



BARLEY IMPROVEMENT

(AICRP on Wheat & Barley)

TECHNICAL PROGRAMME

Rabi 2020-21

Email: pibarley.iwbr@icar.gov.in , rp.verma@icar.gov.in
Ph: 0184-2265632, 2267490 Fax: 0184-2267390 Mobile: 09416468414

**ICAR-Indian Institute of Wheat & Barley Research,
Karnal-132001 (Haryana)**

Barley Improvement

Coordinated Yield Trials

Rabi 2020-21

Entries, Locations and Guidelines for Centres

IMPORTANT POINTS FOR BREEDERS, ZONAL COORDINATORS AND TRIAL CONDUCTING CENTRES

1.	Last date for seed supply to trial coordinator	Rainfed (15 September) Irrigated (20 September)
2.	Last date for trial supply	At least 10 days before the due sowing date
3.	Last date for information of trial conduct by centre to ICAR-IIWBR	1 st December (Timely sown)
4.	Last date for supply of filled data books to ICAR-IIWBR, Karnal	30 th May (Plains), 15 th June (Hills)

5. The zonal coordinator shall supply the seed for the disease nursery from the same seed lot, received for yield trial to Dr. RPS Verma, Principal Scientist & P.I. (Barley Network), ICAR-IIWBR, PB 158, Karnal-132001, Haryana.
(Action: Dr. RPS Verma & Dr. Lakshmi Kant)
6. Also, each centre must supply the seed of new station trial entries for **IBDSN to Dr. RPS Verma, Principal Scientist & P.I. Barley Network, IIWBR, PB 158, Karnal-132001**, failing which no entry will be accepted for IVT next year.
7. Breeders must supply the **insect free, untreated seed of new entries along with the 1000 g. w. data** to the concerned coordinator for timely trial constitution and despatch to the testing centres.
8. The ancillary data on disease/ pest incidence, agronomic and grain characters must be reported in the trial by all centres.
9. Grain yield should be reported in the fractions of 5 to 10 grams in grams/ plot only on each replication and not in q/ha per plot.
10. Observations on disease incidence made by **the monitoring team must be reported** by the trial conducting centres in the data book along with other data.
11. Zonal coordinator will have to supply these guidelines to the testing centres for the conduct of trial, being enclosed from IIWBR along with the other trial details.
12. The trial conducting centres are requested to submit excel data file in the format provided for each trial separately. The file may be right protected or cell protected to avoid unpermitted editing of data.
13. Because of introduction of double coding system in AICW&BIP, the trial packets of entries are carrying entry code and plot number only. The trial may be sown by arranging by the plot numbers, because all replications of one entry are packed in one polythene envelope to avoid the transportation damage. (eg. If there are 25 entries in a trial with 4 replications, then **arrange by plot number** 1 →25 in R1, 26→50 in R2, 51→75 in R3 →76-100 in R4 and likewise depending on number of replications).

R1	1--→	25
R2	26--→	50
R3	51---→	75
R4	76---→	100

14. From crop season 2020-21, all the entries of coordinated yield trials will be genotyped with molecular markers as currently only the AVT-2nd year entries are being done. This will facilitate the use of markers for diversity analysis as well as for step towards MAS in barley improvement.

LIST OF BARLEY BREEDING CENTERS

Centre	Name & Address	Centre	Name & Address
Almora	Dr. Lakshmi Kant, Principal Sci. Division of Crop Improvement, ICAR-VPKAS, Almora-263601 Uttarakhand	Karnal	Dr. RPS Verma PI, Barley Barley Improvement Unit ICAR-IIWBR, PO Box-158, Agrasain Road Karnal-132001 (Haryana)
Bajaura	Dr. Naval Kishore Barley Breeder, HAREC (H.P.K.V.), Bajaura – 175125 Distt. Kulu (H.P.)	Ludhiana	Dr. Simarjit Kaur Barley Breeder, Deptt. of Plant Breeding, P.A.U., LUDHIANA - 141004 (Punjab)
Durgapura	Dr. Hoshiar Singh Barley breeder RARI, Durgapura, Jaipur - 302018 (Rajasthan)	Pantnagar	Dr. J P Jaiswal, Pr. Sci. Genetics & Plant Breeding, College of Agriculture, G. B. P. University of Agriculture & Technology, Pantnagar-263145, Uttarakhand
Faizabad	Dr. R.B. Singh, Barley Breeder, Deptt. of Plant Breeding, N.D. University of Agric. and Tech., Kumarganj, Ayodhya - 224001 (U.P.)	Shimla	Dr DP Walia / Dr. Madhu Chauhan ICAR-IARI, Regional Station, Tutikandi, Shimla - 171004 (H.P.)
Hisar	Dr. Y K Gulia, Barley Breeder, Deptt. of Plant Breeding, CCS H.A.U., HISAR- 125004 (Haryana)	Varanasi	Dr. Sandeep Sharma, Barley Breeder, Deptt. of Plant Breeding, Institute of Agricultural Sciences, BHU, Varanasi- 221005 (U.P.)
Kanpur	Dr. P.K Gupta, Barley Breeder, Section of E.B.(R), CSAUA& T, Kanpur- 208002 (U.P.)		

