	10.9	13.1	10.6	**11.0**
14	RD2960	11.1	7.0	11.4	9.8	13.9	9.2	**10.4**
15	RD2961	10.4	7.6	12.4	10.9	12.2	9.6	**10.5**
16	K603 (c)	10.2	7.0	10.2	13.5	11.4	10.6	**10.5**
17	LAKHAN (c)	11.0	8.5	10.9	10.3	10.0	9.1	**10.0**
	Mean	**10.7**	**7.7**	**11.6**	**11.1**	**13.1**	**9.8**	

Table 31. Test weight (kg/hl) of entries from AVT (SAL/ALK) in NWPZ/NEPZ

S.No.	Varieties	Hisar	Kanpur	Faizabad 1	Faizabad 2	Mean
1	BH1017	63.7	59.4	50.4	57.8	**57.8**
2	DWRB165	64.2	61.8	59.0	53.4	**59.6**
3	DWRB168	64.0	60.9	52.5	58.8	**59.1**
4	HUB258	61.1	53.4	57.2	48.6	**55.1**
5	KB1507	56.7	55.2	58.3	53.8	**56.0**
6	KB1523	61.6	60.4	62.8	51.4	**59.0**
7	KB1546	63.2	59.6	56.1	55.5	**58.6**
8	NDB1655	57.6	55.6	60.4	59.7	**58.3**
9	NDB1665	55.3	54.4	54.7	59.6	**56.0**
10	NDB1673	64.5	53.7	50.5	55.1	**56.0**
11	RD2907	59.4	58.1	54.2	56.3	**57.0**
12	RD2955	56.3	56.4	53.7	56.6	**55.7**
13	RD2956	59.7	55.2	57.5	58.1	**57.6**
14	RD2957	59.3	56.6	56.7	58.5	**57.8**
15	RD2958	56.7	55.4	54.5	57.9	**56.1**
16	NDB1173 (c)	57.7	54.9	58.9	60.1	**57.9**
17	NDB1445 (c)	58.8	55.0	51.7	58.6	**56.0**
18	RD2552 (c)	59.5	56.3	55.9	54.7	**56.6**
19	RD2794 (c)	56.1	56.8	58.6	57.3	**57.2**
	Mean	**59.7**	**56.8**	**56.0**	**56.4**	

Table 32. Thousand grain weight (g) of entries from AVT (SAL/ALK) in NWPZ/NEPZ

S.No.	Varieties	Hisar	Kanpur	Faizabad 1	Faizabad 2	Mean
1	BH1017	58.5	43.6	41.4	43.2	**46.7**
2	DWRB165	42.0	40.7	44.8	33.5	**40.3**
3	DWRB168	43.2	45.5	38.5	37.3	**41.1**
4	HUB258	39.8	32.8	48.2	29.5	**37.6**
5	KB1507	38.7	35.7	37.1	41.0	**38.1**
6	KB1523	35.6	50.6	42.3	40.5	**42.3**
7	KB1546	40.5	38.2	58.2	39.0	**44.0**
8	NDB1655	44.3	39.9	42.6	39.0	**41.5**
9	NDB1665	42.2	27.5	39.6	59.4	**42.2**
10	NDB1673	40.1	34.8	38.9	31.7	**36.4**
11	RD2907	46.8	31.2	40.2	37.9	**39.0**
12	RD2955	40.4	42.3	45.3	35.6	**40.9**
13	RD2956	43.0	43.1	41.8	42.4	**42.6**
14	RD2957	42.2	46.1	50.0	43.2	**45.4**
15	RD2958	41.5	40.6	37.9	39.0	**39.8**
16	NDB1173 (c)	39.0	37.3	30.6	47.5	**38.6**
17	NDB1445 (c)	41.3	31.0	36.7	44.3	**38.3**
18	RD2552 (c)	41.1	33.0	39.8	32.4	**36.6**
19	RD2794 (c)	43.4	36.5	41.8	41.6	**40.9**
	Mean	**42.3**	**38.4**	**41.9**	**39.9**	

Table 33. Bold grain (%) of entries from AVT (SAL/ALK) in NWPZ/NEPZ

S.No.	Varieties	Hisar	Kanpur	Faizabad 1	Faizabad 2	Mean
1	BH1017	93.9	78.8	67.8	79.8	**80.1**
2	DWRB165	83.4	81.4	84.4	53.1	**75.6**
3	DWRB168	91.9	87.7	45.4	93.3	**79.6**
4	HUB258	72.2	55.5	93.4	54.4	**68.9**
5	KB1507	68.4	68.4	80.4	76.1	**73.3**
6	KB1523	66.9	81.4	91.1	72.2	**77.9**
7	KB1546	67.5	60.1	94.6	73.5	**73.9**
8	NDB1655	61.7	49.2	88.6	78.0	**69.4**
9	NDB1665	61.0	36.5	47.4	68.6	**53.4**
10	NDB1673	84.4	36.7	73.8	64.8	**64.9**
11	RD2907	95.6	96.8	77.9	59.8	**82.5**
12	RD2955	93.8	89.6	89.6	67.6	**85.1**
13	RD2956	89.5	88.9	67.3	75.3	**80.3**
14	RD2957	82.4	87.6	99.0	82.8	**88.0**
15	RD2958	76.4	71.8	81.3	54.0	**70.9**
16	NDB1173 (c)	61.3	51.1	67.2	90.9	**67.6**
17	NDB1445 (c)	58.6	44.3	57.3	89.6	**62.4**
18	RD2552 (c)	78.4	68.1	65.2	65.2	**69.2**
19	RD2794 (c)	84.2	64.0	90.3	55.4	**73.5**
	Mean	**77.4**	**68.3**	**76.9**	**71.3**	

Table 34. Thin grain (%) of entries from AVT (SAL/ALK) in NWPZ/NEPZ

S.No.	Varieties	Hisar	Kanpur	Faizabad 1	Faizabad 2	Mean
1	BH1017	1.5	3.2	7.6	4.9	**4.3**
2	DWRB165	3.6	5.4	1.5	16.8	**6.8**
3	DWRB168	1.2	2.4	15.7	1.1	**5.1**
4	HUB258	4.8	11.4	1.5	13.1	**7.7**
5	KB1507	6.9	7.9	3.5	12.7	**7.7**
6	KB1523	7.0	3.4	1.2	6.1	**4.4**
7	KB1546	4.0	7.6	0.8	5.4	**4.4**
8	NDB1655	10.2	15.6	0.9	4.0	**7.7**
9	NDB1665	9.8	21.6	15.8	4.9	**13.0**
10	NDB1673	2.6	22.9	3.9	7.1	**9.1**
11	RD2907	0.6	0.8	3.7	8.0	**3.3**
12	RD2955	1.4	2.3	1.0	7.2	**2.9**
13	RD2956	2.8	2.1	6.2	3.7	**3.7**
14	RD2957	3.3	2.7	1.0	1.9	**2.2**
15	RD2958	7.1	6.7	3.4	10.2	**6.9**
16	NDB1173 (c)	8.2	17.4	4.6	1.6	**8.0**
17	NDB1445 (c)	11.3	21.9	9.9	1.4	**11.1**
18	RD2552 (c)	5.0	9.1	6.1	5.8	**6.5**
19	RD2794 (c)	3.6	12.1	1.1	11.4	**7.1**
	Mean	**5.0**	**9.3**	**4.7**	**6.7**	

Table 35. Grain crude protein content (% d wt) of entries from AVT (SAL/ALK) in NWPZ/NEPZ