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ICAR-INDIAN INSTITUTE OF WHEAT & BARLEY RESEARCH, KARNAL-132001**

CROP	BARLEY	
Name of Trial	AVT	
Production Condition	Rainfed	
Zone	NH Zone	
No. of Trial Centres	11	
State	NO.	Name of centres
Himachal	6	Bajaura, Berthein, Kangra, Katrain, Malan, Shimla
Uttarakhand	3	Almora, Ranichauri, Majhera
J&K	2	Rajauri, Khudwani
No. of varieties including checks	23	
Contributing Centres	No.	Name of varieties
IARI, RS, Shimla	5	BHS483, BHS484, BHS485, BHS486, BHS487
Pantnagar	3	UPB1091, UPB1092, UPB1093
Almora	5	VLB170, VLB171, VLB172, VLB173, VLB174
Bajaura	5	HBL869, HBL870, HBL871, HBL872, HBL873
Checks	5	HBL113, BHS352, BHS380, BHS400, VLB118
Experimental Design		RBD
Replications		4 (2 for cut and 2 non cut)
Plot Size		Gross: 3.5 m x 1.38 m (6 Rows) Net: 3.5 x 0.92 m (4 Rows)
Fertilizer dose		40 Kg N: 30 Kg P: 20 kg K/ha (All as basal)
Irrigation		NONE
Date of sowing (Between)		NHZ (15 October-10 November)
Seed requirement		4.0 Kg/Entry
Last date of seed supply		15 September
Seed to be supplied to Trial Coordinator		Dr. RPS Verma, PI Barley, ICAR-IIWBR, P.B. 158, Agrasain Road, Karnal – 132001 (HARYANA)

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CROP	BARLEY	
Name of Trial	Advancel Varietal Trial	
Production Condition	Irrigated Feed barley	
Zone	NWPZ and NEPZ (Pooled)	
No. of Trial Centers	17	
State	NO.	Name of centers
Haryana	2	Hisar, Karnal
Punjab	2	Ludhiana, Bathinda
Rajasthan	4	Durgapura, Tabiji, Navgaon, SG Nagar
Uttarakhand	1	Pantnagar
U. P	4	Modipuram, Kanpur, Varanasi, Ayodhya,
Bihar	2	Pusa (CAU), Sabour
Jharkhand	1	Ranchi
West Bengal	1	Kalyani
No. of varieties including checks	10	
Contributing Centers	No.	Name of varieties
Kanpur	1	KB1822
Durgapura	1	RD3012
Varanasi	1	HUB272 (NWP+NEP)
Hisar	1	BH1029
Ludhiana	2	PL911, PL917
Checks	4	BH946, BH902, HUB113, DWRB137
Experimental Design		RBD
Replications		4
Plot Size		Gross: 5m x 2.76m (12 rows) Net: 4.5 x 2.30 (10 rows)
Fertilizer dose		60 Kg. N : 30Kg P: 20Kg K /ha
Irrigation		2-3
Date of sowing (Between)		10-25 November
Seed requirement		11.00 Kg / Entry (At 40 gm thousand grain weight, If thousand grain weight is more, then increase seed quantity accordingly)
Last date of seed supply		20 September
Seed to be supplied to Trial Coordinator		Dr. RPS Verma, PI Barley, ICAR-IIWBR, P.B. 158, Agrasain Road, Karnal – 132001 (HARYANA)

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CROP	BARLEY	
Name of Trial	Advance Varietal Trial	
Production Condition	Irrigated Feed barley	
Zone	Central Zone	
No. of Trial Centers	7	
State	NO.	Name of centers
Rajasthan	2	Udaipur, Kota
M. P	3	Gwalior, Morena, Tikamgarh
U. P	1	CAU Jhansi
Gujarat	1	Vijapur
No. of varieties including checks	6	
Contributing Centers	No.	Name of varieties
Kanpur	1	KB1822
Durgapura	1	RD3013
Pantnagar	1	UPB1088
Checks	3	RD2899, DWRB137, BH959
Experimental Design	RBD	
Replications	4	
Plot Size	Gross: 5m x 2.76m (12 rows) Net: 4.5 x 2.30 (10 rows)	
Fertilizer dose	60 Kg. N : 30Kg P: 20Kg K /ha	
Irrigation	2-3	
Date of sowing (Between)	10-25 November	
Seed requirement	5.00 Kg / Entry (At 40 gm thousand grain weight, If thousand grain weight is more, then increase seed quantity accordingly)	
Last date of seed supply	20 September	
Seed to be supplied to Trial Coordinator	Dr. RPS Verma, PI Barley, ICAR-IIWBR, P.B. 158, Agrasain Road, Karnal – 132001 (HARYANA)	

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CROP	BARLEY	
Name of Trial	AVT-SST	
Production Condition	SAL / ALK	
Zone	NWPZ / NEPZ	
No. of Trial Centers	08	
State	No.	Name of centres
U.P.	2	Dalipnagar, Ayodhya
Haryana	3	CCSHAU Hisar, IIWBR (Hisar), CSSRI Karnal
Rajasthan	3	Kumher, Fatehpur, Bhilwara
No. of varieties including checks	15	
Contributing Centers	No.	Name of varieties
Hisar	1	BH1039
Kanpur	3	KB1822 , KB1909, KB1911
Varanasi	1	HUB280
Faizabad	1	NBD1757
Karnal	1	DWRB224
Durgapura	5	RD3016 , RD3039, RD3040, RD3041, RD3042
Checks	3	NDB1173, RD2794, RD2907
Experimental Design		RBD
Replications		4 (Four)
Plot Size		Gross: 5 x 1.38 m (6 Rows) Net: 4.5 x 0.92m (4 Rows)
Fertilizer dose		60 Kg N : 30 Kg P :20 Kg K /ha(1/2N + full P&K as basel)
Irrigation		2-3
Date of sowing (Between)		NWPZ / NEPZ (10-25 November)
Seed requirement		4.0 Kg / Entry (At 40 gm thousand grain weight, If thousand grain weight is more, then increase seed quantity accordingly)
Last date of seed supply		20 September
Seed to be supplied to Trial Coordinator		Dr. RPS Verma, PI Barley, ICAR-IIWBR, P.B. 158, Agrasain Road, Karnal – 132001 (HARYANA)

RD3016 and KB1822 are retained for AVT-I year

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CROP	BARLEY	
Name of Trial	IVT-MB	
Production Condition	Malt Barley	
Zone	NWPZ (Timely Sown)	
No. of Trial Centers	10	
State	NO.	Name of centres
Haryana	3	Bawal, Hisar, Karnal
Punjab	2	Ludhiana, Bathinda
Rajasthan	3	Durgapura, SG Nagar, Navgaon
U.P.	1	Modipuram
Uttarakhand	1	Pantnagar
No. of varieties including checks	22	
Contributing Centers	No.	Name of varieties
Hisar	3	BH1034, BH1035, BH1036
Pantnagar	2	UPB1097, UPB1098
IIWBR, Karnal	4	DWRB218, DWRB219, DWRB220, DWRB221,
Durgapura	4	RD3027, RD3028, RD3029, RD3030
Ludhiana	3	PL926, PL930, PL931
Kanpur	1	KB1939
Checks	5	BH946, DWRUB52, RD2849, DWRB160, DWRB182 (I)
Experimental Design		RBD
Replications		4
Plot Size		Gross: 5 m x 1.08 m (6 Rows@ 18cm) Net: 4.5 x 0.72 (4 rows)
Fertilizer dose		90 Kg. N : 40Kg P: 20Kg per ha
Irrigation		2-3 or more if required at certain locations
Date of sowing (Between)		10-25 November (TS)
Seed requirement		5.50 Kg / Entry (At 45* gm thousand grain weight, If thousand grain weight is more, then increase seed quantity accordingly)
Last date of seed supply		20 September
Seed to be supplied to Trial Coordinator		Dr. RPS Verma, PI Barley, ICAR-IIWBR, P.B. 158, Agrasain Road, Karnal – 132001 (HARYANA)