S.No.	Varieties	Hisar	Kanpur	Faizabad 1	Faizabad 2	Mean
1	BH1017	10.5	12.0	10.0	9.1	**10.4**
2	DWRB165	10.7	12.6	11.0	10.4	**11.2**
3	DWRB168	9.9	11.4	10.5	9.9	**10.4**
4	HUB258	12.4	11.7	14.6	9.4	**12.0**
5	KB1507	11.4	12.6	13.7	10.2	**12.0**
6	KB1523	13.1	10.6	14.8	9.7	**12.1**
7	KB1546	11.5	12.3	13.1	11.6	**12.1**
8	NDB1655	9.6	11.2	13.0	8.5	**10.6**
9	NDB1665	10.3	12.0	10.8	9.2	**10.6**
10	NDB1673	9.3	12.4	11.6	8.9	**10.6**
11	RD2907	11.5	10.1	12.6	9.3	**10.9**
12	RD2955	10.3	9.9	10.8	9.6	**10.2**
13	RD2956	9.8	9.5	9.5	10.0	**9.7**
14	RD2957	8.8	10.1	10.9	9.7	**9.9**
15	RD2958	10.8	9.8	11.5	9.5	**10.4**
16	NDB1173 (c)	9.1	10.9	12.1	13.7	**11.5**
17	NDB1445 (c)	12.1	11.9	9.8	8.9	**10.7**
18	RD2552 (c)	7.5	9.6	10.4	9.5	**9.3**
19	RD2794 (c)	10.8	11.6	10.7	8.8	**10.5**
	Mean	**10.5**	**11.2**	**11.7**	**9.8**	

Table 36. Test weight (kg/hl) of entries from IVT (Dual Purpose Barley)

S.No.	Genotype	Hisar	Durgapura	Ludhiana	Mean (NWPZ)	Rewa	Kanpur	Faizabad	Varanasi	Mean (NEPZ)	Udaipur	Anand	Kota	Mean (CZ)	Mean (O)
1	**JB348**	47.5	61.0	52.2	**53.6**	59.5	56.4	51.0	55.1	**55.5**	61.7	54.2	54.7	**56.9**	**55.3**
2	**KB1527**	53.6	61.9	53.2	**56.2**	59.7	61.5	43.7	55.0	**55.0**	64.2	54.9	58.6	**59.2**	**56.8**
3	**KB1530**	53.5	64.1	54.1	**57.2**	61.6	60.0	56.4	57.1	**58.8**	63.7	59.3	59.6	**60.9**	**59.0**
4	**NDB1660**	51.8	59.3	54.7	**55.2**	56.0	56.3	51.3	54.4	**54.5**	60.9	52.5	56.8	**56.7**	**55.5**
5	**RD2951**	51.3	58.3	54.4	**54.7**	59.8	59.1	51.3	53.5	**55.9**	64.7	51.4	57.9	**58.0**	**56.2**
6	**RD2952**	53.9	60.7	55.0	**56.5**	58.9	57.2	50.4	54.9	**55.3**	64.5	53.0	57.7	**58.4**	**56.7**
7	**RD2953**	55.1	52.6	57.7	**55.1**	55.9	57.0	51.4	56.5	**55.2**	63.1	56.1	58.2	**59.2**	**56.5**
8	**RD2954**	48.7	52.1	50.7	**50.5**	61.2	59.1	55.9	63.5	**60.0**	63.4	55.5	54.4	**57.7**	**56.1**
9	**UBP1066**	51.1	62.7	54.3	**56.0**	54.0	57.7	53.4	59.0	**56.0**	60.7	53.3	60.1	**58.0**	**56.7**
10	**UPB1064**	57.2	60.7	54.0	**57.3**	60.3	58.2	55.0	56.6	**57.5**	62.8	56.2	59.8	**59.6**	**58.1**
11	**UPB1065**	49.5	64.7	52.8	**55.7**	59.2	60.6	51.8	40.2	**52.9**	63.1	56.8	57.6	**59.2**	**55.9**
12	**AZAD (c)**	55.0	63.9	56.5	**58.5**	59.4	60.7	50.6	51.5	**55.5**	63.8	55.4	58.6	**59.2**	**57.7**
13	**RD2035 (c)**	55.1	59.6	56.1	**56.9**	61.9	61.9	55.2	45.5	**56.1**	63.2	57.0	60.0	**60.1**	**57.7**
14	**RD2552 (c)**	55.2	60.2	54.7	**56.7**	59.4	58.2	53.6	56.2	**56.8**	62.4	55.6	59.2	**59.1**	**57.5**
15	**RD2715 (c)**	50.3	52.8	48.0	**50.4**	56.6	57.7	37.9	55.4	**51.9**	60.7	56.5	53.2	**56.8**	**53.0**
		52.6	**59.6**	**53.9**		**58.9**	**58.8**	**51.3**	**54.3**		**62.9**	**55.2**	**57.8**		

Table 37. Thousand grain weight (g) of entries from IVT (Dual Purpose Barley)

S.No.	Genotype	Hisar	Durgapura	Ludhiana	Mean (NWPZ)	Rewa	Kanpur	Faizabad	Varanasi	Mean (NEPZ)	Udaipur	Anand	Kota	Mean (CZ)	Mean (O)
1	**JB348**	34.1	35.5	39.8	**36.5**	41.3	38.7	39.2	36.0	**38.8**	33.3	23.8	35.7	**30.9**	**35.4**
2	**KB1527**	38.4	34.0	37.8	**36.7**	32.9	34.1	34.4	27.4	**32.2**	52.7	29.8	37.9	**40.1**	**36.4**
3	**KB1530**	34.5	35.0	32.4	**34.0**	42.4	33.7	45.3	42.1	**40.9**	48.5	32.9	34.5	**38.7**	**37.8**
4	**NDB1660**	36.4	40.3	36.2	**37.6**	37.5	40.2	42.0	34.8	**38.6**	51.6	39.3	40.8	**43.9**	**40.1**
5	**RD2951**	43.0	41.6	42.9	**42.5**	47.7	43.3	47.0	32.0	**42.5**	49.8	31.5	41.5	**40.9**	**42.0**
6	**RD2952**	45.7	43.8	44.0	**44.5**	48.4	44.0	30.9	39.1	**40.6**	57.3	36.7	43.4	**45.8**	**43.6**
7	**RD2953**	42.3	25.5	36.6	**34.8**	32.8	38.0	28.4	29.0	**32.0**	31.7	31.9	41.3	**34.9**	**33.9**
8	**RD2954**	33.6	34.1	33.7	**33.8**	40.7	38.3	34.9	46.1	**40.0**	48.2	33.5	38.1	**39.9**	**37.9**
9	**UBP1066**	33.8	38.5	37.8	**36.7**	36.2	37.9	47.0	38.4	**39.9**	50.3	25.4	37.9	**37.9**	**38.1**
10	**UPB1064**	39.1	35.8	38.1	**37.7**	40.3	38.8	43.8	32.3	**38.8**	52.0	28.8	38.0	**39.6**	**38.7**
11	**UPB1065**	25.4	31.0	30.7	**29.0**	33.4	32.3	36.1	20.8	**30.6**	51.5	30.2	34.1	**38.6**	**32.8**
12	**AZAD (c)**	37.4	43.4	39.5	**40.1**	44.1	37.2	37.5	30.1	**37.2**	35.0	34.8	41.9	**37.2**	**38.2**
13	**RD2035 (c)**	31.8	30.1	36.4	**32.8**	34.5	4.6	39.9	28.2	**26.8**	48.5	29.9	36.2	**38.2**	**32.6**
14	**RD2552 (c)**	36.1	43.4	37.5	**39.0**	42.8	40.2	42.0	29.0	**38.5**	48.7	31.8	35.6	**38.7**	**38.7**
15	**RD2715 (c)**	32.9	30.1	30.6	**31.2**	41.5	40.6	25.3	39.1	**36.6**	49.3	29.8	32.5	**37.2**	**35.0**
		36.3	**36.1**	**36.9**		**39.8**	**36.1**	**38.3**	**33.6**		**47.2**	**31.3**	**38.0**		

Table 38. Bold grains (%) of entries from IVT (Dual Purpose Barley)