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CROP	BARLEY	
Name of Trial	Initial Varietal Trial	
Production Condition	Irrigated Feed barley	
Zone	NWPZ/ NEPZ / CZ	
No. of Trial Centers	18	
State	NO.	Name of centers
Haryana	2	Hisar, Karnal
Punjab	1	Ludhiana
Rajasthan	3	Durgapura, Tabiji, Udaipur
Uttarakhand	1	Pantnagar
U. P	4	Kanpur, Varanasi, Ayodhya, Modipuram
M. P	2	Gwalior, Morena
Bihar	2	Pusa (CAU), Sabour
Jharkhand	1	Ranchi
Gujarat	1	Vijapur
West Bengal	1	Kalyani
No. of varieties including checks	25	
Contributing Centers	No.	Name of varieties
Kanpur	3	KB1912, KB1916, KB1946,
Varanasi	3	HUB277, HUB278, HUB279
Faizabad	1	NDB 1756
Hisar	2	BH1037, BH1038
Durgapura	4	RD3031, RD3032, RD3033, RD3034
Pantnagar	2	UPB1095, UPB1096
Ludhiana	4	PL927, PL928, PL929, PL932,
Karnal	1	DWRB222
Checks	5	BH902, BH 946, DWRB137, RD2899, HUB113
Experimental Design	Lattice	
Replications	2 (Two)	
Plot Size	Gross: 5m x 1.38m (6 rows) Net: 4.5 x 0.92 (4 rows)	
Fertilizer dose	60 Kg. N : 30Kg P: 20Kg K /ha	
Irrigation	2-3	
Date of sowing (Between)	10-25 November	
Seed requirement	7.5 Kg / Entry (At 40 gm thousand grain weight, If thousand grain weight is more, then increase seed quantity accordingly)	
Last date of seed supply	20 September	
Seed to be supplied to Trial Coordinator	Dr. RPS Verma, P.I. Barley, ICAR-IIWBR, P.B. 158, Agrasain Road, Karnal – 132001 (HARYANA)	

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CROP	BARLEY	
Name of Trial	Initial Varietal Trial/Advance Varietal Trial	
Production Condition	Irrigated Feed barley (Hulless)	
Zone	NWPZ/ NEPZ / CZ	
No. of Trial Centers	15	
State	NO.	Name of centers
Haryana	2	Hisar, Karnal
Punjab	1	Ludhiana
Rajasthan	2	Durgapura, Udaipur
Uttarakhand	1	Pantnagar
U. P	5	Kanpur, Varanasi, Faizabad, Modipuram, CAU Jhansi
M. P	3	Gwalior, Morena, Tikamgarh
Gujarat	1	Vijapur
No. of varieties including checks	8	
Contributing Centers	No.	Name of varieties
Kanpur	2	KB1909, KB 1926
Karnal	1	DWRB223
Pantnagar	2	UPB1086 , UPB1094
Checks	3	Karan16, NDB943, PL891
Experimental Design	RBD	
Replications	4 (Four)	
Plot Size	Gross: 5m x 1.38m (6 rows) Net: 4.5 x 0.92 (4 rows)	
Fertilizer dose	60 Kg. N : 30Kg P: 20Kg K /ha	
Irrigation	2-3	
Date of sowing (Between)	10-25 November	
Seed requirement	7.5 Kg / Entry (At 40 gm thousand grain weight, If thousand grain weight is more, then increase seed quantity accordingly)	
Last date of seed supply	20 September	
Seed to be supplied to Trial Coordinator	Dr. RPS Verma, PI Barley, ICAR-IIWBR, P.B. 158, Agrasain Road, Karnal – 132001 (HARYANA)	

UPB1086 in AVT 1st Year of all three zones

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CROP	BARLEY	
Name of Trial	IVT	
Production Condition	Rainfed	
Zone	NEPZ	
No. of Trial Centers	8	
State	NO.	Name of centres
UP	4	Kanpur, Varanasi, Ayodhya, Saini
Bihar	2	Pusa (CAU), Sabour
Jharkhand	2	Ranchi, Chiyanki
No. of varieties including checks	12	
Contributing Centers	No.	Name of varieties
Kanpur	3	KB1940, KB1944, KB1947
Varanasi	2	HUB275, HUB276
Faizabad	1	NDB1754
Durgapura	4	RD3035, RD3036, RD3037, RD3038
Checks	2	K 603, Lakhan
Experimental Design	RBD	
Replications	4	
Plot Size	Gross: 5m x 1.38 m (6 Rows), Net: 4.5 x 0.92 m (4 Rows)	
Fertilizer dose	40 Kg N : 30 Kg. P: 20Kg K /ha	
Irrigation	None	
Date of sowing	NEPZ (20 October - 10 November)	
Seed requirement	4.0 Kg / Entry (At 40 gm thousand grain weight, If thousand grain weight is more, then increase seed quantity accordingly)	
Last date of seed supply	15 September	
Seed to be supplied to Trial Coordinator	Dr. RPS Verma, PI Barley, ICAR-IIWBR, P.B. 158, Agrasain Road, Karnal – 132001 (HARYANA)	

Barley Quality (2020-21):

1. Malt Barley

Identification of Promising genotypes for malting quality traits

Trial: Initial Varietal Trial (Malt Barley)

Number of Locations: 8

Traits to be analysed:

Grain Traits: Test weight, Thousand Grain weight, Kernel Plumpness, Husk Content, Germination percentage, Protein Content, Starch Content, Beta Glucan content

Malt traits: Malt yield, Friability, Homogeneity, Wort Filtration rate, Wort pH, Wort Colour, Saccharification Rate, Hot Water Extract, Wort Beta Glucan, Wort Free Amino Nitrogen