S.No.	Genotype	Hisar	Durgapura	Ludhiana	Mean (NWPZ)	Rewa	Kanpur	Faizabad	Varanasi	Mean (NEPZ)	Udaipur	Anand	Kota	Mean (CZ)	Mean (O)
1	**JB348**	44.1	56.9	72.4	**57.8**	51.1	60.4	77.0	59.3	**61.9**	54.3	34.5	67.2	**52.0**	**57.2**
2	**KB1527**	63.9	50.9	61.3	**58.7**	44.3	55.6	57.8	27.9	**46.4**	47.7	35.0	75.8	**52.9**	**52.6**
3	**KB1530**	51.5	60.0	64.2	**58.6**	35.0	46.7	86.1	78.1	**61.5**	49.5	64.4	69.7	**61.2**	**60.4**
4	**NDB1660**	27.4	56.0	43.4	**42.3**	54.6	52.9	66.7	61.7	**59.0**	45.9	65.0	66.2	**59.0**	**53.4**
5	**RD2951**	74.4	64.2	83.4	**74.0**	83.7	81.7	90.1	35.4	**72.7**	38.5	39.6	84.2	**54.1**	**66.9**
6	**RD2952**	74.6	78.1	79.5	**77.4**	89.6	75.1	49.3	63.1	**69.3**	63.5	64.0	80.4	**69.3**	**72.0**
7	**RD2953**	43.7	30.6	67.6	**47.3**	36.6	54.0	54.3	59.3	**51.0**	40.4	50.5	79.6	**56.8**	**51.7**
8	**RD2954**	59.2	63.8	71.0	**64.7**	89.3	79.4	77.0	95.3	**85.3**	72.8	72.8	86.1	**77.2**	**75.7**
9	**UBP1066**	30.2	60.6	62.3	**51.0**	30.6	49.9	92.9	42.5	**54.0**	30.6	19.9	66.7	**39.1**	**48.0**
10	**UPB1064**	70.9	44.8	63.2	**59.6**	68.5	47.5	83.5	52.1	**62.9**	47.8	28.6	69.3	**48.6**	**57.0**
11	**UPB1065**	21.3	46.9	42.3	**36.8**	33.9	50.7	57.3	11.5	**38.3**	33.6	40.2	58.2	**44.0**	**39.7**
12	**AZAD (c)**	24.3	54.7	50.7	**43.2**	59.6	49.2	51.5	36.6	**49.2**	36.2	18.4	41.4	**32.0**	**41.5**
13	**RD2035 (c)**	38.6	29.0	58.1	**41.9**	36.5	57.6	72.7	33.5	**50.1**	41.2	35.8	47.3	**41.4**	**44.5**
14	**RD2552 (c)**	58.6	40.9	63.9	**54.5**	65.7	56.5	79.6	43.8	**61.4**	43.1	43.4	64.5	**50.4**	**55.4**
15	**RD2715 (c)**	42.7	50.4	46.5	**46.5**	78.2	71.6	28.8	58.9	**59.4**	49.3	34.5	50.3	**44.7**	**50.2**
		48.4	**52.5**	**62.0**		**57.1**	**59.2**	**68.3**	**50.6**		**46.3**	**43.1**	**67.1**		

Table 39. Thin grains (%) of entries from IVT (Dual Purpose Barley)

S.No.	Genotype	Hisar	Durgapura	Ludhiana	Mean (NWPZ)	Rewa	Kanpur	Faizabad	Varanasi	Mean (NEPZ)	Udaipur	Anand	Kota	Mean (CZ)	Mean (O)
1	**JB348**	16.9	12.3	4.5	**11.2**	6.7	9.9	5.3	12.5	**8.6**	9.5	26.8	4.3	**13.5**	**11.1**
2	**KB1527**	10.0	15.5	9.3	**11.6**	11.9	11.2	19.3	26.6	**17.2**	15.3	21.9	3.1	**13.4**	**14.1**
3	**KB1530**	16.2	12.9	8.8	**12.6**	7.0	15.3	3.7	6.2	**8.0**	17.9	25.9	5.3	**16.3**	**12.3**
4	**NDB1660**	26.1	15.2	15.3	**18.9**	8.1	13.6	10.0	7.2	**9.7**	17.9	12.3	5.2	**11.8**	**13.5**
5	**RD2951**	5.9	11.2	3.8	**6.9**	2.2	3.4	1.8	18.8	**6.6**	17.8	45.9	1.6	**21.8**	**11.8**
6	**RD2952**	6.0	5.0	4.4	**5.1**	1.4	5.0	12.2	11.5	**7.5**	8.6	9.6	2.5	**6.9**	**6.5**
7	**RD2953**	19.6	36.7	7.2	**21.1**	15.8	15.1	17.3	9.7	**14.5**	20.9	18.8	4.0	**14.6**	**16.7**
8	**RD2954**	13.4	15.0	7.1	**11.8**	1.2	5.4	6.4	0.8	**3.5**	6.6	24.0	2.4	**11.0**	**8.8**
9	**UBP1066**	25.1	9.3	8.3	**14.2**	24.3	13.4	1.6	13.2	**13.1**	26.0	19.9	2.7	**16.2**	**14.5**
10	**UPB1064**	6.9	21.5	10.1	**12.9**	4.8	17.6	3.8	11.9	**9.5**	14.5	10.3	3.6	**9.5**	**10.6**
11	**UPB1065**	35.8	12.4	18.8	**22.3**	11.3	8.9	6.7	59.9	**21.7**	19.4	21.9	5.3	**15.5**	**19.8**
12	**AZAD (c)**	26.7	9.0	11.4	**15.7**	6.3	10.2	11.6	24.2	**13.1**	17.9	21.6	8.9	**16.1**	**15.0**
13	**RD2035 (c)**	17.7	32.3	8.4	**19.5**	19.6	8.1	5.7	34.1	**16.8**	18.1	16.0	8.5	**14.2**	**16.8**
14	**RD2552 (c)**	13.2	23.3	11.7	**16.1**	5.8	11.8	6.8	13.1	**9.4**	20.2	30.1	6.1	**18.8**	**14.7**
15	**RD2715 (c)**	20.6	20.1	21.4	**20.7**	3.4	5.5	43.7	9.3	**15.5**	19.9	9.8	14.7	**14.8**	**17.0**
		17.3	**16.8**	**10.0**		**8.7**	**10.3**	**10.4**	**17.2**		**16.7**	**21.0**	**5.2**		

Table 40. Grain crude protein content (% d wt) of entries from IVT (Dual Purpose Barley)

S.No.	Genotype	Hisar	Durgapura	Ludhiana	Mean (NWPZ)	Rewa	Kanpur	Faizabad	Varanasi	Mean (NEPZ)	Udaipur	Anand	Kota	Mean (CZ)	Mean (O)
1	**JB348**	11.1	17.3	10.3	**12.9**	8.8	11.1	9.6	9.2	**9.7**	14.1	15.7	11.5	**13.8**	**12.1**
2	**KB1527**	14.6	17.3	9.9	**13.9**	11.6	11.3	12.0	8.6	**10.9**	14.6	13.3	10.5	**12.8**	**12.5**
3	**KB1530**	11.4	17.0	9.6	**12.7**	10.2	11.1	11.0	8.6	**10.2**	14.7	19.2	10.6	**14.8**	**12.6**
4	**NDB1660**	10.4	15.6	10.4	**12.1**	9.6	10.6	8.3	9.7	**9.6**	13.2	12.3	10.1	**11.9**	**11.2**
5	**RD2951**	10.3	14.6	9.5	**11.5**	9.1	9.3	11.6	10.7	**10.2**	14.1	15.1	10.0	**13.1**	**11.6**
6	**RD2952**	10.7	13.5	9.6	**11.3**	9.2	10.1	8.6	9.9	**9.5**	12.5	12.6	10.7	**11.9**	**10.9**
7	**RD2953**	10.9	19.3	9.5	**13.2**	9.2	11.3	10.1	9.5	**10.0**	14.3	14.5	11.1	**13.3**	**12.2**
8	**RD2954**	13.8	17.0	10.0	**13.6**	9.6	8.8	10.2	14.4	**10.8**	12.8	13.7	11.2	**12.6**	**12.3**
9	**UBP1066**	10.8	13.8	9.6	**11.4**	9.1	9.6	9.1	9.9	**9.4**	13.6	12.6	8.9	**11.7**	**10.8**
10	**UPB1064**	8.9	14.4	8.7	**10.7**	7.4	9.2	7.2	10.1	**8.5**	13.3	14.3	9.3	**12.3**	**10.5**
11	**UPB1065**	13.5	16.0	11.0	**13.5**	10.2	10.2	10.3	12.2	**10.7**	14.3	15.4	11.2	**13.6**	**12.6**
12	**AZAD (c)**	11.6	14.6	9.5	**11.9**	9.6	9.3	10.5	10.2	**9.9**	14.2	10.9	8.5	**11.2**	**11.0**
13	**RD2035 (c)**	10.0	14.2	7.6	**10.6**	8.1	8.8	9.2	11.1	**9.3**	12.6	12.0	7.0	**10.5**	**10.1**
14	**RD2552 (c)**	9.5	14.3	8.7	**10.8**	8.3	9.7	6.8	10.3	**8.8**	13.3	13.0	9.0	**11.8**	**10.5**
15	**RD2715 (c)**	10.3	18.0	10.8	**13.0**	8.1	9.2	13.5	8.9	**9.9**	11.8	12.0	10.4	**11.4**	**11.5**
		11.2	**15.8**	**9.6**		**9.2**	**10.0**	**9.9**	**10.2**		**13.6**	**13.8**	**10.0**		