2. Barley Quality Component Screening Nursery

Identification of promising sources of quality traits with respect to malt and food barley for use in Quality Improvement Programme

Malt Barley Genotypes: 20

Food Barley Genotypes: 15

Number of Locations: 5 (Karnal, Hisar, Ludhiana, Pantnagar & Durgapura)

3. Feed & Hulless Barley

Quality Evaluation of Feed and Hulless Barley Genotypes

Trials: Feed Barley/Hulless Barley

Zones: NWPZ, NEPZ, CZ & NHZ

Grain Physical Traits: Test Weight, Thousand Grain Weight, Grain Plumpness, Protein, Beta Glucan (in selected entries of Hulless genotypes)

Barley Crop Protection (2020-21)

- 1. Crop Health Survey:** All barley cooperating centres in their area of command will carry out the survey and record the incidence and infestation of disease and insect pest in the farmer's fields. **The infected samples of rust will be sent to IIWBR, RS Flowerdale and leaf blight to IIWBR, Karnal for further analysis.** Any entry showing > 40S rust reaction in the trials has to be informed to IIWBR, Karnal and sample should be sent to RS Flowerdale, Shimla for race analysis.

A. Plant pathology:

- 2. Evaluation for status of host resistance in test entries:**

- i. Initial Barley Disease Screening Nursery (IBDSN):**

This nursery will comprise test entries of station trial of barley breeding centres. The entries will be screened against rusts and leaf blight at hot spot locations.

Yellow rust: Ludhiana, Durgapura, Bajaura, Karnal, Almora and Jammu (6)

Leaf blight: Pantnagar, Kanpur, Faizabad, and Varanasi (4)

- ii. National Barley Disease Screening Nursery (NBDSN):**

This nursery will comprise of entries from yield trials (IVT and AVT) which will be screened against rusts and leaf blight.

Yellow rust: Ludhiana, Durgapura, Bajaura, Hisar, Almora, Karnal and Jammu (7)

Leaf rust: Ludhiana and Jammu (2)

Leaf blight: Pantnagar, Kanpur, Faizabad, Varanasi, and Dharwad (5)

- iii. Elite Barley Disease Screening Nursery (EBDSN):**

This nursery will have resistant entries identified in NBDSN and EBDSN tested at hot spot locations. The confirmed sources of resistance would later be shared with different barley breeders for their utilization.

Yellow rust: Ludhiana, Durgapura, Bajaura, Hisar, Almora, Karnal and Jammu (7)

Leaf rust: Ludhiana and Jammu (2)

Leaf blight: Pantnagar, Kanpur, Faizabad, and Varanasi (4)

- iv. Seedling Resistant Test (SRT) of NBDSN and EBDSN:**

The test would be conducted against different pathotypes of three rusts at RS, Flowerdale, Shimla.

- 3. Chemical control of yellow rust (Centres: Ludhiana, Durgapura, Bajaura, Karnal, Almora and Jammu)**

Picoxystrobin 7.05% + Propiconazole 11.7% SC, Pyraclostrobin 133g/l + Epoxiconazole 50g/l SE, Tebuconazole 50% + Trifloxystrobin 25% WG, with standard chemical (Propiconazole and Tebuconazole) and without chemicals.

The chemical will be evaluated under artificial inoculated condition and doses will be @ 0.1% and repeated once after 15 days. Design – RBD, Plot size – 6 rows of 3 meters, replications - 3.

B. Entomology:

- 1. Screening of NBDSN against foliar aphids (Centres: Ludhiana, Kanpur, Durgapura and Karnal).**

The national barley aphid screening nursery (NBDSN) will be continued. It will comprise entries from coordinated trials. Besides, 10-20 extra entries found promising for aphid resistance at Karnal will be screened against aphids at four centres; Ludhiana, Kanpur, Durgapura and Karnal.

- 2. Survey and surveillance of insect-pests and their natural enemies in barley (All centres)**

Roving surveys will be carried out at fortnightly intervals during the cropping season for insect-pests and their natural enemies. Population and damage levels of different insect-pests

will be recorded and indicated as grades or percent damage inflicted to crop. The peak period of pest activity and its severity of damage will also be recorded.

3. Management of aphids through foliar application of new bio-chemical molecules (Centres: Vijapur, Ludhiana, Kanpur, Durgapura and Karnal)

New chemical molecules will be evaluated against foliar aphids in barley. Insect population counts before and after the treatment will be recorded along with yield to determine efficacy of each treatment. Treatment details are as under:-

S. No	Treatment	Dosage g ai/ha	Formulation Dose ml/ha
1.	Thiamethoxam 12.6% + Lambda cyhalothrin 9.5% ZC (Alika)	33.15 (18.9+14.25)	150
2.	Thiamethoxam 25% WG	12.5	50
3.	Lambda cyhalothrin 5% EC	25	500
4.	Beta-Cyfluthrin 9%+ Imidacloprid 21% (Solomon)	(8.49 + 19.81 % w/w)	400
5.	Imidacloprid 17.8 SL	20	400
6.	Beta-cyfluthrin 25 SC	18.75	1450
7.	Sulfoxaflor 12% SC	30	250
8.	Untreated control	-	

C. Nematology

1. Screening of NBDSN and EBDSN against CCN:

The entries of NBDSN and EBDSN will be tested against Cereal Cyst nematode (CCN) at Ludhiana, Durgapura and Hisar centers in sick plots/field.

Barley Resource Management (2020-21)

ZONE-WISE DATE OF SUBMISSION

1.	NORTHERN HILLS ZONE	15 th JUNE
2.	NORTH WESTERN PLAINS ZONE	15 th MAY
3.	NORTH EASTERN PLAINS ZONE	15 th MAY
4.	CENTRAL ZONE	15 th MAY

FOR UNIFORMITY IN DATA RECORDING AND REPORTING FOLLOWING POINTS SHOULD BE STRICTLY FOLLOWED

1. Sequence of treatments should be strictly as per the technical programme. Columns/Rows for the missing treatment/variety should be kept blank. Data should be submitted as per the stipulated date given above.
2. To record observations on stand count, earhead/m² etc., two fixed quadrates may be marked in each plot.
3. For recording observations on weeds, wherever necessary, two fixed quadrates/plot may be marked.
4. Yield, 1000-grain weight and biomass may be reported at 12% moisture. For this purpose, grain and straw samples may be taken for determining moisture content at the time of recording and data corrected to 12% moisture content.
5. For calculating lodging score following formula may be used

$$\text{Lodging Score} = \frac{(\text{Lodged area/Net plot area}) * 100 * \text{Angle of lodging}}{90}$$

6. Data should be reported strictly as per the units given at the top of each page for different parameters.

1. BARLEY AGRONOMY EXPERIMENT NO. SPL-1

Title: Productivity enhancement through adjusting sowing dates in barley

Objective: To optimise sowing dates for increasing the feed and malt barley productivity

Treatments:

Main plot: Sowing dates

NWPZ, CZ	NEPZ	NHZ
1-5 November	11-15 November	25-30 October
11-15 November	21-25 November	5-10 November
21-25 November	1-5 December	15-20 November
1-5 December	11-15 December	25-30 November

Subplot: Varieties

NWPZ: BH 946, DWRB160 NEPZ: DWRB137, HUB113

CZ: DWRB137, RD2899 NHZ: BH 400, VLB 118

Replication: 3

Design: Split plot Design

FERTILIZER: As per Zonal recommendation

SEED RATE: 100 kg/ha (Adjust seed rate taking 1000 seeds weight of 40 g).

OBSERVATIONS: Yield and yield attributing characters.

CENTRES: NWPZ: Agra, Durgapura, Hisar, Karnal, Ludhiana

NEPZ: Varanasi, Faizabad , Kanpur

NHZ: Bajura, Malan

CZ: Udaipur

2. BARLEY AGRONOMY EXPERIMENT NO. SPL-2

Title: Productivity and quality enhancement of barley through Nitrogen and Zinc scheduling

Objective: To enhance quality and productivity through different N and Zinc scheduling

Treatments: N and Zn scheduling

- 1/2 at basal+1/2 at tillering (35-40 DAS)
- 1/2 at basal+1/4 at tillering (35-40 DAS) +1/4 at anthesis stage (80-90DAS)
- 1/3 at basal+1/3 at tillering (35-40 DAS) +1/3 at flag leaf stage (65-70DAS)
- 1/2 at basal+1/2 at tillering (35-40 DAS) +0.5% urea spray at anthesis stage (80-90DAS)
- 1/2 at basal+1/2 at tillering (35-40 DAS) +0.5% urea + 0.5% ZnSO₄.7H₂O spray at anthesis stage (80-90DAS)
- 1/2 at basal+1/4 at tillering (35-40 DAS) +0.5% urea spray at anthesis stage (65-70DAS)
- 1/2 at basal+1/4 at tillering (35-40 DAS) +0.5% urea + 0.5% ZnSO₄.7H₂O spray at flag leaf (65-70DAS) and 0.5% urea spray at anthesis stage (80-90DAS)
- 1/3 at basal+1/3 at tillering (35-40 DAS) +0.5% spray at flag leaf stage (80-90DAS)
- 1/3 at basal+1/3 at tillering (35-40 DAS) +0.5% Urea + 0.5% ZnSO₄.7H₂O spray at anthesis (80-90DAS)

Variety: NWPZ: DWRB160

Design: RBD

Replications:3

FERTILIZER: As per Zone Recommendations and given treatment

SEED RATE: as per recommendation

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

CENTRES: NWPZ: Agra, Durgapura, Hisar, Karnal, Ludhiana

3. BARLEY AGRONOMY EXPERIMENT NO. SPL-3

TITLE: Yield maximisation of barley through integrated nutrient supply and PGRs application

OBJECTIVE: To increase barley productivity and nutrient use efficiency.