Table 41. Test weight (kg/hl) and thousand grain weight (g) of entries from AVT (Dual Purpose Barley) in North Hill Zone

S.No.	Genotype	Test weight (kg/hl)				Thousand grain weight (g)			
		Shimla	Almora	Bajaura	Mean	Shimla	Almora	Bajaura	Mean
1	BHS447	67.6	64.2	58.7	**63.5**	48.0	39.7	45.7	**44.5**
2	BHS452	58.1	55.0	53.7	**55.6**	39.8	32.4	41.2	**37.8**
3	BHS453	65.7	64.5	55.2	**61.8**	45.0	42.0	45.5	**44.1**
4	BHS454	60.5	59.8	51.9	**57.4**	43.0	35.5	39.9	**39.5**
5	BHS455	63.6	61.9	56.0	**60.5**	36.8	32.6	33.0	**34.1**
6	VLB147	68.6	66.8	60.9	**65.4**	40.6	31.3	31.7	**34.6**
7	VLB150	66.3	65.1	57.5	**63.0**	41.5	35.2	33.8	**36.8**
8	VLB151	63.7	59.8	54.7	**59.4**	41.5	42.1	43.3	**42.3**
9	VLB152	57.8	56.2	47.2	**53.7**	37.8	32.9	36.4	**35.7**
10	VLB153	61.5	56.7	52.9	**57.0**	37.8	37.3	31.7	**35.6**
11	HBL764	75.5	74.3	49.1	**66.3**	32.5	26.4	27.1	**28.7**
12	HBL776	78.0	74.9	47.7	**66.9**	39.4	33.0	34.1	**35.5**
13	HBL777	73.5	75.2	50.7	**66.4**	36.1	32.0	32.2	**33.4**
14	HBL778	61.7	57.1	52.9	**57.2**	45.2	36.9	39.5	**40.5**
15	HBL276 (c)	76.6	71.7	68.1	**72.1**	35.2	28.2	32.7	**32.0**
16	BHS380 (c)	64.2	61.7	55.0	**60.3**	36.2	37.4	33.1	**35.6**
17	HBL400 (c)	60.9	55.7	54.8	**57.1**	43.4	36.3	38.9	**39.6**
	Mean	**66.1**	**63.6**	**54.5**		**40.0**	**34.8**	**36.5**	

Table 42. Bold & thin percentage and grain crude protein (% dwt) of entries from AVT (Dual Purpose Barley) in North Hill Zone

S.No.	Genotype	Bold grains (%)				Thin grains (%)				Crude protein (% dwt)			
		Shimla	Almora	Bajaura	Mean	Shimla	Almora	Bajaura	Mean	Shimla	Almora	Bajaura	Mean
1	BHS447	91.1	75.4	92.1	**86.2**	2.6	5.1	1.6	**3.1**	9.9	11.9	9.7	**10.5**
2	BHS452	74.5	54.3	87.1	**72.0**	7.6	9.8	2.5	**6.6**	12.3	14.8	9.6	**12.2**
3	BHS453	81.6	74.9	88.7	**81.8**	2.9	3.7	1.6	**2.7**	12.8	12.7	9.6	**11.7**
4	BHS454	91.5	83.5	92.5	**89.2**	1.8	2.1	2.1	**2.0**	12.1	12.5	10.2	**11.6**
5	BHS455	71.5	54.6	76.2	**67.4**	6.9	10.6	4.2	**7.2**	10.8	12.1	9.6	**10.8**
6	VLB147	74.9	60.3	72.4	**69.2**	6.4	8.1	6.5	**7.0**	11.2	12.4	8.4	**10.7**
7	VLB150	86.0	70.3	71.6	**76.0**	3.7	4.2	4.8	**4.2**	9.2	12.6	9.7	**10.5**
8	VLB151	89.9	81.4	92.4	**87.9**	1.8	3.5	1.2	**2.2**	13.1	11.7	9.6	**11.5**
9	VLB152	69.0	59.3	60.6	**63.0**	6.4	10.3	11.3	**9.3**	9.7	12	10.1	**10.6**
10	VLB153	69.3	58.5	74.9	**67.5**	5.8	9.4	5.1	**6.8**	11.8	12.7	10	**11.5**
11	HBL764	50.1	21.0	78.6	**49.9**	13.0	38.8	15.3	**22.3**	12.1	13.3	10.8	**12.1**
12	HBL776	70.5	41.9	58.7	**57.0**	6.9	16.6	14.9	**12.8**	12.3	14.1	10.5	**12.3**
13	HBL777	65.5	34.6	58.0	**52.7**	4.8	19.2	10.2	**11.4**	11.9	15.9	10.7	**12.8**
14	HBL778	88.2	70.5	86.5	**81.7**	2.3	5.1	1.9	**3.1**	12.7	15.1	10.4	**12.7**
15	HBL276 (c)	34.4	10.5	22.3	**22.4**	33.2	51.9	30.8	**38.6**	10.5	13.6	10.9	**11.7**
16	BHS380 (c)	71.8	65.8	73.1	**70.2**	6.2	6.5	5.2	**6.0**	11.4	13.8	9.3	**11.5**
17	HBL400 (c)	78.9	52.6	68.8	**66.8**	5.4	14.4	6.2	**8.7**	10.2	13.3	9.1	**10.9**
	Mean	**74.0**	**57.0**	**73.8**		**6.9**	**12.9**	**7.4**		**11.4**	**13.2**	**9.9**	

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

Duration: 15Feb. to 17Feb, 2017 **Locations:** Kota, Udaipur, Vallabhnagar and Banswara

The zonal monitoring of the barley coordinated yield trialsconducted in Central Zone was held during February 15 to 17 Feb.2017. During the monitoring, the centres namely Kota, Udaipur, Vallabhnagar and Banswarawere visited by Drs. Vishnu Kumar, Lokendra Kumar and Sudesh Kumar.

The trial wise observations are summarized below-

AVT-FB-CZ: The trial was monitored at threelocations viz. Kota, Udaipur and Banswara. The trial was good in shape and treatment differences were clear among the entries. EntryRD2899 and check BH959 were observed with off types for plant height and waxy spikes. Medium incidence for spot blotch was observed in the check RD2786 (35).

AVT-FB-DP-CZ: The trial was monitored at threelocations viz. Kota, Udaipur and Banswara. The trial was laid out as per the technical programme. Two replications (I and IV) were rejected at Udaipur location due to the poor plant stand and termite infestations. Entry RD2927 and checksAZAD and RD2715 were observed with off types for plant height and waxy spikes.

IVT-IR-FB: The trial was monitored at Udaipur and Banswara centres. The trial was good in shape and conducted as per technical programme. In entries namely, IVTIRFB-12, 14, 16, 25 and 27 segregation/mixture was observed.

IVT-IR-DP: The trial was monitored at threelocations viz. Kota, Udaipur and Banswara. The trial was laid out as per the technical programme. The crop was in good condition at all the locations. In one entry namely, IVTIRTSDP-11 segregation/mixture was observed.