TREATMENTS:

1. Control (No fertiliser)
2. RDF 50%+10t FYM
3. RDF 50%+10t FYM+PGR
4. RDF 75%+10t FYM
5. RDF 75%+10t FYM+PGR
6. RDF
7. RDF+PGR
8. RDF + 10t FYM
9. RDF + 10t FYM+PGR
10. RDF 125%+PGR
11. RDF 125%+10t FYM+PGR
12. RDF 150%+PGR

Plant Growth regulator : chlormequat-chlorid (CCC) @1.25 L ha⁻¹ at GS₃₀₋₃₁ followed by ethephon (Cerone) @0.5 L ha⁻¹ at GS₃₉₋₄₀ as per recommendations

Variety: NWPZ: BH946 NEPZ: DWRB 137 CZ: DWRB137 NHZ: BHS400

Design: RBD

Replications:3

FERTILIZER: As per Zone Recommendations and given treatment

SEED RATE: as per recommendation

OBSERVATIONS: 1. Yield and yield attributing characters. 2. Economics

CENTRES: NWPZ: Agra, Durgapura, Hisar, Karnal, Ludhiana

NEPZ: Varanasi, Faizabad , Kanpur NHZ: Bajura, Malan, CZ: Udaipur

4. BARLEY AGRONOMY EXPERIMENT NO. SPL-4

TITLE: Enhancing nutrient use efficiency through nano fertiliser in barley

OBJECTIVE: To enhance the nutrient use efficiency and to optimise dose of nano fertiser in barley.

TREATMENTS:

1. Control (P+K only)
2. Control (P+K only) +1000 ml NN/ha at 30-35 DAS+1000ml/ha at 60-65 DAS
3. 50% RDN + 500ml NN/ha at 30-35 DAS+500ml/ha at 60-65 DAS
4. 50% RDN + 1000 NN/ha at 30-35 DAS+1000ml/ha at 60-65 DAS
5. 75% RDN +500ml NN at 30-35 DAS+500ml NN at 60-65 DAS
6. 75% RDN + 1000ml NN at 30-35 DAS+1000ml NN at 60-65 DAS
7. RDN + 500ml NN/ha at 30-35 DAS+500ml/ha at 60-65 DAS
8. RDN + 1000ml NN/ha at 30-35 DAS+1000ml/ha at 60-65 DAS

Variety: NWPZ: BH 946 CZ: DWRB137

Design: RBD

Replications:3

FERTILIZER: As per Zone Recommendations and given treatment

OBSERVATIONS: 1. Yield and yield attributing characters. 2. Nutrient use efficiency 3. Economics

CENTRES: NWPZ: Agra, Durgapura, Hisar, Karnal, Ludhiana CZ: Udaipur

5. BARLEY AGRONOMY EXPERIMENT NO. SPL-5

Title: Effect of Zn application on quality and productivity of barley

Objective: To enhance the quality and productivity of barley

Treatments:

A Main Plot: Zinc Application

1. No zinc application
2. Soil application of zinc (12.5 kg Zinc sulphate / ha)
3. Soil application of zinc (25.0kg Zinc sulphate / ha)
4. Two Foliar application of zinc (0.5 % Zinc sulphate at heading and early milk stage)
5. T2+T4
6. T3+T4

B Sub Plot: Varieties:

NEPZ: DWRB137, HUB 113, **NWPZ:** BH 946, DWRB123, **NHZ:** BHS 400, VLB118 and **CZ:** DWRB137, RD2899

Design: RBD Replication: 3

SEED RATE: 100 kg/ha (Adjust seed rate taking 1000 seeds weight of 40 g).

Observations: Yield and yield attributes, Zinc status of soil before sowing and harvesting of crop, Zinc content in grain and straw

CENTRES:

NWPZ: Agra, Durgapura, Hisar, Karnal, Ludhiana **NEPZ:** Varanasi, Faizabad, Kanpur

NHZ: Bajura, Malan **CZ:** Udaipur

6. BARLEY AGRONOMY EXPERIMENT NO. SPL-6

Title: Enhancing productivity and quality of barley using Silicon in low moisture areas.