Agronomy Trials: Agronomic experiments were monitored at Kota, Udaipur and Vallabhnagar locations. At Vallabhnagar, heavy weed infestation was observed in salinity/alkalinity trial, rest of the experiments at Kota and Udaipur were satisfactory.

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

Trial	Segregation/mixture	Offtypes
AVT-IR-FB-CZ	-	RD2899
AVT-IR-DP	-	RD2927
IVT(IR-FB)	IVTIRFB-12, 14, 16, 25 , 27	IVTIRFB-2, 8, 10, 16, 22
IVT-DP	IVTIRTSDP-11	IVTIRTSDP-6

Sd/-
Vishnu Kumar
ICAR-IIWBR, Karnal

Sd/-
Lokendra Kumar
ICAR-IIWBR, Karnal

Sd/-
Sudesh Kumar
RARI, Durgapura

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

Duration: 28 Feb. to 02 March, 2017
Locations: Mathura, Kumher, Agra, Morena, Gwalior, Vanasthli, Durgapura and Bawal

The zonal monitoring of the barley coordinated yield trials conducted in NWPZ and Central Zone was held during February 28 to March 02, 2016. During the monitoring, the centres namely Mathura, Agra, Kumher, Morena, Gwalior, Vanasthli, Durgapura and Bawal were visited by Drs. AS Kharub Dr Chuni Lal from ICAR-IIWBR, Karnal and Sudesh Kumar from RARI Durgapura.

The trial wise observations are summarized below-

AVT-MB-TS: The trial was monitored at Mathura, Durgapura and Bawal locations. The trials at Mathura were sown on 24 November. It was rejected because whole trial was damaged by wild animals. At other locations the trial was very good and as per layout and technical programme. Checks seem to be little superior to new entries in performance.

IVT-MB-TS: The trial was monitored at Mathura, Durgapura and Bawal locations. The trials at Mathura was sown on 24 November. It was rejected because whole trial was damaged by wild animals. At other locations the trial was very good and as per layout and technical programme. Some entries like IVT MB TS 3, 12,16,17,24 were late in flowering, entry like IVT MB TS 6 were having mixtures.

IVT-MB-LS: The trial was monitored at Durgapura and there it was very good and as per layout and technical programme sown on 15th December. The entry IVTIRMB LS 2 was showing mixtures..

AVT-FB-CZ: The trial was monitored at Gwalior and Morena. The trial of Gwalior was not uniform due to faulty spraying of herbicide, the crop growth was adversely affected. The trial at Morena was in good shape and the expression was very good.

AVT-DP-CZ: The trial was monitored at Gwalior and Morena. The trial of Gwalior was not uniform due to faulty spraying of herbicide, the crop growth was adversely affected. The trial at Morena was in good shape and the expression was very good. The rejuvenation of most of the entries was good and comparable with the check RD 2715.

AVT-SAL/ALK: The trial was monitored at Kumher and Vanasthli. At Kumher, the trial sowing was too late and could not judge the purity of entries. At Vanasthli, the trial was very good. Although the layout/sowing was done with key numbers. However, corrective measures were taken by informing the concerned scientist with the names of varieties/entries corresponding to the key numbers, and asked to replace the tags with the tags with names of the entries.

IVT-IR-FB-: The trial was monitored at three locations *viz*. Gwalior, Morena, and Durgapura. The trial was good in shape and treatment differences were clear among the entries at Morena and Durgapura. The trial at Gwalior was having uneven growth due to by the faulty spraying of herbicide. . Entries IVT-FB—no. 7,12,14,16 and 25 were rejected due to segregation/mixture and entries no. 8,12,15 need purification due to off types/mixtures. The most of the entries were rust free except few with minor incidence.

IVT-IR-DP: The trial was monitored at Durgapura. The trial was good in shape and treatment differences were clear among the entries. Entries IVT-DP no. 6 and 14 were having segregation/mixture and entries no. 1,4,20, 28 need purification due to off types/mixtures.The entry no. 3 have the rust incidence up to 60S, entry 11 have the leaf blight incidence 89.

Agronomy Trials: Seven barley agronomy experiments were monitored at Agra and Durgapura. AVT malt barley with nitrogen levels, varieties under conservation tillage, manure/mulching effect on barley productivity, biofertilisres in barley, use of potash in barley, plant growth regulators use in barley and spacing in feed barley trials/experiments were conducted nicely and properly laid out. Apparently, *at par* response of all the treatment combinations with checks/controls in integrated nutrient management, potash use,

biofertilisers and PGRs was observed. However, it was noticed that the treatments with nitrogen levels showed differences. At Gwalior two agronomy trials were conducted but these were rejected due to uneven growth in different treatments due to faulty spraying of herbicides.

National/International nurseries, quality nursery, plant pathological nurseries, entomological and CCN nurseries were also planted at Durgapura and were properly planted and managed. One trial for aphid management was also conducted at Durgapura but aphid population was very less so most of the treatments were comparable.

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

Trial	**Segregation/mixture**	**Offtypes (needs Purification)**
IVT-IR-FB)	Entries IVTIR-FB—no. 7,12,14,16 and 25	IVTIRFB- 1,3, 13,20
IVT-DP	IVTDP 14	IVETDP 6,8,15
AVT-SAL/ALK	Key No. 14, 11, 7(Vanasthli)	8,19
IVT-MB-TS	IVT MB TS 6	IVT MB TS 7,9,18,25
IVT-MB-LS	IVT MB LS 2	-

Sd/-
AS Kharub
ICAR-IIWBR, Karnal

Sd/-
Chuni Lal
ICAR-IIWBR, Karnal

Sd/-
Sudesh Kumar
RARI Durgapura

Barley Network (AICW&BIP)
Monitoring Report of NWPZ

Duration: 5th – 8th March 2017

Locations visited: Hisar, IIWBR Hisar, Sriganaganagar, Bhathinda, Ludhiana, Dholakuan and Karnal

Team Members

Dr. Jogendra Singh, Pr. Scientist (Plant Breeding), Barley Network, IIWBR, Karnal
Dr. Simarjit Kaur, Assistant Breeder (Barley), PAU, Ludhiana
Dr. Kailash Prajapat, Scientist (Agronomy), IIWBR, Hisar Farm

The team constituted by the Director, IIWBR, Karnal for monitoring of Barley Network Trials & Nurseries in NWPZ, assembled at IIWBR, Karnal on 4th March, 2017 and visited the different locations as per schedule.

A: Location wise observations

Hisar

Six barley coordinated trials (AVT-MB-IR-TS, IVT-MB -IR-TS, IVT-MB- IR-LS, IVT-FB-IR-TS, IVT-IR-Dual and AVT-SAL/ALK) were monitored on 5th March, 2017 at the centre. All the experiments were in good conditions with no severe incidence of rusts and leaf spot on entries.

IIWBR, Hisar Farm

Only one trial, AVT-SAL/ALK was monitored at IIWBR, Hisar farm on 5th March, 2017 and was found in good condition.

Sriganganagar

Only one trial, AVT-MB-IR-TS was monitored atSriganganagar on 5th March, 2017 and was found in good condition.

Bathinda

The team visited three coordinated barley yield trials (AVT-MB-IR-TS, IVT-MB -IR-TS, IVT-MB- IR-LS,) at this location on 6th march, 2017. All the trials were in good condition and as per the technical programme.

Ludhiana

The team visited at the centre on 7th March, 2017 at this location. All the five allotted trials (AVT-MB-IR-TS, IVT-MB -IR-TS, IVT-MB- IR-LS, IVT-FB-IR-TS, IVT-IR-Dual were conducted at the centre. Trials were in good condition and the crop expression was very good. All allotted disease/ pest screening nurseries were conducted with good incidence of the disease/pests on the infector lines. Five agronomic trials were also conducted at the centre, those were in good conditions.

Dhaulakuan

Only one trial, AVT-MB-IR-TS was monitored atDholakuan on 5th March, 2017 and was found in good conditions. Three barley pathological nurseries were also monitored at the same station, those were planted in proper way.