Objectives: To evaluate the performance of barley cultivars under Silicon application

Treatments

Main Plots: Irrigation levels (3)

I1 : No irrigation I2 : One irrigation (between 30-35 DAS)

I3 : Two irrigations (30-35 DAS and 80-85 DAS) I4 : Three irrigations (30-35 DAS, 60-65DAS and 90-95 DAS)

Sub plot: Silicon (4)

Control (No silica), Silicon @ 100 kg/ha Silicon @ 150 kg/ha Silicon @ 200 kg/ha

Variety: BH 946

FERTILIZER: As per Zone Recommendations and given treatment

OBSERVATIONS:

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

Centres NWPZ: Agra, Durgapura, Hisar CZ: Udaipur

AICW&BIP CENTRES AND COOPERATING SCIENTISTS

Sr No.	Centre	Cooperating Scientist Address
NORTHERN HILL ZONE		
1.	Bajaura	Dr Gurudev Singh, Assitsnt Agronomist, CSKHPKV, HAREC, Bajaura-175 125 (HP). <i>Email: gdevsaandil@rediffmail.com, Mobile: 09418479856</i>
2.	Palampur/ Malan	Dr AD Bindra, Agronomist, Rice-wheat research station, CSK HPKV, Malan, District Kangra, HP.176047 <i>Email: adbindra03@yahoo.co.in; Mobile: 094181 49795</i>
3.	Almora	Dr, Dibakar Mahanta, Scientist Agronomy, VPKAS, Almora-263 601 (Uttarakhand). <i>Email: dibakar_mahanta@yahoo.com; Mobile: 09456108508</i>
NORTH WESTERN PLAIN ZONE		
4.	Karnal	Dr Ajit Singh Kharub, Principal Scientist, PB NO. 158, ICAR-IIWBR, Karnal - 132 001 <i>Email: Ajit.kharub@icar.gov.in, Mobile 09416158272</i>
5.	Ludhiana	Dr Hari Ram Saharan, Principal Agronomist, Deptt. of Plant Breeding & Genetics, PAU Ludhiana-141 004 <i>Email: hr_saharan@yahoo.com, Mobile:09501002967</i> Dr Maninder Kaur, Agronomist, Plant Breeding & Genetics, PAU Ludhiana-141 004 <i>Email: mkrandhawa@pau.edu, Mobile:09815098390</i>
6.	Agra	Dr SB Singh, Head, Department of Agronomy, RBS College, Bichpuri, Agra, UP-283105. <i>Email: singhsbrbs28@rediffmail.com, Mobile: 9451113256, 8077332948</i>
7.	Hisar	Dr. Bhagat Singh, Agronomist, Department of Agronomy, CCS HAU, Hisar (Haryana)-125 004 <i>Email: bsdahiya@gmail.com, Mobile:09813028447</i>
8.	Durgapura	Dr Malu Ram Yadav, Agronomist, RARI, Durgapura, Jaipur (Rajasthan) <i>Email:mryadavrari@gmail.com, Mobile:7027930165</i>
NORTH EASTERN PLAINS ZONE		
9.	Kanpur	Dr Ram Ashish Yadav, Professor (Agronomy), Section of EB (Rabi Cereals), CSAUA&T, Kanpur (UP)- 208 002 <i>Email: ramashish94@yahoo.in; Mobile: 09450129685.</i>
10.	Varanasi	Dr RK Singh, Sr. agronomist (AICWIP), Institute of Agricultural Sciences, BHU, Varanasi (UP)- 221 005 <i>Email: rks1660bhu@gmail.com, Mobile: 09450533438</i>
11.	Faizabad	Dr Ashok Kumar Singh, Asstt. Wheat Agronomist, Department of Agronomy, NDUUA&T, Kumarganj, Faizabad (UP)- 224 229 <i>Email:aksdla@gmail.com, wbnduat@gmail.com Mobile: 09451714193, 07607513884</i>
CENTRAL ZONE		
12.	Udaipur	Dr Jagdish Choudhary, Assitt. Professor (Agronomy), Department of Agronomy, College of Agriculture, Udaipur, Rajasthan-313 001. <i>Email: aicrp.wheat.udaipur@gmail.com, jaggiudr@gmail.com, Mobile:09460632522</i>

**PROPOSED DATES OF SOWING FOR DIFFERENT ZONES UNDER IRRIGATED
CONDITIONS**

ZONE	Date of sowing
NORTHERN HILLS ZONE	
Normal	25 th Oct. to 10 th Nov.
Late	11 th Nov. to 25 Nov.
NORTH WESTERN PLAINS ZONE	
Normal	6 th Nov. to 15 th Nov.
Late	1 st Dec. to 10 th Dec.
NORTH EASTERN PLAINS ZONE	
Normal	20 th Nov. to 30 th Nov.
Late	15 th Dec. to 22 nd Dec.
CENTRAL ZONE	
Normal	12 th Nov. to 18 th Nov.
Late	2 nd Dec. to 10 th Dec.