B: Disease / pest incidence.

During the season incidence of yellow rust and leaf blight was present in severe form on some entries at Ludhiana and Karnal. Incidence of covered and loose smut was present on Bhathinda and Hisar location.

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, though there were other entries also with few off types.

Trial Name	Entries with	
	Segregation / mixtures	Off types
AVT-MB-TS	RD2849, DWRUB52	DWRB101, DBRW 123
AVT- SAL/ALK	NDB1445	KB1523, KB1546, NDB1665, DWRB165, RD2957
IVT-MB-TS	IVT-MB-TS-20,	IVT-MB-TS-5, IVT-MB-TS-7, IVT-MB-TS-8, IVT-MB-TS-9, IVT-MB-TS-10, IVT-MB-TS-18, IVT-MB-TS-19, IVT-MB-TS-25,
IVT-MB-LS		IVT-MB-LS-2, IVT-MB-LS-3, IVT-MB-LS-7, IVT-MB-LS-10,
IVT-IR-FB	IVT-IR-FB-12, IVT-IR-FB-14, IVT-IR-FB-16, IVT-IR-FB-24,	IVT-IR-FB-1, IVT-IR-FB-3, IVT-IR-FB-6, IVT-IR-FB-20, IVT-IR-FB-25,
IVTIRTSDP	IVTIRTSDP-14	

E. Disease / pest screening

Team visited at different locations of NWPZ. At Bathinda, there was no incidence of rusts in any of the trials while covered smuts were observed in few plots. At Dholakuan, all nurseries were conducted as per recommendation. In one plot of barley, Spot blotch was observed under natural conditions. At Ludhiana location, the stripe rust, leaf blights and covered smut were observed in all trials with varying intensity.

F. Agronomy Trials

Among the stations visited, Agronomy trials are being conducted at Hisar, Ludhiana and Karnal stations. At Hisar (CCSHAU), all the allotted trials have been executed with proper layout, replications, treatment allocation and are managed well. One Agronomic trial is conducted at IIWBR, Seed and research unit Hisar.

All the trails were sown meticulously as per layout, experimental design, allocation of treatments and managed excellently at Ludhiana centre.

At IIWBR, Karnal all the allotted trials sown with standard design and layout provided. Trails are being managed with good agronomic practices required under each trial.

(Kailash Prajapat)
Scientist (Agronomy)
IIWBR Farm, Hisar

Simarjit Kaur
Assistant Breeder (Barley),
PAU, Ludhiana

(Jogendra Singh)
Principal Scientist,
IIWBR Farm, Hisar

Barley Network (AICW&BIP)
Monitoring Report of NEPZ

Duration: 22nd to 25th February 2017

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

Team: DrChuni Lal, Principal Scientist, Barley Network, ICAR-IIWBR, Karnal
Dr Vishnu Kumar, Scientist, Barley Network, ICAR-IIWBR, Karnal
Dr PK Gupta, Barley Breeder, CSAUA&T, Kanpur
DrJavedBahar Khan, Wheat Pathologist, CSAUA&T, Kanpur

The team constituted by the Director, IIWBR, Karnal for monitoring of Barley Network Trials and Nurseries in the NEPZ, assembled at CSAUA&T, Kanpur on 22nd February 2017 and visited different locations of the zone from 22nd to 25th February. Dr RPS Verma from ICARDA also joined the team to monitor the International Trials and Nurseries of barley supplied to Kanpur, Faizabad and Varanasi locations through IIWBR, Karnal. This team visited the experimental fields and meticulously observed the trials and the other technical programme allotted to the centresin the last annual Wheat and Barley Workshop. The notable observations made by the team are briefed hereunder trialwise.

AVT-FB-NEPZ: This trial was monitored at Kanpur, Faizabad and Varanasi locations. The trial was laid out in accordance with the technical programme. The trial of Faizabad centre was rejected due to very poor plant stand. Excessive rat damage was observed in two replications therefore those two replications were rejected at Varanasi. Medium to high incidence was observed for spot blotch at Varanasi in the entry RD2921 (67) and check RD2552 (67).
AVT-RF-NEPZ: This trial was conducted at Kanpur, Faizabad, Saini and Varanasi locations. It was laid out as per the proposed technical programme. However, at all the locations high incidence (89-99) of leaf blight was observed in the AVT first year entry JB328.

AVT-Sal/ALK: This trial with test entries of IVT, AVT and checks was conducted atDalipnagar and Faizabad (I&II) locations. At both the locations tags were found mismatched and were corrected by the monitoring team as per trial key numbers. In entries namely, KB1507, KB1523, HUB258 and checks NDB1173 and NDB1445 segregation/mixture was observed. Incidences of loose and covered smuts were observed in traces, however, in case of RD2958 loose smut was observed to the tune of 10% at Faizabad location. The entry RD2955 was observed with very stunted growth at all the locations, whereas the entry KB1546, NDB1655 were observed with few off-types. The entries RD2956 and RD2957 showed spot blotch reaction of 37 and 36, respectively.

IVT-RF-NEPZ: This trial was conducted at Kanpur, Varanasi, Saini and Faizabad locations. The trial was laid out in accordance with the proposed sowing plan for these centres. The crop was in good condition. The second and third replications at Faizabad were rejected due to poor plant stand. In some entries viz., IVTRFNEP-14 (99), IVTRFNEP-7,8&11 (79), IVTRFNEP-4&10 (68) and IVTRFNEP-2 (67) very high incidences of leaf blight were observed at Faizabad location.

IVT-IR-FB-NEPZ: This trial was conducted at Kanpur, Faizabadand Varanasi locations. Lay out of the trial was in line with the technical programmes for these centres. The crop was in good condition. In four entries namely, IVTIRFB-12, IVTIRFB-14, IVTIRFB-16 and IVTIRFB-25 segregation/mixture was observed. In entries IVTIRFB-13, IVTIRFB-15, IVTIRFB-19 as high as 99 incidences of leaf blight were observed. Entry IVTIRFB-11 was very good at all the three locations.

IVT-IR-Dual Purpose: This trial was conducted at Kanpur, Faizabad and Varanasi locations as per the proposed lay out. The crop was in good condition at all the locations. In one entry namely, IVTIRTSDP-11 segregation/mixture was observed. High incidences of leaf blight were noticed in the entries namely, IVTIRTSDP-1& 12 (79) and IVTIRTSDP-10& 11 (99), respectively.

International trials and nurseries: At Kanpur four (INBYT-HI, 4thGSBSN, INBON-HI and 4thGSBYT), whereas at Faizabad two (4thGSBSN and 4thGSBYT) international trials and nurseries were conducted. In addition,two nurseries NBGSN and EIBGN were also planted at Kanpur, Faizabad and Varanasi locations.

Barley Pathology:

Initial Barley Disease Screening Nurseries (IBDSN, NBDSN, EBDSN) were being screened for leaf rust at Kanpur and Faizabad and for leaf blight at Kanpur, Faizabad and Varanasi. Experiments for *chemical control of barley leaf blight* were conducted at Kanpur, Faizabad and Varanasi locations. Both the experiments on *screening of NBDSN against aphids* and *chemical control of foliar aphids* allotted to Kanpur centre were conducted satisfactory.

Barley Agronomy:

Except at Varanasi where five experiments on agronomic management were conducted, the remaining two centres Kanpur and Faizabad six such experiments were conducted as per the proposed technical programme for these centres. The agronomic experiments were planted very late atMasauda (Faizabad)and unanimously suggested by the monitoring team to plant such experiments timely. In case of an experiment on optimization of row spacing for feed barley, there was problem with the plot size at Kanpur and Varanasi locations.

The entries observed with segregation/mixtures and needs purification

Trail	Segregation /mixture	Needs purification
AVT-Sal/ALK	KB1507, KB1523, HUB258	KB1546, NDB1655
IVT-RF-NEPZ	-	IVTRFNEP 4
IVT-IR-FB	IVTIRFB-12, 14, 16, 25	IVTIRFB-1, 8, 17, 20, 22
IVT-IR-Dual Purpose	IVTIRTSDP-11	IVTIRTSDP-6

-sd- DrChuni Lal, Principal Scientist, Barley Network, ICAR-IIWBR, Karnal	-sd- Dr Vishnu Kumar, Scientist, Barley Network, ICAR- IIWBR, Karnal	-sd- Dr PK Gupta, Barley Breeder, CSAUA&T, Kanpur	-sd- DrJavedBahar Khan, Wheat Pathologist, CSAUA&T, Kanpur

Proforma for Zonal Monitoring Report

Zone: NHZ

Period of visit:

Name of team members:

Name	Centre
Dr Chunni Lal	ICAR-IIWBR, Karnal
Dr Lakshmi Kant, Dr K K Mishra	ICAR-VPKAS, Almora
Dr Dhirendra Singh	CSK HPKV, HAREC Dhaulakuan
Dr Madhu Patial	ICAR-IARI CHC, Tutikandi, Shimla

Centres visited:

Centre	Date
Ranichauri	12.04.17
Majhera	13.04.17
Hawalbagh	14.04.17

Breeding trials allocated & monitored:

Centre		Trial	Remark
Ranichauri	Wheat	IVT-TS-RF	Very Good
		IVT/AVT-LS-RI	Very Good
	Barley	AVT-TS-RF Grain	Very Good
	Triticale	SPL-TCL- TS-RF	Very Good
Majehra	Wheat	IVT/AVT-ES-RF	Very Good
		IVT/AVT-LS-RI	Very Good
	Barley	AVT-TS-RF Grain	Very Good
		AVT-TS-RF Dual	Very Good
Hawalbagh	Wheat	IVT/AVT-ES-RF	Very Good
		IVT-TS-RF	Very Good
		IVT/AVT-LS-RI	Very Good
	Barley	AVT-TS-RF Grain	Good
		AVT-TS-RF Dual	Very Good

Trials not conducted/rejected by monitoring team:

Centre	Trial	Remark
	Nil	

Entries recommended for purification

Trial	Entry	Remarks
Wheat		
IVT-TS-RF &IR	NHIVT 1604	Few non waxy plants
	NHIVT1608	Few tall plants
	NHIVT 1617	Few awnless plants
	NHIVT 1619	Few tall plants
	NHIVT 1622	Few awnless plants
IVT/AVT-LS-RI	HS 647	Few tall plants
	HPW 448	Few tall plants

Trial	Entry	Remarks
Barley		
AVT-TS-RF Grain	HBL 765	Few 2 rowed off type plants
	HBL 778	Few tall plants
AVT-TS-RF- Dual	BHS 453	Few erect plants
	HBL 764	Few 2 rowed off type plants
	HBL 776	Few 2 rowed off type plants
	HBL 777	Few erect plants
	HBL 778	Few 2 rowed off type plants
SPL-TCL-RF-TS	TL 3012	Ear shape variation

Entries recommended to be dropped from further testing:

Trial	Entry	Remarks
Wheat		
IVT-TS-RF & IR	NHIVT 1605	Segregating for height and maturity
Barley		
AVT-TS-RF Grain	UPB 1062	Mixture for 2 and 6 rowed

Entries exhibiting higher diseases/insect infestation:

Entry	Disease response
HS 490	YR- 20S in IVT/AVT-LS-RI at Ranichauri

Report on Agronomical Trials:

Wheat

Trial	Centre	Remark
SPL-1- Evaluation of herbicides--- in wheat	**Hawalbagh**	Conducted properly but no weed infestation in weedy check.
SPL-2-Management of lodging----- nutrient expert		Conducted properly, treatment effects were visible
SPL-4- Validation of LCC		Conducted properly, treatment effects were visible
SPL-12-Precision nutrient management in wheat		Conducted properly, treatment effects were visible

Barley

Trial	Centre	Remark
SPL-7- Optimization of row spacing for feed barley	**Hawalbagh**	Conducted properly, treatment effects were visible

Report on Pathological Nurseries:

Centre	Nursery	Remark
Hawalbagh		
	Wheat	

	LSSN	Conducted properly and disease pressure was very good.
	PMSN	Conducted properly but disease pressure was less.
	MDSN	Conducted properly but disease pressure was less.
	EPPSN	Conducted properly but disease pressure was less.
	SAARC	Conducted properly but disease pressure was less.
	HBSN	Conducted properly but disease pressure was less.
	Barley	
	NBDSN	Conducted properly but disease pressure was less.
	EBDSN	Conducted properly but disease pressure was less.
	IBDSN	Conducted properly but disease pressure was less.

Report on Physiology Trials MLHT-1 & 2:

Centre	Remark
NIL	

Special comments, if any

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

Signature of the monitoring team

Dr Chunni Lal	Dr Dhirender Singh	Dr Madhu Patial	Dr K K Mishra	Dr Lakshmi Kant
ICAR-IIWBR,	HAREC,	ICAR-IARI RS	ICAR-VPKAS	ICAR-VPKAS
Karnal	Dhaulakuan	Tutikandi, Shimla	Almora	Almora

Zonal Monitoring Report 2016-17
Zone: NHZ (Barley Trials)

Period of visit: 18.4.17 to 21.4.17

Name of team members:

Dr. Dharam Pal, ICAR-IARI Regional Station, Tutikandi Centre, Shimla
Dr. Vijay Rana, CSK-HPKV, RWRC, Malan, HP
Dr. Naval Kishore, CSK-HPKV, HAREC, Bajaura, HP
Dr. Hanif Khan, ICAR-IIWBR, RS, Shimla, HP
Dr. PL Kashyap, ICAR-IIWBR, Karnal

Centres visited:

Reg. Station, IARI Shimla
RSS Berthin
SAREC Kangra, RWRC Malan, CSK-HPKV Palampur
HAREC, Bajaura, Katrain

Breeding trials allocated & monitored:

Centre	Trial	Remark*
Shimla	IVT/AVT-Barley- Grain, IVT/AVT-Barley- (Dual purpose)	Very good
Palampur	IVT/AVT-Barley- (Dual purpose)	Average
Berthin	IVT/AVT-Barley- Grain	Very good
Kangra	IVT/AVT-Barley- Grain	Good**
Malan	IVT/AVT-Barley- Grain	Very good
Bajaura	IVT/AVT-Barley- Grain, IVT/AVT-Barley- (Dual purpose)	Very Good

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

**** Trial was conducted with three replications.**

Trials not conducted / rejected by monitoring team:

Centre	Trial	Remark
Palampur	IVT/AVT-Barley-(Dual purpose)	Rejected on account of poor germination/crop stand and delayed fodder cut taken at 90days after sowing instead of 70DAS.

Entries showing promising performance in breeding trials:

Trial	Entry	Remarks
IVT/AVT-Barley- Grain	UPB1061, VLB149, BHS460	Good agronomic score
IVT/AVT-Barley- (Dual purpose)	VLB152, BHS454	-do-

Entries recommended for purification:

Trial	Entry	Remarks
IVT/AVT-Barley- Grain	HBL765	Few off types for height, maturity and 2 rows
IVT/AVT-Barley- (Dual purpose)	HBL776, HBL778	Few off types for height

Entries recommended to be dropped from further testing

Trial	Entry	Remark
IVT/AVT-Barley- Grain	HBL764	Mechanical mixture, variation for height and 2/6 rows
IVT/AVT-Barley- (Dual purpose)	HBL764	Mechanical mixture, variation for height and 2/6 rows
	BHS447	Variation for waxy/non-waxy ears

Entries exhibiting higher diseases incidence / insect infestation

Trial	Entry	Remarks
IVT/AVT-Barley- Grain	HBL780	30S Yellow rust

Report on Agronomical Trials:

Centre	Trial	Remark
Malan	SPL-4	Nicely conducted. Visual effect of bio-fertilizer was visible. However, the grain yield data will substantiate the effect of bio-fertilizer. 75%N (45Kg/ha) and 100%N (60Kg/ha) visually giving similar expression.
	SPL-2	The trial was nicely conducted. Seed rate with 125Kg was looking better.
	SPL-1 & SPL-7	Both of the trials were nicely conducted and grain yield data will depict the effects.
Bajaura	SPL 1, SPL 2, SPL4, SPL7	Nicely conducted and treatment effects were visible

Report on Pathological Nurseries:

Centre	Nursery	Remark (Resistant entries)
Bajaura	IBDSN	UPBM 2, UPBM 3, UPBM 4, UPBM 6, UPBM 8, PKB 1628, PKB 1633, PKB 1634, PKB 1636, PKB, 1638 , PKB 1640, BK 1601, BK 1606, BK 1607, BK 1608, BK 1609, BK 1610, HBL 789, HBL 790, HBL 791, HBL 817, JB 354, JB 355, JB 356, JB 357, BL 1228.,BL 1233. NDB 1697, NDB 1698, BBM 754, VB 1601, VB 1608, VB 1609, VB 1624, VB 1625, VB 1626, BD 1726, BD 1736, BD 1750, BH 1601, DWRNB 23, DWRNB 25
	NBDSN	NBDSN 1, NBDSN 2, NBDSN 3, NBDSN 12, NBDSN 20, NBDSN 28, NBDSN 29, NBDSN 44, NBDSN 55, NBDSN 67, NBDSN 79, NBDSN 80, NBDSN 106, NBDSN 107, NBDSN 113, NBDSN 114, NBDSN 118, NBDSN 119, NBDSN 129, NBDSN 145, NBDSN 162, NBDSN 163
	EBDSN	DWRB 127, DWRB 147, DWRB 149, DWRB 150, DWRB 152, BH 995, KB 1318, BCU 7819, BH 981, RD 2930, RD 2935

Special comments, if any – One agronomist to be included in the Zonal Monitoring Team.

Signature of the monitoring team members

(Dharam Pal) (P. L. Kashyap) (Vijay Rana) (Naval Kishore) (Hanif Khan)

Barley Front Line Demonstrations (BFLDs) during 2016-17

During the rabi crop season 2016-17, 100 Barley Front Line Demonstrations (BFLDs) were allotted to 20 different cooperating centers all over India in six states namely, HP, UP, Punjab, Haryana, Rajasthan and MP of which 85 were conducted by 18 centers, covering 93.7 hectares area of 206 farmers. Improved barley varieties with complete package of practices (irrigation management, fertilizer dose and method of application, weed control, seed treatment etc.) were demonstrated.

Centre wise distribution of Barley FLDs during rabi 2016-17

S.No.	Zone and Centre	Allotted (1 BFLD=1 ha)	Conducted (1 ha basis)	Area sown (ha)	No. of farmers/ locations
	NHZ				
1.	CSKHPKV, HAREC, Bajaura, Kullu (HP)	5	2	2.0	12
2.	IARI, RS, Amartara Cottage, Shimla (HP)	5	Not conducted	-	-
	NEPZ				
3.	NDUA&T, Narendranagar, Kumarganj, Faizabad (UP)	5	5	5.4*	9
4.	KVK (IAS-BHU), Barkachha, Mirzapur (UP)	5	Not conducted	-	-
5.	CSAUA&T, Kanpur (UP)	5	5	6.4*	16
6.	BHU, Varanasi (UP)	5	3	2.5	3
	NWPZ				
7.	ICAR-IIFSR, Modipuram, Meerut (UP)	5	5	6.6	18
8.	PAU, Ludhiana (Punjab)	5	5	5.0	9
9.	CCSHAU, Hisar (Haryana)	5	5	5.0	10
10.	KVK (CCSHAU), Fatehabad (Haryana)	5	5	6.4	16
11.	KVK, Rampura, Rewari (Haryana)	5	5	5.0	11
12.	KVK (CCSHAU), Bhiwani (Haryana)	5	5	6.6*	11
13.	RARI (SKNAU), Durgapura, Jaipur (Rajasthan)	5	5	5.0	9
14.	KVK, Tankarda, Chomu, Jaipur (Rajasthan)	5	5	5.0	8
	CZ				
15.	RCOA, MPUA&T, Udaipur (Rajasthan)	5	5	5.0	10
16.	KVK (MPUA&T), Dhoinda, Rajasmand (Rajasthan)	5	5	5.0	12
17.	ZARP, COA, JNKVV, Kuthulia Farm, Rewa (MP)	5	5	5.0	5
18.	KVK (JNKVV), Purushottampur, Panna (MP)	5	5	5.0	15
19.	KVK (RVSKVV), Juara Khurd, AB Road, Morena (MP)	5	5	6.4*	16
20.	KVK (RVSKVV), Lahar, Bhind (MP)	5	5	6.4*	16
		100	**85**	**93.7**	**206**

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

The highest increase in barley yield was recorded in UP (25.33 %) followed by HP (23.51 %), Madhya Pradesh (19.46 %), Rajasthan (18.18 %) and Haryana (08.92%). The lowest increase in yield was reported in Punjab (05.55 %). The yield gain due to improved varieties over regional mean yield was highest in Northern Hills Zone (43.21 %) followed by central zone (39.42 %), north eastern plains zone (36.47 %) and north western plains zone (15.16 %).

State wise yield gain during 2016-17

State	BFLDs yield (q/ha)	Check yield (q/ha)	% increase
HP	24.06	19.48	23.51***
UP	43.25	34.51	25.33***
Punjab	46.44	44.00	05.55*
Haryana	46.02	42.25	08.92***
Rajasthan	48.75	41.25	18.18***
MP	46.34	38.79	19.46***

*** Significant at 1 percent level, ** - Significant at 5 percent level.

The yield gain due to improved varieties over check mean yield was highest in north eastern plains zone (30.15 %) followed by northern hills zone (23.51 %) central zone (20.37 %) and north western plains zone (11.45 %) (Table 6). Therefore, efforts should be made to increase barley yield in the NEPZ and CZ in collaboration with the state department of agriculture.

Zone wise productivity over regional during 2016-17

Zone	BFLDs yield (q/ha)	Regional mean yield (q/ha)	% Increase
NHZ	24.06	16.80	43.21***
NEPZ	41.87	30.68	36.47***
NWPZ	48.00	41.68	15.16***
CZ	45.02	32.29	39.42***

*** Significant at 1 per cent level.

The yield gain at Rajsamand (35.20 %) centre was highest followed by Faizabad (33.60 %), Kanpur (29.31 %), Panna (25.49 %), Bajaura (23.51 %), Bhind (20.18 %) and Meerut (19.42 %) centers across the zones. The increase in improved variety's yield at Ludhiana over check variety was the lowest (05.55 %) but significant. In NHZ, BHS 400 was the highest average yielding (25.40 q/ha) variety at Bajaura centre. In NEPZ, RD 2794 at Kanpur (45.00 q/ha), BH 946 at Chomu Jaipur (63.02 q/ha) in NWPZ and BH 959 at Morena (52.50 q/ha) in central zone were the highest average yielding varieties.

At particular farmers' field as well as on average basis BHS 400 (26.40 q/ha), Rd 2794 (48.00 q/ha), BH 946 (65.10 q/ha) and BH 959 (55.00 q/ha) performed better than other varieties at Bajaura, Kanpur, Chomu-Jaipur and Bhind centres in the NHZ, NEPZ, NWPZ and CZ, respectively.

Barley varieties grown in different zones during 2016-17

Zone	Improved varieties	Check varieties	Popular varieties in the region
NHZ	BHS 400	HBL 316, Sonu	Sonu, Dolma, HBL 316, HBL 276, Local
NEPZ	RD 2794, HUB 113	Faizabad Local, Azad, Jyoti	Faizabad Local, Azad, Jyoti
NWPZ	BH 946, DWRB 101	PL 807, DWRUB 52, BH 393, RD 2052, RD 2794, Local	PL 807, DWRUB 52, BH 393, Local, RD 2035, RD 2052, RD 2715, RD 2794
CZ	BH 959	RD 2035, RD 2552, JB 1, JB 58, Munda Jawa, Local	RD 2035, RD 2552, RD 2715, RD 2660, RD 2786, JB 1, JB 58, Munda Jawa, Local

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